ROTAX®

MAINTENANCE MANUAL

FOR ROTAX® 582 UL DCDI MOD. 99 AND MOD. 17

ROTAX® ENGINE TYPE 582 UL SERIES
HEAVY MAINTENANCE | REF. NO.: MMH-2STROKE | PART NO.: 899059

A BRP BRAND

WARNING

Before starting any maintenance work, please read the Maintenance Manual completely as it contains important safety relevant information. Failure to do so may result in personal injuries including death. Consult the orginal equipment manufacturers handbook for additional instructions!

Translation into other languages might be performed in the course of language localization but does not lie within ROTAX® scope of responsibility.
In any case the original text in English language and the metric units are authoritative.

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Chapter: INTRO
GENERAL NOTE

Foreword

Before carrying out maintenance work on the engine, read this Maintenance Manual carefully.
If any passages of the Manual are not clearly understood or in case of any questions, please contact your nearest ROTAX® Authorized Aircraft Engines Distributors or their independent Service Centers.

BRP-Rotax wishes you much pleasure and satisfaction flying your aircraft powered by this ROTAX®-aircraft engine.

The structure of the Manual follows whenever it is possible the structure of the ATA (Air Transport Association) standards. The aim is the compatibility with the aircraft manufacturers documentation, which means they must then adapt the documentation to their standard.

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Chapter: LEP
LIST OF EFFECTIVE PAGES

Each new revision to the Maintenance Manual Heavy will have a new List of Effective Pages.

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Chapter: TOA
TABLE OF AMENDMENTS

Edition 0/Rev. 0	January 01 2019	Obsolete with Revision 1, which is a complete re-revision
Rev. 1	October 01 2020	

Rev. no.	chapter	page	date of change	remark for approval	date of approval from authorities	date of inclusion	signature
0	INTRO	all	Jan. 01 2019				
0	LEP	all	Jan. 01 2019				
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0	80-10-00	all	Jan. 01 2019				
0	80-20-00	all	Jan. 01 2019				

Rev. no.	chapter	page	date of change	remark for approval	date of approval from authorities	date of inclusion	signature
1	INTRO	all	Oct. 01 2020				
1	LEP	all	Oct. 01 2020				
1	TOA	all	Oct. 01 2020				
1	00-00-00 up to 80-20-00 inclusive	all	Oct. 01 2020				

Summary of amendments

Summary of the relevant amendments in this context, but without requirement on completeness.

current no.	chapter	page	date of change	comment
1	24–00–00	17, 18	Oct. 01 2020	Wear limits
1	79–00–00	13 - 15	Oct. 01 2020	Rotary valve installation: change of text

Chapter: 00–00–00
GENERAL NOTE

TOPICS IN THIS CHAPTER

GENERAL

Purpose

The purpose of this Manual is to acquaint (iRMT) trained maintenance service staff with some necessary technical requirements for maintaining the engine into the aircraft in compliance with the relevant installation and safety instructions provided by the engine manufacturer.

Documentation

For more detailed information regarding, installation, maintenance, safety- or flight operation, consult the documentation provided by the aircraft manufacturer and/or dealer.

For additional information on engines, maintenance or parts, you can also contact your nearest ROTAX® Authorized Aircraft Engines Distributors or their independent Service Centers.

ROTAX® Distributors

For ROTAX® Authorized Distributors for Aircraft Engines see latest Operators Manual or on the Internet at the official Website www.FLYROTAX.com.

Engine serial number

When making inquiries or ordering parts, always indicate the engine serial number, as the manufacturer might make modifications to the engine in the course of product improvement. The engine serial number is on the top of the crankcase, magneto side.

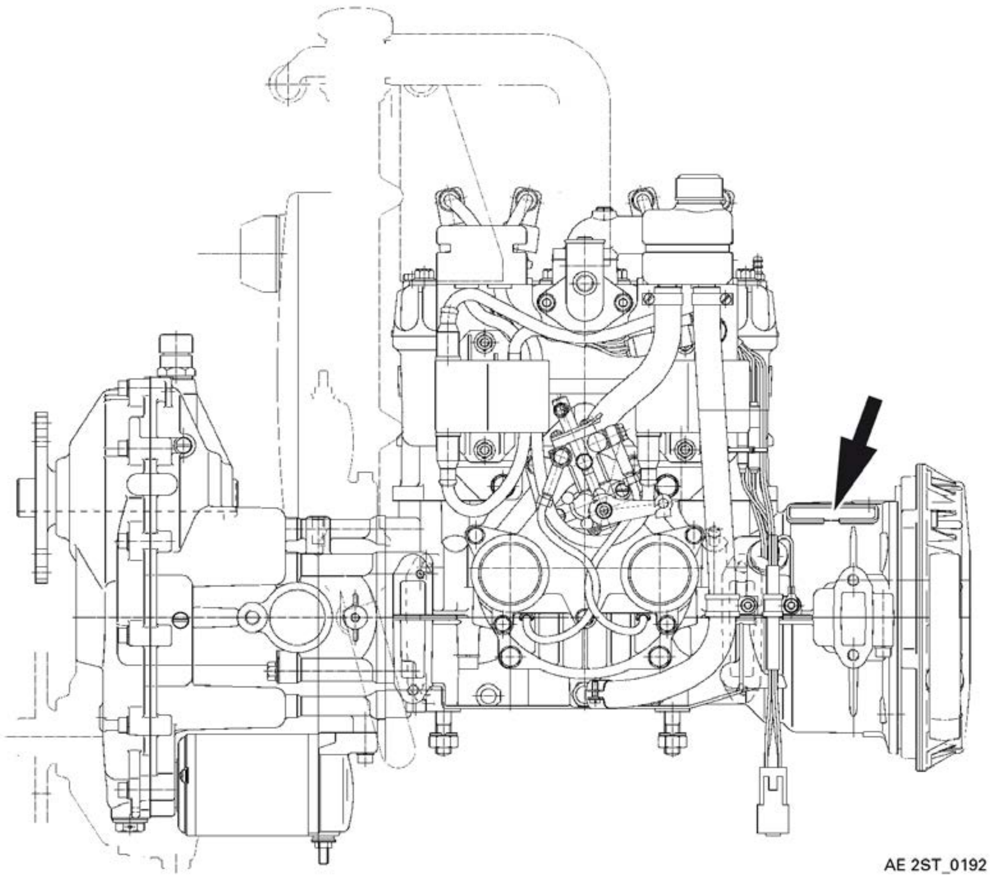

Figure 1.1: Serial number

TYPE DESCRIPTION

The type description consists of the following:

e.g. **ROTAX**	**582**	**UL**	**DCDI**	**mod. 99 / mod. 17**
	type	certification	ignition	model

Designation

Designation		Description
Type	**582**	Two stroke engine, 2 cylinder in line with rotary valve inlet.
Certification	**UL**	Approved to ASTM F2339.
Ignition	**DCDI**	Dual Capacitor Discharge Ignition
Model	**mod. 99 / mod. 17**	Model year

ABBREVIATIONS AND TERMS

Abbreviations	Description
*	Reference to another section
	center of gravity
	The drop symbol indicates use of sealing agents, adhesives or lubricants (only in the Illustrated Parts Catalog).
°C	Degrees Celsius (Centigrade)
°F	Degrees Fahrenheit
rpm	Revolutions per minute
A	Ampere
AC	alternating current
Ah	Ampere hour
A/C	Aircraft
AR	as required
assy.	assembly
ASB	Alert Service Bulletin
ACG	Austro Control GmbH
API	American Petrol Institute
ASTM	American Society for Testing and Materials
ATA	Air Transport Association
AWG	American Wire Gauge
CW	clockwise
CCW	counter-clockwise
CGSB	Canadian General Standards Board
DCDI	Dual Capacitor Discharge Ignition
DOA	Design Organisation Approval
DOT	Department of Transport
EASA	European Aviation Safety Agency
EN	European Norm
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
hr.	hours

IFR	Instrument Flight Rules
IM	Installation Manual
INTRO	Introduction
IPC	Illustrated Parts Catalog
ips	inch per second
iRMT	independent ROTAX Maintenance Technican
ISA	International Standard Atmosphere
kg	Kilograms
LEP	List of Effective Pages
MMH	Maintenance Manual Heavy
MML	Maintenance Manual Line
MON	Motor Octane Number
MAG	Magneto Side
N	Newton
n.a.	not available
NDT	Non Destructive Testing
Nm	Newton metre
NVFR	Night Visual Flight Rules
OHM	Overhaul Manual
OHV	Over Head Valve
OM	Operators Manual
part no.	Part number
POA	Production Organisation Approval
PTO	Power Take Off
Rev.	Revision
ROTAX®	is a trademark of BRP-Rotax GmbH & Co KG
RON	Research Octane Number
S/N	Serial Number
SAE	Society of Automotive Engineers
SB	Service Bulletin
SI	Service Instruction
SL	Service Letter
SMD	Surface Mounted Devices

s.v.	still valid (only Illustrated Parts Catalog)
TBO	Time Between Overhaul
TC	Type certificate
TOA	Table Of Amendment
TOC	Table of content
TSN	Time Since New
TSNP	Time Since New Part
TSO	Time Since Overhaul
V	Volt
VFR	Visual Flight Rules
XXXX	shows the serial component number

WIRING COLOR CODES

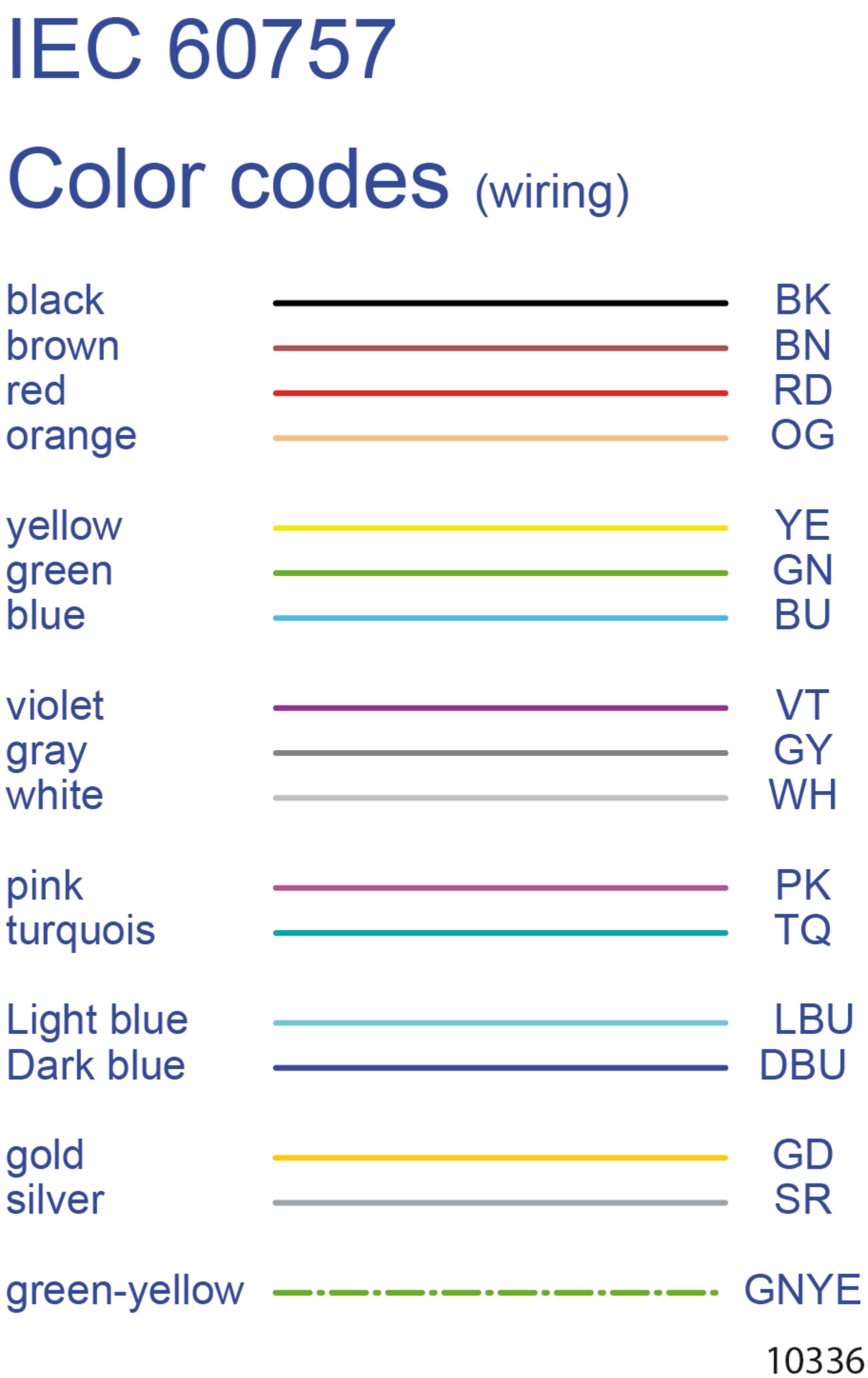

Figure 1.2

CONVERSION TABLE

Units of length:	Units of power:
1 mm = 0.03937 in 1 in = 25.4 mm 1 ft = 12 in = 0.3048 m	1 kW = 1.341 hp 1 hp = 0.7457 kW 1 kW = 1.3596 PS 1 PS = 0.7355 kW
Units of area:	**Units of temperature:**
1 cm² = 0.155 sq. in (in²) 1 sq. in (in²) = 6.4516 cm²	K = °C – 273,15 °C = (°F – 32) / 1,8 °F = (°C x 1.8) +32
Units of volume:	**Units of velocity:**
1 cm³ = 0.06102 cu in (in³) 1 cu in (in³) = 16.3871 cm³ 1 dm³ = 1 l 1 dm³ = 0.21997 gal (UK) 1 gal (UK) = 4.5461 dm³ 1 dm³ = 0.26417 gal (US) 1 gal (US) = 3.7854 dm³	1 m/s = 3.6 km/h 1 ft/min = 0.3048 m/min = 0.00508 m/sec 1 m/s = 196.85 ft/min 1 kt = 1.852 km/h 1 km/h = 0.53996 kn
Units of mass:	**spec. fuel consumption:**
1 kg = 2.2046 lbs. 1 lb. = 0.45359 kg	1 g/kWh = 0.001644 lb/hph 1 lb/hph = 608.277 g/kWh
Density:	**Units of torque:**
1 g/cm³ = 0.016018 lb/ft³ 1 lb/ft³ = 62.43 g/cm³	1 Nm = 0.737 ft lb = 8.848 in lb 1 ft lb = 1.356 Nm 1 in lb = 0.113 Nm
Units of force:	**Cable cross-section: Conversion table-Wire Gauge: AWG-mm²**
1 N = 0.224809 lbf 1 lbf = 4.4482 N **Units of pressure:** 1 Pa = 1 N/m² 1 bar = 100 000 Pa / 1000 hPa / 100 kPa 1 bar = 14.503 lbf/in² (psi) 1 in Hg = 33.8638 hPa	AWG —> mm² 4 —> 21 6 —> 13 8 —> 8.4 10 —> 5.3 12 —> 3.3 14 —> 2.1 16 —> 1.3 18 —>0.8 20—> 0.52

SAFETY NOTICE

Although reading such information does not eliminate any hazards, it promotes understanding and application of the information and will promote correct use of the engine. Always apply common workshop safety rules.

The information and descriptions of components and systems contained in this Manual are correct at the time of publication. BRP-Rotax maintains a policy of continuous improvement of its products without imposing upon itself any obligation to retrofit products previously manufactured.

Revisions

BRP-Rotax reserves the right to remove, replace or discontinue any design, specification, feature or other at any time, and without incurring obligation.

Measurement

Specifications are given in the SI metric system with the imperial- and US customary measurement system equivalents in parenthesis.

Symbols used

This Manual uses the following symbols to emphasize particular information. This information is important and must be observed.

⚠ WARNING
Identifies an instruction which, if not followed, may cause serious injury or even fatal injury.

⚠ CAUTION
Identifies an instruction which, if not followed, may cause minor or moderate injury.

ATTENTION
Identifies an instruction which, if not followed, may severely damage the engine or could void any warranty.

NOTE

Indicates supplementary information which may be needed to fully complete or understand an instruction.

ENVIRONMENTAL NOTE
Environmental notes give you tips on environmental protection.

A revision bar outside the page margin indicates a change to text or graphic.

SAFETY INFORMATION

Use for intended purpose

> ⚠ **WARNING**
>
> **Non-compliance can result in serious injuries or death!**
> The user has to assume all risks possibly arising from utilizing auxiliary equipment.

> ⚠ **WARNING**
>
> **Non-compliance can result in serious injuries or death!**
> Never fly the aircraft equipped with this engine at locations, air speeds, altitudes or in other situations which do not allow a successful no-power landing after sudden engine stoppage.

- This engine is not suitable for aerobatics (inverted flight, etc.). Flight attitudes outside the permissible limits are not allowed.
- It should be clearly understood that the choice, selection and use of this particular engine on any aircraft is at the sole discretion and responsibility of the aircraft manufacturer, assembler or owner/user.
- Due to the varying designs, equipment and types of aircraft, BRP-Rotax grants no warranty on the suitability of its engines use on any particular aircraft. Further, BRP-Rotax grants no warranty on this engines suitability with any other part, component or system which may be selected by the aircraft manufacturer, assembler or user for aircraft application.

> ⚠ **WARNING**
>
> **Non-compliance can result in serious injuries or death!**
> For each use of DAY VFR, NIGHT VFR or IFR in an aircraft the applicable legal requirements and other existing regulations must be adhered to.

- In addition to observing the instructions in our Manual, general safety and accident precautions, legal regulations and regulations of any aeronautical authority must be observed.
- Where differences exist between this Manual and regulations provided by any authority, the more stringent regulation shall be applied.
- Unauthorized modifications of engine or aircraft will automatically exclude any liability of the engine manufacturer for sequential damage.

INSTRUCTION

Engines require instructions regarding their installation, application, use, operation, maintenance and repair.
Technical documentation and regulations are useful and necessary complementary elements for trainings, but can by no means substitute for theoretical and practical instructions.
These instructions should cover explanation of the technical context, advice for operation, maintenance, installation, use and operational safety of the engine.

Safety notice

In this technical Manual passages concerning safety are especially marked. Pass on safety warnings to other users!

Accessories

This engine must only be operated with accessories supplied, recommended and released by BRP-Rotax. Modifications are only allowed after consent of the engine manufacturer.

Spare parts

See Illustrated Parts Catalog for the engine type 582 mod. 99 / mod. 17, latest issue.

> **ATTENTION**
>
> **Only use GENUINE ROTAX® spare parts. Spare parts must meet the requirements defined by the engine manufacturer. This can only be guaranteed when using GENUINE ROTAX® spare parts and/or accessories. Spare parts are available at ROTAX® Authorized Distributors and their independent Service Centers. Any warranty by BRP-Rotax will become void if spare parts and/ or accessories other than GENUINE ROTAX® spare parts and/or accessories are used (see latest Warranty Conditions).**
> See relevant Service Letter on www.FLYROTAX.com

Standard tools / Special tools

> **ATTENTION**
>
> **Only use tools and appliances which are suitable for the relevant task according to the latest Manuals.**

State of delivery

> **⚠ WARNING**
>
> **Engine and gearbox are delivered in “dry“ conditions (without fuel, oil and coolant).**
> Before putting the engine into operation it must be filled with oil and cooling liquid. Use only oil and coolant as specified.

MAINTENANCE CONCEPT

General note

The maintenance functions detailed in this Manual are divided into two categories:

- Maintenance I (Line Maintenance)
- Maintenance II (Heavy Maintenance)

Repairs beyond the levels detailed in this Manual are not recommended as maintenance functions and must be conducted by an authorized service facility.

Maintenance I (Line Maintenance)

Chapter 00,05 and 12
The scope of line maintenance consists of removal, installation and adjustment of engine components (including part wear). All procedures in this Manual are to be considered line maintenance.

NOTE

Where applicable, you will be referred to the Heavy Maintenance Manual for work above and beyond line maintenance.

Maintenance II (Heavy Maintenance)

Separate Manual.
Maintenance Manual II details removal, installation and repair of components or parts normally considered beyond the scope of the "Line Maintenance".

NOTE

This Manual can only be used in combination with Maintenance Manual I (Line Maintenance), as it builds upon it.

TECHNICAL DOCUMENTATION

These documents form the instructions ensuring continued airworthiness of ROTAX® aircraft engines.
The information contained herein is based on data and experience that are considered applicable for authorized mechanics (iRMT, see Maintenance Manual Line) under normal conditions for engine removal and installation. Concerning design of engine installations in depth knowledge of aircraft design is required.
Due to the fast technical progress and fulfillment of particular specifications of the customers it may occur that existing laws, safety prescriptions, constructional and operational regulations may not be sufficient or cannot be transferred completely to the object bought, in particular for special constructions.

Documentation

- Installation Manual
- Operators Manual
- Maintenance Manual (Line and Heavy Maintenance)
- Illustrated Parts Catalog
- Alert Service Bulletin
- Service Bulletin / Service PAC
- Service Instruction
- Service Instruction-Parts and Accessories
- Service Letter

Status

The status of the Manuals can be determined by checking the table of amendments. The first column of this table indicates the revision status, which should be compared with the revision provided on the ROTAX®-Website: www.FLYROTAX.com
Amendments and current versions can be downloaded free of charge.

Replacement pages

Furthermore the Manual is constructed in such a way that single pages can be replaced instead of the complete document. The list of affected pages is given in the chapter LEP. The particular edition and revision number is given on the footer of each page.

Reference

This Manual for maintenance is only part of the technical documentation and will be supplemented by the respective Operators Manual, Installation Manual and Illustrated Parts Catalog.

ATTENTION
Pay attention to references to other documentation, found in various parts of this Manual.

If not stated otherwise, any reference to a document refers to the latest edition issued by BRP-Rotax.

This symbol informs you of additional references (data sheets, Manuals, etc.) associated with the given subject.

Illustrations

The illustrations in this Manual are merely sketches and show typical arrangements. They may not represent full detail or the exact shape of the parts but should outline the same or similar function. Therefore deriving dimensions or other details from illustrations is not permitted.
TYPICAL indicates a general view which may not represent exact details.

NOTE

The Illustrations in this Manual are stored in a graphic data base system and are provided with a consecutive irrelevant number.
This number (e.g. AE 2ST_001) is of no significance for the content.

Some measurements are given in the drawings, these are manufacturing dimensions and are subject to corresponding tolerances.

USE FOR INTENDED PURPOSE

⚠ WARNING
Explosion hazard. Flying components can cause serious injuries. Never run an engine without propeller.

Use

The engine ROTAX® 582 UL DCDI mod. 99 / mod. 17 is intended for use in uncertified aircraft. In case of doubt the regulations of the national authorities or the respective sportive federations have to be observed.

Never run the engine without propeller, this inevitably causes engine damage and hazard of explosion.

Uncertified engines

The engine ROTAX® 582 UL DCDI mod. 99 / mod. 17 is uncertified. These engines have not received any safety or durability testing, and conform to no aircraft standards. These engines are meant for use in experimental, uncertified aircraft and vehicles only, in which an engine failure will not compromise safety.

Engine stoppage

In using the engine the operator assumes all risk of use and acknowledges that he/she knows this engine is subject to sudden stoppage.

Maintenance and repair conditions

Use for intended purpose also includes observation of the operational, maintenance and repair conditions prescribed by the manufacturer. This is a crucial factor concerning the reliability of the engine and can increase the durability of the engine.

INSPECTION OF PARTS AND REPORT OF FINDINGS

General note

Measure all parts listed in the dimension sheets. These are attached directly after each section.
All measurements must be entered in the corresponding dimension sheets as shown.

Filling in the dimension sheets

Following the description how to fill in the dimension sheets.

> **ATTENTION**
>
> If the engine is overhauled/repaired before the end of the TBO, the 50 % specified values for wear limits do not apply and must be calculated separately in accordance with section ”Classification of parts for maintenance/repair”.

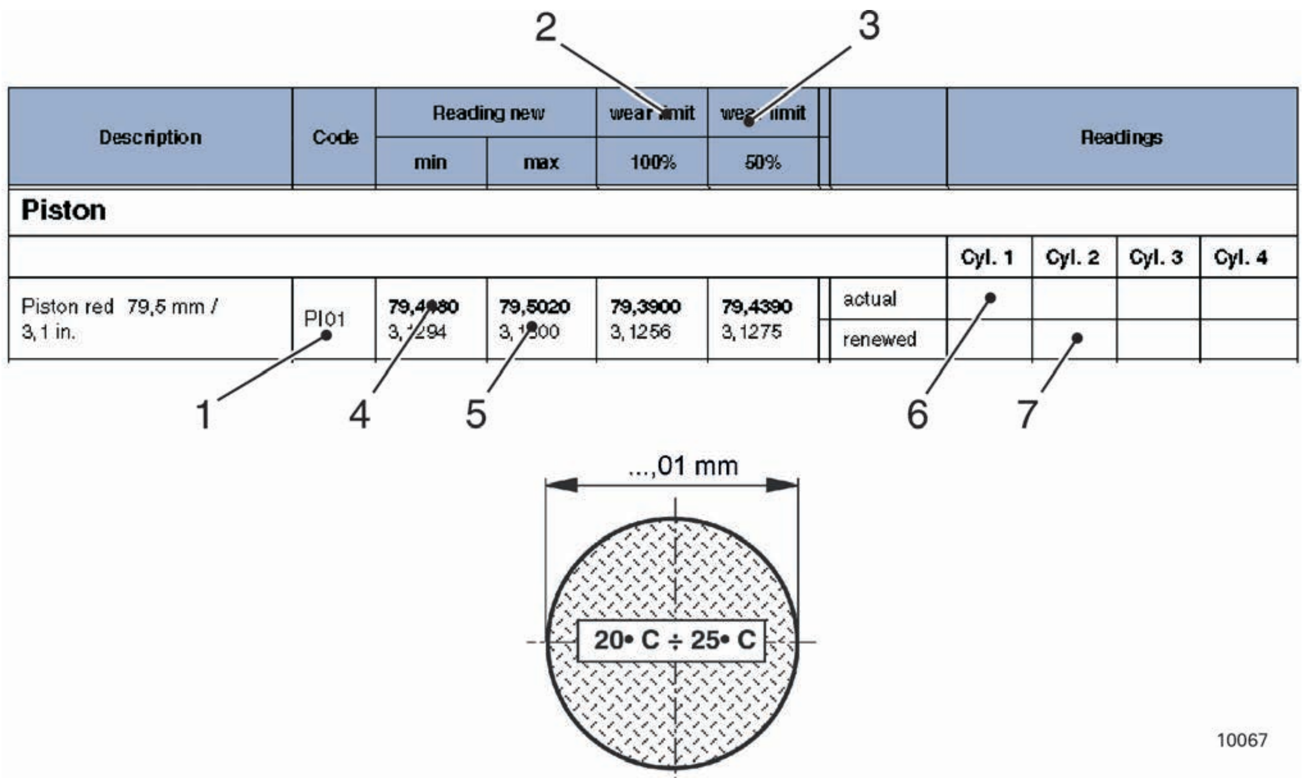

Figure 1.3: EXAMPLE ONLY

> **ATTENTION**
>
> Where measurement values are taken in hundredth of a millimeter or more precisely, the temperature of the part must be 20 to 25 °C (68 to 77 °F).

- Look up the desired control point code (1) in the illustration in the specified section

- The maximum limits for wear are divided into the columns maximum wear 100 % (2) and 50 % wear (3)
- The first line (4) gives the maximum permissible value in [mm], the second line (5) in [inches]
- The respective actual value must be entered in the corresponding box (6) in [mm] or [inches]
- The actual value for any part which has been replaced must be entered in the corresponding field (7) in [mm] or [inches]

List of abbreviations

The following table shows the abbreviations used for the control points.

Abbreviation	Description
AL	**al**ternator
CA	**ca**mshaft
CC	**c**rank**c**ase
CH	**c**ylinder **h**ead
CR	**c**on**r**od
CS	**c**rank**s**haft
CY	**cy**linder
EL	**el**ectric
ES	**e**lectric **s**tarter
EX	**ex**haust
GB	**g**ear**b**ox
GO	**go**vernor
OP	**o**il **p**ump
PI	**p**iston **p**in
ST	**st**ator
VT	**v**alve **t**rain
WP	**w**ater **p**ump

CLASSIFICATION OF PARTS FOR MAINTENANCE/REPAIR

General note

As for an overhaul, parts for maintenance/repair must be classified. They are classified either as “parts usable“ (“On-Condition“) or as “parts to be replaced“ (“100 % Parts“).

Criteria

The classification is made on the basis of following criteria:

- Hours of operation (decisive are the total operating hours of the part/engine or hours since the last overhaul)
- Determined (measured) actual dimension of the respective parts

Max. permissible wear

Proceed as follows:

- Determine the hours of operation for the part in question (logbook etc.)
- Determine wear as a percentage of the wear tolerance (see the dimension sheets attached directly after each section for the wear limit (100 %) of the part in question)
- The classification is carried out as per following table:

TSN [h] Time Since New		max. permissible wear for repair [%]
from	**to**	**TBO 300 h**
0	25	2
26	50	4
51	75	9
76	100	12
101	150	18
151	200	24
201	250	30
251	300	36

Determination of actual wear [%]

- Determine actual dimension F of the part in question
- For new dimension (max.) B and wear limit C see the corresponding dimension sheets attached after each section
- Determine the actual wear [%] with following formula

$$\text{Actual wear} = \frac{\{\text{Actual dimension (F) - New dimension max. (B)}\} \times 100}{\{\text{Wear limit (C) - New dimension max. (B)}\}} \quad [\%]$$

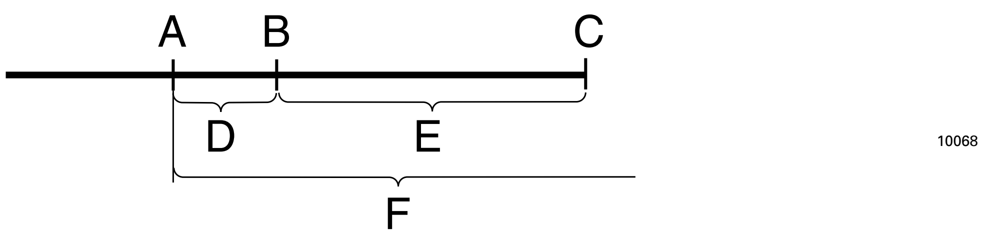

Figure 1.4: Formula

A	*New dimension (min)*	***B***	*New dimension (max)*
C	*Wear limit*	***D***	*New dimension tolerance*
E	*Wear tolerance*	***F***	*Actual dimension*

ATTENTION

New dimension (max.) B is always the dimension which is closest to wear limit C.

Classification of “On-Condition“ parts at maintenance/repair:

Actual wear [%] is **greater** than or **equal** to the **max. permissible wear** [%] calculated from the table	Parts must be replaced
Actual wear [%] is **smaller** than the **max. permissible wear** [%] calculated from the table	Parts can be used again

NOTE

*A negative result means that the actual dimension **F** is within the new dimension tolerance **D** and the part can be used again.*

Example

The hours of operation are indicated with 300 h. The determined percentage of maximum permissible wear is therefore 36 %.

New dimension (max.)	**B**	28.03 mm (1.1035 in.)
Wear limit	**C**	28.10 mm (1.1062 in.)
Actual dimension	**F**	28.07 mm (1.1051 in.)
Actual wear		57.1%

MAINTENANCE

General note

Beyond the maintenance and special checks (see therefore Line Maintenance Manual), as well as the system descriptions hitherto, the following sections describe the maintenance procedures for affected engine type. The description is subdivided into subsections and descriptions of the function of the various systems.
Some overlapping maintenance instructions are treated as generally valid information at the beginning of this section.

Troubleshooting

In the Operators Manual possible problems as well as feasible remedies are listed. At the same time, brief reference is made to the necessary remedial action.

See the respective section in the Operators Manual for the engine Type .

Tightening torques

Tighten fasteners to the torque specified in the exploded view(s) and/or in the written procedure.

⚠ WARNING

Non-compliance can result in serious injuries or death!
Exactly observe the tightening torques for screws and nuts. Overtightening or a connection which is too loose could cause serious engine damage.

In order to avoid a poor assembly, tighten screws, bolts, or nuts in accordance with the following procedure:

- Manually screw all screws, bolts and/or nuts
- Apply half the recommended torque value
- Tighten fastener to the recommended torque value

ATTENTION

Be sure to use the recommended tightening torque for the specified fastener.

NOTE

When possible, always apply torque on the nut.

NOTE

Always torque screws, bolts and/or nuts using a crisscross pattern when multiple fasteners are used to secure a part. Some parts must be torqued according to a specific sequence and torque pattern as detailed in the installation procedure.

ATTENTION
If not specified otherwise, the threads are not lubricated when fastened.

FASTENER INFORMATION

Self locking fasteners procedure

The following describes common procedures used when working with self-locking fasteners (Hardware supplies with pre-applied adhesive).
Use a metal brush on the fastener threads or a tap to clean the hole properly, then use a solvent. Allow the solvent time to act, then wipe off or blow out with shop air. Solvent utilization is to ensure proper adhesion of the product used for locking the fastener.

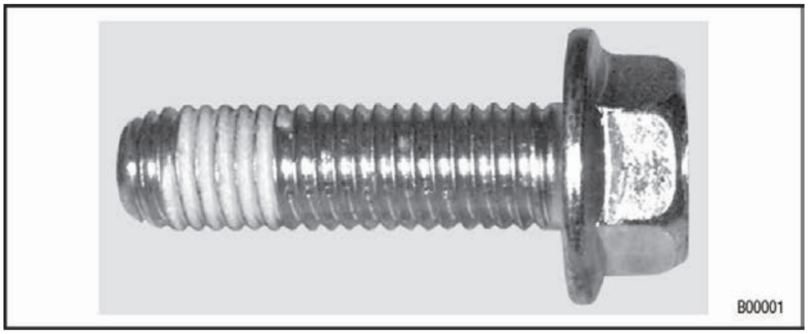

Figure 1.5: Fastener Information

LOCTITE APPLICATION PROCEDURE

The following describes common procedures used when working with LOCTITE products.

NOTE

Always use proper strength LOCTITE product as recommend in this Manual.

Observe the instructions of the manufacturer!

Thread locker application

Thread locker application for uncovered holes (Bolts and nuts).

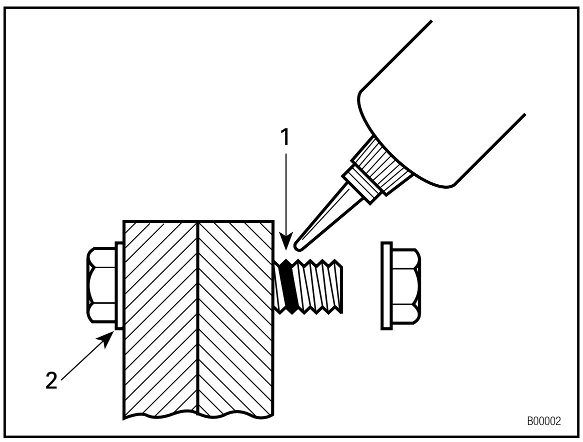

Figure 1.6: Application for uncovered holes (Bolts and nuts)

1 *Apply here*   2 *Do not apply*

Step	Procedure
1	Clean threads (bolt and nut) with solvent.
2	Apply LOCTITE 7063 on threads and allow to dry.
3	Choose proper strength LOCTITE thread locker.
4	Fit bolt in the hole.
5	Apply a few drops of thread locker at proposed tightened nut engagement area.
6	Position nut and tighten as required.

Thread locker for blind holes

Thread locker application for blind holes.

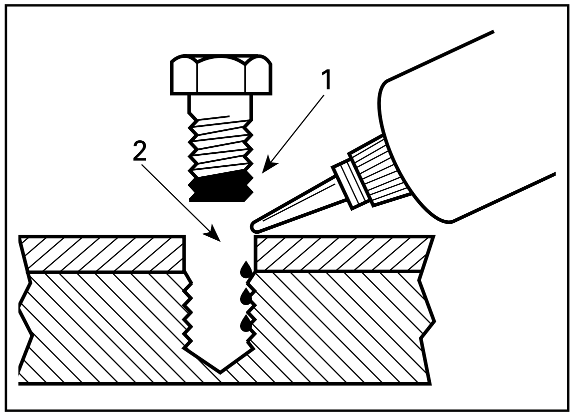

Figure 1.7: Application for blind holes

1 On fastener threads

2 On threads and at the bottom of hole

Step	Procedure
1	Clean threads (bolt and nut) with solvent.
2	Apply LOCTITE 7063 on threads and allow to dry.
3	Choose proper strength LOCTITE thread locker.
4	Apply several drops along the threaded hole and at the bottom of the hole.
5	Apply several drops on bolt threads.
6	Tighten as required.

Thread locker for stud installation

Thread locker application for stud installation in blind holes.

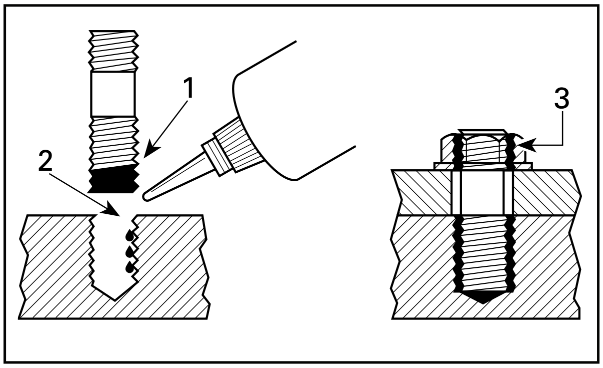

Figure 1.8: Application for stud installation in blind holes

1 On stud threads
2 On threads and in the hole
3 On retaining nut threads

Step	Procedure
1	Clean threads (stud and hole) with solvent.
2	Apply LOCTITE 7063 on threads and allow to dry.
3	Put 2 or 3 drops of proper strength LOCTITE thread locker on female threads and in hole.

NOTE

To avoid a hydro lock situation, do not apply too much LOCTITE.

Step	Procedure
4	Apply several drops of proper strength LOCTITE on stud threads.
5	Install stud.
6	Install cover, part, etc.
7	Apply a few drops of proper strength LOCTITE on uncovered stud threads.
8	Install and tighten retaining nut(s) as required.

Thread locker for pre-assembled parts

Thread locker application for pre-assembled parts.

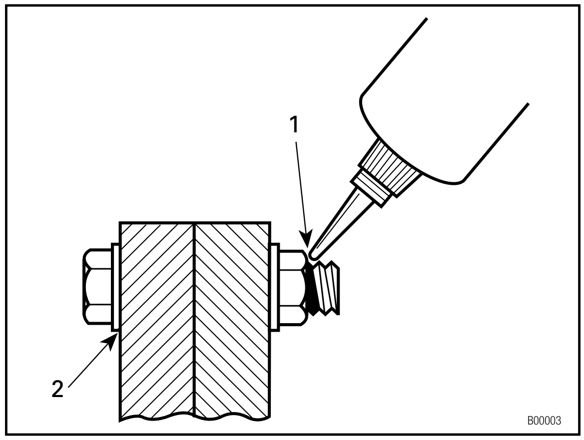

Figure 1.9: Application for pre-assembled parts

1 Apply here

2 Do not apply

Step	Procedure
1	Clean bolts and nuts with solvent.
2	Assemble components.
3	Tighten nuts.
4	Apply a few drops of proper strength LOCTITE on bolt/nut contact surfaces.
5	Avoid touching metal with tip of flask.

NOTE

For preventive maintenance on existing equipment, retighten nuts and apply proper strength LOCTITE on bolt/nut contact surfaces.

Thread locker for an adjustment screw

Thread locker application for an adjustment screw.

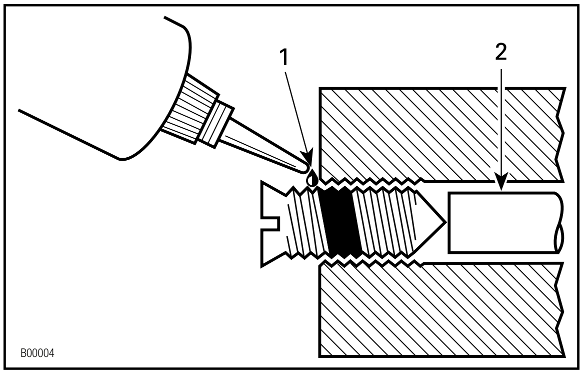

Figure 1.10: Application for an adjustment screw

1 Apply here *2 Plunger*

Step	Procedure
1	Adjust screw to proper setting.
2	Apply a few drops of proper strength LOCTITE thread locker on screw/body contact surfaces.
3	Avoid touching metal with tip of flask.

NOTE

If it is difficult to readjust, heat screw with a soldering iron (232 °C) (450 °F).

CONSUMABLE MATERIALS

ATTENTION

Use only the specified or technically equivalent materials for all maintenance work.

ATTENTION

When handling chemicals, comply with all the customary regulations and specifications of the producer, including the expiry date and instructions of use.

Consider the curing time of the sealing surface compound as stated by the manufacturers instructions.

The materials listed have undergone longterm testing and are suitable for all operating conditions indicated by the manufacturer.

No.	Part no.	Description, application	Qty.
AA	n.a.	**MOLYKOTE PG 54** High-performance grease for plastic/plastic, plastic/metal and rubber/metal combinations involving slow to medium fast movements and light to medium loads.	AR
B	897651	**LOCTITE 243** Blue medium duty screw locking agent, oil tolerant	10 ml
C	899788	**LOCTITE 648** Green high temperature screw locking agent + retaining compound	5 ml
E	297434	**LOCTITE ANTI SEIZE 8151** Long-term lubricant for shaft seals	50 ml
F	n.a.	**LOCTITE 7063** For degreasing and cleaning surfaces	AR
H	897870	**FILTER OIL** For optimum filter efficiency and moisture protection	14.8 ml
I	897330	**LITHIUM-BASE GREASE** Electrical isolating	250 g
O	n.a.	**Engine oil** For easier assembly of components or for first lubrication before first engine start	AR
Q	297386	**Silastic 732 RTV** One-component silicone adhesive/sealant	100 g

No.	Part no.	Description, application	Qty.
V	898570	**Screw securing paint**	20 ml
Z	899789	**LOCTITE 603** Oil tolerant retaining compound, heavy-duty	10 ml

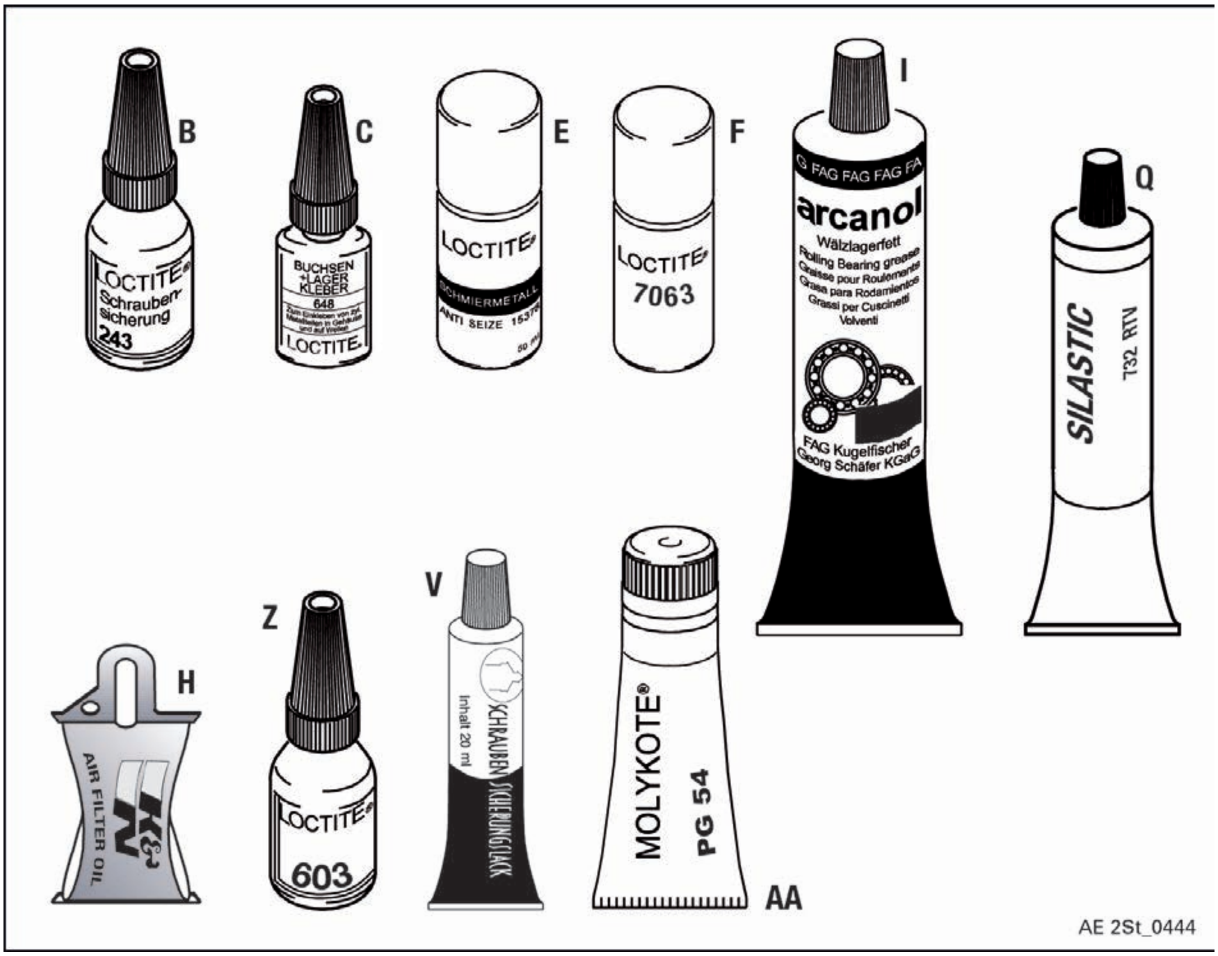

Figure 1.11: Lubricant tools

Additional materials

ATTENTION
All metal and synthetic parts should be cleaned with suitable cleaning agents. Before using new and unknown cleaning agents, check their compatibility with the materials they are being used on.

No.	Part no.	Description, application	Qty.
1	n.a.	**Cleaning agent/solvent/parts cleaner** Soak combustion chamber, piston and cylinder head with cleaning agent and remove combustion residues with a bronze brush. CASTROL “Clenvex 2000“ has proved very effective. It is a solvent - cold cleaner, free of halogen, on the basis of selected fuel fractions and is biodegradable. Never use caustic or corrosive cleaning agents.	AR
2	n.a.	**Multipurpose grease** Generally usable, neutrally colored multipurpose grease, water resistant and highly adherent. Usable for temperatures from -35 °C to +120 °C (-31 °F to 248 °F) and can be subjected to high mechanical loads.	AR
3	n.a.	**Preservation oil** This special oil has excellent penetrating capabilities and reaches even tiny gaps, its highly effective additives protect against corrosion of metal surfaces.	AR
4	n.a.	**Flexible web for surface finishing 3M Scotch-Brite Multi Flex - very fine or ultra fine (or equivalent)** Is sold by the meter and used for manual removal of smaller rust spots or oxidation, especially for optimum ground connections. It is particularly suitable for removing LOCTITE from surfaces or threads to make them metallic clean. Before re-applying LOCTITE, clean surfaces with nitrothinner or degreasing agent (CASTROL ZA 30 or OMV - SOFT SOL). When using solvents, observe the safety regulations for persons and the environment.	AR
5	n.a.	**MS4 / DC4 corning #4 (or equivalent)** Electrical insulation compound for protection of electrical connections.	AR

No.	Part no.	Description, application	Qty.
6	n.a.	**Valve lapping paste** This paste, produced by various manufacturers, is a fine granulate lapping paste for manual lapping of valve seats and valves. The paste is usually available in 3 different granulate sizes. Use as per manufacturers instructions.	AR
7	n.a.	**Compressed air blasting using a solid blasting agent** This method is suitable for local and gradual very fine treatment of steel parts with rust film (propeller shaft). The Compressed air blasting contains no harmful substances, is approved by the competent authorities and guarantees optimum cleaning. The granulates used are of sizes 40 to 60 µ . The achievable surface roughness is between 0.5 and 1 µ, which corresponds to ultra fine machining of surfaces.	AR

ATTENTION

Exhaust valves and intake valves may NOT undergo a compressed air blasting treatment with solid blasting, strong abrasive material. Due to this surface treatment one does gain a microscopic surface pitting which does allow as a consequence the adhesion of fuel residues. These deposits are then involved in a chemical reaction (especially of the sulfur and lead content of AVGAS) with the valve material. This effect may cause hot-gas corrosion on the affected parts.

TOOLS

Auxiliary tools

- Compression tester or 2 pressure gauges with calibrated orifice, adapter for dial gauge in spark plug thread
- Valve spring mounting pliers
- Step punch for valve guide
- Adjustable reamer 6.5 to 7.5 mm (0.256 to 0.295 in.)
- Valve seat machining device, valve lapping paste
- Gearbox support plate
- Stud extraction tool
- Scraper, very fine emery cloth, grinding tool, cover sheet, adhesive tape
- Cleaning agent, approved cleaners, funnel, graphite marker
- Magnetic holder
- Screw extractor set
- Box wrench set with torque wrench 5 Nm to 50 Nm (44 in.lb to 37 ft.lb)
- Magnetic particle tester DEUTROFLUX, series UHW, or equivalent

Disassembly device

- Manual hydraulic press

Measuring tools

- Caliper rule, dial gauge indicator, micrometer, inner micrometer, inner fine measuring device, feeler gauge, spring scale up to 50 kp (500 N) (112.5 lbf)

Multimeter

- FLUKE Series 70, Series 80 or equivalent
- Electronic, 3 1/2 digit indication
- Current range 10 A
- Direct voltage range 200 V minimum
- Resistance range 200 Ω to 2 MΩ
- Acoustic continuity tester

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Chapter: 24–00–00
ELECTRICAL POWER

TOPICS IN THIS CHAPTER

SPECIAL TOOLS

Description	Part number
Puller assembly	876065
Protector mushroom	876557
Puller plate	876081
Locking pin	876640
Gauge adapter (mod. 99 - 14 mm / 0.55 in.)	876940
Gauge adapter (mod. 17 - 12 mm / 0.47 in.)	876942
Gauge pin	876945
Dial gauge	876950

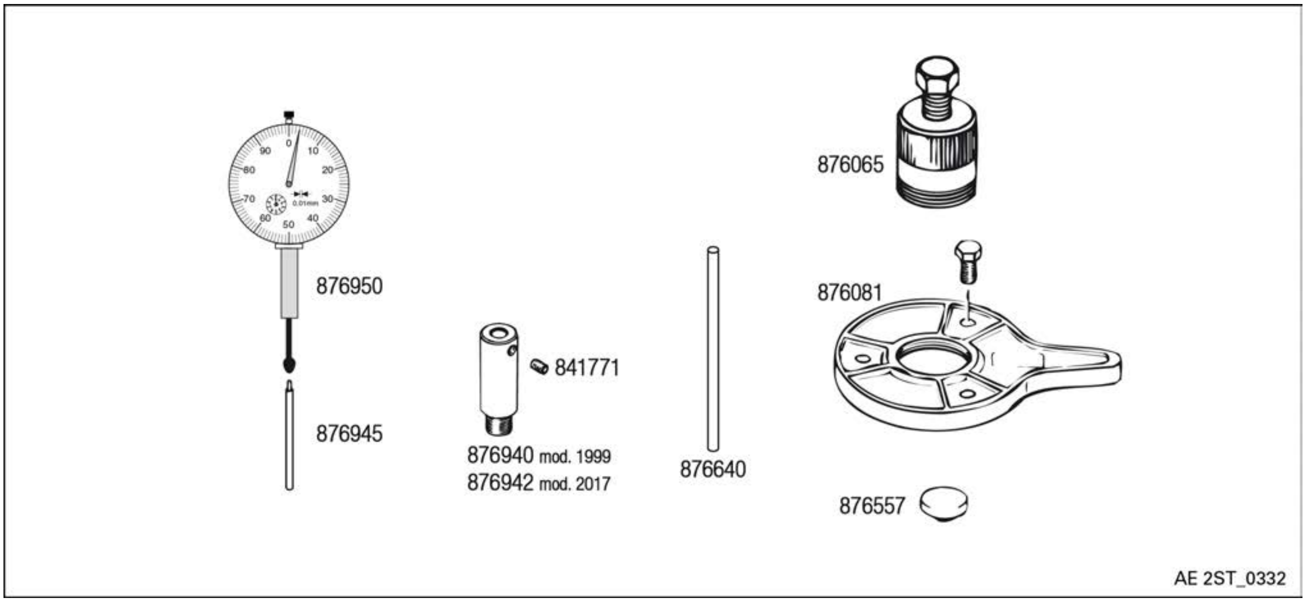


Figure 2.1

SERVICE PRODUCTS

Description	Part number
LOCTITE 243	897651
LITHIUM-BASED GREASE,	897330
LOCTITE 648	899788

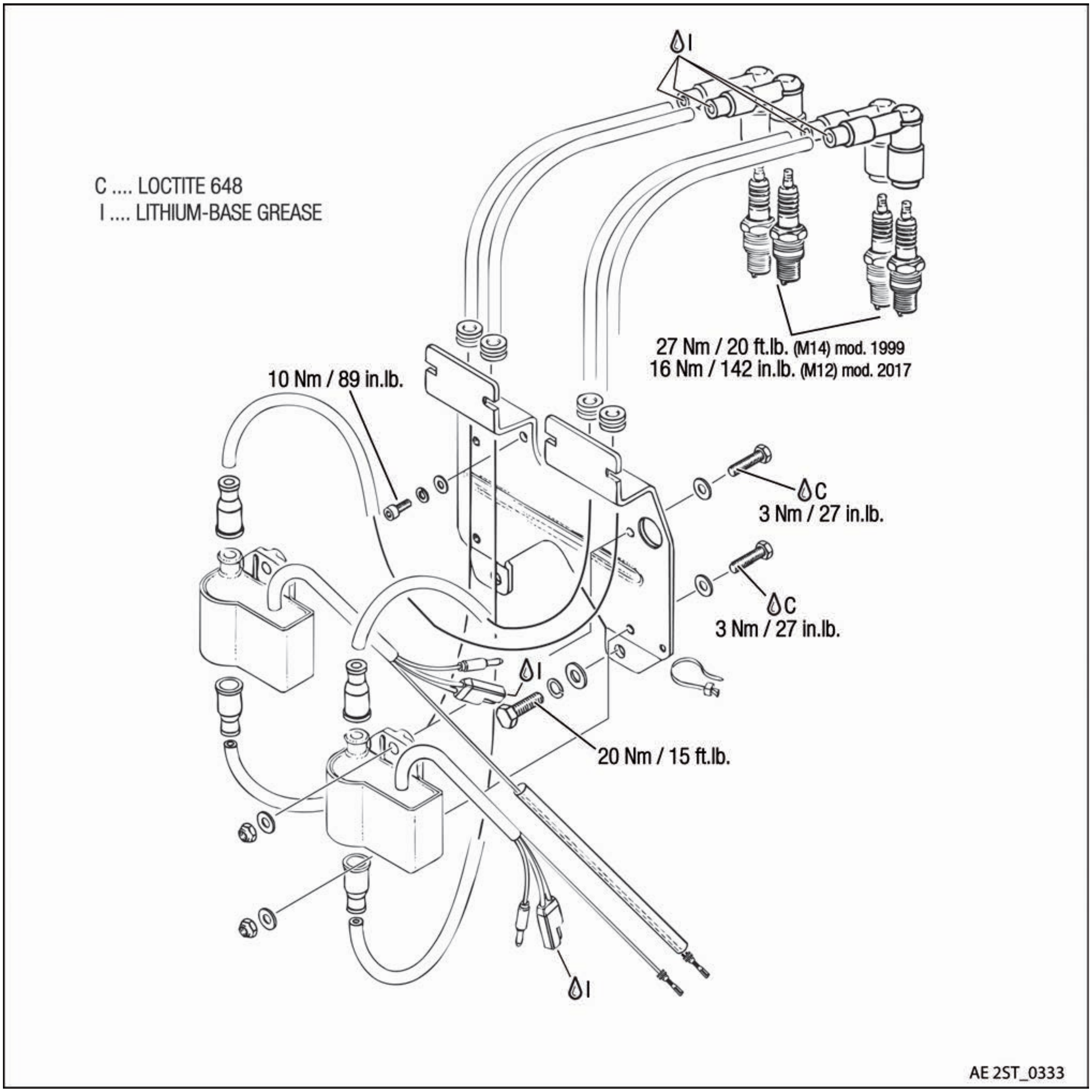


Figure 2.2: Components

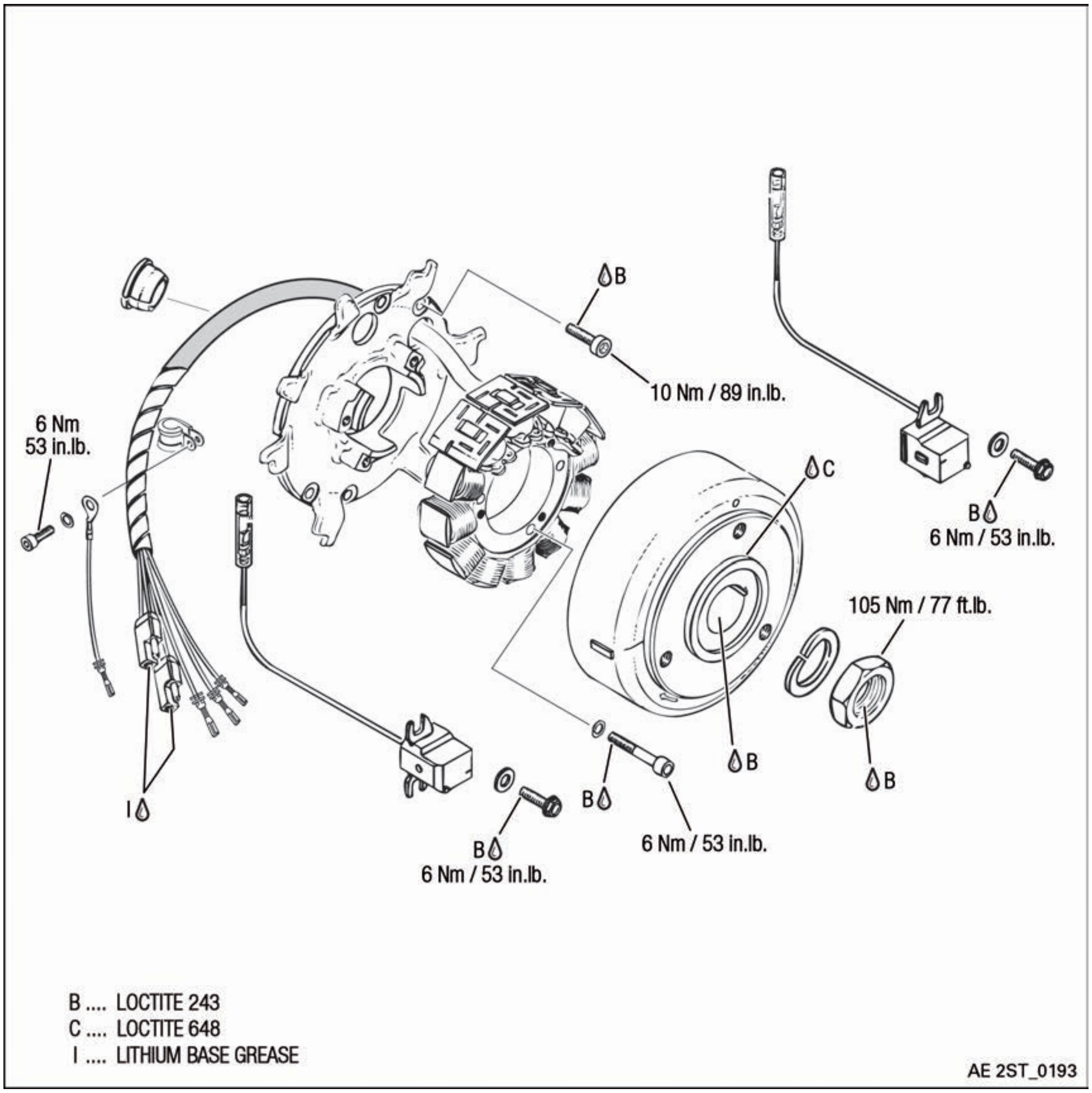
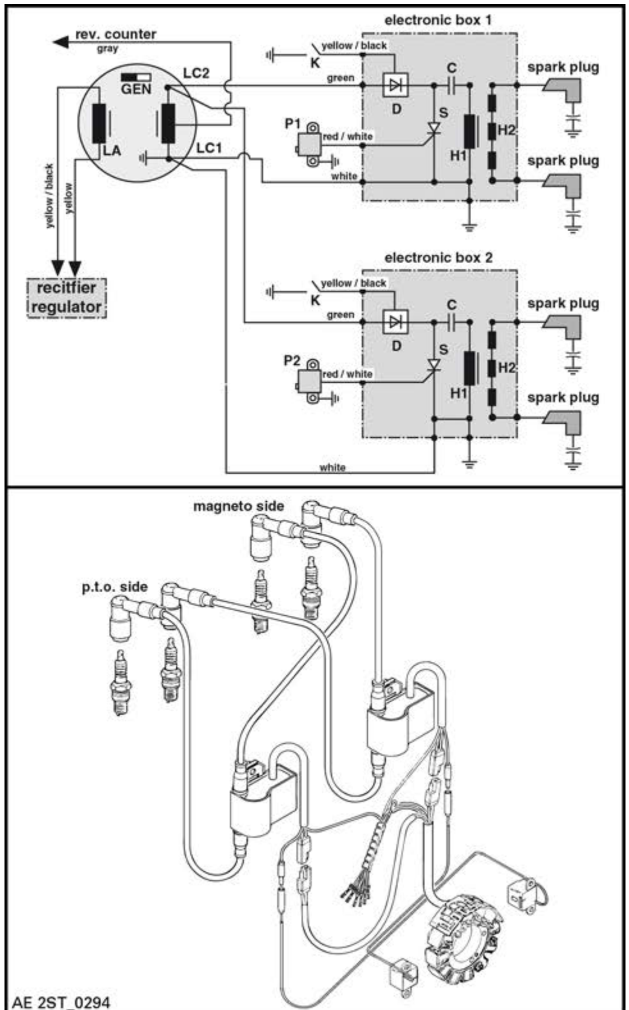


Figure 2.3: Components

SYSTEM DESCRIPTION

General
The ROTAX® 582 UL Mod. 99 and 17 are equipped with a breakerless 12 V 170 W DUCATI capacitor discharge dual ignition. The unit consists of a flywheel magneto generator, 2 double ignition coils with integrated electronic control circuit and 2 external pick-ups.
The 12-pole flywheel generator is an outer rotor type with 12 permanent magnets. The stator is equipped with 12 coils, 8 of them used for feeding auxiliary equipment and 4 to supply current for the 2 ignition circuits

Ignition coil
The ignition coil generates an AC voltage which is supplied to the ignition module via an insulated connector.
Two pairs of charging coils fitted on the stator plate and independent from each other feed one ignition circuit each. The energy supplied is stored in the capacitor. At the moment of ignition, the external pick-ups trigger the discharge of the capacitors via the primary winding in the ignition coil. The secondary winding supplies the high voltage for the ignition spark. The ignition voltage is approx. 25 kV at 6000 rpm. and a load of 50 pF.
Each of the two ignition switches needs its own grounding switch. Both grounding cables connected to one switch only would render both circuits grounded and ineffective.



Check electric connections and wiring	faulty →	Repair
↓ good		
❋ Check spark plug and connector Carry out spark test	faulty →	Clean or renew
↓ good		
Check ignition switch	faulty →	Repair or replace
↓ good		
Check pick-ups (measure resistance)	faulty →	Replace
↓ good		
Check flywheel generator, (measure resistance of charging coil)	faulty →	Repair or renew
↓ good		
Check electronic box, (measure resistance of secondary coil)	faulty →	Replace electronic box
↓ good		
Check control circuit (continuity test)	faulty →	Replace electronic box

Figure 2.4

SAFETY INSTRUCTIONS

⚠ WARNING

Danger of damage to engine! There is a risk of short circuits and cable fires during work on the electric system.
All installation work on the electric system should be carried out with the engine switched off and the battery (negative terminal) disconnected.

⚠ WARNING

Danger of severe burns and scalds! Always allow the engine to cool down to ambient temperature before starting any work.

ATTENTION

Interruption could destroy the electronic box.
With the engine running, the trigger cable (red) must not be disconnected from the electronic box.

MAINTENANCE

As well as the maintenance and special checks, see current Maintenance Manual Line for the respective engine type.

GENERAL INFORMATION

Before the component is removed, the work described below must be carried out to identify any further faults in the component and rectify them as part of repair work.

BEFORE THE INTERNAL GENERATOR IS REMOVED

ATTENTION

If these checks are omitted, it may be necessary to dismantle the product again to rectify any faults after repair work.

General visual inspection.
See Maintenance Manual Line for the respective engine type.

Engine cleaning.
See Maintenance Manual Line for the respective engine type.

Carry out an engine test run.
See Maintenance Manual Line for the respective engine type.

REMOVAL

Preparation

- Disconnect negative terminal of battery
- Ignition and main switches must be “OFF”

ATTENTION

Prevent the ingress of foreign bodies into all disconnected lines and connections.
Use appropriate protective coverings.

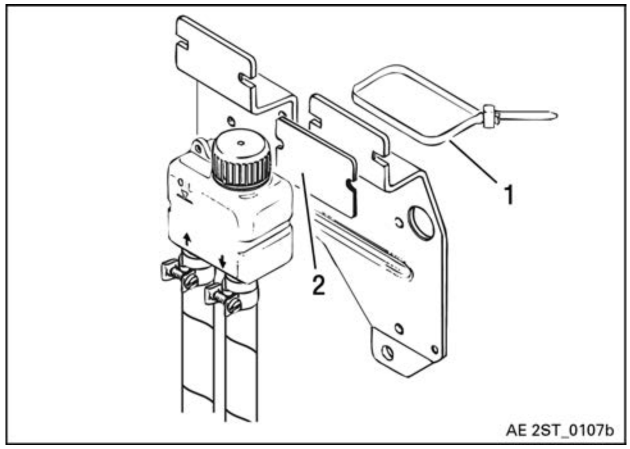
ATTENTION

Cracking and other obvious damage to the ignition cable is not permitted!
If in doubt, always replace the cable and connectors in question.

IGNITION COILS - REMOVAL

Preparation

- Remove intake silencer and carburetor, see Chapter 73-00-00
- Remove stator connections (electrical + mechanical), see Stator - removal in this chapter (Step 2-5)
- Carefully cut tie wrap (1) and remove rubber spacer (2)



1 Tie wrap *2 Rubber spacer*

Figure 2.5

NOTE

Ignition coils can be removed individually or attached together with the support plate.

ATTENTION

Mark cables and connectors before removing the connector receptacle.

Step	Procedure
1	Disconnect charging coils (1) and pickup coils (2) from stator. See Section – Stator removal.
2	Disconnect ignition shut-off wires YE/BK (3) from the 4-pin connector housing (4).
3	Pull spark plug connectors (5) from the spark plugs. **NOTE** *Cut tie wraps on ignition plugs.*
4	Hold ignition cable (6) and rotate the connector counter-clockwise to unscrew and remove it.

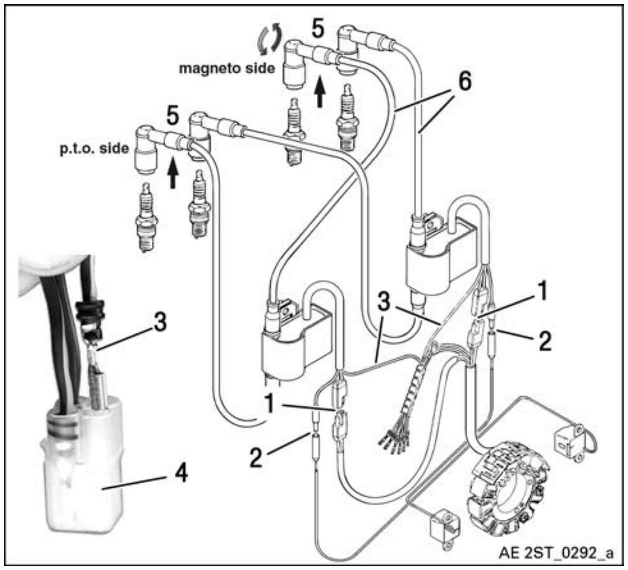


Figure 2.6

1	*Charging coil*	2	*Pickup coil*
3	*Ignition shut-off*	4	*4-pin connector housing*
5	*Spark plug connector*	6	*Ignition cable*

Step	Procedure
5	Pull ignition cables through grommets (7).
6	Unscrew lock nut (8) with washer (9) and remove ignition coil. **NOTE** *Support hex. screw M6x25 (10) with washer.*
7	Pull rubber grommet (11) from ignition cable in direction to coil.

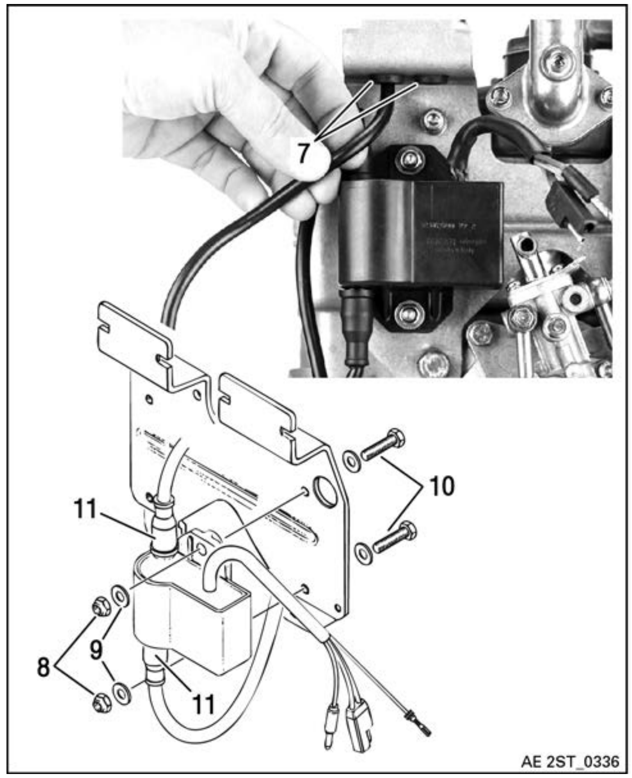


Figure 2.7

7	*Grommet*	8	*Lock nut*
9	*Washer*	10	*Hex. screw M6x25*
11	*Rubber grommet*		

Step	Procedure
8	Hold ignition coil securely (12) and rotate the cables counter-clockwise to unscrew and remove it.

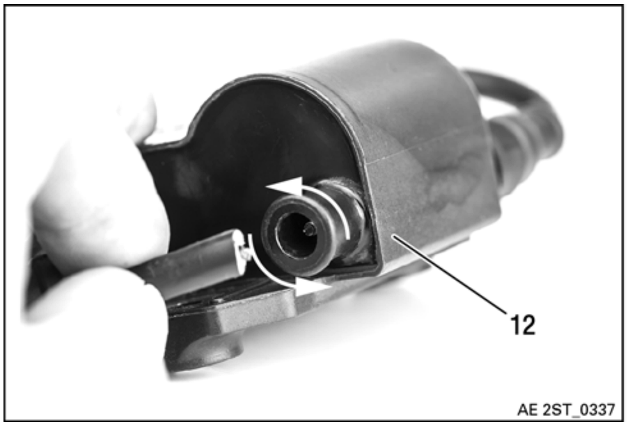


Figure 2.8

12 Ignition coil

SUPPORT PLATE - REMOVAL

Preparation

- Remove tie wrap from oil tank of rotary valve
- Remove carburetors. See Chapter 73-00-00 Fuel System
- Disconnect electrical connection of ignition coils, see Ignition coil - removal in this chapter

Step	Procedure
1	Carefully cut any plastic ties holding ignition cables or wires in place.
2	Remove 2 hex. screws M8x25 (2) along with lock washers and washers.
3	Remove 2 Allen screws M6x16 (1) along with lock washers and washers.

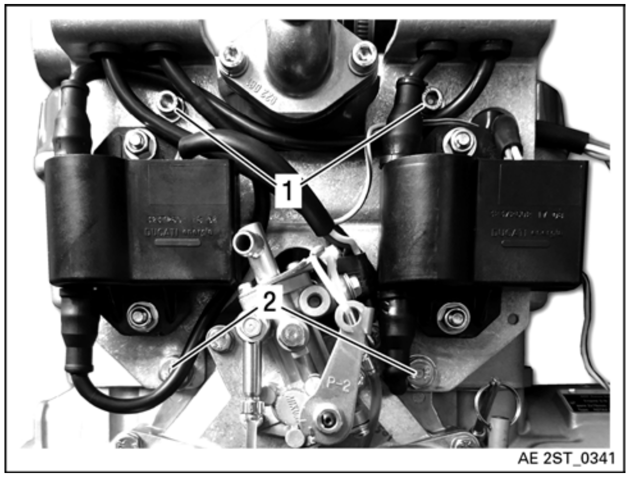


Figure 2.9

1 Allen screw M6x16 *2 Hex. screw M8x25*

MAGNETO FLYWHEEL — REMOVAL

Preparation

- Remove the starter assembly (rewind or electric) in order to access the magneto flywheel and stator coil. See Chapter 80-10-00 Electric Starter removal and Chapter Chapter 80-20-00 Rewind Starter removal

ATTENTION

Use hex. screws M8x20 only!
Longer screws destroy the stator coil assy.

Step	Procedure
1	Attach puller plate part no. 876081 (1) to magneto flywheel using 3 hex. screws M8x20 (2).

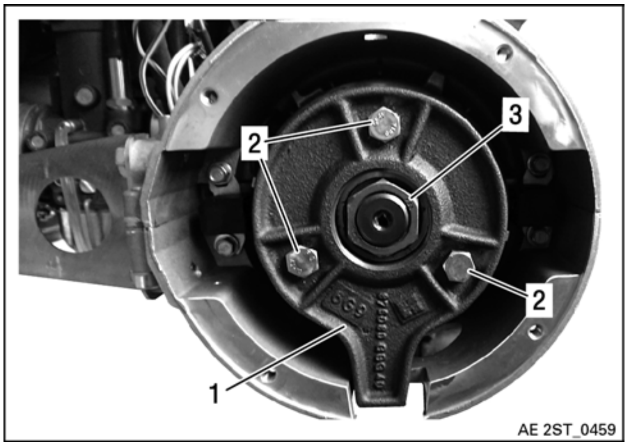


Figure 2.10

1 Puller plate	*2 Hex. screw M8x20*
3 Hex. nut M22x1.5 with lock washer	

Step	Procedure
2	Remove hex. nut M22x1.5. Take off hex. nut along with lock washer A22 (3).
3	Slightly grease mushroom-shaped protection piece part no. 876557 and place on crankshaft end.

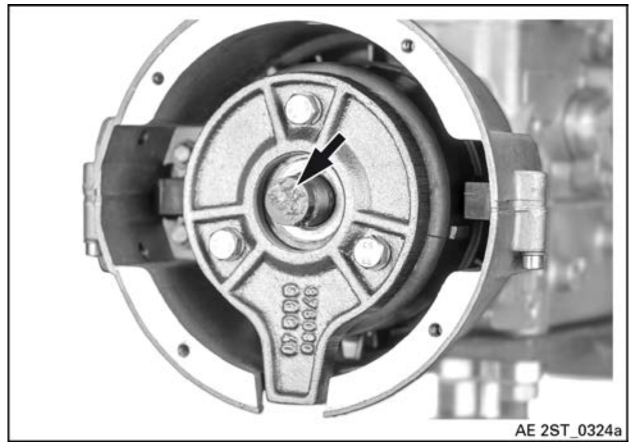


Figure 2.11

Step	Procedure
4	Thread puller part no. 876065 fully into puller plate and pull off magneto flywheel by turning puller screw clockwise. On a tight fit, a blow to the puller with a hammer might be effective. **NOTE** *Help to break the magneto flywheel's LOCTITE bond by heating up evenly and carefully using a hot –air gun , being careful not to apply too much heat and damage stator assy.*

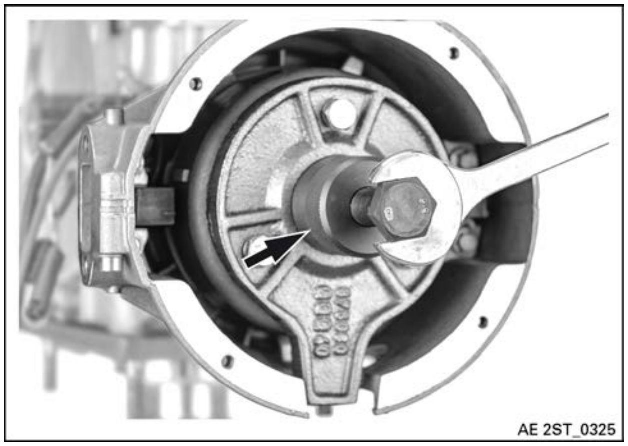


Figure 2.12

Step	Procedure
5	Remove the flywheel assembly together with puller and puller plate in place.
6	Detach puller and puller plate.
7	Remove woodruff key from crankshaft end.

ATTENTION

Put aside flywheel in a way to prevent any metallic matter collecting on magnets.

STATOR – REMOVAL

Step	Procedure
1	Mark stator plate assy. (1) to crankcase (2) so there won't be any need for adjustment at re-assembly.

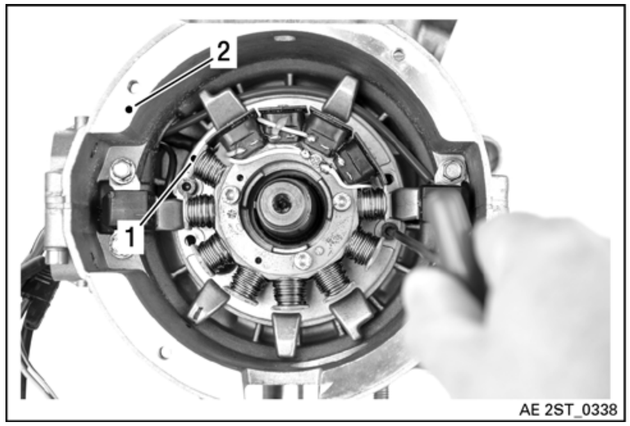


Figure 2.13

1 Stator plate assy. *2 Crankcase*

Step	Procedure
2	Remove Allen screw, lock washer, wire (BN) and clamp (3).
3	Remove spiral hose (4).
4	The rev. counter wire (GY) (5) is connected to 4 pin connector housing. Remove the wire from the connector housing with a small screwdriver by moving the plastic retainer to the side.

Step	Procedure
5	Disconnect the 2-pin charging coil connectors (WH and GN wires) (6). **NOTE** *Only needed if ignition coils will be dismantled too.*
6	Disconnect 2-pin lighting coil connector (YE and YE/BK wires) (7) .

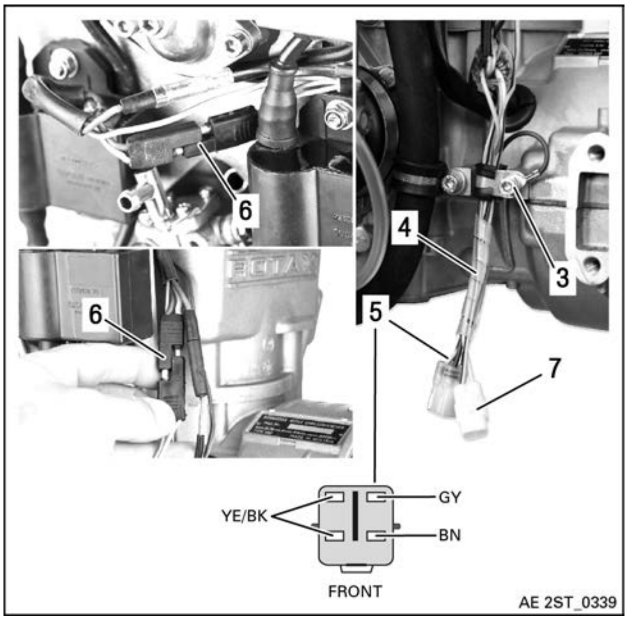


Figure 2.14

3	*Clamp*	4	*Spiral hose*
5	*Rev. counter wire on 4-pin connector*	6	*2-pin charging coil connectors*
7	*2-pin lighting coil connector*		

Step	Procedure
7	Remove both torx screws M5x16 (8) attaching stator plate to crankcase.
8	Remove cable grommet (9) and pull out stator plate and stator coil assy. **NOTE** *Be careful when passing cables and connectors through the opening in crankcase.*

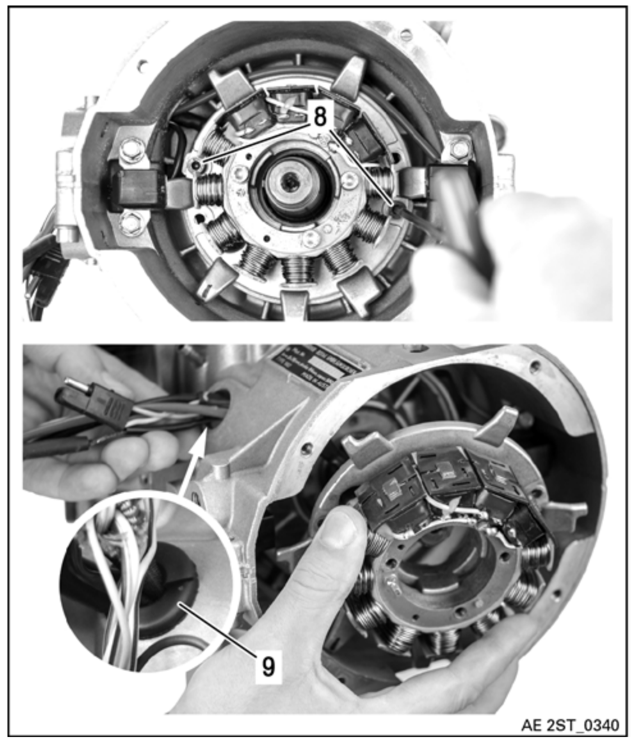


Figure 2.15

8	*Torx screws M5x16*	9	*Cable grommet*

Step	Procedure
9	Loosen 3 Allen screws M5x30 (11) and remove stator plate (10).

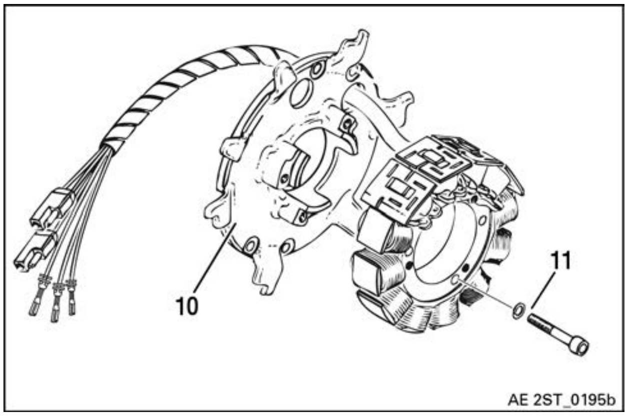


Figure 2.16

10 Stator plate

11 Allen screw M5x30

PICKUP COILS - REMOVAL

These instructions show the magneto flywheel and stator and plate assembly already removed.

Step	Procedure
1	Loosen 2 Taptite (self-tapping) screws M5x16 (1) with washers. **NOTE** *Removal of the stator plate will allow proper access for wiring.*

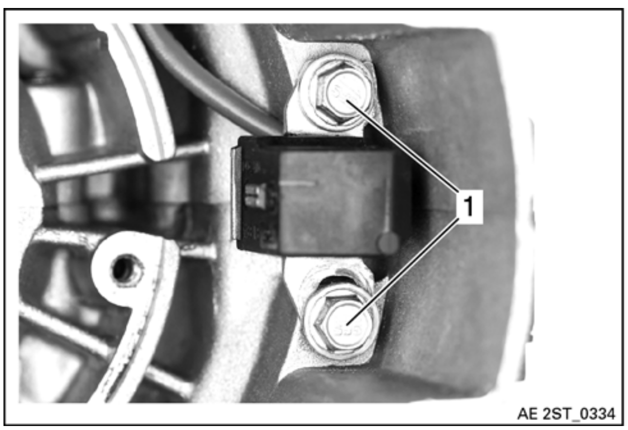


Figure 2.17

1 M5x16 Taptite screw

Step	Procedure
2	Disconnect RD/WH pickup coil wires (2) and remove pickup coils from crankcase.

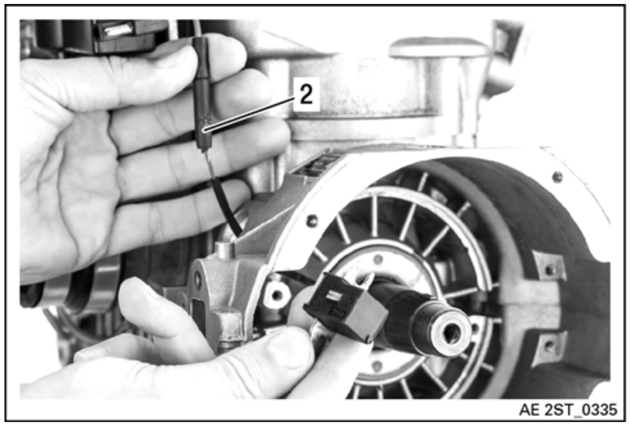


Figure 2.18

2 RD/WH pickup coil wire

INSPECTION

PICKUP COIL - INSPECTION

NOTE

Formation of a rust film on the metal cores of the trigger coils is harmless.

Step	Procedure
1	Visually inspect the pickup coil. Check coils and wiring for damage and wear. **NOTE** *If the metal core of the coil shows signs of contact or wear, replace with a new part.*

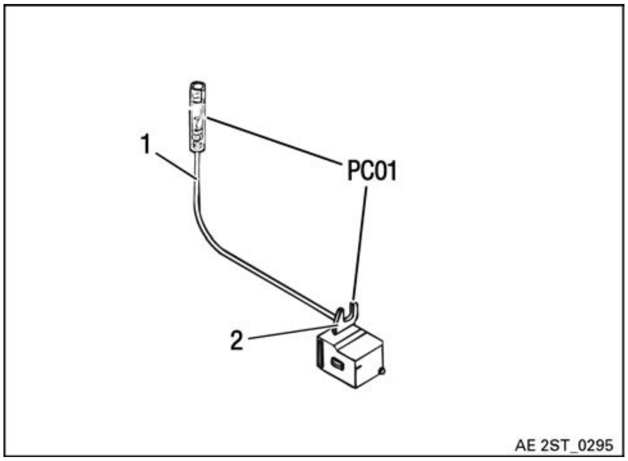


Figure 2.19

1 RD/WH wire *2 Ground*

STATOR – INSPECTION

ATTENTION

Danger of consequent damage to engine!
The stator may not be post-machined! If the stator or its wiring is damaged or worn, always replace with a new part.

Step	Procedure
1	Carry out a visual inspection of the stator assembly and wiring, checking for damage and wear.
2	Check resistance of lighting coil (SC01), charging coils (SC02) and rev counter pickup (SC03). See Chapter Wear Limits.

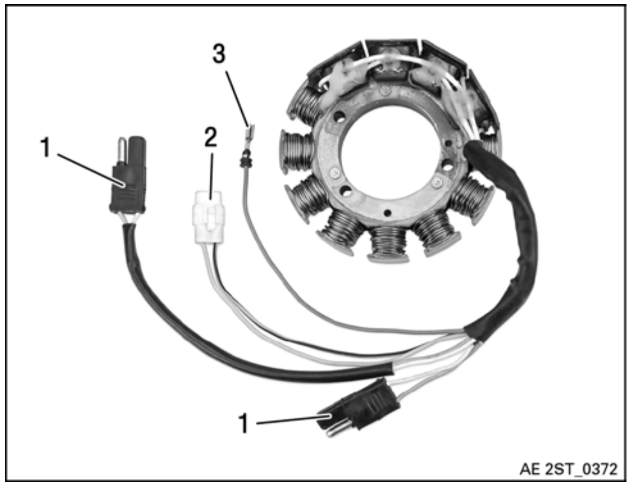


Figure 2.20

1 Lighting coil (SC01) *2 Charging coil (YE and YE/BK) (SC02)*

3 Rev counter(SC03)

IGNITION COIL - INSPECTION

The ignition coil is integrated within the CDI module and can only be replaced, not repaired.

Step	Procedure
1	Check screws and washers for damage, corrosion and deformation, replace lock nuts with new.
2	Check ignition coils for damage, corrosion and deformation.
3	Check the resistance of the secondary high voltage coil (IC01) between the 2 ignition-cable threaded prongs (1). See section Wear Limits (IC01).

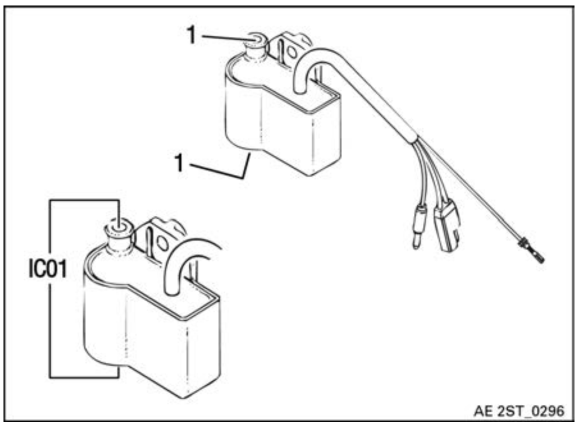


Figure 2.21

1 Threaded prong

MAGNETO FLYWHEEL – INSPECTION

Step	Procedure
1	Clean flywheel and inspect magneto ring (1) for cracks. **NOTE** *Even with a small crack in the magneto ring, the flywheel must be exchanged.*
2	Visual check of taper (2) and woodruff key groove (3).

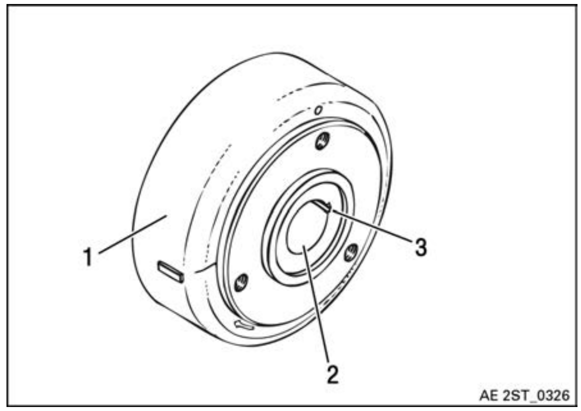


Figure 2.22

1 Magneto ring *2 Taper*

3 Woodruff key groove

ATTENTION

Signs of wear on the magnets are not permissible!
Damaged parts on the flywheel are not permissible.

Step	Procedure
3	Check for signs of wear or damage at the permanent magnets. **NOTE** *Formation of a rust film on the magnets is harmless.*

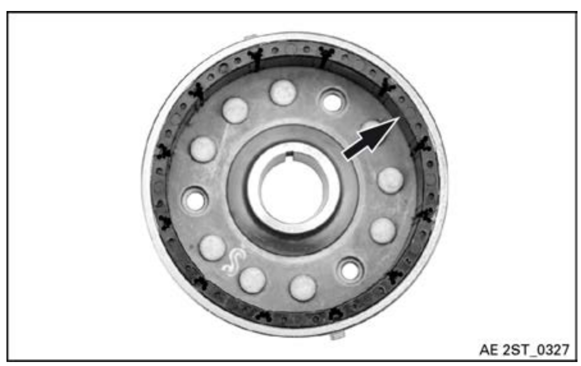


Figure 2.23

WEAR LIMITS

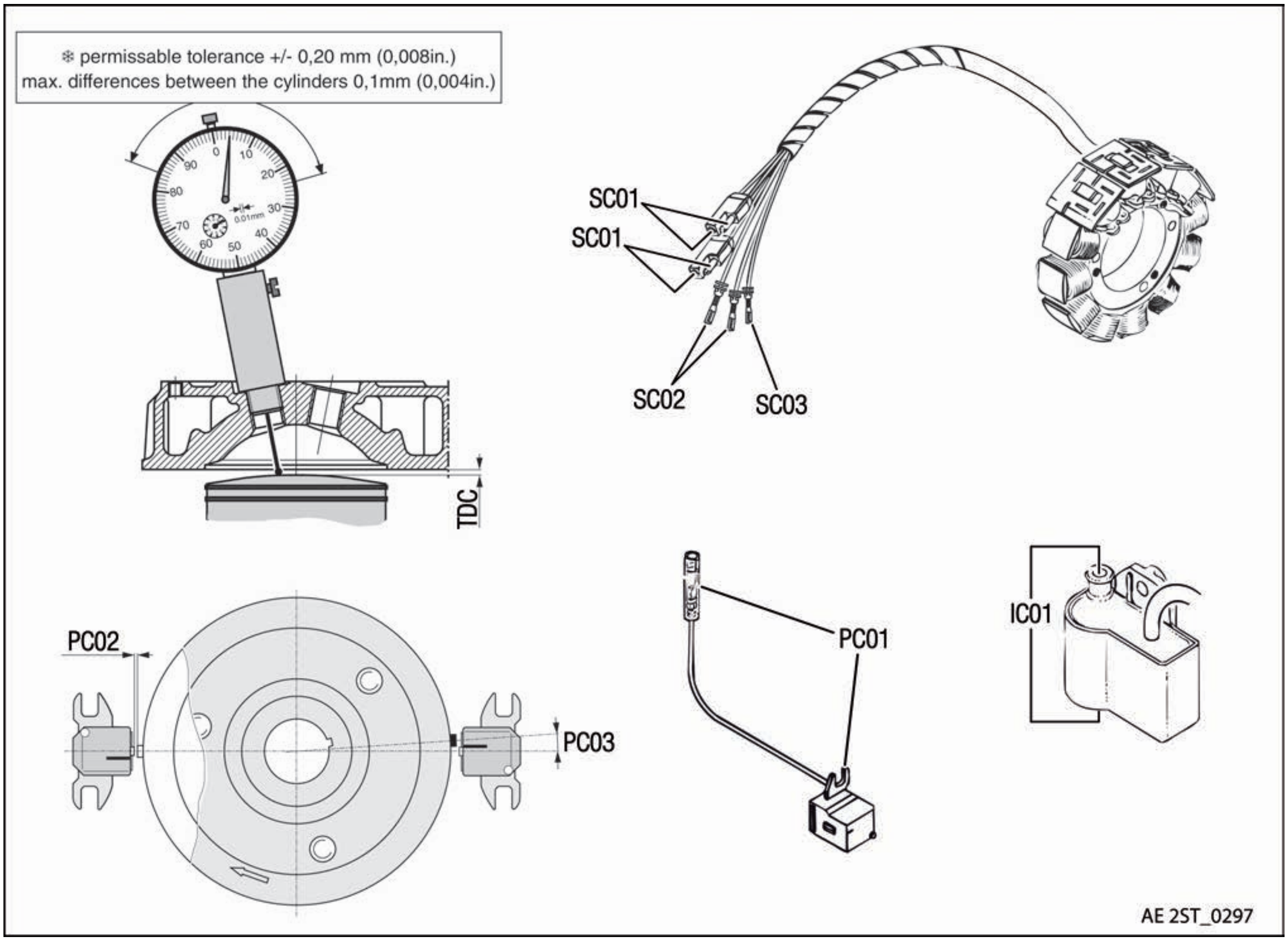


Figure 2.24

Description	Code	Tolerance Value		Readings
		min	**max**	
Top Dead Center	TDC	1.76 mm (0.069 in.)	2.16 mm (0.085 in.)	
Ignition coil				
Secondary high voltage coil HV1-HV2	IC01	5.1 kΩ	6.3 kΩ	electronic box transducer
Secondary high voltage coil HV1-ground		open		
Stator				

Description	Code	Tolerance Value		Readings
		min	max	
Charging coil (green – white)	SC01	280 Ω	330 Ω	primary coil
Lighting coil (yellow – yellow/black)	SC02	0.3 Ω	0.35 Ω	charging circuit
Rev counter (grey – white (ground)	SC03	30 Ω 35 Ω	35 Ω 42 Ω	old taped new molded
Pickup coil				
Pickup coil (red/white – engine ground)	PC01	140 Ω 50 Ω	180 Ω 70 Ω	new old
Pickup coil – Air gap	PC02	0.4 mm (0.016 in)	0.5 mm (0.020 in)	
Pickup coil - Timing	PC03	18° B.T.D.C		
Spark plug and spark plug connector				
See Maintenance Manual Line for the engine type 582 mod. 99 / mod. 17 Chapter 12–20–00 section Spark plugs.				

ASSEMBLY

ELECTRONIC MODULE/SUPPORT PLATE - ASSEMBLY AND INSTALLATION

CABLE ACTUATED ASSEMBLY

Step	Procedure
1	Attach new ignition cable to electronic modules. **NOTE** *Apply lithium based grease to end of ignition wire and screw wire onto ignition module threaded prong (1) approx. 22 mm (0.87 in) depth.*
2	Pull over rubber grommets (2).
3	Route ignition cables through grommets (3) and attach ignition coils to plate with M6 lock nuts along with washers 6.4 (4) and hex. screws M6x25 (5) with washers 6.4 and LOCTITE 648. Tightening torque 3 Nm (27 in. lb)

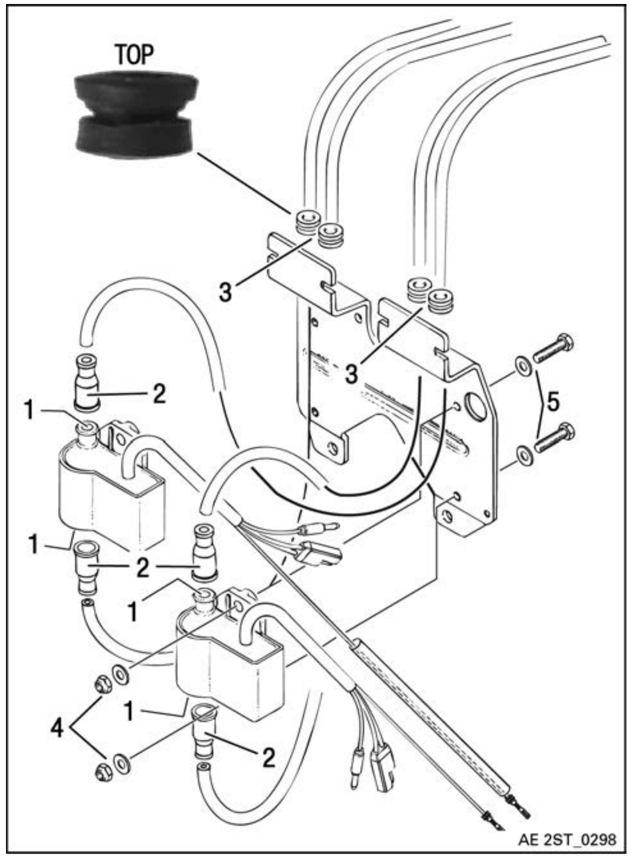


Figure 2.25

1	*Threaded prongs*	2	*Rubber grommet*
3	*Grommet*	4	*M6 lock nut with washer 6.4*
5	*Hex. screw M6x25 with washer 6.4*		

Step	Procedure
4	Attach plate to cylinder head with 2 Allen screw M6x16 (6) along with lock-washer A6 and washer 6.4. Tightening torque 10 Nm (89 in.lb). **NOTE** *First tighten screws M6x16 (6) only hand-tight, after the hex. screws M8x25 (7) are tightened, tighten with torque.*
5	Attach plate to rotary valve cover hand-tight with 2 hex. screws M8x25 (7) along with lock washer A8 and washer 8.4.
6	Tighten rotary valve cover with 2 hex. screws M8x20 (8) and 2 hex screws M8x25 (7) cross-wise. Tightening torque 20 Nm (15 ft.lb)

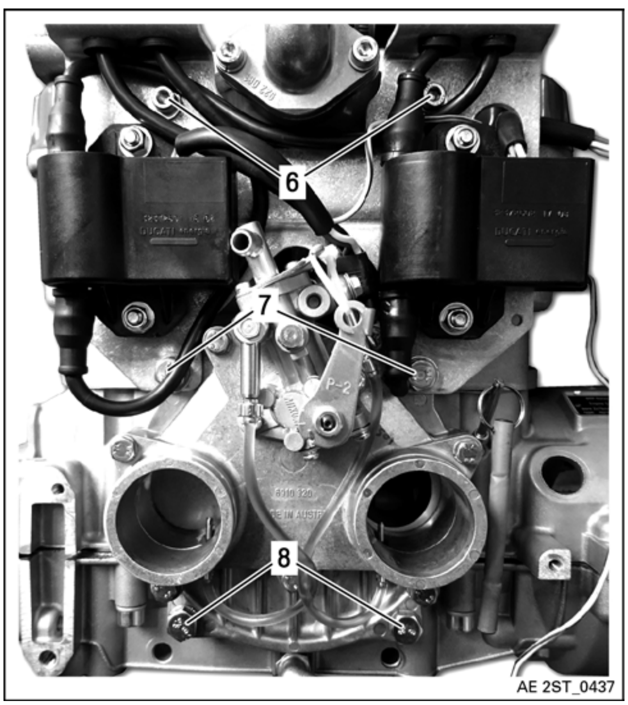


Figure 2.26

6 Allen screw M6x16 *7 Hex. screw M8x25*
8 Hex. screw M8x20

Step	Procedure
7	Connect charging coils (9) and pickup coils (10) to stator.
8	Insert ignition shut-off wires (YE/BK) (11) into 4-pin connector housing (12).
9	Install clamp (13), (BN) wire (14) and Allen screw M5x16 with lock washer. Tightening torque 6 Nm (53 in. lb).
10	Install spiral hose (15).

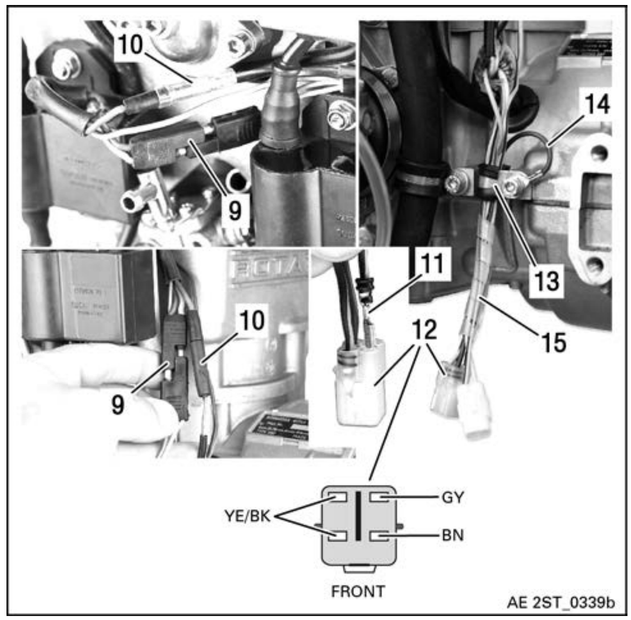


Figure 2.27

9 Charging coils *10 Pickup coils*
11 Ignition shut-off wires *12 4-pin connector housing*
13 Clamp *14 Brown wire*
15 Spiral hose

NOTE

Fix remaining cables with cable ties.

INSTALLATION

SPARK PLUG – INSTALLATION

See Maintenance Manual Line of the engine type 582 mod. 99 / mod. 17 Chapter 12-20-00 section Spark plug install.

STATOR — INSTALLATION

Step	Procedure
1	Feed the stator wires (1) through the stator plate (2) and align stator with the thread holes (3) of the stator plate.
2	Secure the stator with 3 Allen screws M5x30 (4) and lock washers (5) with LOCTITE 243. Tightening torque 10 Nm (89 in. lb).

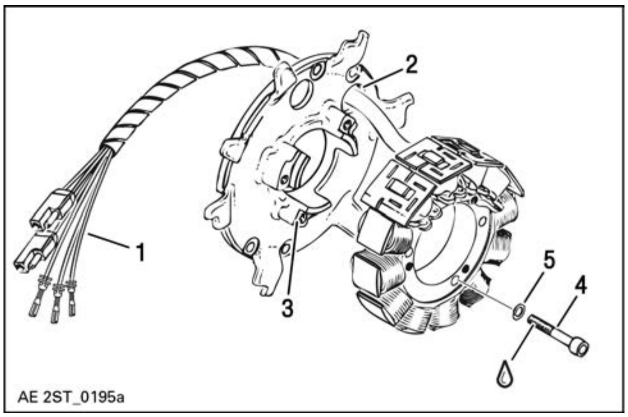


Figure 2.28

1 Stator wires | *2 Stator plate*
3 Thread holes | *4 Allen screws M5x30*
5 Lock washers A5

Step	Procedure
3	Feed stator wires through crankcase (6). **NOTE** *Route the stator wires and pickup wires so that they are behind and held in place by the outer lugs (8) of the stator plate.*

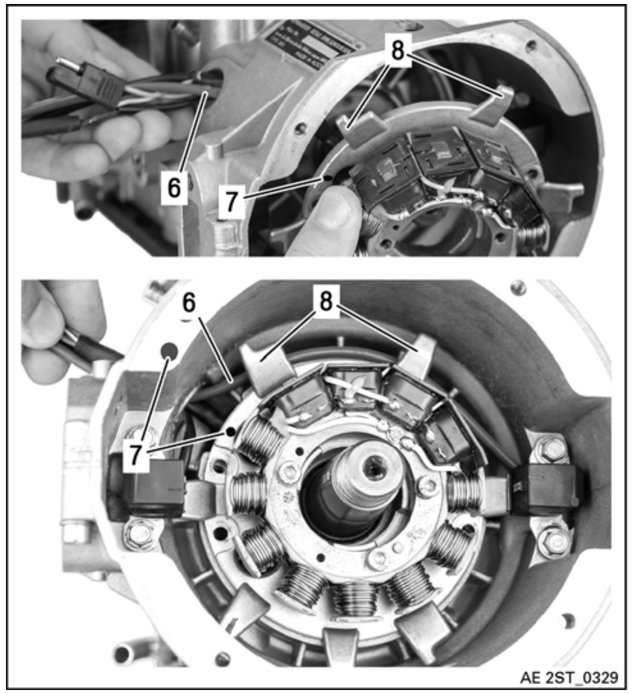


Figure 2.29

6 Stator wires | *7 Alignment marks*
8 Lug

Step	Procedure
4	Place the stator assembly into position on crankcase so that marking (7) on stator plate (9) aligns. Secure stator plate with 2 Torx screws M5x16 (10) with LOCTITE 243. Tightening torque 6 Nm (53 in.lb).

NOTE

Now install the trigger coil, see Trigger coil - installation.

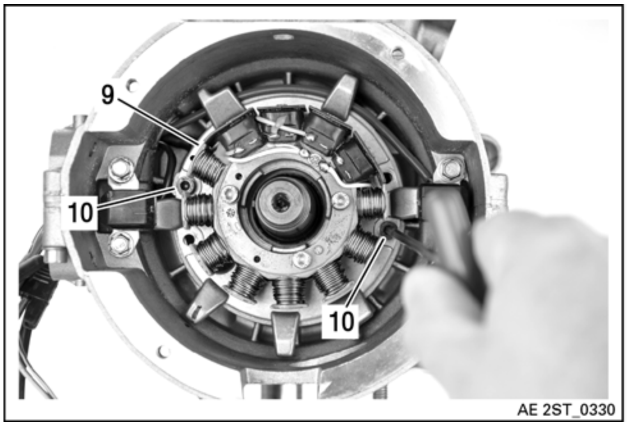


Figure 2.30

9 Stator plate *10 Torx screws M5x16*

Step	Procedure
5	Place rubber grommet (11) into crankcase.
6	Connect the 2-pin charging coil connectors (12), lubricate with lithium based grease.
7	Connect (GY) rev. counter wire (13) to 4-pin connector housing.
8	Install clamp (14) and (BN) wire (15) with Allen screw M5x16 and lock washer. Tightening torque 6 Nm (53 in. lb).
9	Mount spiral hose (16). (YE) and (BK) lighting coil wires(YE/BK) are provided with 2-pin connector housing (17)

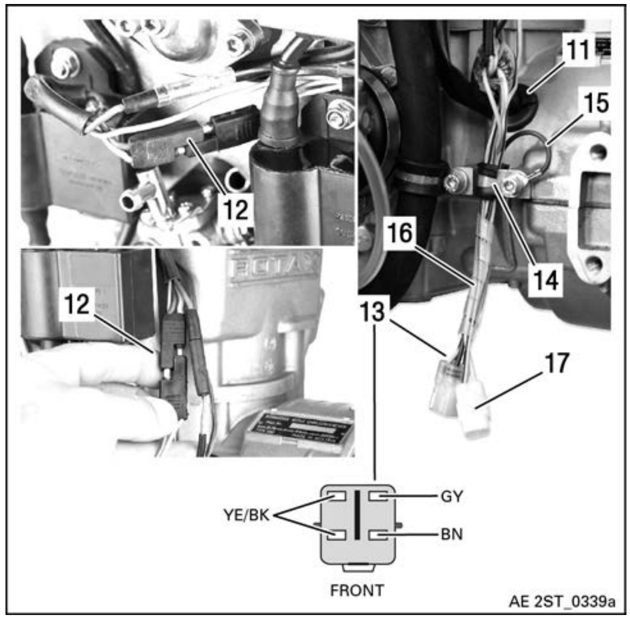


Figure 2.31

11 Rubber grommet *12 Charging coils connectors*
13 Rev. counter wire *14 Clamp*
15 Brown wire *16 Spiral hose*
17 2-pin connector housing

TRIGGER COIL – INSTALLATION

Step	Procedure
1	Place magneto side pickup coil in position (1) and attach using 2 Taptite screws M5x16 with washers. **NOTE** *Set ignition timing before final torque of Taptite screws.*
2	Carefully route RD/WH wire behind stator plate bosses and feel wire through grommet (2).
3	Connect RD/WH wire to ignition module.
4	Repeat for P.T.O. side pickup coil (3).

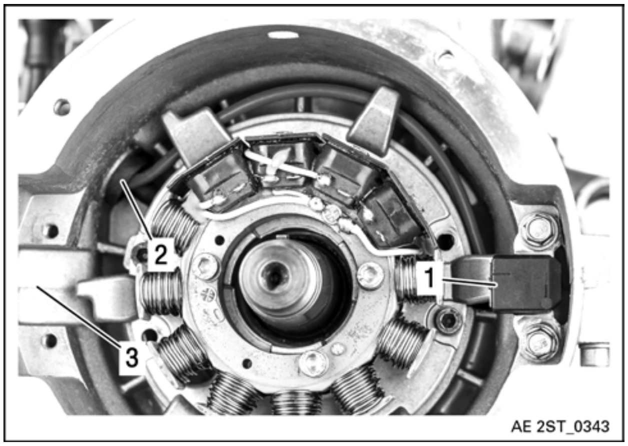


Figure 2.32

1	*Pickup coil (MAG)*	2	*Grommet*
3	*P.T.O. side*		

MAGNETO FLYWHEEL – INSTALLATION

Step	Procedure
1	Polish the tapers of the crankshaft (1) and the magneto flywheel (2) using very fine abrasive pad then degrease.
2	Lock the crankshaft with locking pin part no. 876640.
3	Place woodruff key (3) securely in the crankshaft key slot.
4	Apply a thin layer of LOCTITE 243 to the taper surface of the flywheel and place flywheel into position on the crankshaft aligning woodruff key with flywheel groove (4).
5	Remove locking pin part no. 876640.

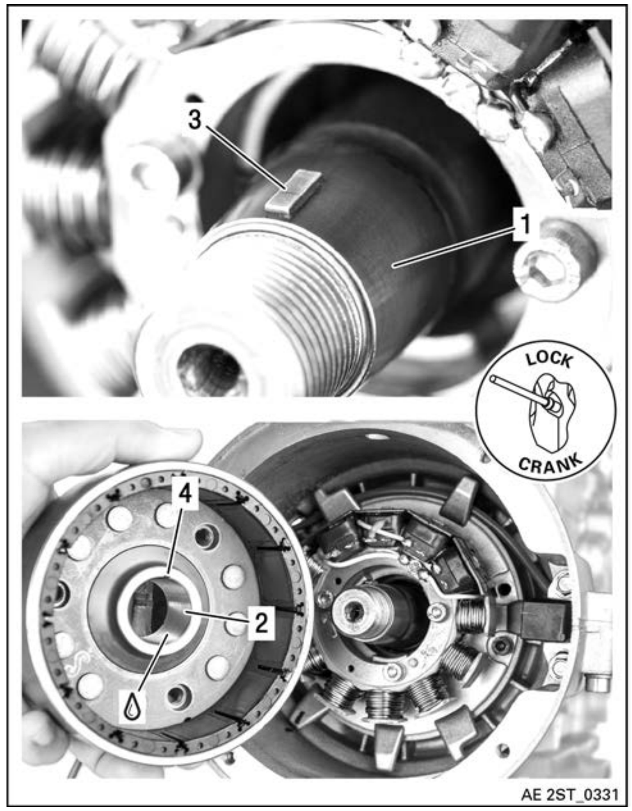


Figure 2.33

1	*Crankshaft taper*	2	*Magneto flywheel*
3	*Woodruff key*	4	*Flywheel groove*

Step	Procedure
6	Attach puller plate part no. 876081 (5) to magneto flywheel using 3 hex. screws M8x20 (6).
7	Place lock washer A22 over crankshaft threads and attach hex. nut M22 (7) with LOCTITE 243. Tightening torque 105 Nm (77 ft.lb).

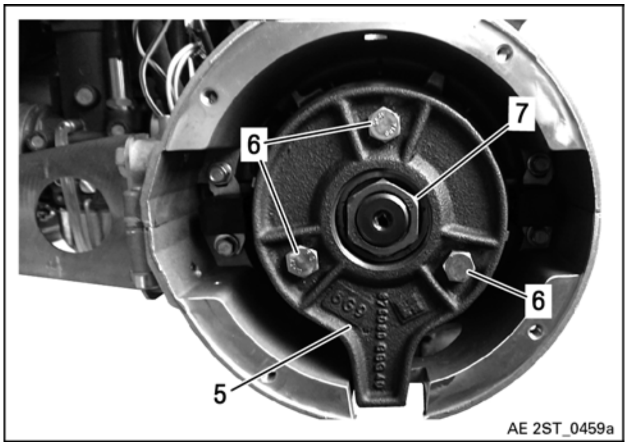


Figure 2.34

5 Puller plate
6 Hex. screws M8x20
7 Hex. nut M22

Step	Procedure
8	Remove puller plate part no. 876081.

SETTING OF IGNITION TIMING

General

Timing of the rotary valve requires that pistons, cylinders and head is installed. See Chapters 72-30-10 “Displacement Parts” and 72-30-00 “Cylinder Head”. Rotary valve timing is set by aligning valve with intake opening for MAG end cylinder, while at TDC.

ATTENTION

Piston may be damaged!
To avoid piston damage, ensure that the dial gauge has sufficient travel to allow the piston full stroke.

NOTE

Error of measurement caused by the slightly inclined spark plug hole is minimal and can therefore be ignored.

Step	Procedure
1	Remove spark plug on each cylinder.
2	Rotate the engine in the normal direction of rotation until the “Magneto End” cylinder’s piston is close to Top Dead Center (TDC). **NOTE** *The magneto flywheel nut can be used to rotate the crankshaft. Normal rotation direction is shown by an arrow on magneto flywheel.*

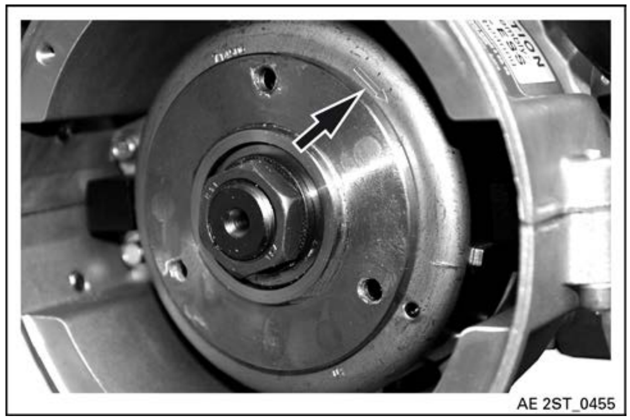


Figure 2.35

Step	Procedure
3	Insert dial gauge and gauge pin part no. 876945 with 14 mm spark plug adapter part no. 876940 (mod. 99) or 12 mm adapter part no. 876942 (mod. 17) into spark plug hole of the magneto end cylinder.
4	Slowly turn the crank in the direction of normal rotation until the dial gauge indicates that the piston is at its top most point of travel (TDC) and “zero” the gauge.
5	Slowly rotate the crankshaft in REVERSE direction until the dial gauge indicates 1.96 mm +/- 0.2 mm (0.077 in +/- 0.008 in). The magneto end piston is now resting at 18° B.T.D.C.

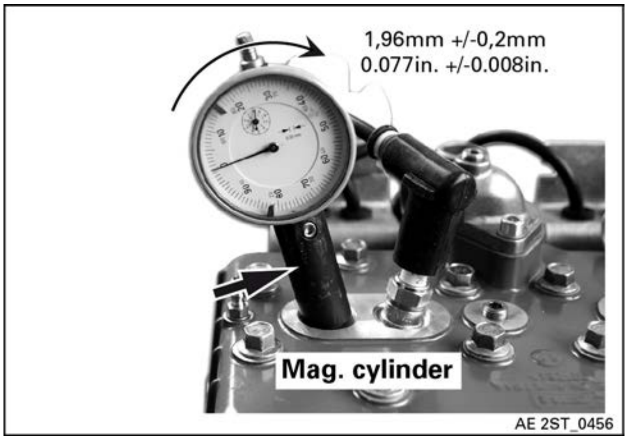


Figure 2.36

Step	Procedure
6	Slacken the 2 Taptite screws (1) attaching the 9 O'clock position pick-up coil.
7	Move the pick-up until its alignment mark lines (2) up with the mark on the magneto flywheel (3).
8	Adjust gap (4) to 0.45 - 0.55 mm (0,018 - 0,022 in.). Hand tighten the Taptite screws (1) in place.
9	Tighten trigger coil mounting screws to 6 Nm (53 in.lb).
10	Re-check timing mark alignment and trigger coil gap. Adjust if necessary.

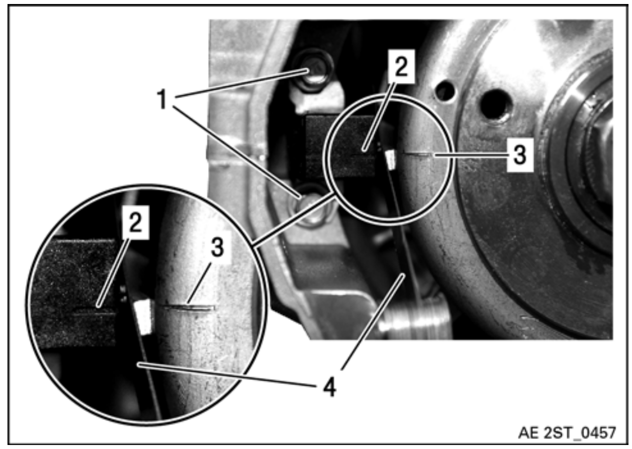


Figure 2.37

1 *Taptite screws*	2 *Mark lines*
3 *Magneto flywheel*	4 *Gap*

Step	Procedure
11	Move the dial gauge and adapter to the PTO cylinder.
12	Repeat the ignition timing and trigger gap for the 3 O'clock position pick-up coil which corresponds to the PTO cylinder.

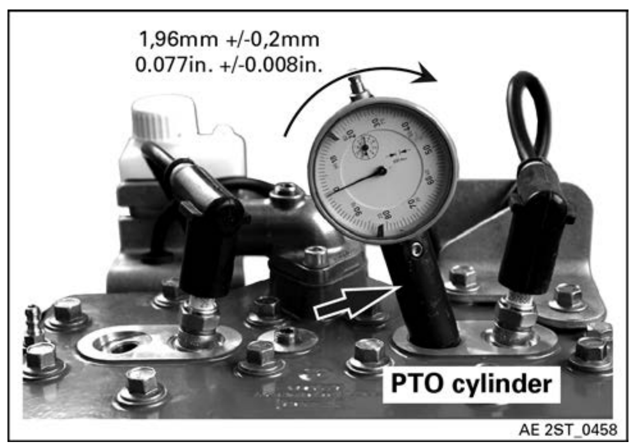


Figure 2.38

FINISHING WORK

- Check ignition pickup coil gap
- Re-install the rewind starter or electric starter (magneto end) if optionally equipped. See Chapter 80-10–00 or 80-20-00, section Installation
- Install carburetor and intake silencer, see Chapter 73-00-00
- Remove the crankshaft locking pin. See Maintenance Manual Line for 582 mod. 99 / mod. 17
- Re-connect negative terminal of battery
- Setting of the ignition timing. See Chapter 72-20-00 section Rotary valve assembly, installation and timing.

Carry out an engine test run.
See Maintenance Manual Line for the engine type 582 mod. 99 / mod. 17.

Chapter: 72–10–00
PROPELLER GEARBOX

TOPICS IN THIS CHAPTER

SPECIAL TOOLS

Description	Part number
Mounting yoke	876880
Locking pin	876640
Puller assy.	276808
Insertion punch	876668
Gasket set “B”	995781
Protection mushroom	876552

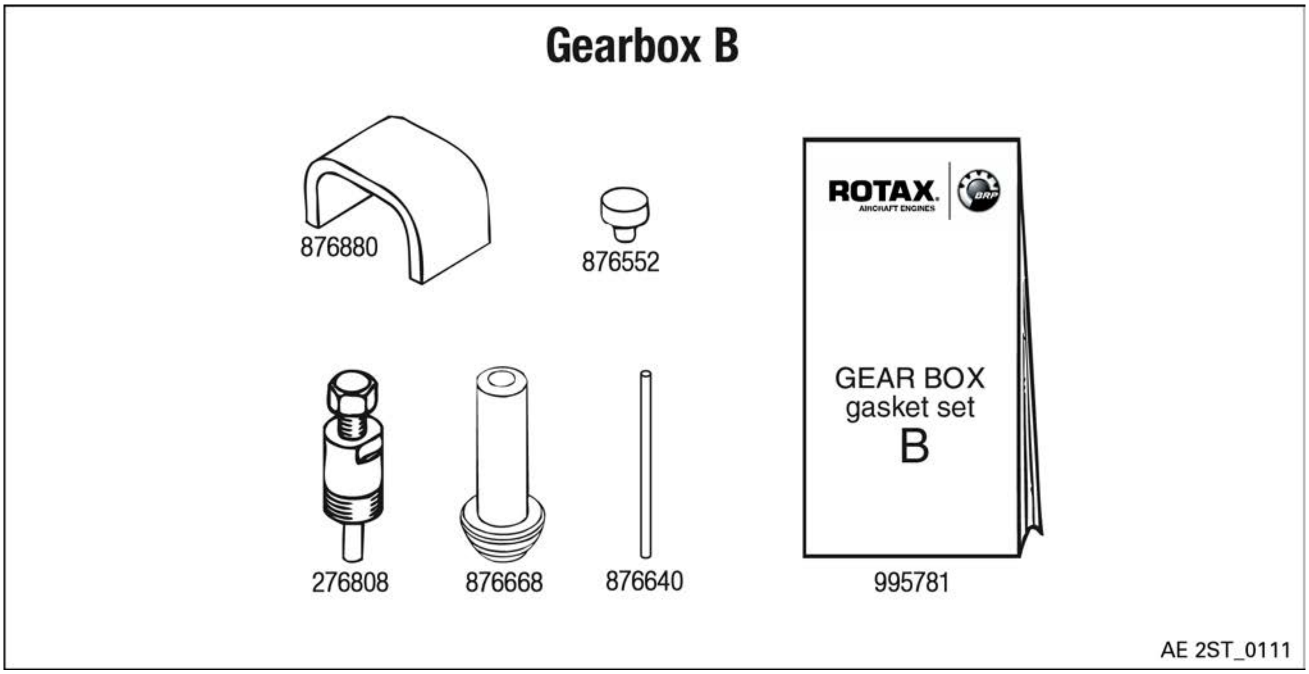


Figure 3.1

Description	Part number
Insertion punch	877430
Insertion jig	877432
Insertion jig	277982
Socket 41x12.5	877445
Cone sleeve expander	877810
Protector mushroom	877415
Puller assembly	877425
Protector mushroom	876552
Clamp	851160
Gasket set “C”	995775
Gasket set “E”	995776
Locking pin	876640
Puller assy.	877379

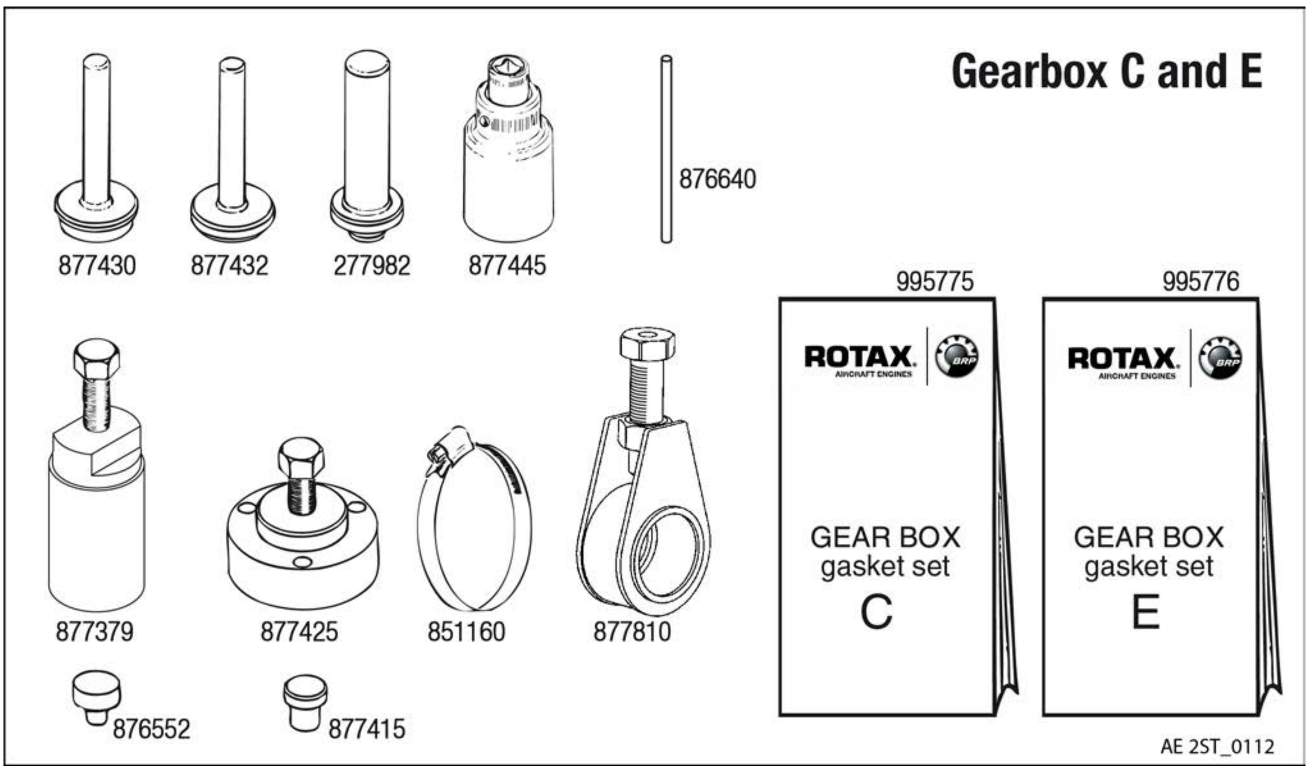


Figure 3.2

SERVICE PRODUCTS

Description	Part number
LOCTITE 243	897651
LOCTITE 603	899789
LOCTITE 648	899788
LOCTITE ANTI-SEIZE	297434
LOCTITE 7063	n.a.
SILASTIC 732 RTV	297386
LITHIUM BASED GREASE	897330
Gear Oil (85W140)	n.a.

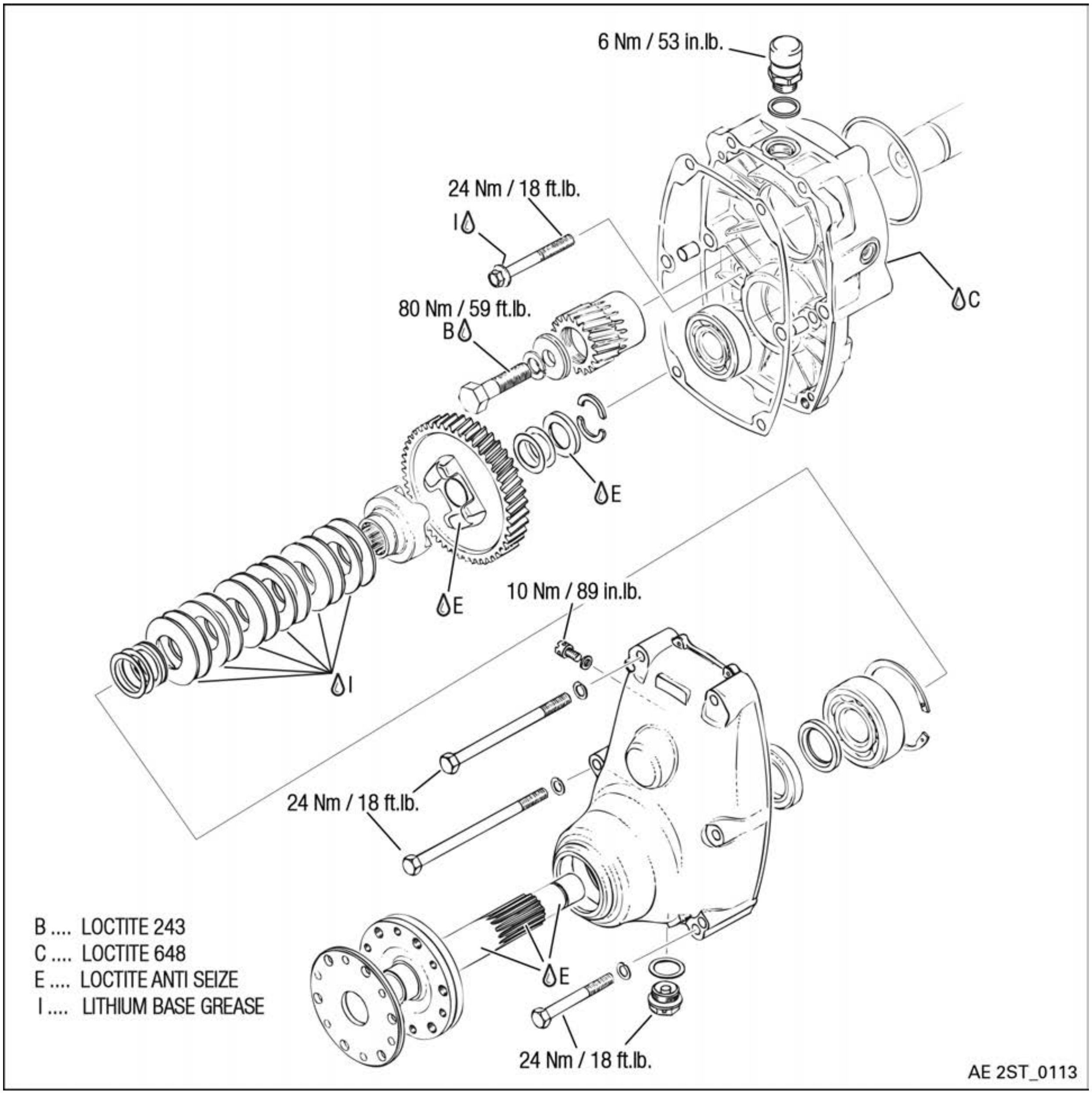


Figure 3.3: Gearbox B

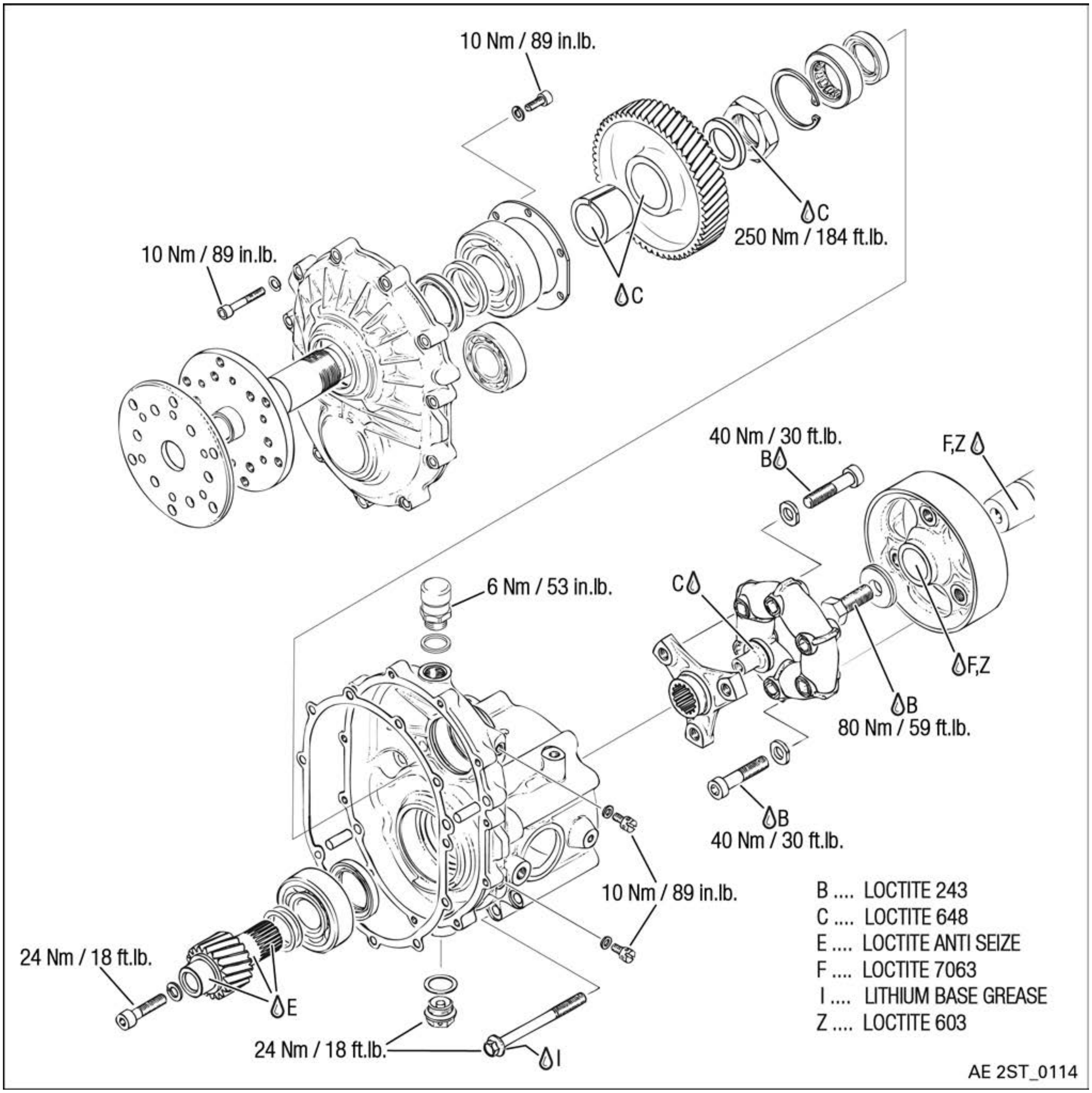


Figure 3.4: Gearbox C

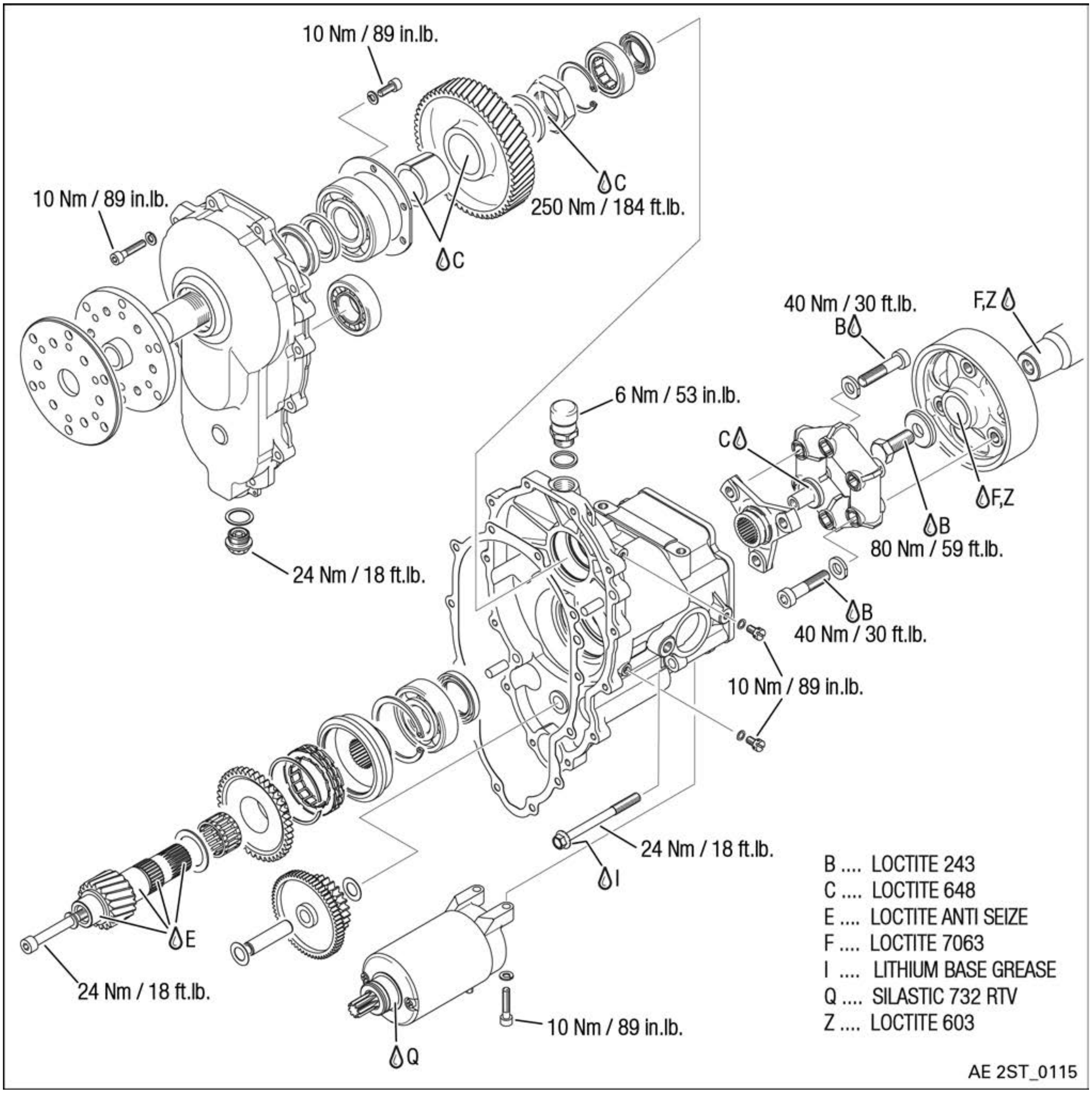


Figure 3.5: Gearbox E

SYSTEM DESCRIPTION

GEARBOX VERSION “B”

The propeller shaft is driven by the crankshaft by means of a linear helical gear unit.

The propeller gearbox has a damping means to counteract torsional vibrations. This consists of torsional shock absorption by means of contoured dogs with axial spring loading by disc springs.

ATTENTION

For “B” version gearbox, the moment of inertia of the propeller must not exceed 3.000 kg cm².

GEARBOX VERSION “C”

The propeller shaft is driven by the crankshaft by means of a linear helical gear unit.

The propeller gearbox has a damping means to counteract torsional vibrations. This consists of torsional shock absorption by means of a rubber coupling and a flywheel.

ATTENTION

For “C” version gearbox, the moment of inertia of the propeller must not exceed 6.000 kg cm².

GEARBOX VERSION “E”

The propeller shaft is driven by the crankshaft by means of a linear helical gear unit.

The propeller gearbox has a damping means to counteract torsional vibrations. This consists of torsional shock absorption by means of a rubber coupling and a flywheel.

Gearbox version “E” is fitted with an electric starter which is attached to the drive gear by a sprag clutch.

ATTENTION

For gearbox version “E”, the moment of inertia of the propeller must not exceed 6.000 kg cm ².

SAFETY INSTRUCTIONS

⚠ WARNING

Danger of severe burns and scalds!
Always allow the engine to cool down to ambient temperature before starting any work.

⚠ WARNING

During work on the engine there is a risk of life-threatening injuries from the propeller and rotating parts in the engine!
Ensure that the ignition is switched off!
Disconnect the battery
Prevent the engine from being unintentionally switched on!

REMOVAL

For removal of the propeller gearbox, see current Maintenance Manual Line for the respective engine type.

Preparation
Before the propeller gearbox is removed, the work described below must be carried out to identify any further malfunctions in the propeller gearbox and rectify them as part of repair work.

ATTENTION

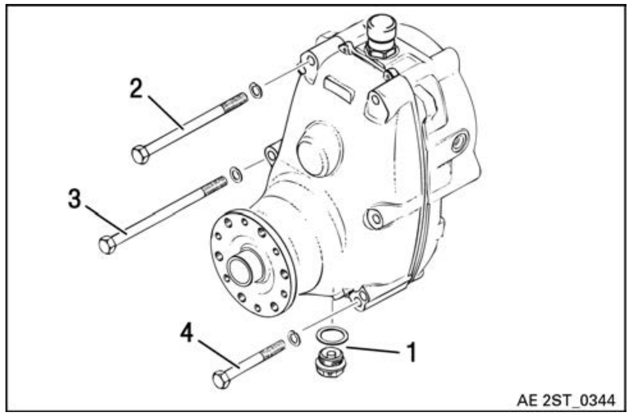
If these checks are omitted, it may be necessary to dismantle the propeller gearbox again to rectify any faults after it has been repaired.

PROPELLER GEARBOX “B” — REMOVAL

ENVIRONMENTAL NOTE

Ensure proper collection and disposal of gear oil.

Step	Procedure
1	Remove magnetic plug (1) with gasket ring and drain gear oil into suitable tray (0.5 l capacity).
2	Remove 2 hex screws (2) M8x110, 2 hex. screws (3) M8x125 and 2 hex. screws (4) M8x65 along with lock washers.



1	*Magnetic plug with gasket ring*	2	*Hex. screw M8x110*
3	*Hex. screw M8x125*	4	*Hex. screw M8x65*

Figure 3.6

Step	Procedure
3	Remove gear cover assembly (5) and set aside. If required, tap gently using a soft mallet to remove gear cover.
4	Remove 2 hex. collar screws (6) M8x65 inside and remove gear housing (7) and O-ring.

NOTE

To reduce fretting, the gear housing is glued in place using LOCTITE 648.

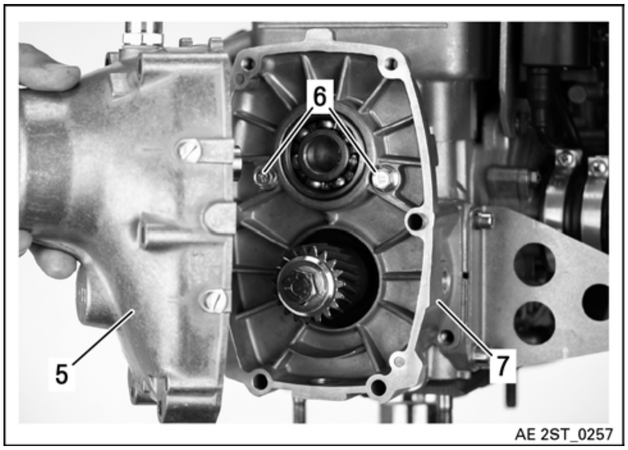


Figure 3.7

5 Gear cover assy. *6 Hex. collar screws*

7 Gear housing

Step	Procedure
5	Lock crankshaft by inserting locking pin part no. 876640 (8) into fuel pump pulse hose nipple (9) and turning crankshaft until pin engages in crank blade recess.

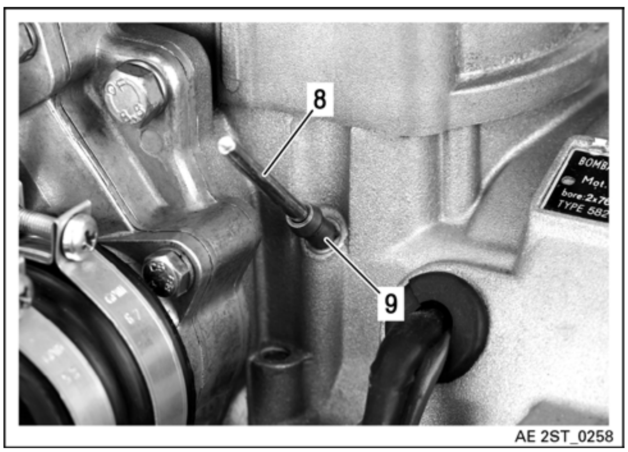


Figure 3.8

8 Locking pin *9 Hose nipple*

ATTENTION

Use GENUINE ROTAX® locking pin part no. 876640 only, to prevent any damage to crankcase and crankshaft.

Step	Procedure
6	Remove hex. screw (10) 1/2-20 UNFX2 along with lock washer (11) and washer (12).

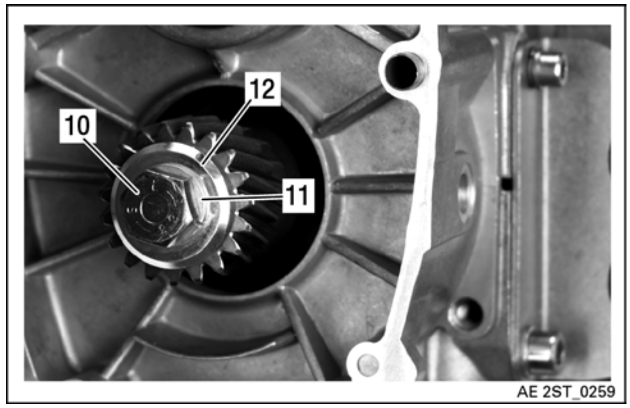


Figure 3.9

10 Hex. screw *11 Lock washer*

12 Washer

Step	Procedure
7	Thread puller assy. (13) part no. 276808 into the drive gear (14).
8	Pull off drive gear by turning the puller screw clockwise.

NOTE

If the drive gear is difficult to pull off, do not strike puller screw which can damage the bearing. Heat gear while protecting seal.

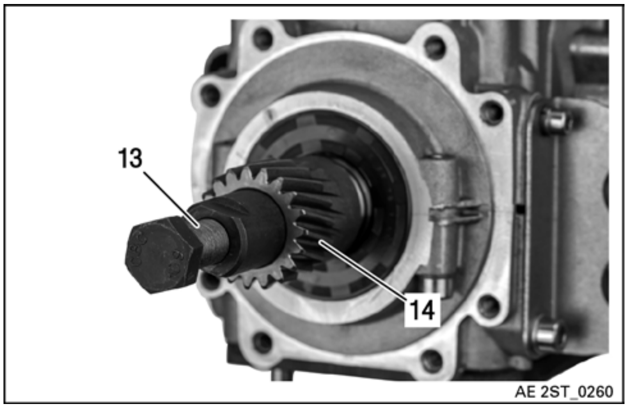


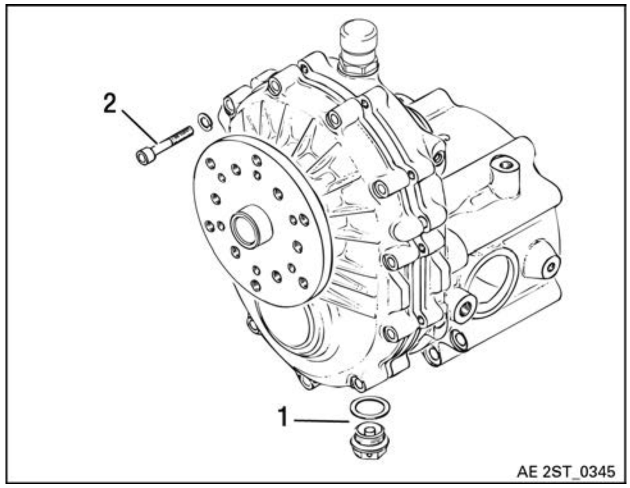
Figure 3.10

13 Puller assy. *14 Drive gear*

PROPELLER GEARBOX "C" — REMOVAL

ENVIRONMENTAL NOTE
Ensure proper collection and disposal of gear oil.

Step	Procedure
1	Remove magnetic plug (1) with gasket ring and drain gear oil into suitable tray (0.5 l capacity).
2	Remove 11 Allen screws (2) M6x30 attaching gear cover to the gearbox housing.

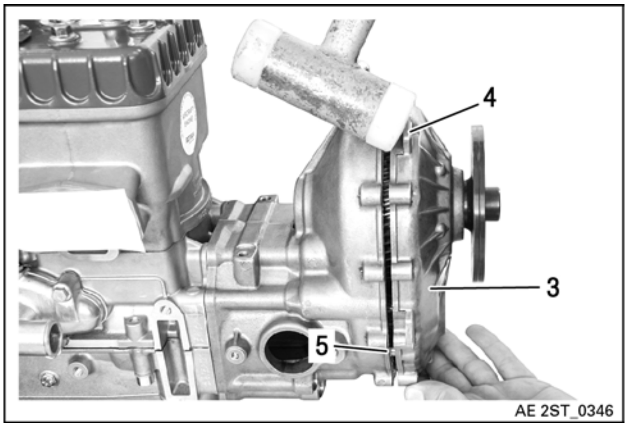


1 Magnetic plug with gasket ring *2 Allen screws M6x30*

Figure 3.11

Step	Procedure
3	Remove gear cover (3) by tapping cover on the lugs (4), using a soft mallet. Gear cover is kept in position by 2 dowel pins (5).

ATTENTION
Damage to bearings can occur. Never hammer on propeller shaft to remove gearbox cover.



3 Gear cover *4 Lugs*

5 Dowel pins

Figure 3.12

Step	Procedure
4	Lock crankshaft by inserting locking pin part no. 876640 (6) into fuel pump pulse hose nipple (7) and turning crankshaft until pin engages in crank blade recess.

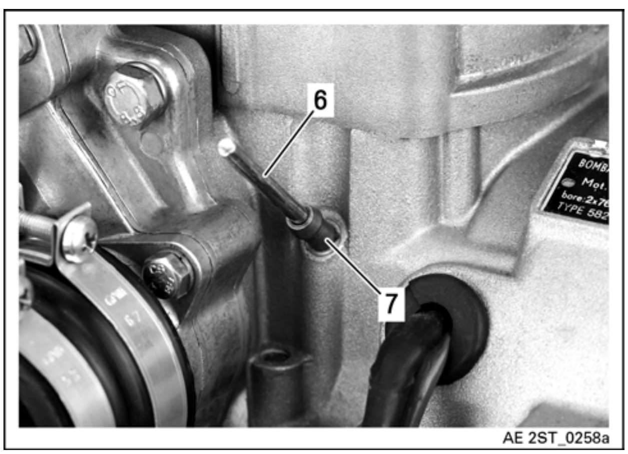


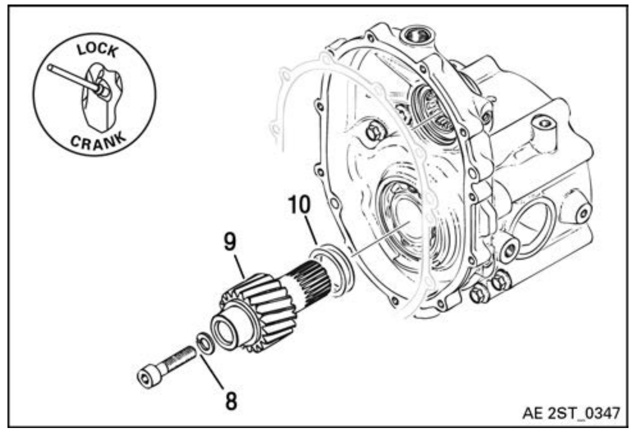
Figure 3.13

6 Locking pin *7 Hose nipple*

ATTENTION

Use GENUINE ROTAX® locking pin part no. 876640 only, to prevent any damage to crankcase or crankshaft.

Step	Procedure
5	Remove Allen screw (8) M8x35 with lock washer and with gear set (9).
6	Remove shim 26.5/34/0.2 (10).

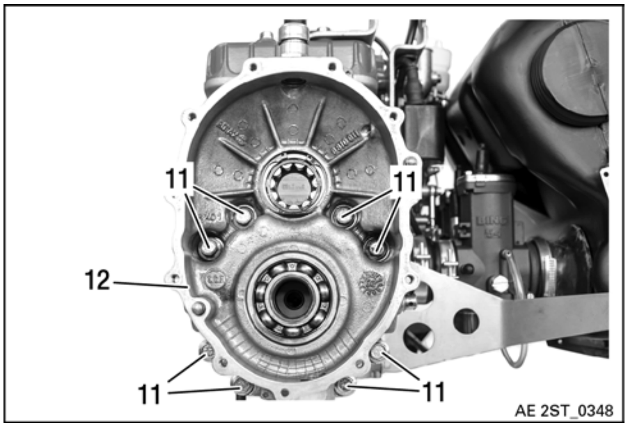


8 Allen screws M8x35 *9 Gear set*

10 Shim 26.5/34/0.2

Figure 3.14

Step	Procedure
7	Remove the 8 hex. collar screws (11) M8x90, 4 of them inside the gearbox housing and pull off gearbox housing (12).

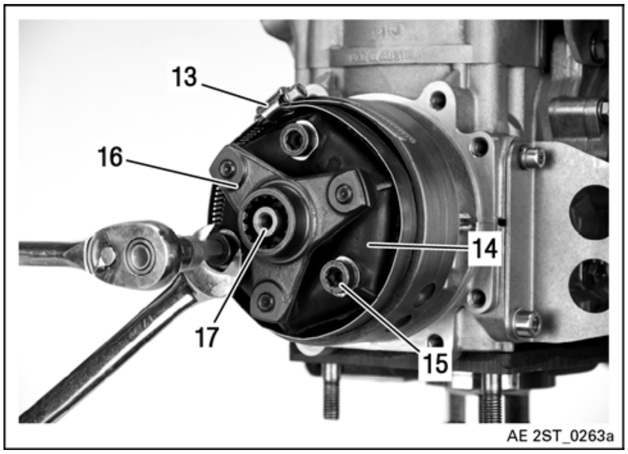


11	*Hex. collar screws M8x90*	*12*	*Gearbox housing*

Figure 3.15

ATTENTION
Placed on the back side of the pinion gear are the shims for proper axial distance of pinion shaft.

Step	Procedure
8	Fit hose clamp (13) and tighten around rubber coupling (14). Remove 3 Allen screws (15) M10x45.
9	Remove coupling flange (16) together with the rubber coupling (14) and nut M8 (17).

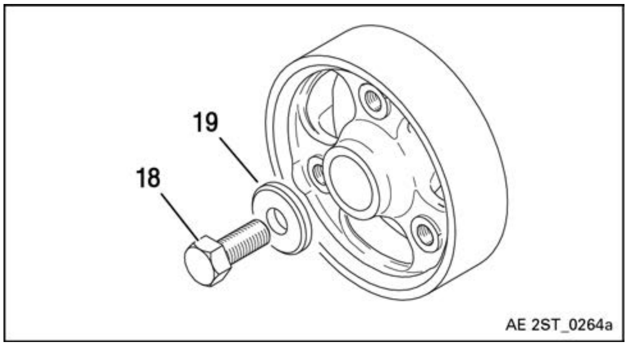


13	*Hose clamp*	*14*	*Rubber coupling*
15	*Allen screws M10x45*	*16*	*Coupling flange*
17	*Nut M8*		

Figure 3.16

ATTENTION
To prevent any damage to rubber coupling, hold washer with flats in position using 17 mm wrench.

Step	Procedure
10	Remove hex. screw (18) 1/2-20 UNFX1 3/16 along with washer 13/34/5 (19).



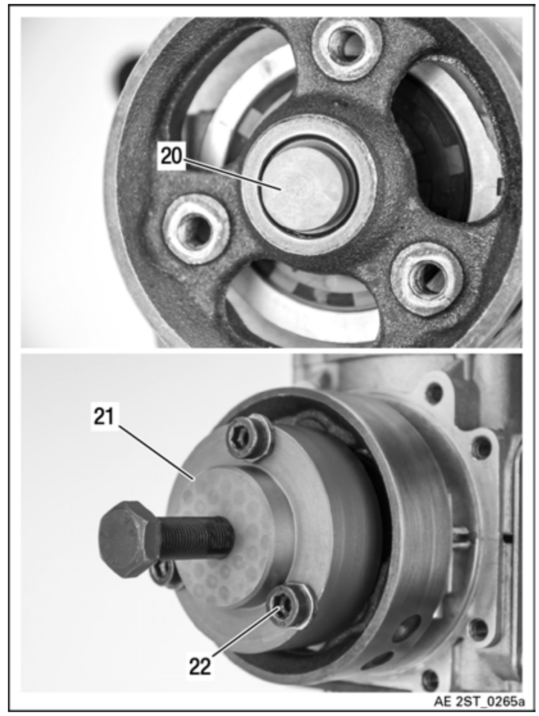
18	*Hex. collar screw 1/ 2–20 UNFX1 3/16*	19	*Washer 13/34/5*

Figure 3.17

Step	Procedure
11	Slightly grease mushroom shaped protection piece part no. 876552 (20) and place it onto crankshaft.
12	Fit flywheel puller part no. 877425 (21) using 3 Allen screws (22) M10x45 and pull off flywheel by turning hex. screw clockwise.
13	Put aside flywheel and protection mushroom.

NOTE

The flywheel is glued in place with LOCTITE 603. If the flywheel is difficult to pull off, a smart blow with a hammer to the puller screw may help. If necessary, heat the flywheel with a hot air gun.



20	*Protection piece*	21	*Flywheel puller*
22	*Allen screws M10x45*		

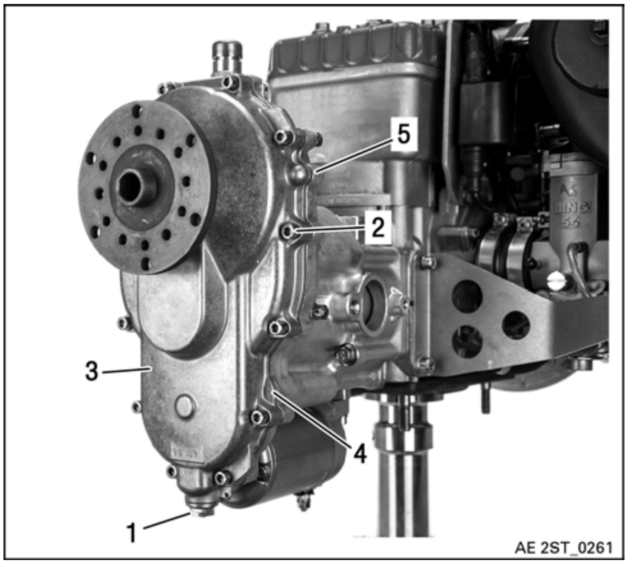
Figure 3.18

PROPELLER GEARBOX “E” — REMOVAL

ENVIRONMENTAL NOTE

Ensure proper collection and disposal of gear oil.

Step	Procedure
1	Remove magnetic plug (1) (Wrench size: 17) and drain gear oil into suitable tray (0.5 l capacity).
2	Remove 11 Allen screws (2) M6x30 attaching gear cover to the gearbox housing.
3	Remove gear cover (3) by tapping cover on the lugs (4), using a soft mallet. Gear cover is kept in position by 2 dowel pins (5).



1	*Magnetic plug*	2	*Allen screw M6x30*
3	*Gear cover*	4	*Lug*
5	*Dowel pin*		

Figure 3.19

Step	Procedure
4	Lock crankshaft by inserting locking pin (6) part no. 876640 into fuel pump pulse hose nipple (7) and turning crankshaft until pin engages in crank blade recess.

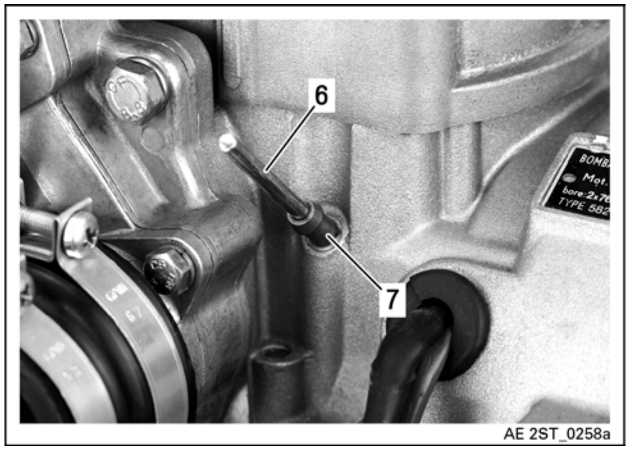


Figure 3.20

6	*Locking pin*	7	*Hose nipple*

ATTENTION

Use GENUINE ROTAX® locking pin part no. 876640 only, to prevent any damage to crankcase or crankshaft.

Step	Procedure
5	Remove the idle gear along with idle gear (14) shaft and two thrust washers.
6	Remove Allen screw (8) M8 x 35 and withdraw pinion shaft (9), thrust washer (10), needle bearing (11), freewheel gear (12) and sprag clutch assy. (13).

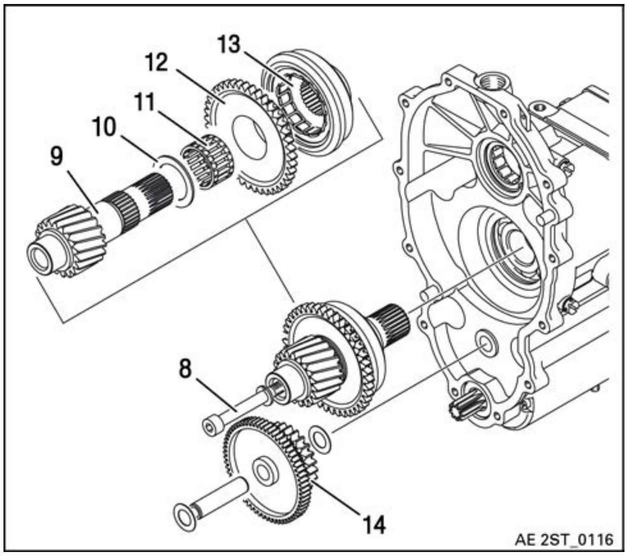
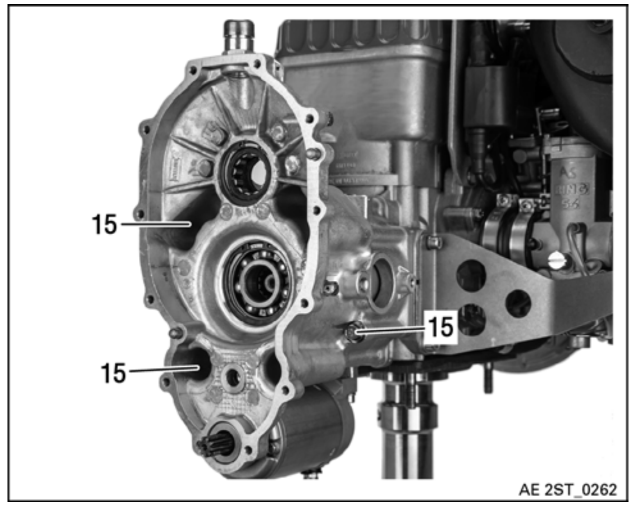


Figure 3.21

8	*Allen screw M8x35*	9	*Pinion shaft*
10	*Thrust washer*	11	*Needle bearing*
12	*Freewheel gear*	13	*Sprag clutch assy.*
14	*Idle gear*		

Step	Procedure
7	Remove the 8 hex. collar screws (15) M8x90 (11 mm / 0.43 in.), 6 of them inside the gearbox housing and pull off gearbox housing.



15	*Hex. collar screws M8x90*

Figure 3.22

Step	Procedure
8	Fit hose clamp (16) part no. 851160 and tighten around rubber coupling (17). Remove 3 Allen screws (18) M10x45.
9	Remove coupling flange (19) together with the rubber coupling and nut M8 (20).

NOTE

To reduce fretting, the gearbox housing is glued in place using LOCTITE 648.

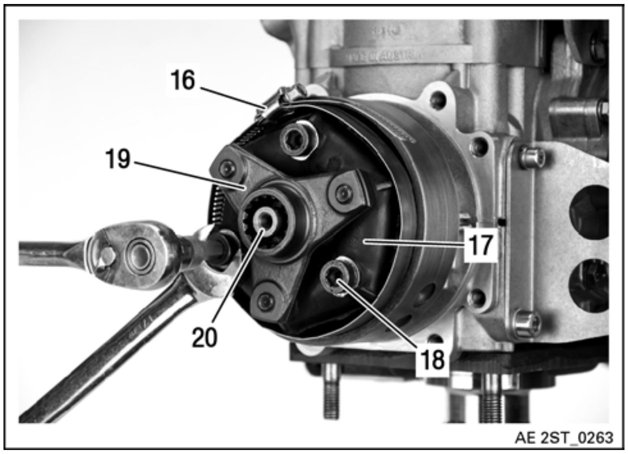


Figure 3.23

16 Hose clamp	*17 Rubber coupling*
18 Allen screw M10x45	*19 Coupling flange*
20 Nut M8	

ATTENTION

To prevent any damage to rubber coupling, hold washer with flats in position using 17 mm wrench.

Step	Procedure
10	Remove hex. screw (21) 1/2-20 UNFX1 3/16 (Wrench size: A/F: 19) along with washer (22).

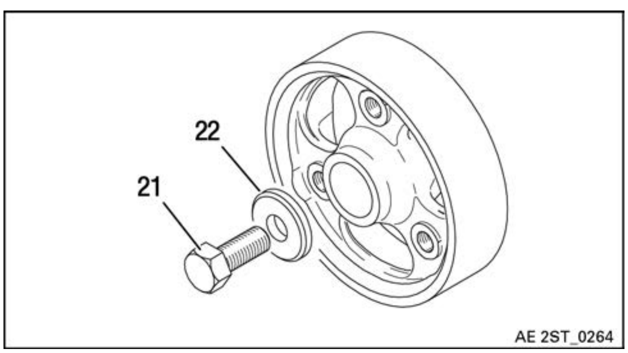


Figure 3.24

21 Hex. screw	*22 Washer*

Step	Procedure
11	Slightly grease mushroom shaped protection piece (23) part no. 876552 and place it onto crankshaft.
12	Fit flywheel puller (24) part no. 877425 using 3 Allen screws (25) M10x45 and pull off flywheel by turning hex. screw clockwise.
13	Put aside flywheel and protection piece.

NOTE

The flywheel is glued in place with LOCTITE 603. If the flywheel is difficult to pull off, a smart blow with a hammer to the puller screw may help. If necessary, heat the flywheel with a hot air gun.

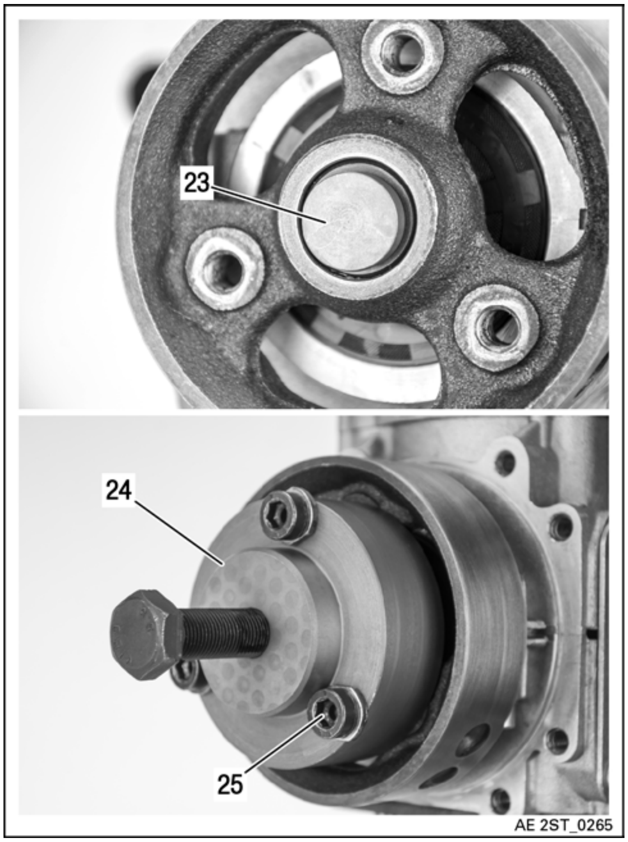


Figure 3.25

23	*Protection mushroom*	24	*Flywheel puller assy.*
25	*Hex. collar screw M8x90*		

PROPELLER GEARBOX “B” — DISASSEMBLY

After disassembly, clean and examine single components for damage and wear.

Step	Procedure
1	Place reduction gear assembly with prop flange on suitable support (1) under hydraulic press. Apply a load of 16 kN (3600 lbs) on the dog gear (2) via the mounting yoke (3) part no. 876880.
2	Remove ring halves (4) and slowly release pressure and remove mounting yoke.

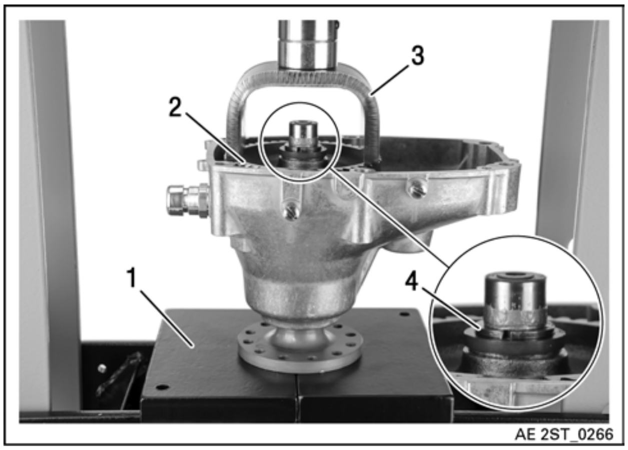


Figure 3.26

1	*Support*	2	*Dog gear*
3	*Mounting yoke*	4	*Ring halves*

ATTENTION

Take care not to damage gear cover with yoke, and that the load applied is not in excess of 16 kN (3600 lbs), otherwise dog gear might crack.

Step	Procedure
3	Withdraw angular ring (5), 2 thrust washers (6), dog gear (7), dog hub (8), 12 disk springs (9), distance ring (10) and shims (11) from the propeller shaft.

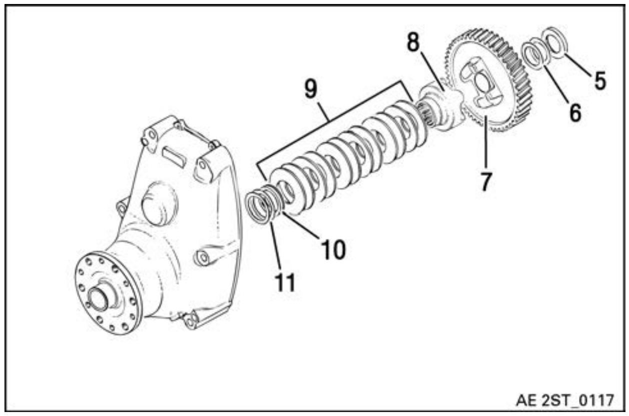


Figure 3.27

5	*Angular ring*	6	*Thrust washers*
7	*Dog gear*	8	*Dog hub*
9	*Disk springs*	10	*Distance ring*
11	*Shim(s)*		

REMOVAL OF THE PROPELLER SHAFT (B)

Step	Procedure
1	Place protection mushroom (1) part no. 876552 onto propeller shaft. Place gear cover on a suitable support (2) and press out propeller shaft.

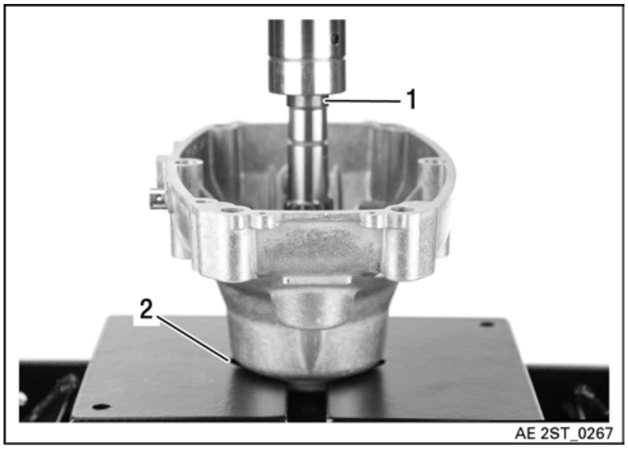


Figure 3.28

1 Protection mushroom *2 Suitable support*

ATTENTION
If the propeller shaft is removed, the oil seal and the ball bearing must be replaced.

REMOVAL OF THE BALL BEARINGS AND OIL SEAL (B)

⚠ WARNING
Danger of severe burns and scalds! Wear heat resistant gloves!

Step	Procedure
1	Remove snap ring (1).
2	Heat up gear cover to 100 to 120° C (212 to 248° F). With the bearing facing down, gently tap the gearbox housing on a clean, solid surface until the ball bearing (2)and distance ring (3) drops out.
3	Press out oil seal (4).

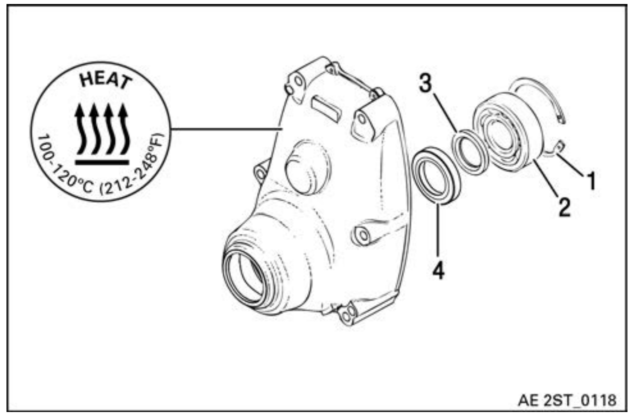


Figure 3.29

1 Spring *2 Ball bearing*

3 Distance ring *4 Oil seal*

Step	Procedure
4	Heat up gear cover to 100 to 120° C (212 to 248° F). With the bearing facing down, gently tap the gearbox housing on a clean, solid surface until the ball bearing (5) drops out.

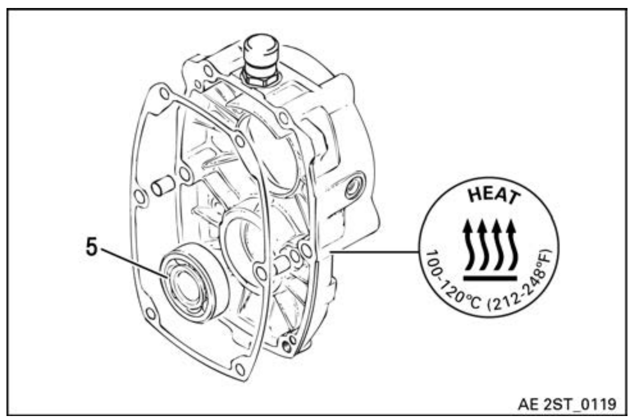


Figure 3.30

5 Bearing

PROPELLER GEARBOX “C” — DISASSEMBLY

⚠ WARNING

Danger of severe burns and scalds!
Wear heat resistant gloves!

ATTENTION

Never clamp propeller shaft or propeller flange directly in a vice.

Step	Procedure
1	Fix gear cover assy. with propeller flange down, bolted to suitable fixture (1), to lock the propeller shaft against rotation.
2	Remove hex. nut (2) M30x1.5 (Socket 41x12.5 part no. 877445, turn clockwise) with washer 30 (3).

NOTE

M30 nut and layshaft gear is glued in place with LOCTITE 648. Use a heat gun for removal..

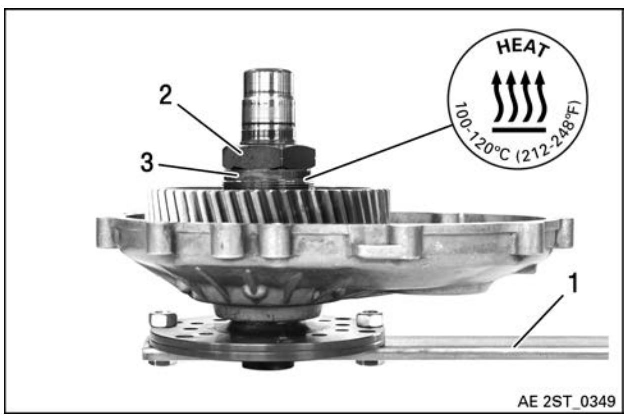


Figure 3.31

1 Fixture *2 Hex. nut M30x1.5 (left hand)*

3 Washer

Step	Procedure
3	Place lightly greased protection piece part no. 877415 on propeller shaft and thread the puller tool (4) part no. 877379 securely onto layshaft gear (5).
4	Pull off layshaft gear by turning the puller tool bolt (19 mm) clockwise.

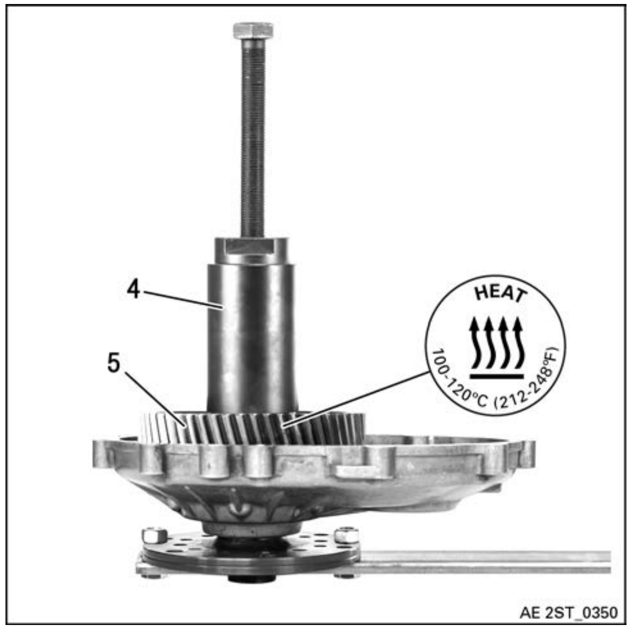


Figure 3.32

4 Puller *5 Layshaft gear*

Step	Procedure
5	Place puller tool (6) part no. 877810 over cone sleeve (7) and align with split.
6	Tighten tool (19 mm) to pry open the cone sleeve and put off propeller shaft.

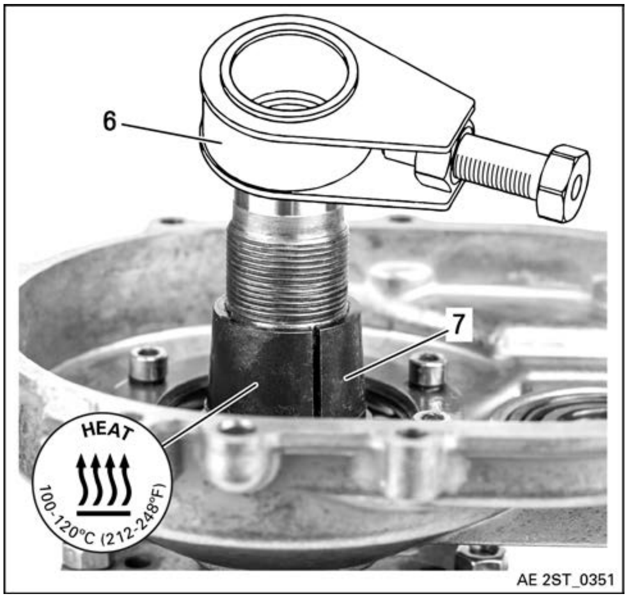


Figure 3.33

6 Puller *7 Cone sleeve*

NOTE

Split cone sleeve is glued in place with LOC-TITE 648. Use a heat gun for removal.

REMOVAL OF THE PROPELLER SHAFT (C)

Step	Procedure
1	Place protection mushroom (1) part no. 877415 onto propeller shaft. Place gear cover on a suitable support (2) and press out propeller shaft.

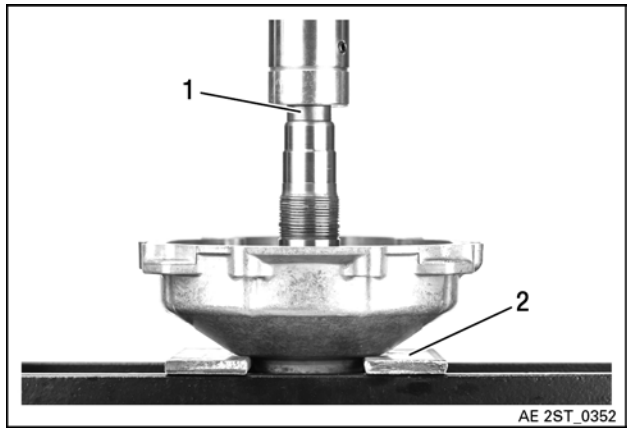


Figure 3.34

1 Protection mushroom *2 Suitable support*

ATTENTION

When pressing out prop shaft, properly brace the gear cover to avoid damage.

ATTENTION

If the propeller shaft is removed, the oil seal and the ball bearing must be replaced.

REMOVAL OF THE BALL BEARINGS AND OIL SEAL (C)

Step	Procedure
1	Remove 6 Allen screws (1) M6x16 along with lock washers and bearing retaining plate (2).
2	Heat up gear cover to 100 to 120° C (212 to 248° F). Press out ball bearing inwards, along with distance ring (3) and oil seal (4).
3	Remove the alignment dowel pins (5) if they are in place in the gear cover.
4	Heat up gear cover to 100 to 120° C (212 to 248° F). With the bearing facing down, gently tap the gearbox housing on a clean, solid surface until the ball bearing (6) drops out.

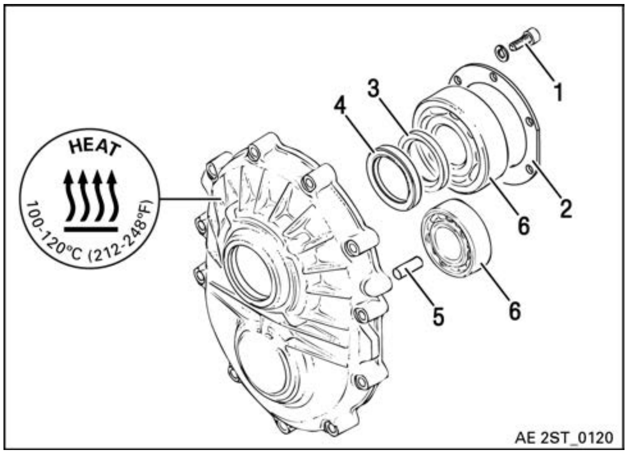


Figure 3.35

1	*Allen screws M6x16*	2	*Retaining plate*
3	*Distance ring*	4	*Oil seal*
5	*Dowel pin*	6	*Ball bearing*

Step	Procedure
5	Remove retaining ring (7) from rear gear-box housing and heat housing to 100 to 120 °C (212 to 248 °F).
6	Press out roller bearing (8) inwards along with oil seal (9).
7	Press out ball bearing (10) inwards along with oil seal (11).

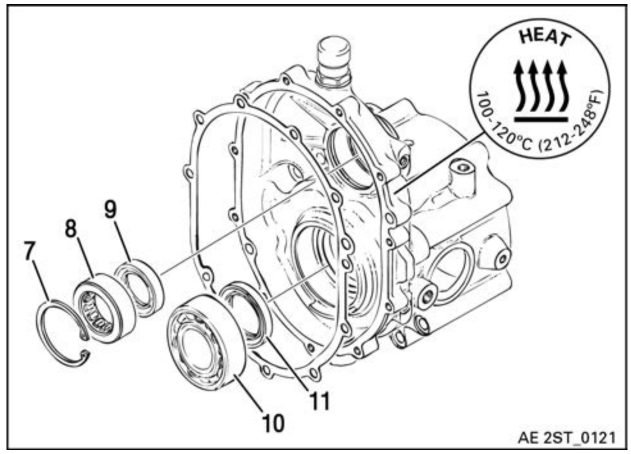


Figure 3.36

7	*Retaining ring*	8	*Roller bearing*
9	*Oil seal*	10	*Ball bearing*
11	*Oil seal*		

PROPELLER GEARBOX “E” — DISASSEMBLY

⚠ WARNING

Danger of severe burns and scalds!
Wear heat resistant gloves!

ATTENTION

Never clamp propeller shaft or propeller flange directly in a vice.

Step	Procedure
1	Fix gear cover assembly with propeller flange down, bolted to suitable fixture (1), to lock the propeller shaft against rotation.
2	Remove hex. nut (2) M30x1.5 (Socket 41x12.5 part no. 877445, turn clockwise) with washer (3).

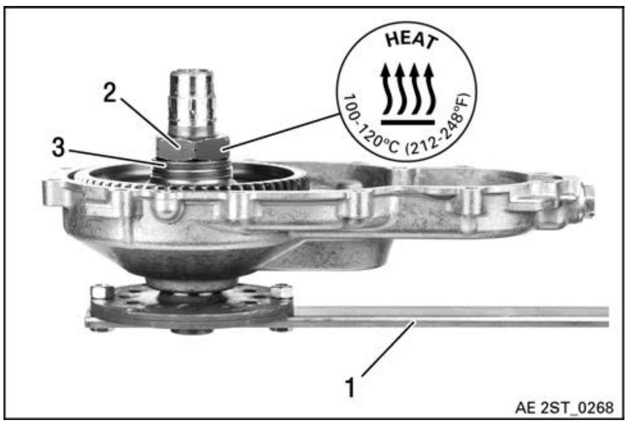


Figure 3.37

1 Fixture *2 Hex. nut M30x1.5 (left hand)*

3 Washer

NOTE

M30 nut and layshaft gear is glued in place with LOCTITE 648. Use a heat gun for removal.

Step	Procedure
3	Place lightly greased protection piece part no. 877415 on propeller shaft and thread puller (5) part no. 877379 securely onto layshaft gear (6).
4	Pull off layshaft gear by turning the puller tool bolt (19 mm) clockwise.

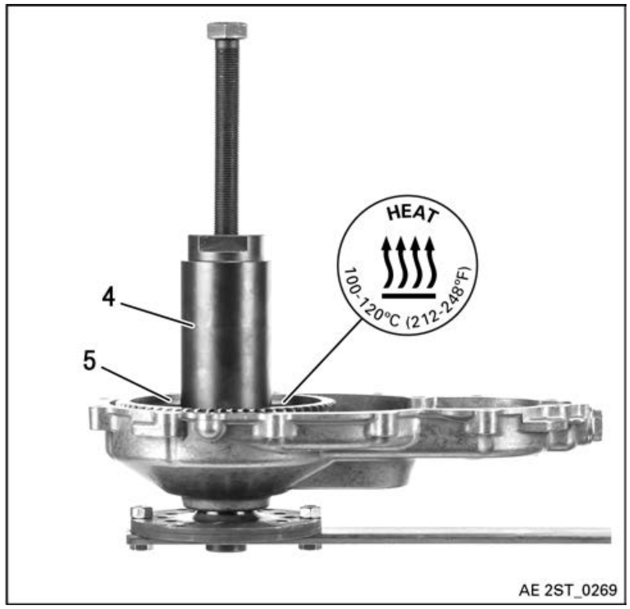


Figure 3.38

4 Puller *5 Layshaft gear*

Step	Procedure
5	Place puller tool (6) part no. 887810 over cone sleeve (7) and align with split.
6	Tighten tool (19 mm) to pry open the cone sleeve and pull off propeller shaft.

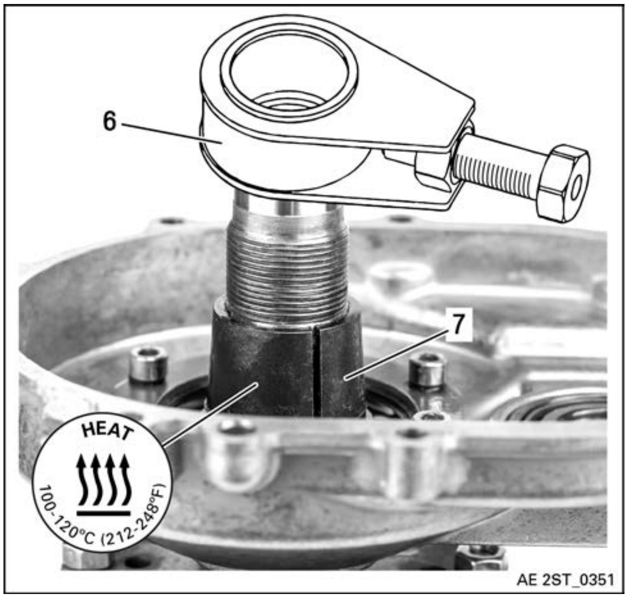


Figure 3.39

6 Puller *7 Cone sleeve*

NOTE

Split cone sleeve is glued in place with LOCTITE 648. Use heat gun for removal.

REMOVAL OF THE PROPELLER SHAFT (E)

Step	Procedure
1	Place protection mushroom (1) part no. 877415 onto propeller shaft. Place gear cover on a suitable support (2) and press out propeller shaft.

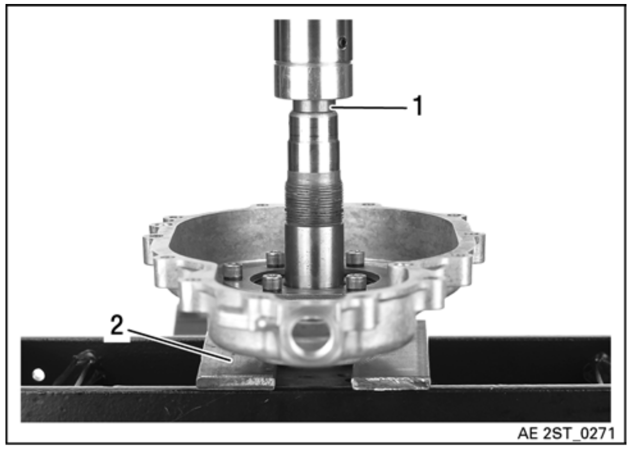


Figure 3.40

1 Protection mushroom *2 Suitable support*

ATTENTION

When pressing out of propeller shaft, properly brace the gear cover to avoid damage.

ATTENTION

If the propeller shaft is removed, the oil seal and the ball bearing must be replaced.

REMOVAL OF THE BALL BEARINGS AND OIL SEAL (E)

Step	Procedure
1	Remove 6 Allen screws (1) M6x16 along with lock washers and bearing retaining plate (2).
2	Heat up gear cover to 100 to 120° C (212 to 248° F). Press out ball bearing inwards, along with distance ring (3) and oil seal (4).

Step	Procedure
3	Remove the alignment dowel pins (5) if they are in place in the gear cover.
4	Heat up gear cover to 100 to 120° C (212 to 248° F). With the bearing facing down, gently tap the gearbox housing on a clean, solid surface until the ball bearing (6) drops out.

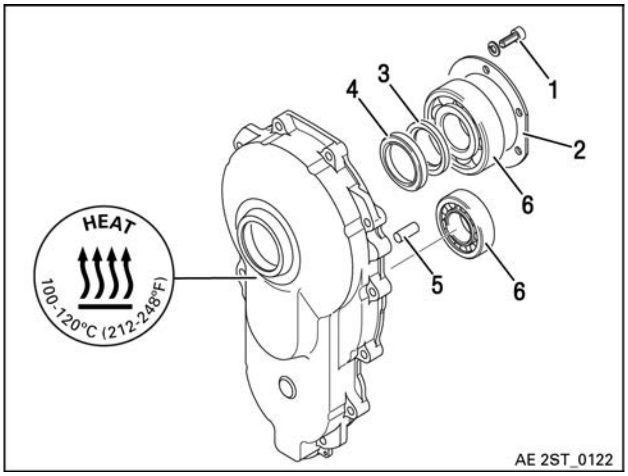


Figure 3.41

1	*Allen screws M6x16*	2	*Retaining plate*
3	*Distance ring*	4	*Oil seal*
5	*Dowel pin*	6	*Ball bearing*

Step	Procedure
5	Remove retaining rings (7) from rear gearbox housing and heat housing to 100 to 120 °C (212 to 248 °F).
6	Press out roller bearing (8) inwards along with oil seal (9).
7	Press out ball bearing (10) inwards along with oil seal (11).

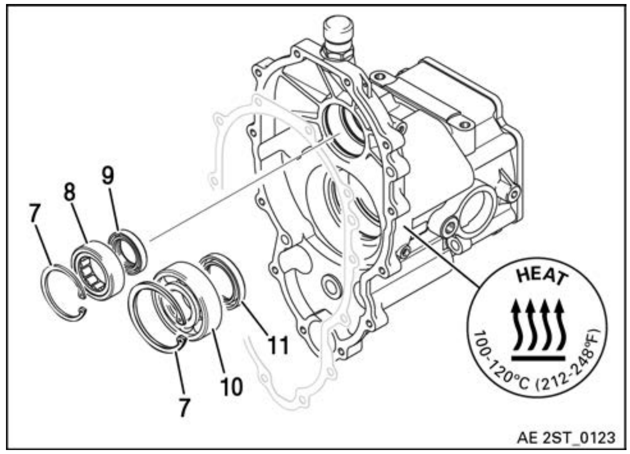


Figure 3.42

7	*Retaining rings*	8	*Roller bearing*
9	*Oil seal*	10	*Ball bearing*
11	*Oil seal*		

INSPECTION

PROPELLER GEARBOX “B” SINGLE PARTS CHECK

Preparation

- Clean all parts carefully

GEAR COVER /GEAR HOUSING ASSY. CHECK (“B” BOX)

ATTENTION

When using dye penetrant, observe the product manufacturer’s directions and safety information.

Step	Procedure
1	Inspect the gear housing and gear cover for cracks using a dye penetration method. **NOTE** *Only carry out in the case of propeller strike! See latest Maintenance Manual Line.*
2	Inspect gear housing and gear cover for damage. • Depressions and scratches outside flat and sealing surfaces up to a maximum of 0.5 mm (0.02 in.) in depth and 2 mm (0.08 in.) in diameter are permissible • Traces of corrosion and pitting outside sealing surfaces up to a maximum of 0.3 mm (0.012 in.) in depth and 2 mm (0.08 in.) in diameter are permissible
3	Inspect mating surfaces for Allen screws. • Indentations up to a maximum of 0.2 mm (0.008 in.) are permissible • Bumps up to a maximum of 0.2 mm (0.008 in.) are permissible

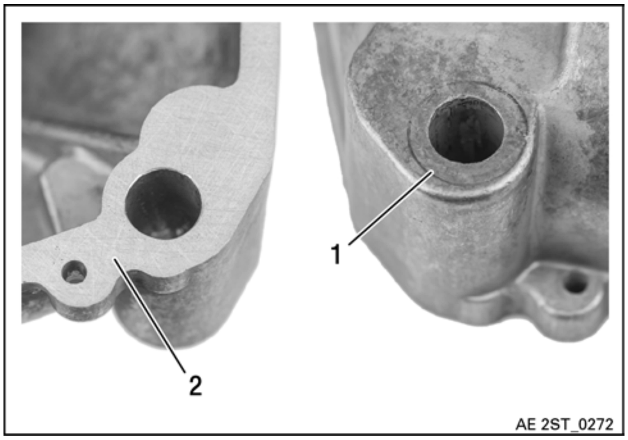


Figure 3.43

1 Screw mating surface 2 Sealing contact surface

Step	Procedure
4	Measure the gear cover propeller shaft ball bearing seat (3). See Chapter 72-10-00 section Wear Limits “B” gearbox (GB01)
5	Measure the rear gear housing bearing seat (4). See Chapter 72-10-00 section Wear Limits “B” gearbox (GB02).

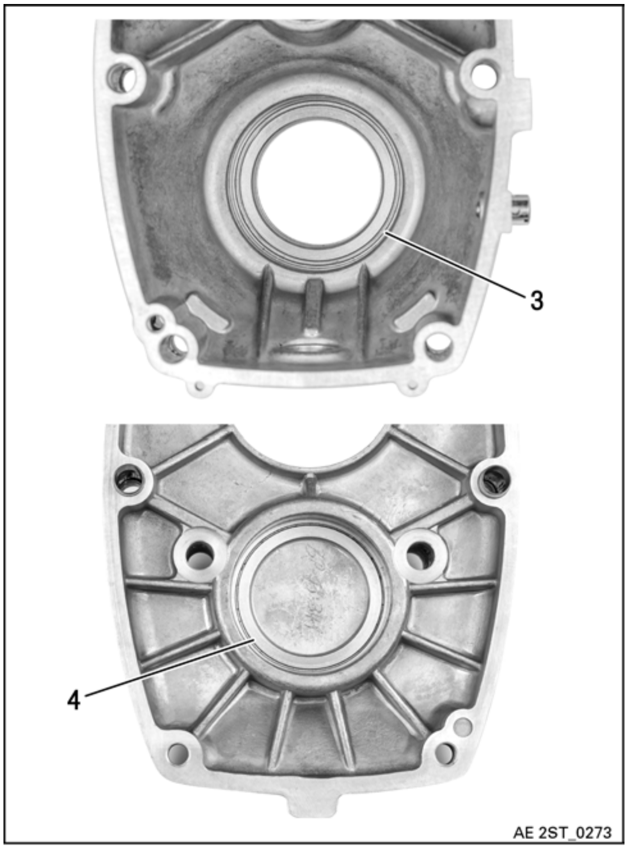


Figure 3.44

3	*Bearing seat (prop shaft)*	4	*Bearing seat (gear housing)*

PROPELLER SHAFT CHECK (“B” BOX)

Step	Procedure
1	Inspect propeller shaft for cracks by using a magnetic particle method. **NOTE** *Only carry out in the case of propeller strike! See latest Maintenance Manual Line.*
2	Roll the propeller shaft and check the roundness (1). Check flatness on propeller flange (2). See Chapter 72-10-00 section “Wear Limits B gearbox” (GB03/04).
3	Measure propeller shaft at bearing seat (3+4) and dog gear set (5). See Chapter 72-10-00 section “Wear Limits B gearbox” (GB05/06/07).

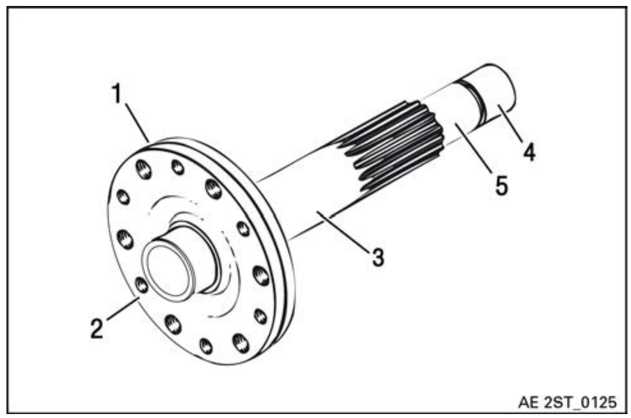


Figure 3.45

1	*Roundness check*	2	*Flatness check*
3	*Bearing seat*	4	*Bearing seat (shaft end)*
5	*Dog gear set*		

Step	Procedure
4	Check the grooves for retaining ring halves (6), oil seal running surface (7) and shaft splines (8).

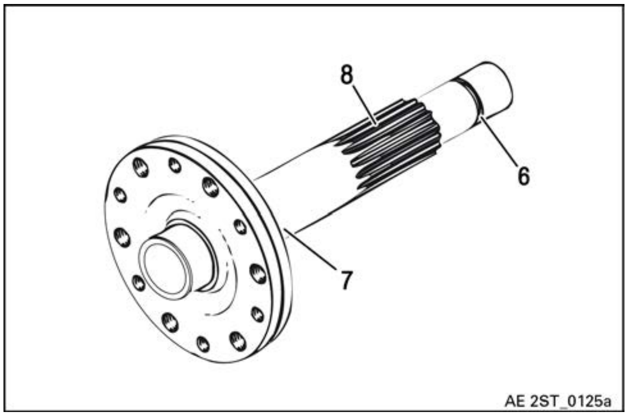


Figure 3.46

6	*Ring groove*	7	*Running surface (oil seal)*
8	*Shaft splines*		

ATTENTION

The entire propeller shaft including fastener bores must be free from corrosion. There must be no fretting corrosion at the bearing seats.

Treatment of corrosion damage and surface damage on the propeller flange.
The flange of the propeller shaft is susceptible to flash rust. After the propeller shaft has been covered with an adhesive plastic tape or plastic tube, the propeller flange can be treated with a blasting medium. To prevent corrosion damage, the rear of the propeller flange should be coated with a layer of anti-corrosion paint.
In the event of more severe corrosion damage which has affected the material, the propeller shaft must be replaced.

ATTENTION

To apply protective paint, carefully cover the propeller hub mating surface, fastening bores and propeller shaft.

DOG HUB CHECK (“B” BOX)

Step	Procedure
1	Visually check the dog hub for damage and wear. **NOTE** *Slight to moderate traces of wear and pitting on the dogs (1) are permissible.*
2	Visually inspect the splines (2) for damage and wear. Dog hub has to slide smoothly on the propeller shaft. At noticeable wear of splines exchange hub.

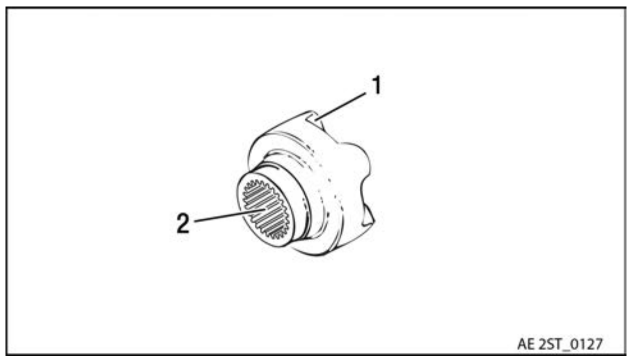


Figure 3.47

1	*Dogs*	2	*Splines*

GEAR SET CHECK (“B” BOX)

The gear set is checked to identify any damage to the gear-tooth system.

Step	Procedure
1	Measure dog gear sleeve (2). See Chapter 72-10-00 section “Wear limits B gearbox” (GB08).
2	Visually check the dogs for damage and wear. **NOTE** *Slight to moderate traces of wear and pitting on the dogs (1) are permissible.*
3	Visually inspect all tooth flanks (3) for any damage or pitting. See Chapter 72-10-00 section Gear set check.
4	Check the cone (4) for any damage or pitting.

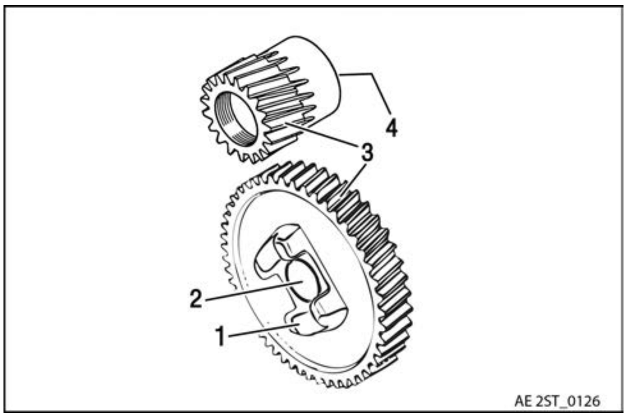


Figure 3.48

1 Dogs *2 Dog gear sleeve*
3 Tooth flanks *4 Cone*

DISK SPRING CHECK (“B” BOX)

Step	Procedure
1	If wear of the disk springs is visible in the contact area, replace the disk springs. All 12 disk springs should be replaced together.

Figure 3.49: Disk springs

INSPECTION

PROPELLER GEARBOX "C" SINGLE PARTS CHECK

Preparation

- Clean all parts carefully

GEAR COVER /GEAR HOUSING ASSY. CHECK ("C" BOX)

ATTENTION

When using dye penetrant, observe the product manufacturer's directions and safety information.

Step	Procedure
1	Inspect the gear housing and gear cover for cracks using a dye penetration method. **NOTE** *Only carry out in the case of propeller strike! See latest Maintenance Manual Line.*
2	Inspect gear housing and gear cover for damage. • Depressions and scratches outside flat and sealing surfaces up to a maximum of 0.5 mm (0.02 in.) in depth and 2 mm (0.08 in.) in diameter are permissible • Traces of corrosion and pitting outside sealing surfaces up to a maximum of 0.3 mm (0.012 in.) in depth and 2 mm (0.08 in.) in diameter are permissible
3	Inspect mating surfaces for Allen screws. • Indentations up to a maximum of 0.2 mm (0.008 in.) are permissible • Bumps up to a maximum of 0.2 mm (0.008 in.) are permissible

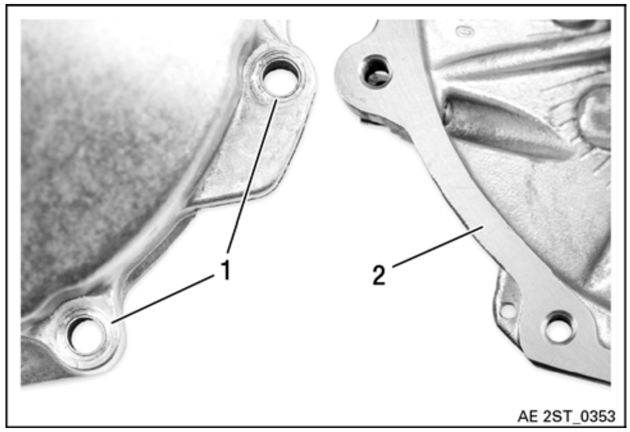


Figure 3.50

1 Screw mating surface 2 Sealing contact surface

Step	Procedure
4	Measure the gear cover propeller shaft ball bearing seat (3). See Chapter 72-10-00 section Wear Limits "C" gearbox (GB01)
5	Measure the gear cover pinion gear bearing seat (4). See Chapter 72-10-00 section Wear Limits "C" gearbox (GB02).
6	Measure the rear gear housing bearing seat (5). See Chapter 72-10-00 section Wear Limits "C" gearbox (GB03).
7	Measure the rear gear housing pinion gear bearing seat (6). See Chapter 72–10–00 section Wear Limits "C" gearbox (GB04).

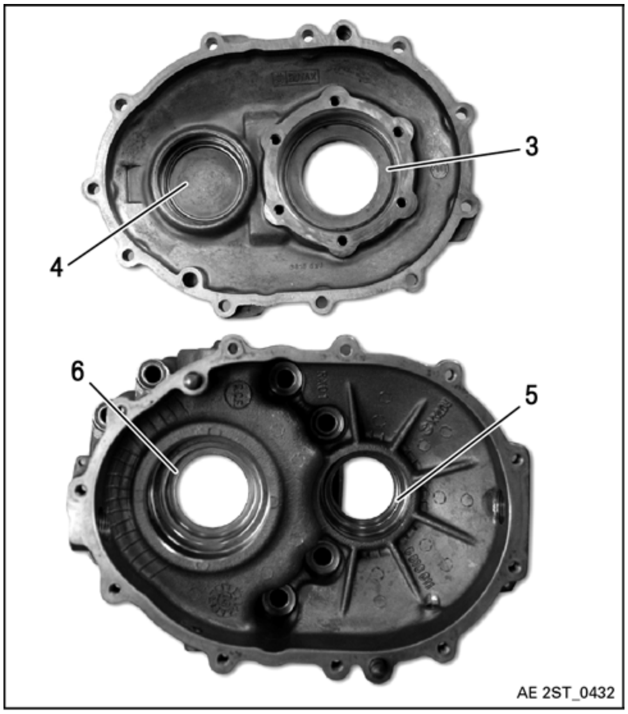


Figure 3.51

3	*Prop bearing seat*	4	*Pinion bearing seat*
5	*Prop bearing seat*	6	*Pinion bearing seat*

PROPELLER SHAFT CHECK (“C” BOX)

Step	Procedure
1	Inspect propeller shaft for cracks by using a magnetic particle method. **NOTE** *Only carry out in the case of propeller strike! See latest Maintenance Manual Line.*
2	Roll the propeller shaft and check the roundness (1). Check flatness on propeller flange (2). See Chapter 72-10-00 section “Wear Limits C gearbox” (GB05/06).
3	Measure propeller shaft at bearing seat (3). See Chapter 72-10-00 section “Wear Limits C gearbox” (GB07/08).
4	Check oil seal running surface (4).

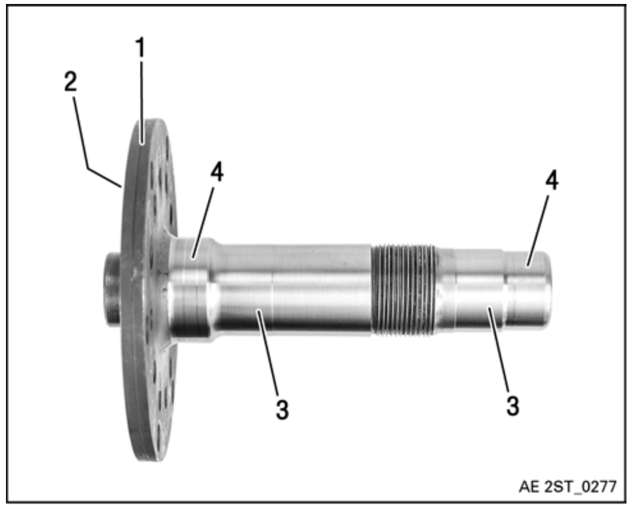


Figure 3.52

1	*Roundness check*	2	*Flatness check*
3	*Bearing seat*	4	*Running surface (oil seal)*

ATTENTION

The entire propeller shaft including fastener bores must be free from corrosion. There must be no fretting corrosion at the bearing seats.

Treatment of corrosion damage and surface damage on the propeller flange.
The flange of the propeller shaft is susceptible to flash rust. After the propeller shaft has been covered with an adhesive plastic tape or plastic tube, the propeller flange can be treated with a blasting medium. To prevent corrosion damage, the rear of the propeller flange should be coated with a layer of anti-corrosion paint.
In the event of more severe corrosion damage which has affected the material, the propeller shaft must be replaced.

ATTENTION
To apply protective paint, carefully cover the propeller hub mating surface, fastening bores and propeller shaft.

RUBBER COUPLING CHECK (C)

Step	Procedure
1	Examine rubber coupling for physical damage and cracks.
2	Ensure the use of a rubber coupling marked with “75”. This number specifies the Shore hardness. If hardness of the rubber used does not comply, exchange rubber coupling.

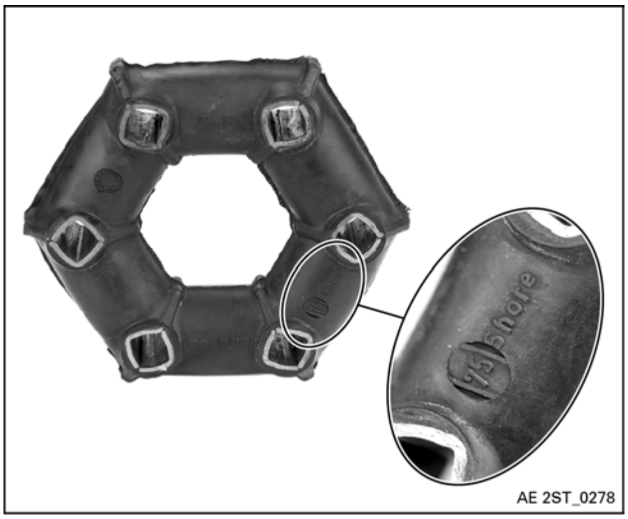


Figure 3.53

Rubber coupling inspection

Step	Procedure
3	Coupling flange (1) must be easy to move on pinion shaft (2). At distinct wear of spline teeth, renew coupling flange and pinion shaft.

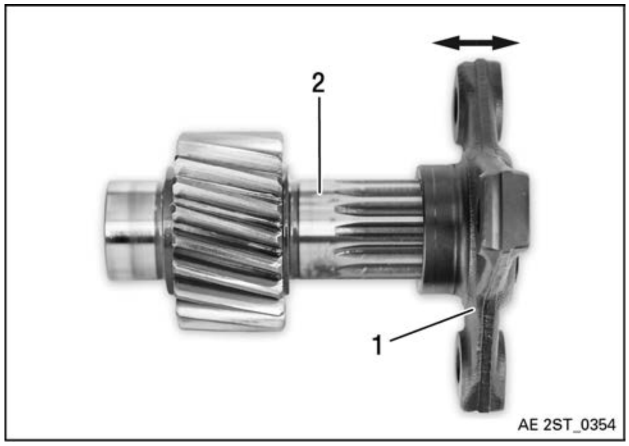


Figure 3.54

1 Flange *2 Pinion shaft*

GEAR SET CHECK (“C” BOX)

The gear set is checked to identify any damage to the gear-tooth system.

Step	Procedure
1	Visually inspect all tooth flanks (1) for any damage or pitting. See Chapter 72-10-00, section Gear set check.
2	Measure pinion shaft at bearing seat (2). See Chapter 72-10-00 section “Wear Limits C gearbox” (GB09/GB10)
3	Check the cone (3) for any damage or pitting.
4	Visually check the coupling splines (4) for wear and pitting.

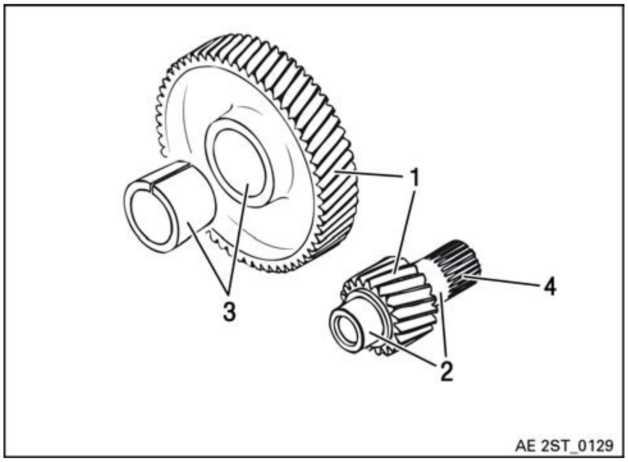


Figure 3.55

1	*Tooth flanks*	2	*Bearing seats*
3	*Cone*	4	*Coupling splines*

INSPECTION

PROPELLER GEARBOX “E” SINGLE PARTS CHECK

Preparation

- Clean all parts carefully

GEAR COVER /GEAR HOUSING ASSY. CHECK (“E” BOX)

ATTENTION

When using dye penetrant, observe the product manufacturer’s directions and safety information.

Step	Procedure
1	Inspect the gear housing and gear cover for cracks using a dye penetration method. **NOTE** *Only carry out in the case of propeller strike! See latest Maintenance Manual Line.*
2	Inspect gear housing and gear cover for damage. • Depressions and scratches outside flat and sealing surfaces up to a maximum of 0.5 mm (0.02 in.) in depth and 2 mm (0.08 in.) in diameter are permissible • Traces of corrosion and pitting outside sealing surfaces up to a maximum of 0.3 mm (0.012 in.) in depth and 2 mm (0.08 in.) in diameter are permissible
3	Inspect mating surfaces for Allen screws. • Indentations up to a maximum of 0.2 mm (0.008 in.) are permissible • Bumps up to a maximum of 0.2 mm (0.008 in.) are permissible

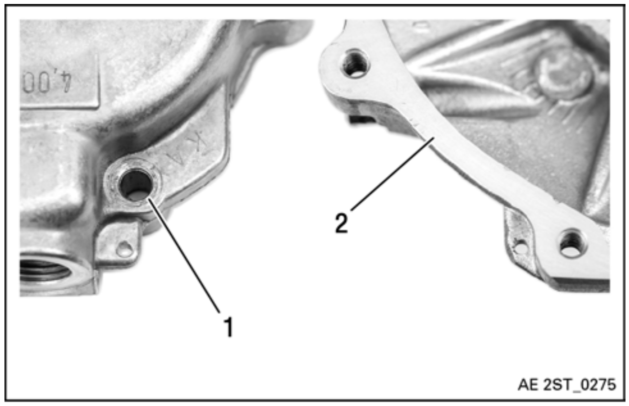


Figure 3.56

1 Screw mating surface 2 Sealing contact surface

Step	Procedure
4	Measure the gear cover propeller shaft ball bearing seat (3). See Chapter 72-10-00 section Wear Limits “E” gearbox (GB01)
5	Measure the gear cover pinion gear bearing seat (4). See Chapter 72-10-00 section Wear Limits “E” gearbox (GB02).
6	Measure the rear gear housing bearing seat (5). See Chapter 72-10-00 section Wear Limits “E” gearbox (GB03).
7	Measure the rear gear housing pinion gear bearing seat (6). See Chapter 72–10–00 section Wear Limits “E” gearbox (GB04).

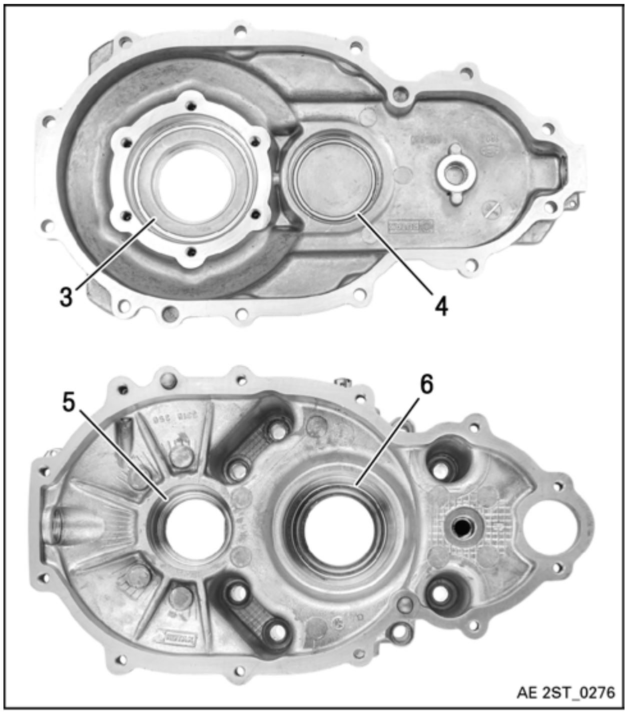


Figure 3.57

3	*Prop bearing seat*	4	*Pinion bearing seat*
5	*Prop bearing seat*	6	*Pinion bearing seat*

PROPELLER SHAFT CHECK ("E" BOX)

Step	Procedure
1	Inspect propeller shaft for cracks by using a magnetic particle method. **NOTE** *Only carry out in the case of propeller strike! See latest Maintenance Manual Line.*
2	Roll the propeller shaft and check the roundness (1). Check flatness on propeller flange (2). See Chapter 72-10-00 section "Wear Limits E gearbox" (GB05/06).
3	Measure propeller shaft at bearing seats (3). See Chapter 72-10-00 section Wear Limits E gearbox (GB07/08).
4	Check oil seal running surface (4).

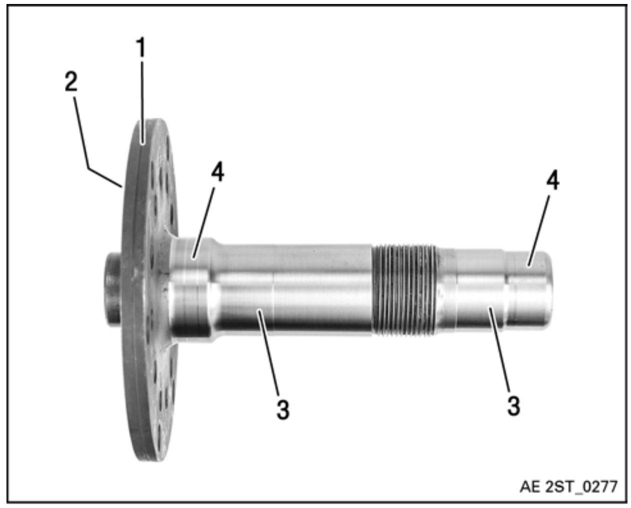


Figure 3.58

1	*Roundness check*	2	*Flatness check*
3	*Bearing seats*	4	*Running surface (oil seal)*

ATTENTION
The entire propeller shaft including fastener bores must be free from corrosion. There must be no fretting corrosion at the bearing seats.

Treatment of corrosion damage and surface damage on the propeller flange.
The flange of the propeller shaft is susceptible to flash rust. After the propeller shaft has been covered with an adhesive plastic tape or plastic tube, the propeller flange can be treated with a blasting medium. To prevent corrosion damage, the rear of the propeller flange should be coated with a layer of anti-corrosion paint.
In the event of more severe corrosion damage which has affected the material, the propeller shaft must be replaced.

ATTENTION

To apply protective paint, carefully cover the propeller hub mating surface, fastening bores and propeller shaft.

RUBBER COUPLING CHECK (E)

Step	Procedure
1	Examine rubber coupling for physical damage and cracks.
2	Ensure the use of a rubber coupling marked with “75”. This number specifies the Shore hardness. If hardness of the rubber used does not comply, exchange rubber coupling.

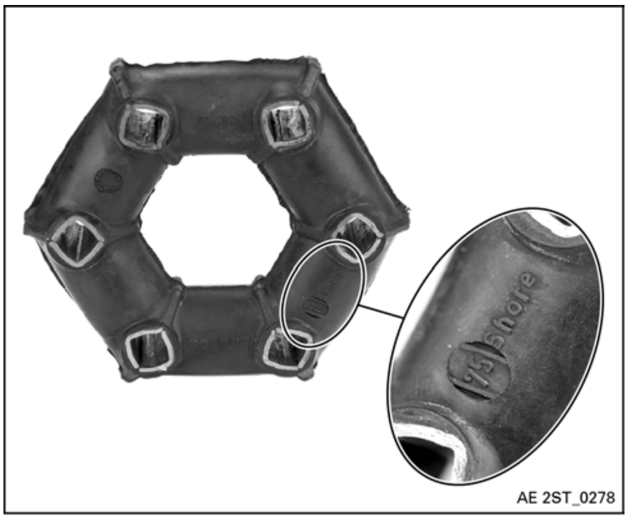


Figure 3.59

Rubber coupling inspection

Step	Procedure
3	Coupling flange (1) must be easy to move on pinion shaft (2). At distinct wear of spline teeth, renew coupling flange and pinion shaft.

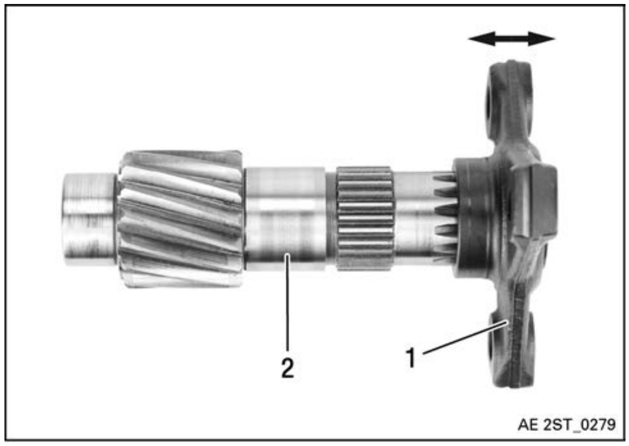


Figure 3.60

1 Flange *2 Pinion shaft*

GEAR SET CHECK (“E” BOX)

The gear set is checked to identify any damage to the gear-tooth system.

Step	Procedure
1	Visually inspect all tooth flanks (1) for any damage or pitting. See Chapter 72-10-00, section Gear set check.
2	Visually check the coupling splines (2+3) for wear and pitting.
3	Measure pinion shaft at bearing seat (4). See Chapter 72-10-00 section “Wear Limits C gearbox” (GB09/GB10/GB11).
4	Check the cone (5) for any damage or pitting.

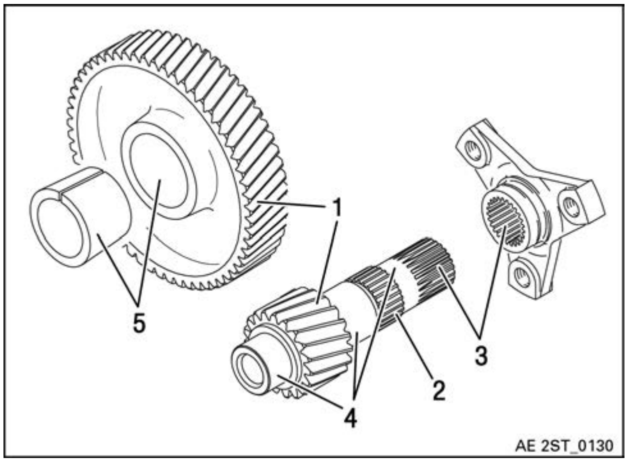


Figure 3.61

1	*Tooth flanks*	2	*Coupling splines*
3	*Coupling splines*	4	*Bearing seats*
5	*Cone*		

IDLE GEAR AND IDLE SHAFT - CHECK

Step	Procedure
1	Visually inspect all tooth flanks (1) for any damage or pitting. See Chapter 72-10-00, section Gear set check.
2	Measure the idle gear bore (2) and idle shaft (3). See Chapter 72-10- 00 section Wear Limits “E” gearbox (GB12/GB13)

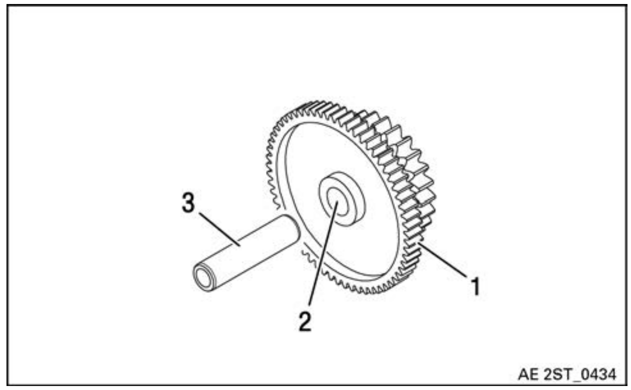


Figure 3.62

1	*Tooth flanks*	2	*Idle gear bore*
3	*Idle shaft*		

FREEWHEEL GEAR - CHECK

Step	Procedure
1	Visually inspect all tooth flanks (1) for any damage or pitting. See Chapter 72-10-00, section Gear set check.
2	Measure the freewheel gear bore (2) and idle shaft (3). See Chapter 72-10- 00 section Wear Limits “E” gearbox (GB14)

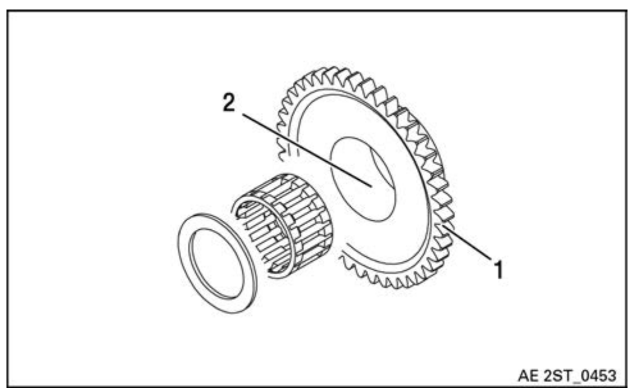


Figure 3.63

1	*Tooth flanks*	2	*Freewheel gear bore*

WEAR LIMITS

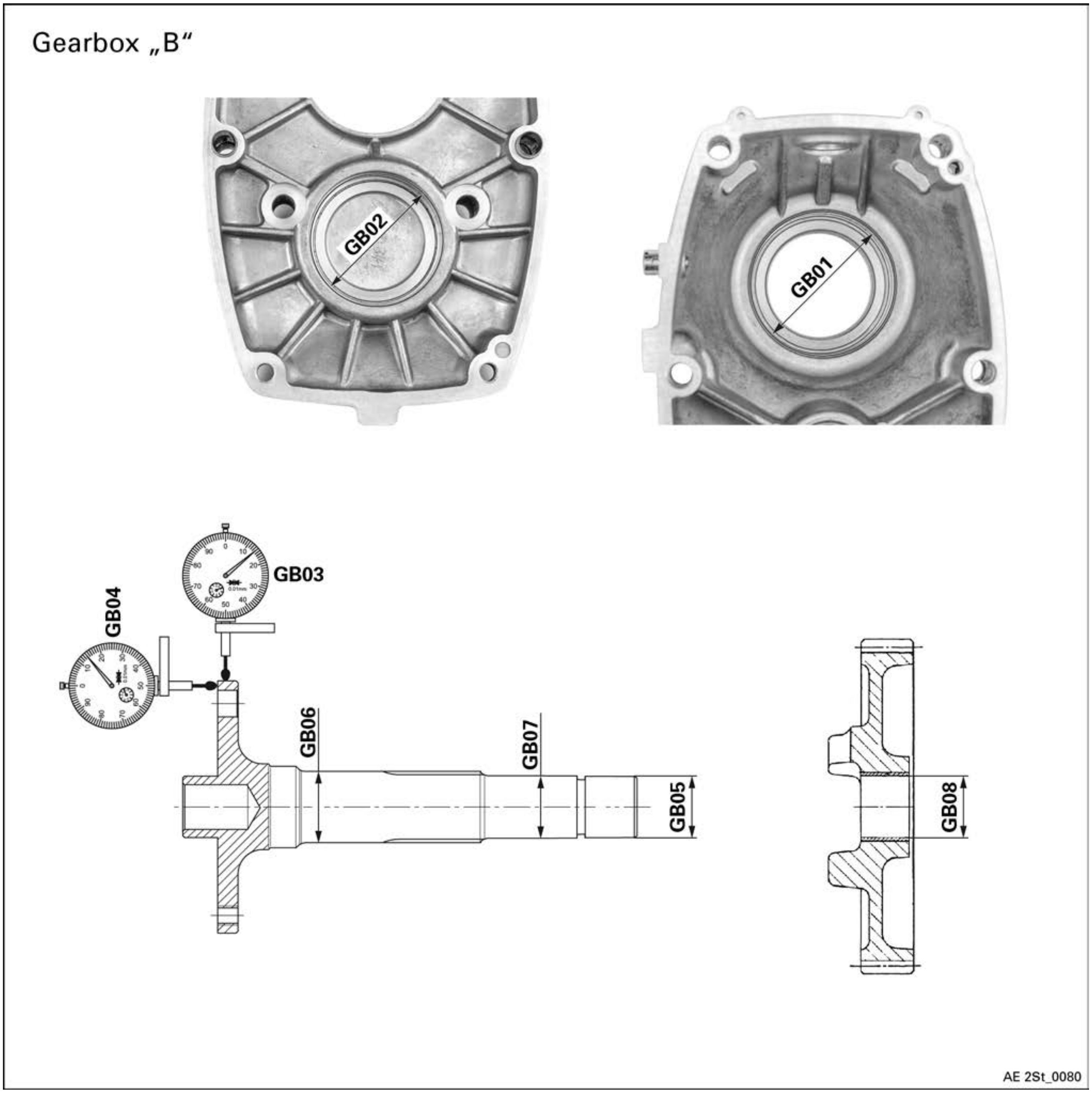


Figure 3.64

Description	**Code**	**Reading new**		**Wear limit**		**Readings**
		min	**max**	**100 %**		
Propeller gearbox "B"						
1. Gearbox cover						
Bearing seat, 72 mm	GB01	71.94 mm 2.832 in.	71.958 mm 2.833 in.	71.96 mm 2.833 in.	actual	
					renewed	
Bearing seat, 52 mm	GB02	51.955 mm 2.045 in.	51.965 mm 2.046 in.	51.97 mm 2.046 in.	actual	
					renewed	
2. Propeller shaft						
Out of round	GB03	0.000 mm 0.000 in.		0.05 mm 0.002 in.	actual	
					renewed	
Out of true	GB04	0.000 mm 0.000 in.		0.05 mm 0.002 in.	actual	
					renewed	
Shaft diameter 20 mm (bearing)	GB05	19.993 mm 0.7871 in.	19.998 mm 0.7873 in.	20.00 mm 0.7874 in.	actual	
					renewed	
Shaft diameter 25 mm (bearing)	GB06	24.993 mm 0.9840 in.	25.009 mm 0.9878 in.	25.01 mm 0.9882 in.	actual	
					renewed	
Shaft diameter 20.2 mm (dog gear)	GB07	20.187 mm 0.7947 in.	20.200 mm 0.7952 in.	20.205 mm 0.7953 in.	actual	
					renewed	
3. Gear set						
Dog gear sleeve	GB08	20.205 mm 0.7953 in.	20.215 mm 0.7959 in.	20.27 mm 0.798 in.	actual	
					renewed	
Drive gear pitting	GB09	0.00 %	0.00 %	5.00 %	actual	
					renewed	
Dog gear pitting	GB10	0.00 %	0.00 %	5.00 %	actual	
					renewed	
Gear set backlash	GB11	0.3 mm 0.012 in.	0.5 mm 0.02 in.	0.9 mm 0.036 in.	actual	
					renewed	

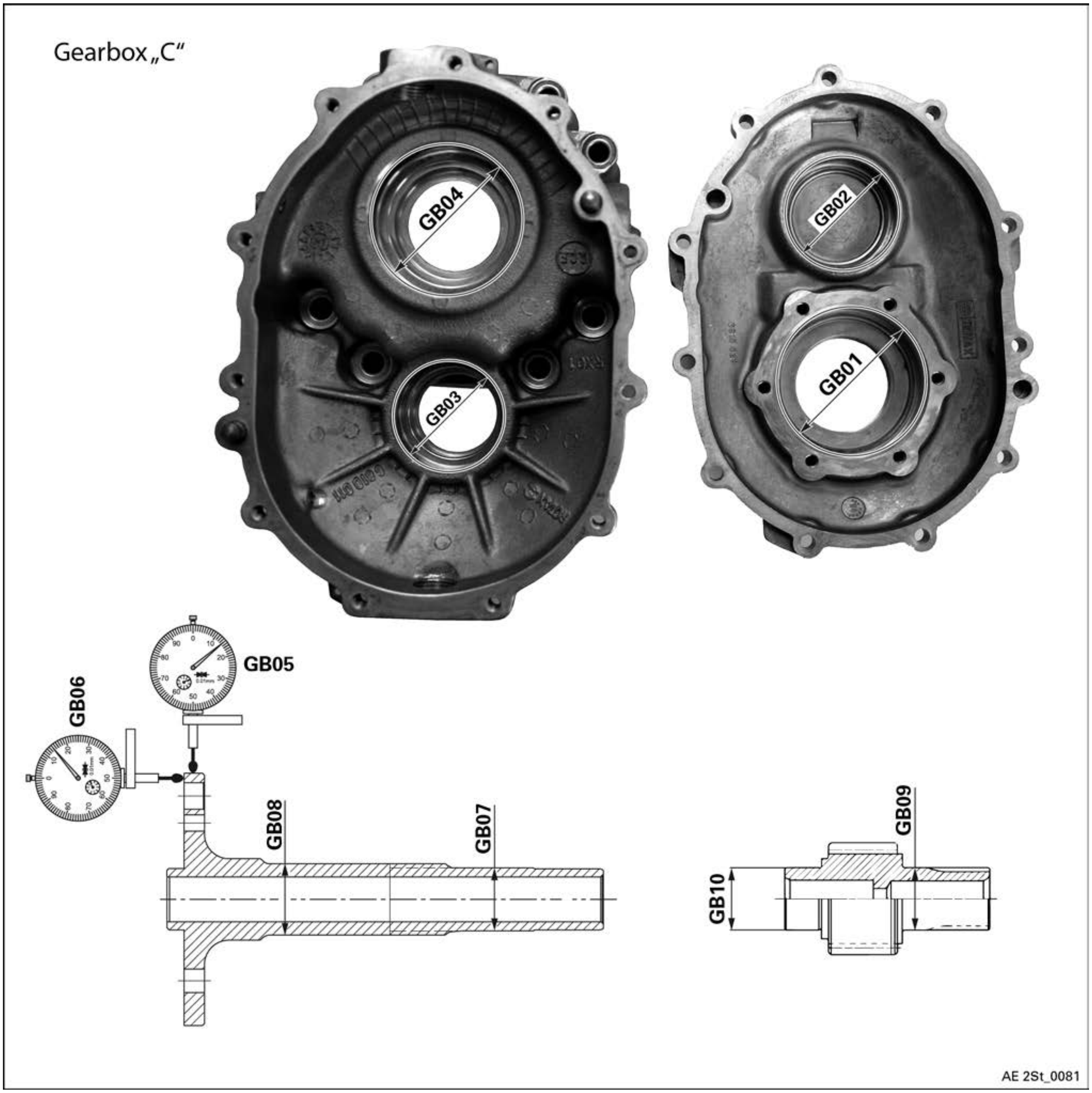

Gearbox „C“
GB04
GB02
GB03
GB01
GB05
GB06
GB08
GB07
GB09
GB10
AE 2St_0081

Figure 3.65

Description	Code	Reading new		Wear limit		Readings
		min	max	100 %		
Propeller gearbox “C”						
1. Gearbox cover						
Bearing seat, 72 mm front prop shaft	GB01	71.955 mm 2.832 in.	71.965 mm 2.833 in.	71.97 mm 2.833 in.	actual	
					renewed	
Bearing seat, 52 mm front pinion	GB02	51.955 mm 2.045 in.	51.965 mm 2.046 in.	51.97 mm 2.046 in.	actual	
					renewed	
Bearing seat, 47 mm rear prop shaft	GB03	46.967 mm 1.849 in.	46.978 mm 1.850 in.	46.98 mm 1.850 in.	actual	
					renewed	
Bearing seat, 62 mm rear pinion	GB04	61.955 mm 2.439 in.	61.965 mm 2.440 in.	61.97 mm 2.440 in.	actual	
					renewed	
2. Propeller shaft						
Out of round	GB05	0.000 mm 0.000 in.		0.05 mm 0.002 in.	actual	
					renewed	
Out of true	GB06	0.000 mm 0.000 in.		0.05 mm 0.002 in.	actual	
					renewed	
Shaft diameter 30 mm	GB08	30.008 mm 1.181 in.	30.021 mm 1.182 in.	30.022 mm 1.182 in.	actual	
					renewed	
Shaft diameter 26.5 mm	GB07	26.480 mm 1.042 in.	26.493 mm 1.043 in.	26.45 mm 1.041 in.	actual	
					renewed	
3. Pinion shaft						
Shaft diameter	GB09	24.980 mm 0.9834 in.	24.993 mm 0.9839 in.	24.975 mm 0.9832 in.	actual	
					renewed	
Shaft diameter	GB10	24.987 mm 0.9837 in.	24.996 mm 0.9840 in.	24.982 mm 0.9835 in.	actual	
					renewed	
4. Gear set						
Drive gear pitting	GB11	0.00 %	0.00 %	5.00 %	actual	
					renewed	
Dog gear pitting	GB12	0.00 %	0.00 %	5.00 %	actual	
					renewed	

Gear set backlash	GB13	0.3 mm 0.012 in.	0.5 mm 0.02 in.	0.9 mm 0.036 in.	actual	
					renewed	

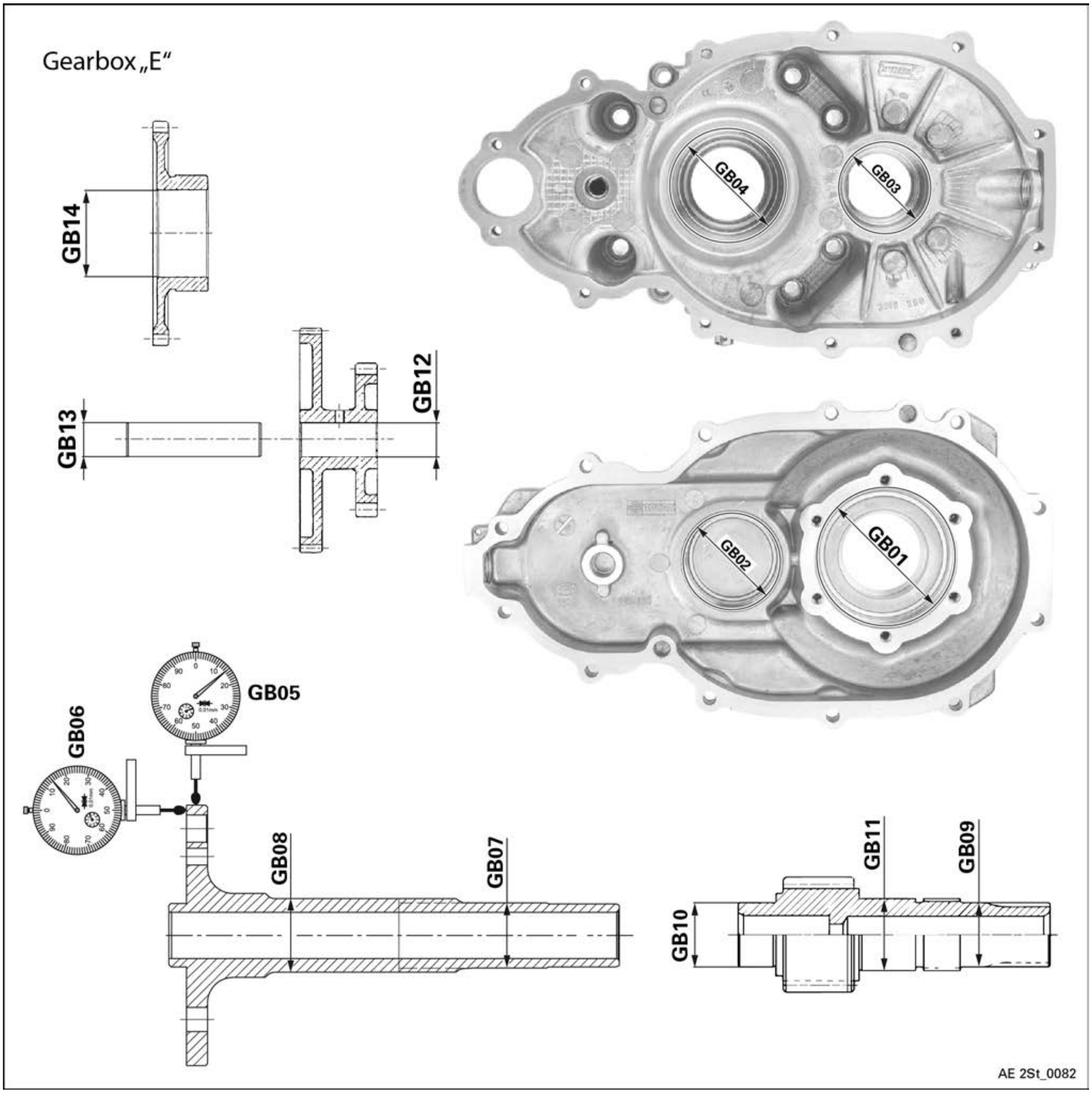


Figure 3.66

Description	Code	Reading new		Wear limit		Readings
		min	max	100 %		
Propeller gearbox "E"						
1. Gearbox cover						
Bearing seat front prop shaft	GB01	71.955 mm 2.832 in.	71.965 mm 2.833 in.	71.97 mm 2.833 in.	actual	
					renewed	
Bearing seat front pinion	GB02	51.955 mm 2.045 in.	51.965 mm 2.046 in.	51.97 mm 2.046 in.	actual	
					renewed	
Bearing seat rear prop shaft	GB03	46.967 mm 1.849 in.	46.978 mm 1.850 in.	46.98 mm 1.850 in.	actual	
					renewed	
Bearing seat rear pinion	GB04	61.955 mm 2.439 in.	61.965 mm 2.440 in.	61.97 mm 2.440 in.	actual	
					renewed	
2. Propeller shaft						
Out of round	GB05	0.000 mm 0.000 in.		0.05 mm 0.002 in.	actual	
					renewed	
Out of true	GB06	0.000 mm 0.000 in.		0.05 mm 0.002 in.	actual	
					renewed	
Shaft diameter 30 mm	GB08	30.008 mm 1.181 in.	30.021 mm 1.182 in.	30.022 mm 1.182 in.	actual	
					renewed	
Shaft diameter 26.5 mm	GB07	26.480 mm 1.042 in.	26.493 mm 1.043 in.	26.45 mm 1.041 in.	actual	
					renewed	
3. Pinion shaft						
Shaft diameter	GB09	24.980 mm 0.9834 in.	24.993 mm 0.9840 in.	24.975 mm 0.9832 in.	actual	
					renewed	
Shaft diameter	GB10	24.987 mm 0.9837 in.	24.996 mm 0.9840 in.	24.983 mm 0.9835 in.	actual	
					renewed	
Shaft diameter	GB011	27.980 mm 1.1015 in.	27.993 mm 1.1020 in.	27.975 mm 1.1013 in.	actual	
					renewed	
4. Idle gear, idle shaft						
Idle shaft diameter	GB13	11.973 mm 0.4713 in.	11.984 mm 0.4718 in.	11.990 mm 0.4720 in.	actual	
					renewed	
Idle gear bore	GB12	12.000 mm 0.4724 in.	12.018 mm 0.4731 in.	12.025 mm 0.4734 in.	actual	
					renewed	

5. Freewheel gear						
Freewheel gear bore	GB14	34.025 mm 1.3395 in.	34.041 mm 1.3400 in.	34.049 mm 1.3405 in.	actual	
					renewed	
6. Gearset						
Drive gear pitting	GB15	0.00 %	0.00 %	5.00 %	actual	
					renewed	
Dog gear pitting	GB16	0.00 %	0.00 %	5.00 %	actual	
					renewed	
Gear set backlash	GB17	0.3 mm 0.012 in.	0.5 mm 0.02 in.	0.9 mm 0.036 in.	actual	
					renewed	

PITTING, GENERAL INFORMATION

NOTE

*When pitting occurs it is necessary to distinguish between **tolerable initial pitting** and **flake pitting**. To make the assessment easier for you, see the following assessment tips.*

Pitting is the breaking off of more or less small, flat material particles from the active tooth flank. Whereas tooth breakage results in failure of the gearbox, this is not the case for pitting damage. There are in this case different stages of damage.

Rate of development
The rate of development depends on the lubricant and amount of stress. The pitting surface can become so large that the remaining undamaged flank can no longer transfer the load. During further operation the gear-tooth system is then completely destroyed.

NOTE

Fine pitting or pitted areas hardly affect the running behavior of the gear-tooth system at all.

The rule is however pitting damage which increases over time.
A distinction can be made according to the size, type and number of pitting, as follows.

- Slight pitting (initial pitting)
- Destructive pitting
- Flake pitting (large-area flank fractures)

SLIGHT PITTING

Features:
Individual small pits (up to approx. 0.5% of the flank area) or pore-like areas of pitting, generally only present in the dedendum area of the flank. This pit formation can cease during the operating phase of the gearbox.

Causes:
Locally high stresses in gears which have not yet run in can result in isolated pits. The adjustable running-in wear which results in these areas being relieved of stress, as a result of which the formation of pits can cease. Similarly, changed operating conditions can prevent pits which have already formed from developing.

Conclusion:
These pits are not important for safe operation. The gear set can still be used.

NOTE

The illustrations are sometimes not very informative due to fine pitting or the printing process. If in doubt, consult technical literature or contact the ROTAX® Authorized Distributor or their independent Service Centers.

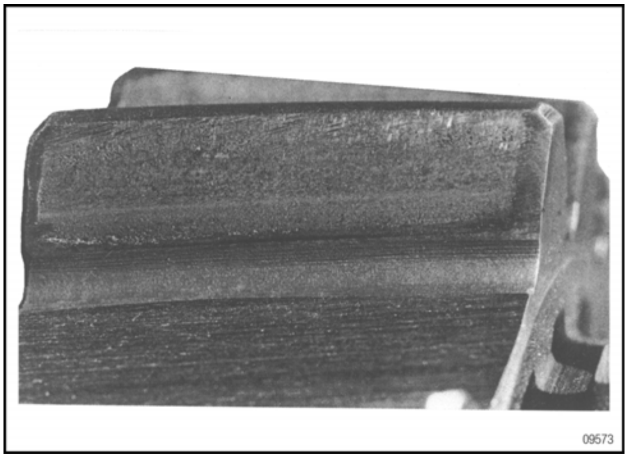


Figure 3.67: Magnification: approx. 2x

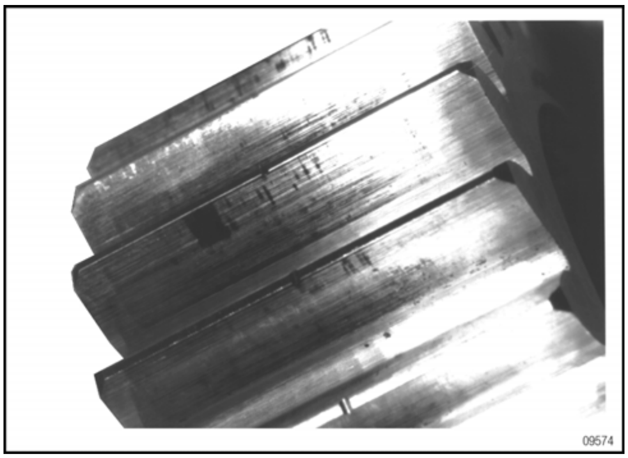


Figure 3.68: Magnification: approx. 1.5x

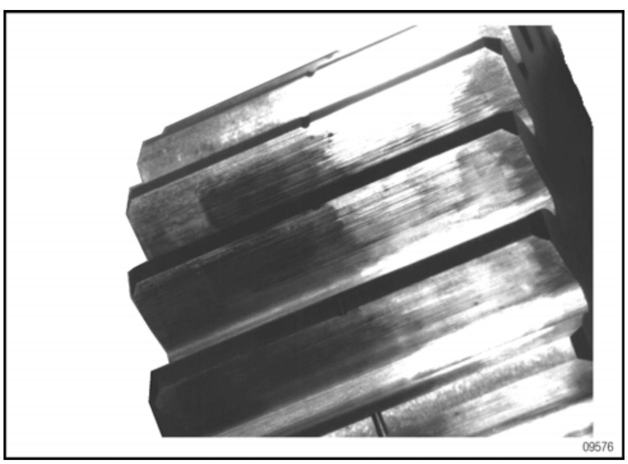


Figure 3.69: Magnification: approx. 1.5x

DESTRUCTIVE PITTING

Features:
Extensive flank fractures, generally occurring as zones of pitting. The bottom of the fracture generally has a mussel-shaped structure. The total pitting area can be so great that the running smoothness is noticeably affected and/or the remaining flank area which still bears the load is rapidly destroyed by wear etc.

Causes:
Pitting is attributable to the fatigue of the material due to combined stresses from compression and sliding. They are triggered when the material strength is exceeded locally. Essential influences on pit strength are: oil viscosity and oil temperature.

Conclusion:
Pitting of up to 5% of the flank area is permissible if the individual flank fractures do not exceed a size (greatest longitudinal extent) of 0.5 mm. Otherwise the gear set must be replaced.

ATTENTION

The whole gear set must always be replaced. Dog hubs or drive gears must not be replaced individually.

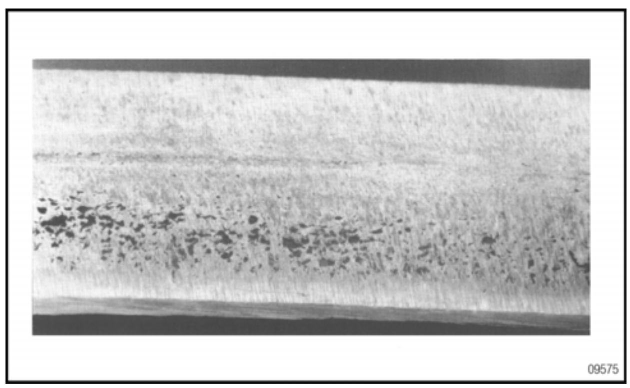


Figure 3.70: Magnification approx. 5x.

Pitted area in the dedendum flank region of a spur gear.

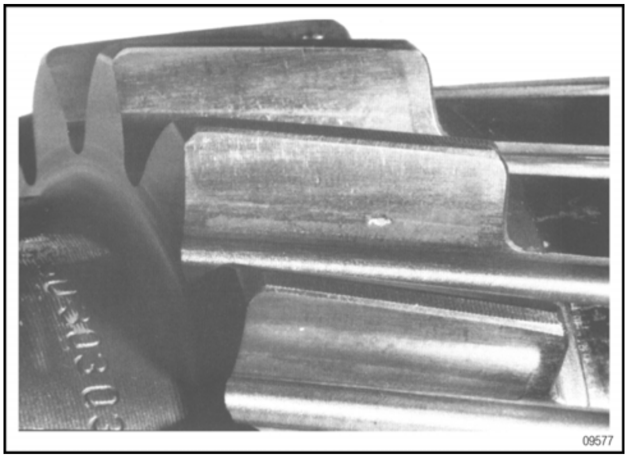


Figure 3.71: Magnification approx. 1.5x.

Pit formation in the dedendum region of a spur gear tooth system

FLAKE PITTING (LARGE-AREA FLANK FRACTURES)

See the following figures.

Features:
A large-area, triangular flank fracture emanating from a micropitting zone or a fine line of pits in the tooth dedendum. The fracture area has a relatively constant depth. Further cracks can run obliquely over the flank from the fracture. The damage sometimes extends into the addendum region, which results in breakage of the tooth tip.

ATTENTION

If flake pitting is found, the gear set must be replaced.

Max. permissible pitting or flake pitting. See Destructive pitting.

ATTENTION

The whole gear set must always be replaced. Gears must not be replaced individually.

Causes:
This pattern of damage generally occurs at low operating oil viscosities and/or high oil temperatures. Apart from these, the same causes apply as for pitting.

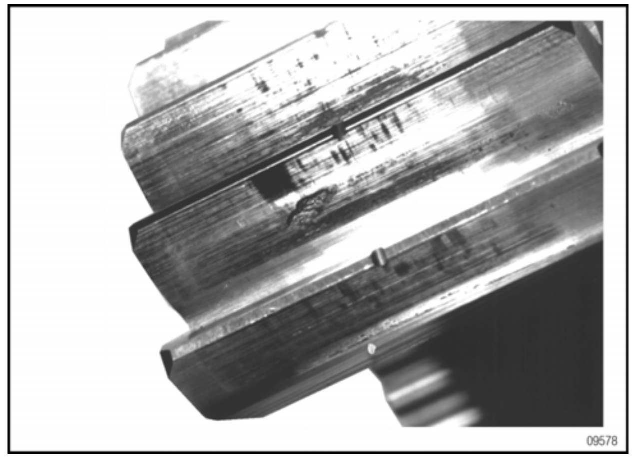


Figure 3.72: Magnification approx. 2x.

Triangular flake pitting

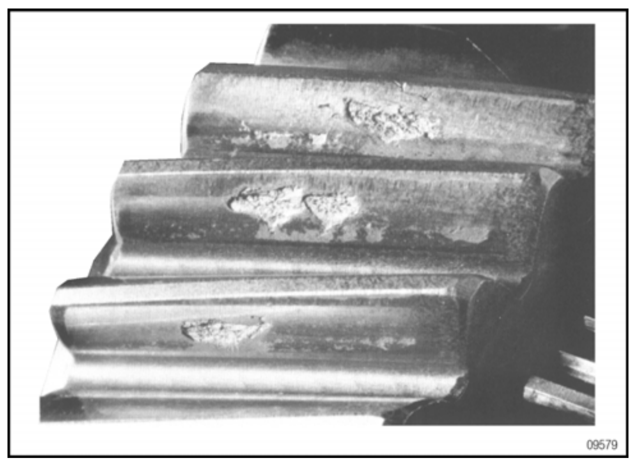


Figure 3.73: Magnification approx. 2x.

Triangular flake pitting

PROPELLER GEARBOX “B” - ASSEMBLY

⚠ WARNING

Danger of severe burns and scalds!
Wear heat resistant gloves!

ATTENTION

Apply force on outer race only, never on inner race.

NOTE

Use new oil seal and bearing only.

Step	Procedure
1	Heat the gearbox cover with hot air (or in an oven) to approx. 100 to 120 °C (212 to 248 °F).
2	Lubricate the sealing lips of new oil seal 30x47x7/7.5 (1) with engine oil and press into the gearbox housing (from inside) using insertion jig part no. 876668 (2).

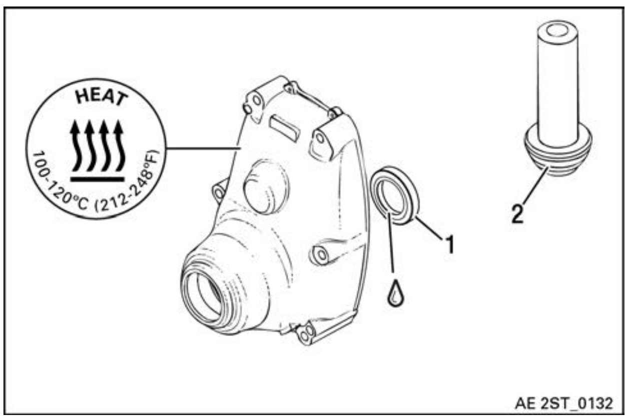


Figure 3.74

1 *Oil seal*

2 *Insertion jig*

Step	Procedure
3	Add distance ring (3) with chamfering towards the propeller flange and fit ball bearing 25-62-17 (4) in the still warm cover. If needed, push bearing to positive stop with a suitable punch.
4	Install retaining ring 62x2 (5) with circlip pliers.

NOTE

Place the retaining ring in the groove with the sharp edge pointing towards bearing.

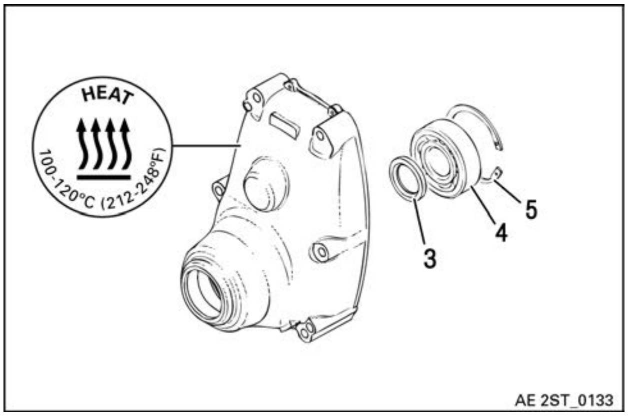


Figure 3.75

3 *Distance ring*

4 *Ball bearing*

5 *Retaining ring*

Step	Procedure
5	Heat the rear gearbox housing with hot air (or in an oven) to approx. 100 to 120 °C (212 to 248 °F).
6	With the still warm rear gearbox housing, push in the ball bearing 20-52-15 (6). If needed, push bearing to positive stop by suitable punch.

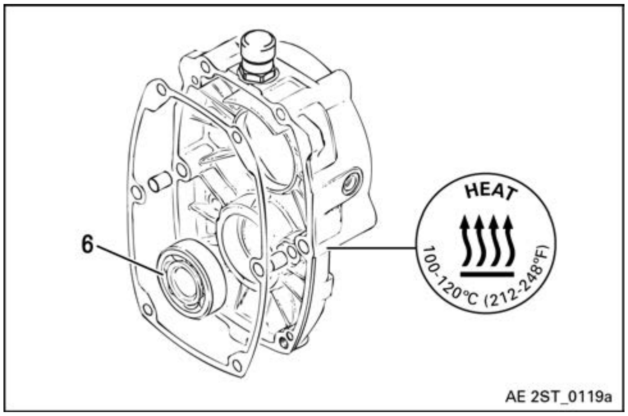


Figure 3.76

6 Ball bearing

INSTALLATION OF PROPELLER SHAFT (B)

ATTENTION

Press on the inner race of the bearing only.

Step	Procedure
1	Lubricate the propeller shaft with LOCTITE ANTI SEIZE at the bearing seat and place into the gearbox cover.
2	Place the propeller shaft with gearbox cover onto a suitable flat support (1).
3	Using a hand operated hydraulic press and a suitable hollow tube (2), press the bearing inner race until the propeller shaft is seated and stops against the distance ring.

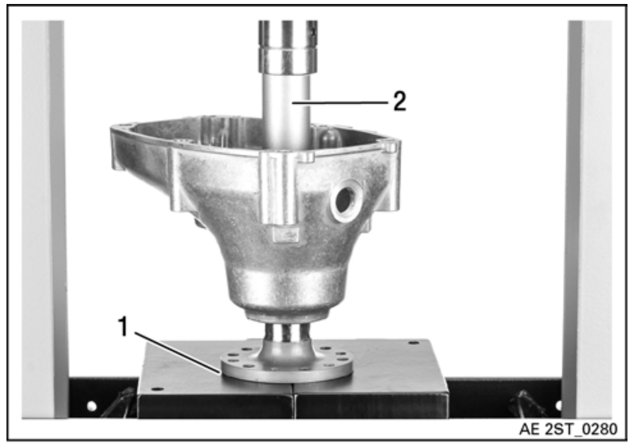


Figure 3.77

1 Support propeller shaft *2 Hollow tube*

DISK SPRING ASSEMBLY AND PRELOAD SETTING

Step	Procedure
1	With the propeller shaft fitted in gear cover, place distance ring (1) with tapered side and identification groove inwards towards springs. **NOTE** *Don’t fit any shims at this stage.*
2	Add 12 ungreased springs (2) in alternating pairs towards each other followed by dog hub (3).
3	Place the dog gear over dog hub taking care to align the dogs, followed by 2 thrust washers 0.8 mm (0.031 in.) (5).

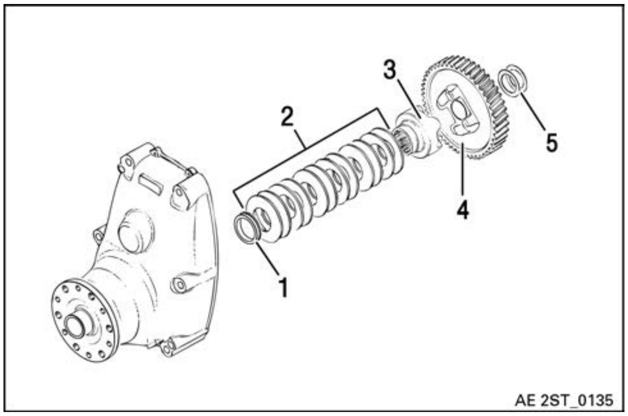


Figure 3.78

1	*Distance ring*	2	*Springs*
3	*Dog hub*	4	*Dog gear*
5	*Thrust washers*		

Step	Procedure
4	Place gearbox with propeller shaft on suitable support under hand press.
5	Place the mounting yoke, part no. 876880 on the dog gear. See section: Gearset removal “B” box.
6	Apply a load of 16 kN (3600 lbs) on the dog gear via the mounting yoke. With this load, disk springs will be completely compressed.
7	With springs in compressed state (2), measure the distance from top side of angular ring to lower edge of groove (A).

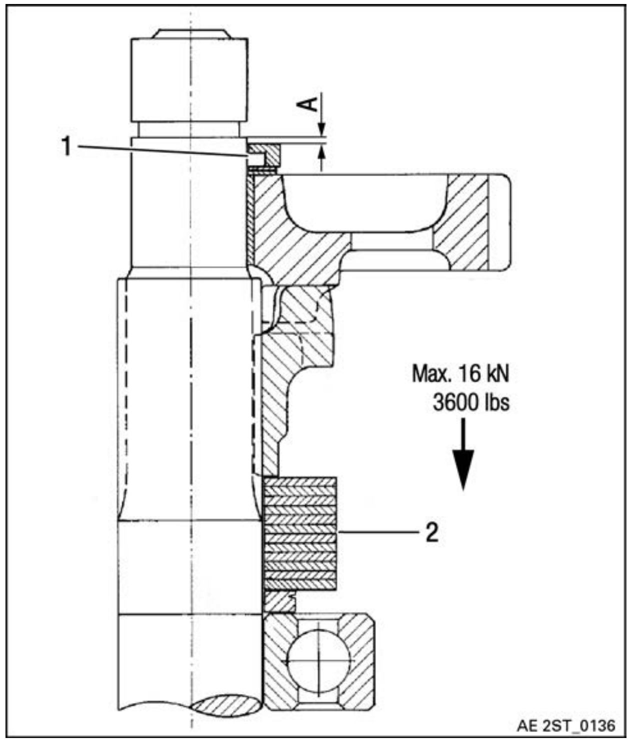


Figure 3.79

1	*Angular ring*	2	*Compressed springs*
A	*Measure for shim thickness*		

Step	Procedure
8	Relieve pressure, remove all items from prop shaft and compensate distance **A** by placing appropriate shims under distance ring. **NOTE** *Shims are available as spare parts in the sizes 0.1 / 0.2 / 0.3 / 0.5 and 1.0 mm (0.004 / 0.008 / 0.012 / 0.02 and 0.04 in.).*
9	Grease the shims, distance ring and disk springs with lithium grease and place over the propeller shaft. See Illustrated Parts Catalog, Chapter 72-10-00 for blow-up diagram.

Step	Procedure
10	Apply LOCTITE ANTI-SEIZE to the dog hub's dogs and inner splines and place over the propeller shaft with dogs facing upward.
11	Apply LOCTITE ANTI-SEIZE to the dog gear's dogs and inner sleeve and place over the propeller shaft, taking care to align the dogs.
12	Grease the 2 thrust washers 0.8 mm (0.031 in.) and place them over the propeller shaft.
13	Apply LOCTITE ANTI-SEIZE to both faces of the angular ring and place it flat face down over the propeller shaft.

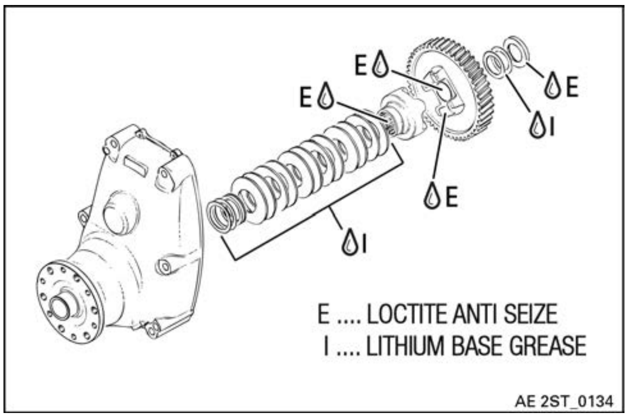


Figure 3.80: Assembly with shims

Step	Procedure
14	Place gearbox with propeller shaft on suitable support under hand-press.
15	Place the mounting yoke part no. 876880 on the dog gear. See section: Gear set removal "B" box.

Step	Procedure
16	Apply a load of 16 kN (3600 lbs) on the dog gear via the mounting yoke. With this load, disk springs will be completely compressed.
17	Mount ring halves into the groove **NOTE** *Slightly relieve pressure of the hand-press.*

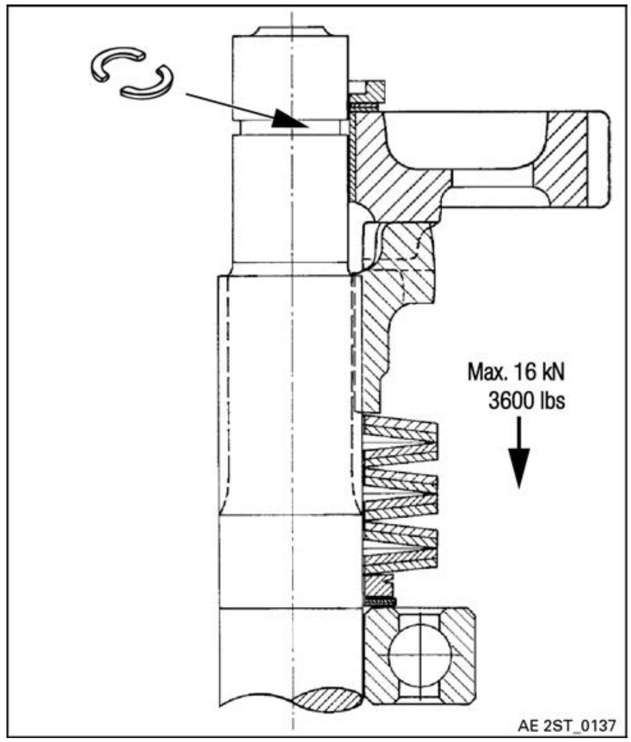


Figure 3.81

PROPELLER GEARBOX “C” — ASSEMBLY

⚠ WARNING
Danger of severe burns and scalds! Wear heat resistant gloves!

ATTENTION
Apply force on outer race only, never on inner race.

NOTE

Use new oil seal and bearing only.

Step	Procedure
1	Heat the rear gearbox cover with hot air (or in an oven) to approx. 100 to 120 °C (212 to 248 °F).
2	Lubricate the sealing lips of new oil seal 35x47x7 (1) with engine oil and press into the gearbox housing (from inside) using insertion jig part no. 877430 (2).

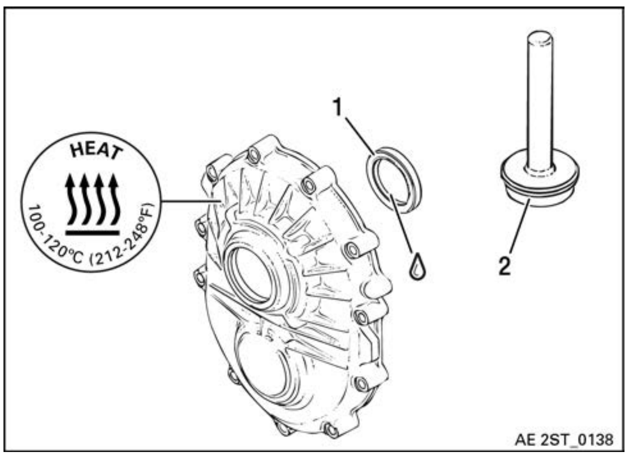


Figure 3.82

1 Oil seal *2 Insertion jig*

Step	Procedure
3	Add distance ring (3) with chamfering towards the propeller flange and fit ball bearing 30-72-19 (4) in the still warm cover. If need be, push bearing to positive stop by suitable punch.
4	With the gear cover still warm, fit ball bearing 25-52-15 (5). If need be, push bearing to positive stop by suitable punch.
5	Fit retaining plate (6) and attach with 6 Allen screws M6 x 16 (7) and lock washers. Tightening torque 10 Nm (90 in.lb).

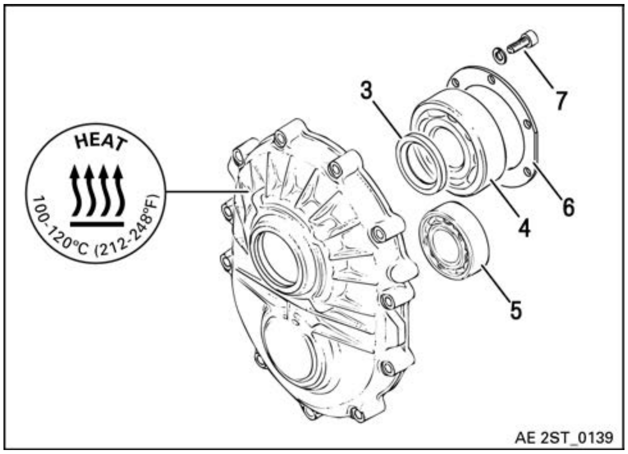


Figure 3.83

3 Distance ring *4 Bearing 30-72-19*
5 Bearing 25-52-15 *6 Retaining plate*
7 Allen screw M6x16

Step	Procedure
6	Heat the gearbox cover with hot air (or in an oven) to approx. 100 to 120 °C (212 to 248 °F).
7	Lubricate the sealing lips of new oil seal 32x47x7 (8) with engine oil and press into the gearbox housing (from inside) using insertion jig part no. 877432 (9).
8	Lubricate the sealing lips of new oil seal 25x38x7 (10) with engine oil and press into the gearbox housing (from inside) using insertion jig part no. 277982 (11).

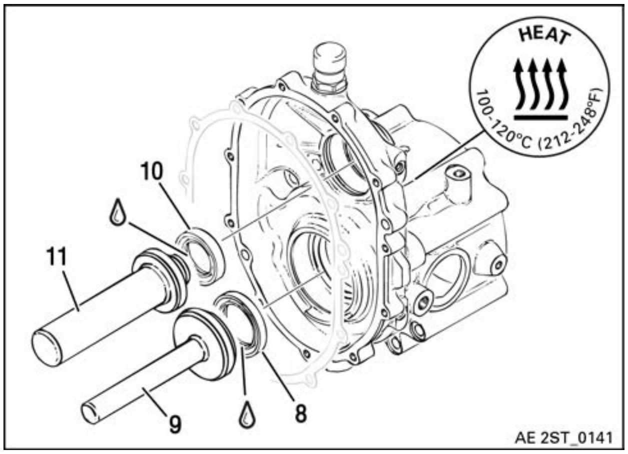


Figure 3.84

8 Oil seal 32x47x7

9 Insertion jig 877432

10 Oil seal 25x38x7

11 Insertion jig 277982

Step	Procedure
9	With the rear gearbox housing still warm, push in both ball bearing 26-62-17 (12) and roller bearing 26.5-47-14 (13). If need be, push bearing to positive stop by suitable punch.
10	Install retaining ring 47x1.75 (14) with circlip pliers.

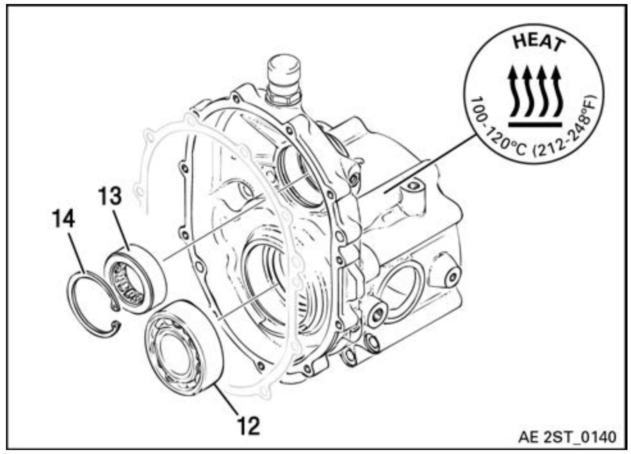


Figure 3.85

12 Ball bearing

13 Roller bearing

14 Retaining ring

INSTALLATION OF PROPELLER SHAFT (C)

ATTENTION

Press on the inner race of the bearing only.

Step	Procedure
1	Carefully feed in prop shaft and push it into position. If necessary, support inner race of ball bearing and press-in prop shaft. Never knock it into position.
2	Fix gear cover assembly with prop flange down, bolted to suitable fixture, to lock the prop shaft against rotation.

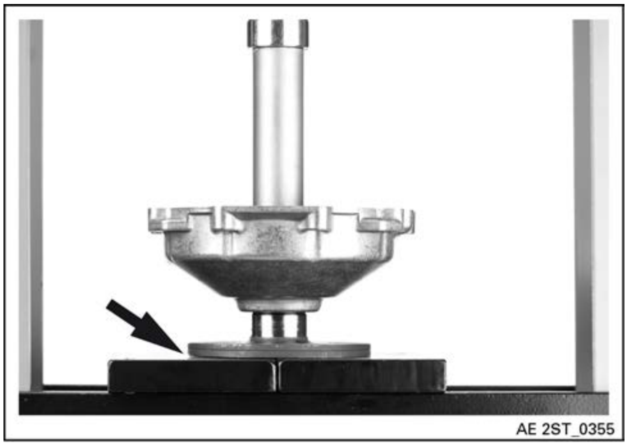


Figure 3.86

ATTENTION
Handle LOCTITE 648 adhesive carefully and economically. At any contact of adhesive with propeller shaft ball bearing, immediately clean thoroughly with solvent. If adhesive has cured hard already, exchange bearing.

Step	Procedure
3	Remove 2 screws with lock washers (1) from retaining plate in the sliding cover (2).
4	Insert the tapered piece (4) into the expansion tool part no. 877810 (3). **NOTE** *Large taper end to the outside with 5 mm (0.20 in.) projecting length.*

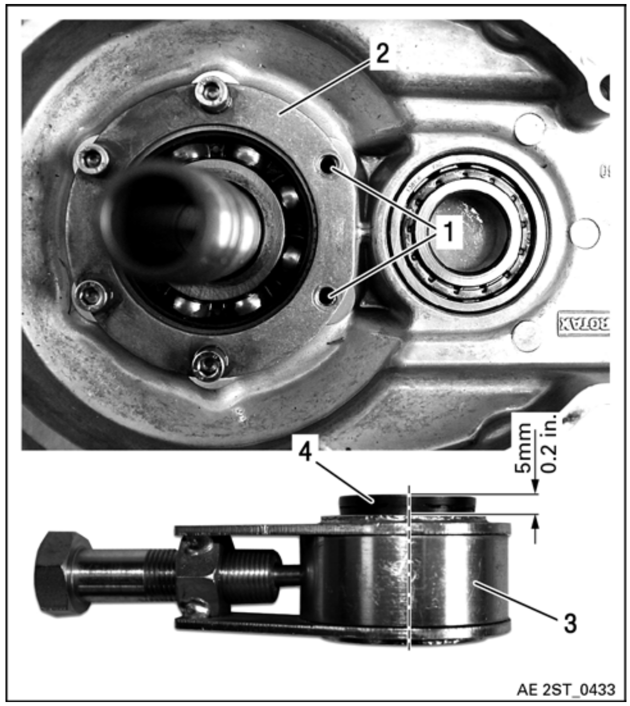


Figure 3.87

2	*2 screws with lock washers*	2	*Retaining plate in sliding cover*
3	*Expansion tool part no. 877810*	4	*Tapered piece*

Step	Procedure
5	Degrease propeller shaft taper sleeve, cone of layshaft gear (5) and split cone sleeve (6). Moisten both inner and outer surfaces of the split cone sleeve with LOCTITE 648.
6	Slide split cone sleeve (4) over propeller shaft with large taper end towards propeller flange.

Step	Procedure
7	Refit the two screws with lock washers (1) at retaining plate in the gearbox cover (2). Tightening torque 10 Nm (89 in.lb)
8	Slide layshaft gear (5) over propeller shaft with large taper opening facing towards propeller flange. **NOTE** *Lubricate layshaft gear (inner side) and split cone sleeve with LOCTITE 648.*

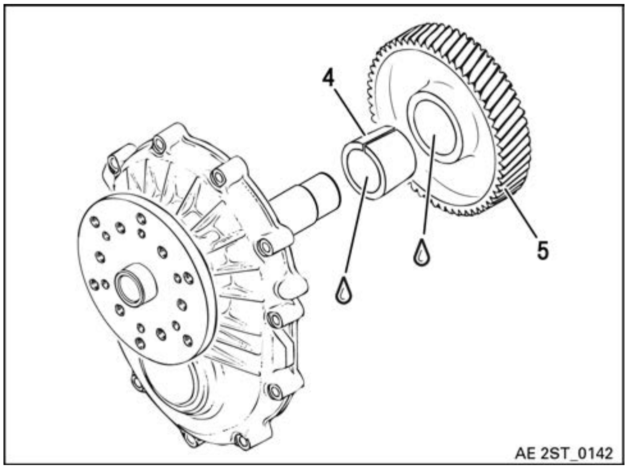


Figure 3.88

4 Split cone sleeve *5 Layshaft gear*

Step	Procedure
9	Place friction washer (6) with crowning upwards over prop flange. Apply LOC-TITE 648 on nut M30x1.5 (7), place over propeller shaft and tighten to 250 Nm (184 ft.lb). **NOTE** *M30 nut is **left hand thread**.*

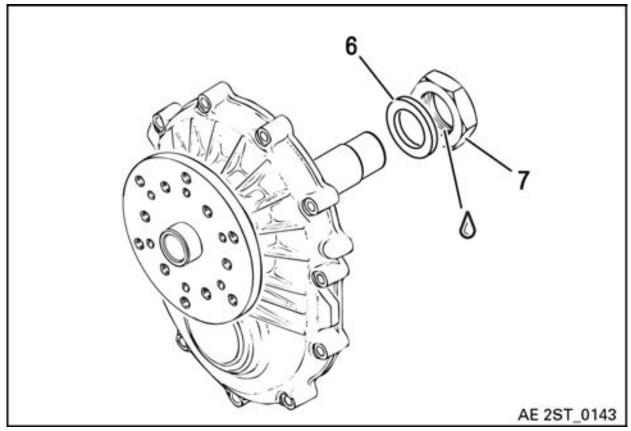


Figure 3.89

6 Friction washer *7 Nut M30x1.5*

PROPELLER GEARBOX “E” — ASSEMBLY

⚠ WARNING

Danger of severe burns and scalds!
Wear heat resistant gloves!

ATTENTION

Apply force on outer race only, never on inner race.

NOTE

Use new oil seal and bearing only.

Step	Procedure
1	Heat the gearbox cover with hot air (or in an oven) to approx. 100 to 120 °C (212 to 248 °F).
2	Lubricate the sealing lips of new oil seal 35x47x7 (1) with engine oil and press into the gearbox housing (from inside) using insertion jig part no. 877430 (2).

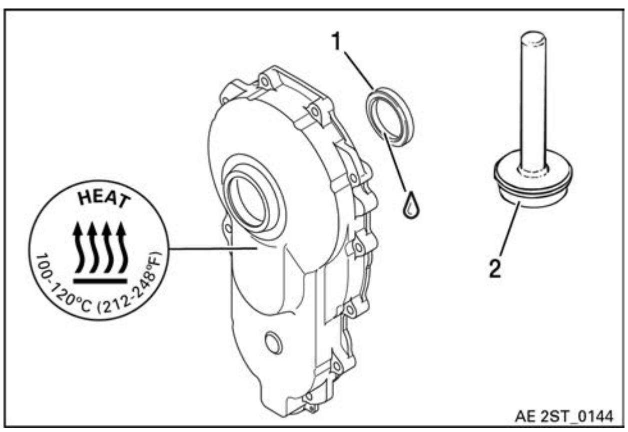


Figure 3.90

1 *Seal*

2 *Insertion jig*

Step	Procedure
3	Add distance ring (3) with chamfering towards the propeller flange and fit ball bearing 30-72-19 (4) in the still warm cover. If need be, push bearing to positive stop by suitable punch.
4	With the gear cover still warm, fit roller bearing **NJ205** (5). If need be, push bearing to positive stop by suitable punch.
5	Fit retaining plate (6) and attach with 6 Allen screws M6 x 16 (7) and lock washers. Tightening torque 10 Nm (89 in.lb). **NOTE** *With proper pre-heating, bearing can be pushed in easily.*

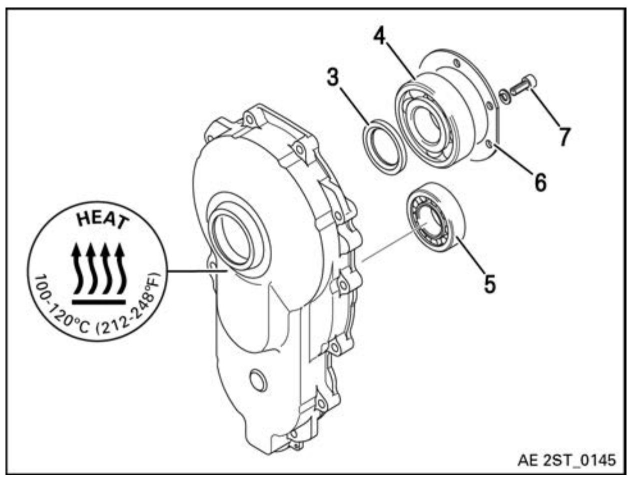


Figure 3.91

3 *Distance ring*

4 *Ball bearing*

5 *Roller bearing*

6 *Retaining plate*

7 *Allen screw M6x16*

Step	Procedure
6	Heat the rear gearbox housing with hot air (or in an oven) to approx. 100 to 120 ° C (212 to 248 °F).
7	Lubricate the sealing lips of new oil seal 32x47x7 (8) with engine oil and press into the gearbox housing (from inside) using insertion jig part no. 877432 (9).
8	Lubricate the sealing lips of new oil seal 25x38x7 (10) with engine oil and press in-to the gearbox housing (from inside) us-ing insertion jig part no. 277982 (11).

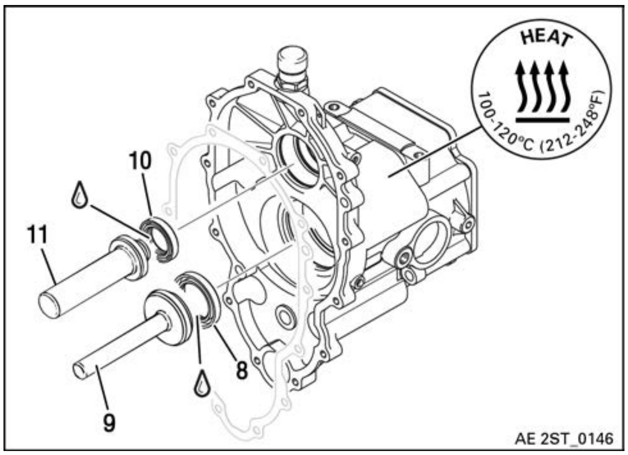


Figure 3.92

8 Oil seal 32x47x7
9 Insertion jig 877432
10 Oil seal 25x38x7
11 Insertion jig 277982

Step	Procedure
9	With the rear gearbox housing still warm, push in both ball bearing 25-62-17 (12) and roller bearing 26.5-47-14 (13). If need be, push bearings to positive stop by suit-able punch.
10	Install retaining rings 47x1.75 (14) and 62x2 (15) with circlip pliers.

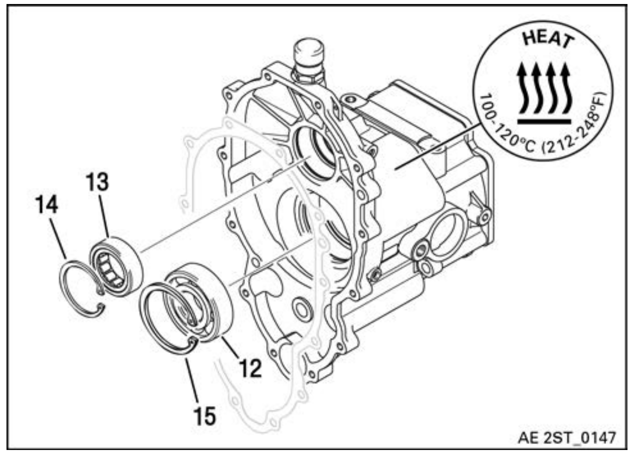


Figure 3.93

12 Ball bearing
13 Roller bearing
14 Retaining ring
15 Retaining ring

INSTALLATION OF PROPELLER SHAFT (E)

ATTENTION
Press on the inner race of the bearing only.

Step	Procedure
1	Carefully feed in prop shaft and push it in-to position. If necessary, support inner race of ball bearing and press-in prop shaft. Never knock it into position
2	Fix gear cover assembly with prop flange down, bolted to suitable fixture, to lock the prop shaft against rotation.

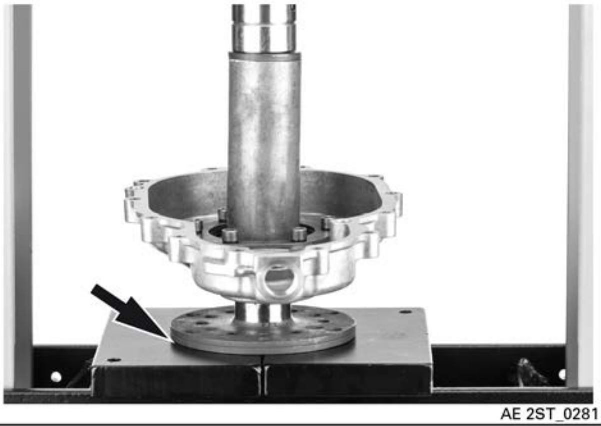


Figure 3.94: Propeller flange secured

ATTENTION

Handle LOCTITE 648 adhesive carefully and economically. At any contact of adhesive with propeller shaft ball bearing, immediately clean thoroughly with solvent. If adhesive has cured hard already, exchange bearing.

Step	Procedure
3	Remove 2 screws with lock washers (1) from retaining plate in the sliding cover (2).
4	Insert the tapered piece (4) into the expansion tool part no. 877810 (3). **NOTE** *Large taper end to the outside with 5 mm (0.20 in.) projecting length.*

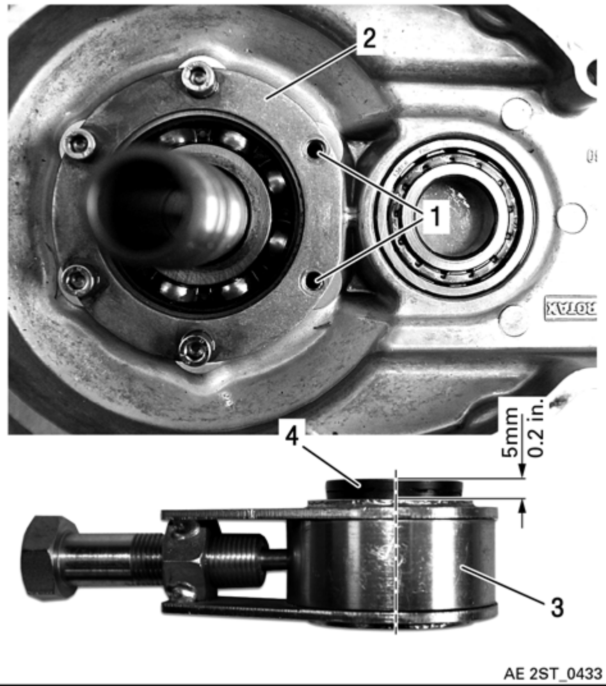


Figure 3.95

1	*2 screws with lock washers*	2	*Retaining plate in sliding cover*
3	*Expansion tool part no. 877810*	4	*Tapered piece*

Step	Procedure
5	Degrease propeller shaft taper sleeve, cone of layshaft gear (5) and split cone sleeve (6). Moisten inner surface of the split cone sleeve with LOCTITE 648.
6	Slide split cone sleeve (4) over propeller shaft with large taper end towards propeller flange.
7	Refit the two screws with lock washers (1) at retaining plate in the gearbox cover (2). Tightening torque 10 Nm (89 in.lb)
8	Slide layshaft gear (5) over propeller shaft with large taper opening facing towards propeller flange. **NOTE** *Lubricate cone with LOCTITE 648.*

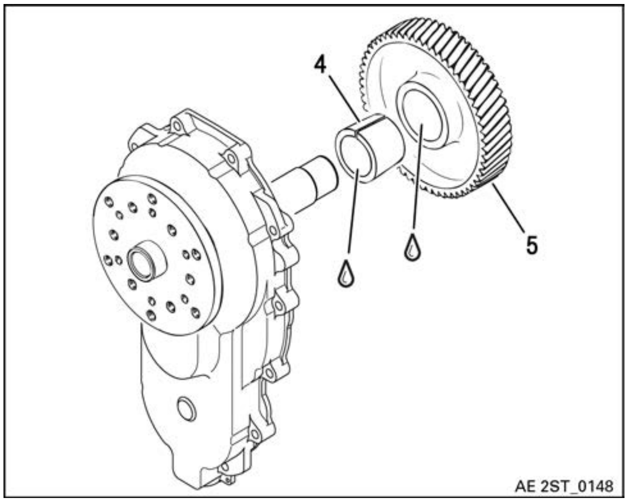


Figure 3.96

4 Split cone sleeve *5 Layshaft gear*

Step	Procedure
9	Place friction washer (6) with crowning upwards over prop flange. Apply LOC-TITE 648 on nut M30x1.5 (7), place over propeller shaft and tighten to 250 Nm (184 ft.lb). **NOTE** *M30 nut is **left hand thread**.*

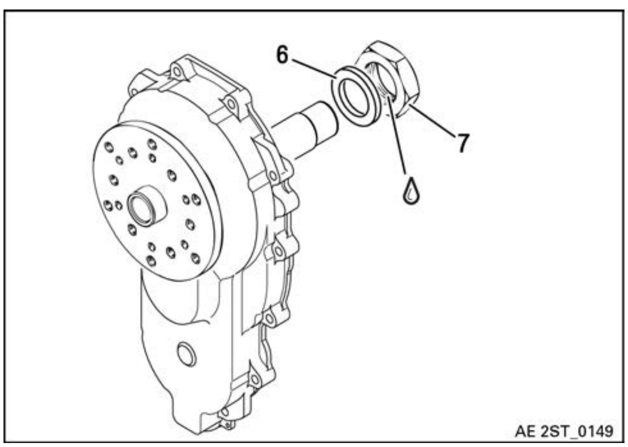


Figure 3.97

6 Friction washer *7 Nut M30x1.5*

SPRAG CLUTCH - ASSEMBLY (E)

NOTE

Do not disassemble the sprag clutch.
If wear or damage is apparent, or if starter engagement issues occur, replace the sprag clutch with new.

Step	Procedure
1	Grease the sprag clutch (1) with Lithium based grease and insert into the sprag clutch housing (2). **NOTE** *The sprag clutch must be inserted with the arrow (3) facing upwards.*
2	Insert the snap ring (4), ensuring that it seats completely into its groove.

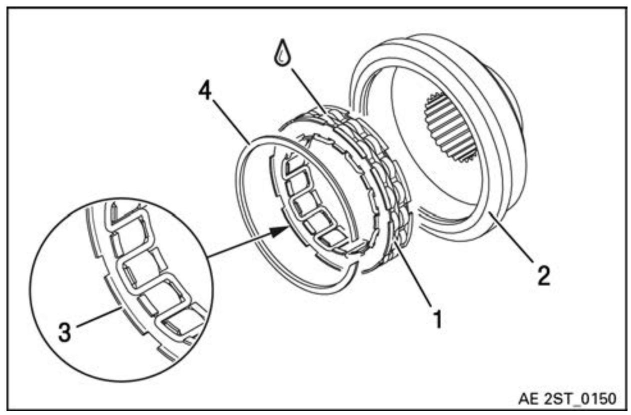


Figure 3.98

1 Sprag clutch *2 Clutch housing*
3 Directional arrow *4 Snap ring*

INSTALLATION

GENERAL NOTES FOR ALL REDUCTION GEARBOX TYPES

The engine can be installed in two basic options:

- Upright, with spark plugs up (standard version) = S
- Inverted, with spark plugs down = H

Additionally, there are two possible positions how to fit the reduction gear:

- With propeller shaft towards cylinder = Z
- With propeller shaft towards engine base = S

See Installation Manual for further details on engine and gearbox position configurations.

NOTE

The max. permitted out-of-balance on a propeller is 1 g m. If gear set was changed in course of a repair, oil change will be necessary after the first 10 hours of operation. Any change of the gear ratio has to be marked on the gear cover.

NOTE

Gearbox will be delivered always "dry", i.e. without oil, even on a gearbox fitted to engine prior to delivery.

PROPELLER GEARBOX "B" – INSTALLATION

Fitting of drive gear to engine

Step	Procedure
1	Thoroughly degrease taper of crankshaft end and drive gear as well as 1/2" screw and tapped hole in crankshaft.
2	Lock crankshaft with locking pin part no. 876640 and attach drive gear by 1/2" screw (1) along with washer (2) and lock washer (3), applying LOCTITE 243 on thread only, but not on taper. Tighten screw to 80 Nm (59 ft.lb.). Withdraw crankshaft locking pin.

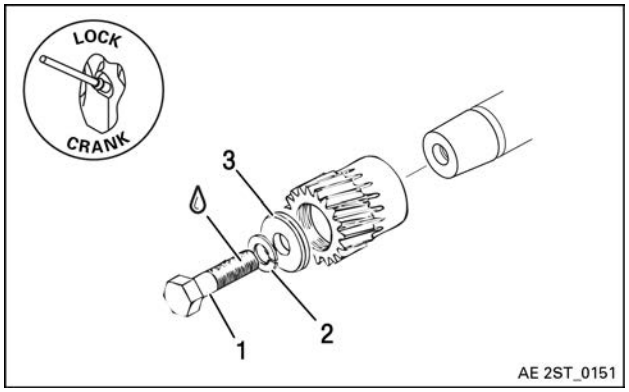


Figure 3.99

1 1/2" screw *2 Washer*
3 Lock washer

Fitting of gearbox to engine

Step	Procedure
1	Apply LOCTITE 648 on crankcase mating face. Insert O-ring 75 x 2.5 (1) into groove and fit gear housing to crankcase.
2	Lubricate support face of collar hex screws M8x65 (2) to minimize friction. Attach gear housing with the two hex. collar screws located inside and tighten to 24 Nm (18 ft.lb.)
3	Fit both dowel sleeves (3) on gear housing and place new gasket (4) in position.

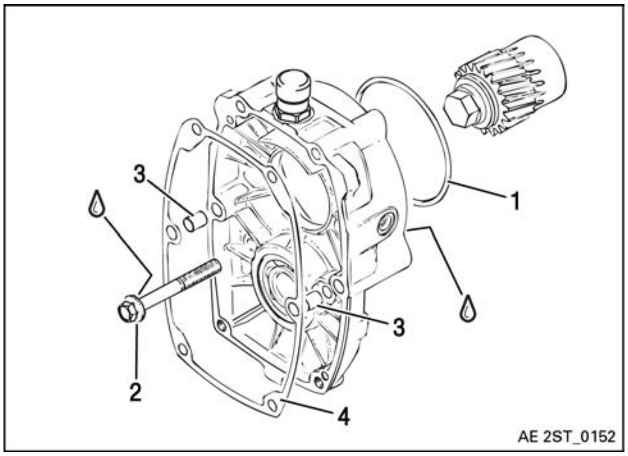


Figure 3.100

1	*O-ring 75x2.5*	2	*Hex. screw M8x65*
3	*Dowel pin*	4	*Gasket*

Step	Procedure
4	Fit gear cover assembly (5) to gear housing with dog gear engaging in drive gear.
5	Attach cover with hex. screws M8x110 (6), M8x125 (7) and M8x65 (8) with lock washers (9) and tighten it crosswise. Tightening torque 24 Nm (18 ft.lb).
6	Check for backlash of gears. See Chapter 72-10-00 section Wear Limits “B” gearbox (GB10).

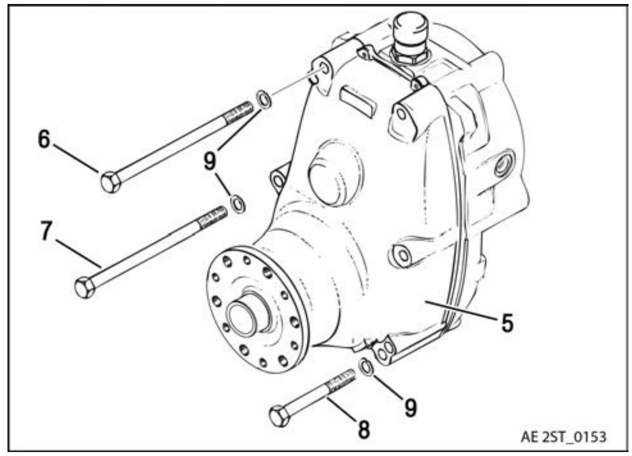


Figure 3.101

5	*Cover assy.*	6	*Hex. screw M8x110 (x2)*
7	*Hex. screw M8x125 (x2)*	8	*Hex. screw M8x65 (x2)*
9	*Lock washers (x6)*		

NOTE

Wire secure oil level plugs, oil drain plug and vent screw.

Step	Procedure
7	Fit oil drain plug (10) with new sealing ring. Tightening torque 24 Nm (18 ft.lb).
8	Fit top oil level plug (11) with new sealing ring, tightening torque 10 Nm (89 in.lb). Fill gearbox with oil up to the lower level plug. **NOTE** *See SI-2ST-008 “Selection of suitable operating fluids for ROTAX 2-stroke UL engines”* **NOTE** *Oil quantity: “SS” and “HS” prop shaft towards base: c. 300 cm3 (0,63 liq. pt.) “SZ” and “HZ” prop shaft towards cyl.: c. 330 cm3 (0,70 liq.pt.).*
9	Fit lower oil level plug (12) and vent screw (13) along with new sealing rings. Tightening torque 10 Nm (89 in.lb) **NOTE** *Vent screw must always be at the upper position of the gearbox.*

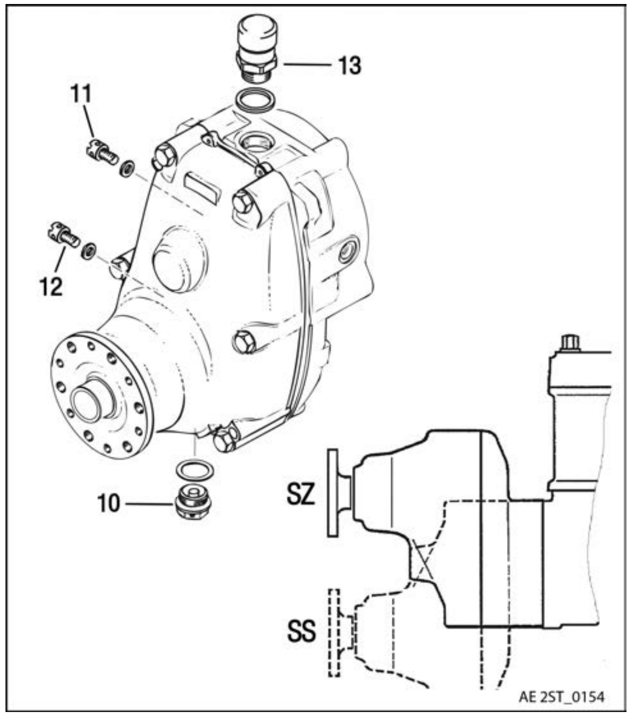


Figure 3.102

10 Oil drain plug *11 Top level plug*
12 Lower level plug *13 Vent screw*

PROPELLER GEARBOX “C” – INSTALLATION

Fitting flywheel and rubber coupling to engine
For this part see Propeller gearbox (E) - installation.

Adjusting pinion gear clearance
First, axial clearance is shimmed to “zero”. The necessary clearance of 0.4 mm (0.016 in.) is given by fitting the gasket between housing and cover.

Step	Procedure
1	To determine shims needed, take dimension by depth gauge from jointing plane of housing and cover to bearing.
2	Add dimensions **A** and **B** and compare with dimension **C** of pinion shaft. Compensate the difference by shims to zero, placed between pinion shaft and gear housing.
3	Dim. **A**: from jointing plane of cover to ball bearing, P.T.O. side. Dim. **B**: from jointing plane of housing to ball bearing, engine side Dim. **C**: length of pinion shaft between bearings Dim. **A** + Dim. **B** - Dim. **C** = **thickness of shimming**

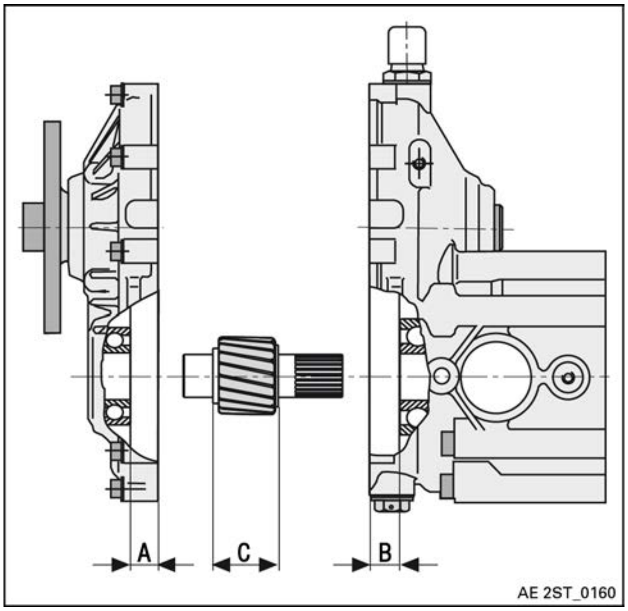


Figure 3.103

Determining thickness of shimming

Fitting gearbox

Step	Procedure
1	Lubricate support face of 4 hex. collar screws M8x90 (1). Fit gearbox to engine (with prop shaft either down or up) using the 4 outside collar screws but tighten only finger tight.
2	Apply LOCTITE ANTI-SEIZE to splines and bearing seat of pinion shaft (2) and fit along with the number of shims (3) determined , through ball bearing into coupling flange. **NOTE** *To ease engagement of splines, turn slightly.*
3	Fit Allen screw M8x35 (4) and lock washer (5) into pinion shaft. Tightening torque 24 Nm (18 ft.lb)
4	Lubricate support face of 4 hex. collar screws M8x90 to minimize friction. Fit the 4 inside located collar screws.

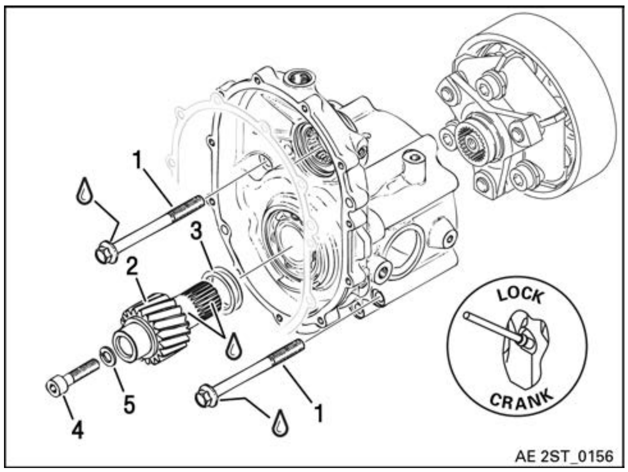


Figure 3.104

1	*Hex. collar screw M8x90*	*2*	*Pinion shaft*
3	*Shims*	*4*	*Allen screw M8x35*
5	*Lock washer*		

Step	Procedure
5	Tighten now all hex. collar screws in the shown sequence. Tightening torque 24 Nm (18 ft.lb).

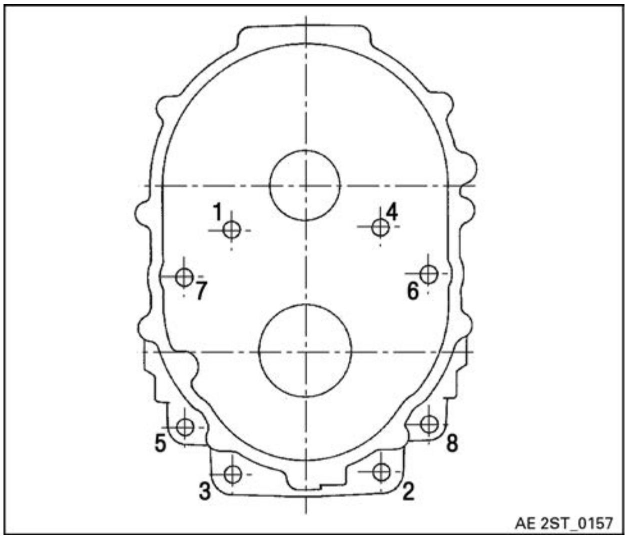


Figure 3.105

Tightening sequence

NOTE

Apply LOCTITE Anti Seize on points shown in the following figure.

Step	Procedure
6	Place dry gasket (6) on gear housing and carefully fit gear cover, paying attention to proper engagement of dowel pins (7) and not to damage oil seal. Attach gear cover with 11 Allen screws M6 x 30 (8) along with lock washers tightened crosswise. Tightening torque 10 Nm (89 in.lb).
7	Remove crankshaft locking pin.
8	Check for backlash of gears. See chapter 72-10-00 section Wear Limits “C” gearbox (GB13).

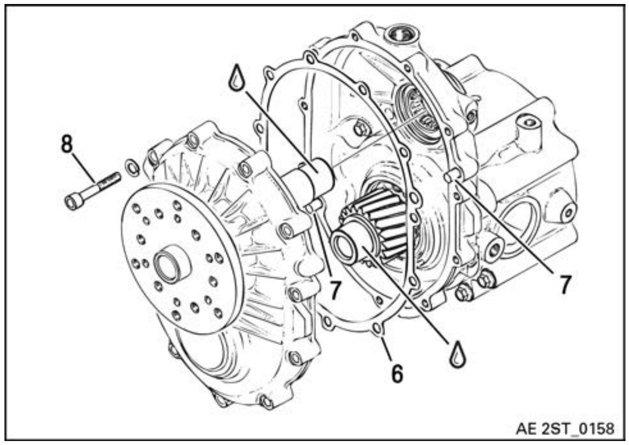


Figure 3.106

6 Gasket
7 Dowel pins
8 Allen screw M6x30

Step	Procedure
9	Fit oil drain magnetic plug (9) along with sealing ring at bottom of gear housing and tighten it. Tightening torque 24 Nm (18 ft.lb)
10	Fit top oil level plug (10) with new sealing ring, tightening torque 10 Nm (89 in.lb). Fill gearbox with oil up to the lower level plug. **NOTE** *See SI-2ST-008 “Selection of suitable operating fluids for ROTAX 2-stroke UL engines”* **NOTE** *Oil quantity: “SS” and “HS” prop shaft towards base: c. 300 cm3 (0,63 liq. pt.) “SZ” and “HZ” prop shaft towards cyl.: c. 330 cm3 (0,70 liq.pt.).*
11	Fit lower oil level plug (11) and vent screw (12) along with new sealing rings. Tightening torque 10 Nm (89 in.lb) **NOTE** *Vent screw must always be at the upper position of the gearbox.*

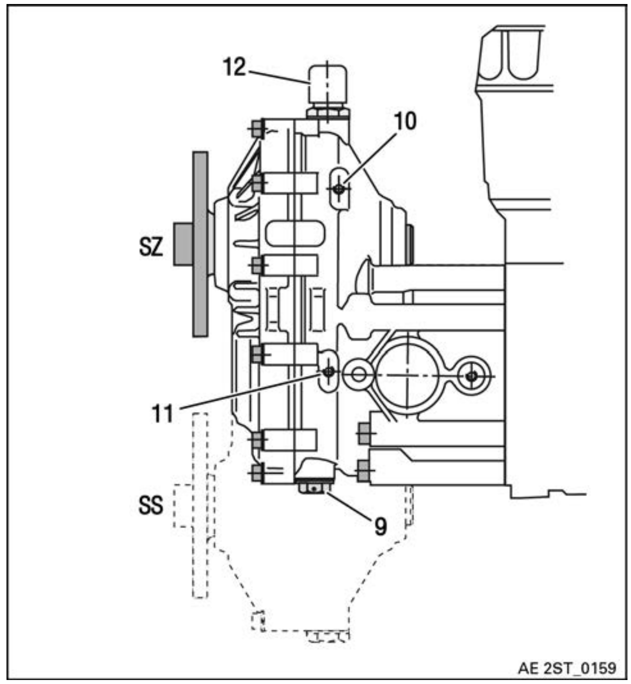


Figure 3.107

9	*Magnetic plug*	10	*Top oil level plug*
11	*Lower oil level plug*	12	*Vent screw*

PROPELLER GEARBOX “E” — INSTALLATION

Fitting flywheel and rubber coupling to engine

Step	Procedure
1	Thoroughly degrease taper of crankshaft end and cone of flywheel as well as 1/2" screw and tapped hole in crankshaft using LOCTITE 7063. Lock crankshaft with locking pin part no. 876640.
2	Apply LOCTITE 603 to the flywheel taper (1) and fit flywheel on P.T.O. end of crankshaft.

Step	Procedure
3	Apply LOCTITE 243 on hex. screw 1/2"-20 UNF (2) and fit flywheel (3) along with washer (4) on crankshaft taper. Tightening torque 80 Nm (59 ft.lb).
4	Compress rubber coupling (5) using clamp (6) to align the holes with hole pattern in coupling flange (7). Lubricate 3 Allen screws M10x45 (8) with LOCTITE 243 and attach coupling to flange with flat sided washers (9). Tightening torque 40 Nm (30 ft.lb). **NOTE** *To prevent deformation of the rubber coupling during tightening the screws, hold flat sided washer (9) in position by open end spanner 17 A/F.*

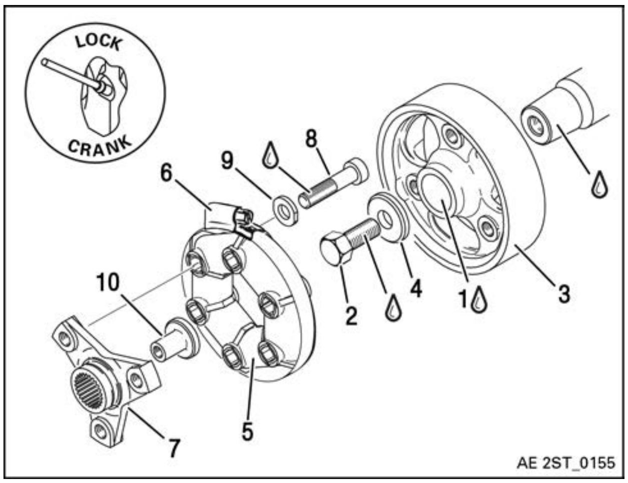


Figure 3.108

1	*Flywheel taper*	*2*	*Hex. screw 1/2”*
3	*Flywheel*	*4*	*Washer*
5	*Coupling*	*6*	*Clamp*
7	*Coupling flange*	*8*	*Allen screw M10x45*
9	*Flat sided washer*	*10*	*Nut M8*

Step	Procedure
5	If a new coupling flange (7) has to be mounted, insert M8 nut (10) with LOCTITE 648 at first.
6	Lubricate 3 Allen screws M10x45 (8) with LOCTITE 243 and attach coupling flange assy. (11) to flywheel with flat sided washer (9). Tightening torque 40 Nm (30 ft.lb).
7	Remove the clamp (6).

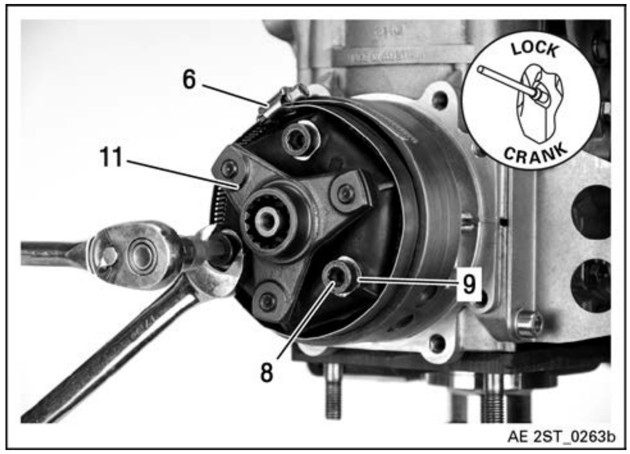


Figure 3.109

6	*Clamp*	*8*	*Allen screws M10x45*
9	*Flat sided washer*	*11*	*Coupling flange assy.*

Fitting gearbox

Step	Procedure
1	Lubricate support face of hex collar screws M8x90 (1). Fit gearbox to engine (with prop shaft either down or up) using the 8 collar screws but tighten only finger tight.
2	Apply LOCTITE ANTI-SEIZE to splines and bearing seat of pinion shaft (2) and fit through thrust washer (3), needle bearing (4), freewheel gear (5) and sprag clutch assembly (6).

Step	Procedure
3	Fit the pinion gear and clutch assy. through ball bearing into coupling flange. **NOTE** *To ease engagement of splines, turn slightly.*
4	Tighten Allen screw M8x80 (7) and lock washer (8) into pinion shaft. Tightening torque 24 Nm (18 ft.lb).

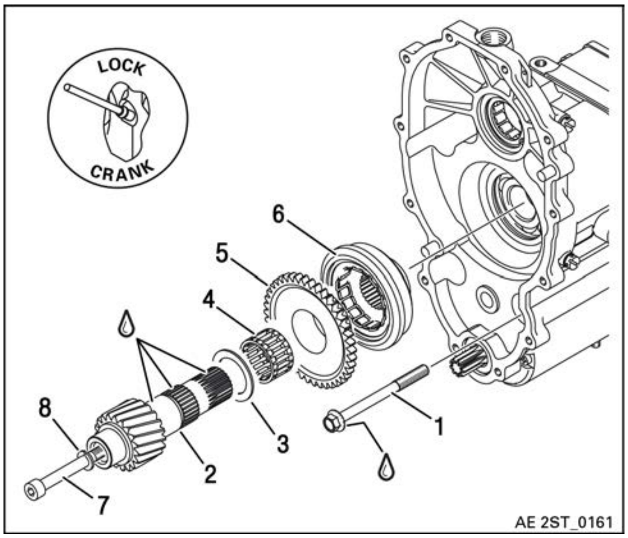


Figure 3.110

1	*Hex. collar screw M8x90*	2	*Pinion shaft*
3	*Thrust washer*	4	*Needle bearing*
5	*Freewheel gear*	6	*Clutch assy.*
7	*Allen screw M8x80*	8	*Lock washer*

Step	Procedure
5	Tighten now all hex. collar screws in the shown sequence. Tightening torque 24 Nm (18 ft.lb).

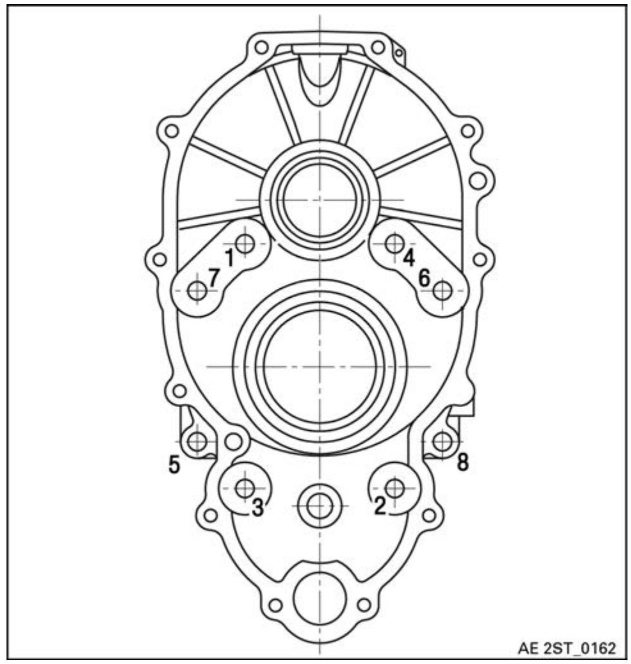


Figure 3.111

Tightening sequence

NOTE

Apply LOCTITE Anti Seize on points shown in the following figure.

ATTENTION

If the inner ring of the roller bearing is missing, check if all rolls are inside the bearing. The inner ring must now be mounted.

Step	Procedure
6	Fit idle gear (9) and gear shaft (10) with thrust washers (11). Ensure correct se-quence of fitting.
7	Place dry gasket (12) into position and fit gear cover (13) carefully, paying attention to proper engagement of dowel pins (14) and not to damage oil seal.
8	Attach gear cover with 14 Allen screws M6x30 (15) along with lock washers (16) tightened crosswise to 10 Nm (89 in.lb).

Step	Procedure
9	Remove crankshaft locking pin.
10	Check for backlash of gears. See Chapter 72-10-00 section Wear Limits “E” gearbox (GB17).

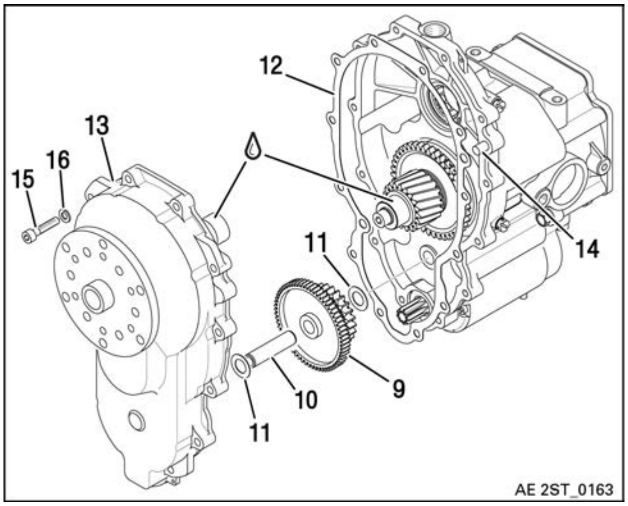


Figure 3.112

9 *Idle gear*	10 *Gear shaft*
11 *Thrust washer*	12 *Gasket*
13 *Gear cover*	14 *Dowel pin*
15 *Allen screw M6x30*	16 *Lock washer*

Step	Procedure
11	Fit oil drain magnetic plug (17) along with sealing ring at bottom of gear housing and tighten it. Tightening torque 24 Nm (18 ft.lb).
12	Fit top oil level plug (18) with new sealing ring, tightening torque 10 Nm (89 in.lb). Fill gearbox with oil up to the lower level plug. **NOTE** *See SI-2ST-008 “Selection of suitable operating fluids for ROTAX 2-stroke UL engines”.* **NOTE** *Oil quantity: “SS” and “HS” prop shaft towards base: c. 300 cm3 (0,63 liq. pt.) “SZ” and “HZ” prop shaft towards cyl.: c. 330 cm3 (0,70 liq.pt.).*
13	Fit lower oil level plug (19) and vent screw (20) along with new sealing rings. Tightening torque 10 Nm (89 in.lb) **NOTE** *Vent screw must always be at the upper position of the gearbox.*

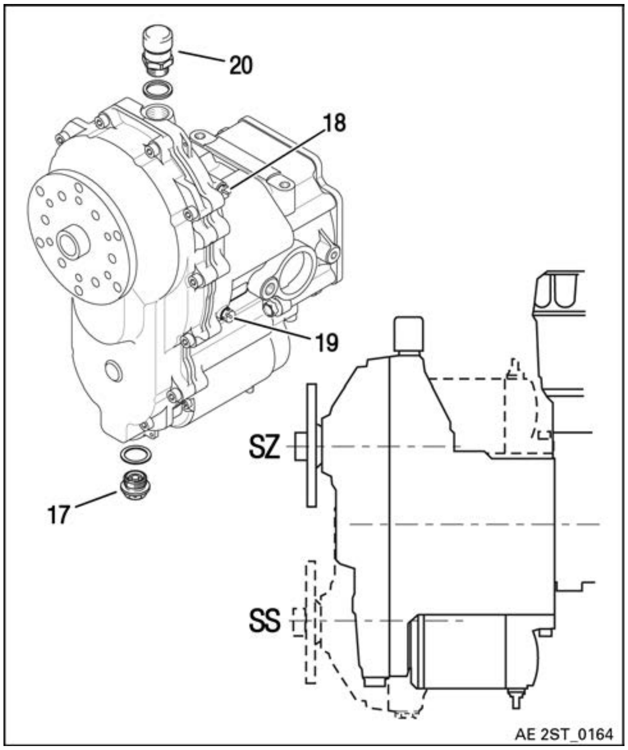


Figure 3.113

17	*Magnetic plug*	*18*	*Top oil level plug*
19	*Lower oil level plug*	*20*	*Vent screw*

PROPELLER STRIKE - SHOCK LOAD INSPECTION (FOR ALL GEARBOX TYPES)

- Remove gearbox if installed
- Disassembling of complete gearbox, visual inspection of all lose parts
- Perform MT Inspection (Magnetic crack inspection)of gear set, propeller shaft, gear-box fly-wheel and coupling flange (type “C” and “E” gearbox)
- Perform PT inspection (Fluorescent penetrant crack inspection) of gearbox housing
- Dismantle MAG side flywheel. Perform visual inspection of wood-ruff key slot in crankshaft and flywheel
- Check out of round crankshaft - PTO and MAG side
- Perform PT inspection (Fluorescent penetrant crack inspection) of crankcase attaching point to engine frame
- Assembling of engine and gearbox, perform test run

Chapter: 72-20-00
CRANKCASE, CRANK SHAFT, WATER PUMP, ROTARY VALVE DRIVE

TOPICS IN THIS CHAPTER

SPECIAL TOOLS

Description	Part number
Puller assy.	877636
Insertion jig	876602
Insertion jig	876500
Insertion jig	877825
Distance ring 72/105/28	876569
Protection mushroom	876552
Protection mushroom	876557
Ring	977490
Ring half	977475
Ring half	276025
Insertion jig	876512
Extrusion jig	876612
Guide sleeve	876980
Crankshaft fixation bolt	876640
Mounting plate with detent	876746
Puller assy.	877860

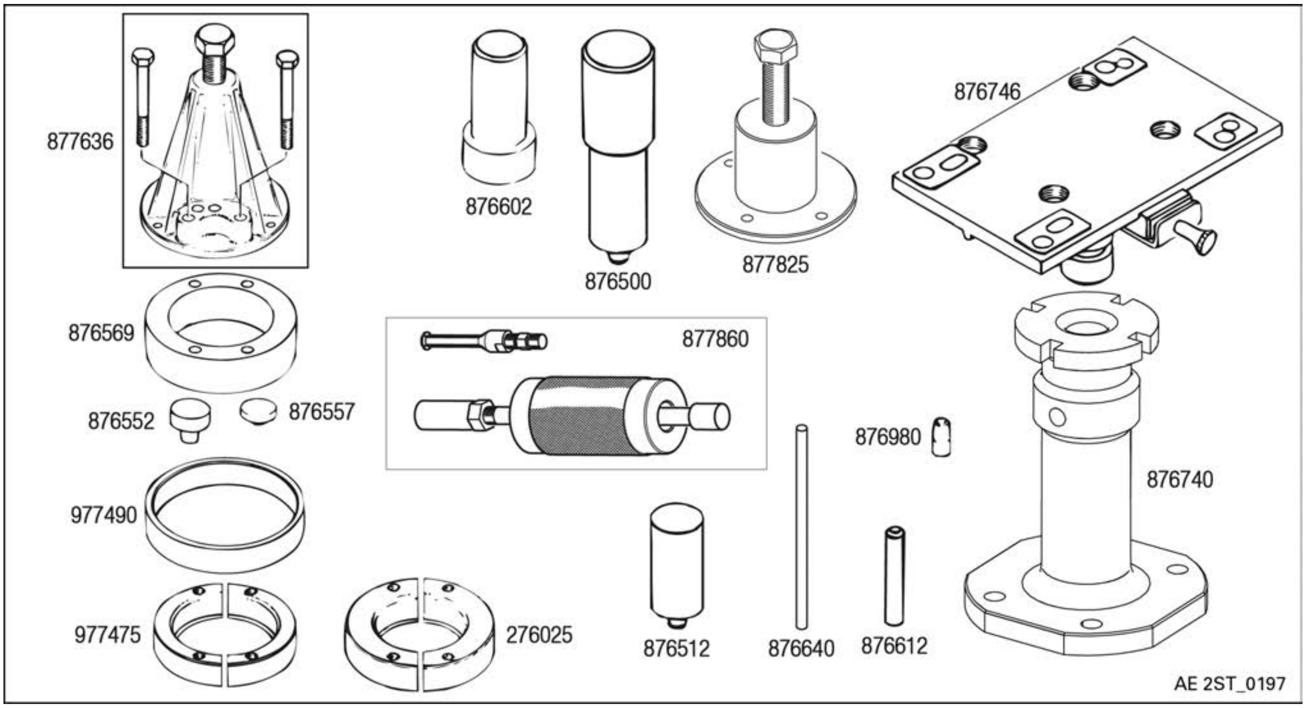

877636
876602
876500
877825
876746
876569
877860
876552
876557
876980
876740
977490
977475
276025
876512
876640
876612
AE 2ST_0197

Figure 4.1

SERVICE PRODUCTS

Description	Part number
LOCTITE 243	897651
LOCTITE 648	899788
LOCTITE 5910	899791
LITHIUM-BASED GREASE	897330
LOCTITE ANTI SEIZE	297434
ENGINE OIL	n.a.

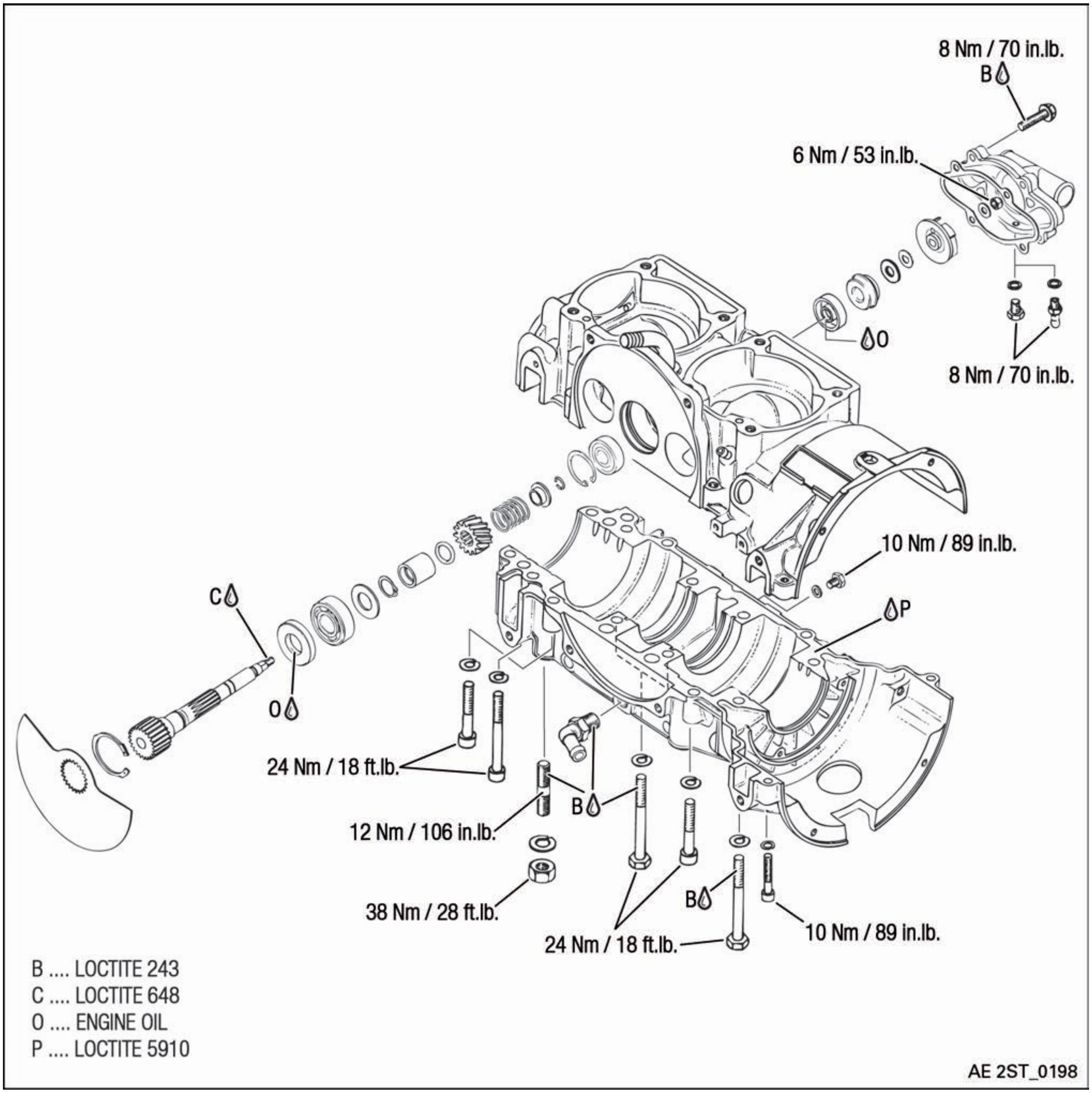


Figure 4.2: Components

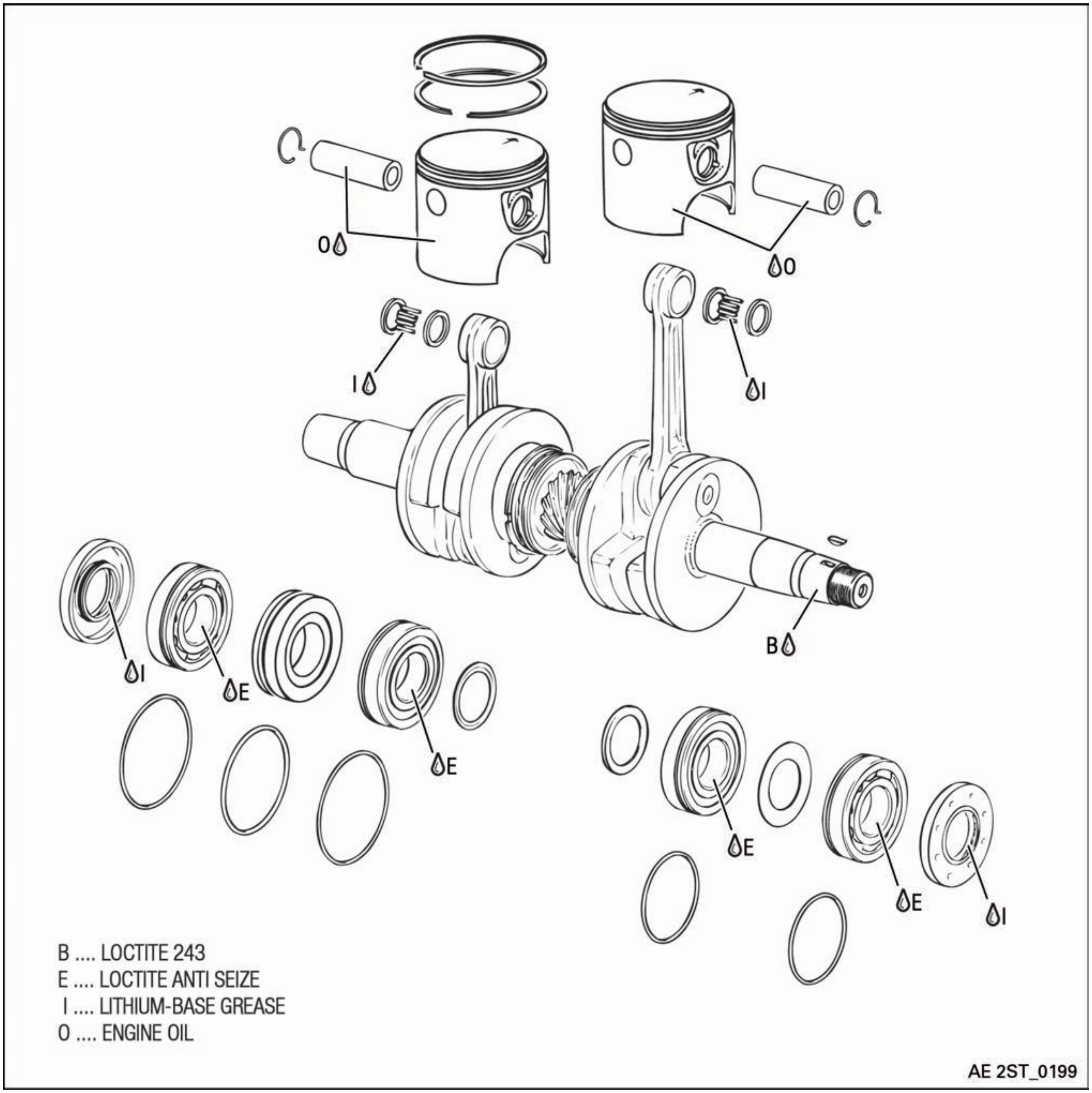


Figure 4.3: Components

SYSTEM DESCRIPTION

SAFETY INSTRUCTIONS

⚠ WARNING

Danger of severe burns and scalds! Always allow the engine to cool down to ambient temperature before starting any work.

MAINTENANCE

As well as the maintenance and special checks, see current Maintenance Manual Line for the respective engine type.

REMOVAL AND DISASSEMBLY

Preparation

- Remove carburetors. See Chapter 73-00-00 Fuel system section Carburetor removal.
- Remove ignition coils and supporting plate. See Chapter 24-00-00 section Ignition coils removal.
- If optionally equipped, remove oil tank. See Chapter 79-00-00 section Oil tank (engine) removal
- Remove cylinder head, cylinders and pistons. See Chapter Chapter 72-30-00 Cylinder Head and Chapter Chapter 72-30-10 Displacement Parts.
- Remove rotary valve cover and rotary valve oil tank. See Chapter 79-00–00 section Oil tank (rotary valve) installation.

WATER PUMP - DISASSEMBLY

Step	Procedure
1	Remove 4 hex. screws M6x25 (1) and take off water pump housing (2) along with gasket (3).

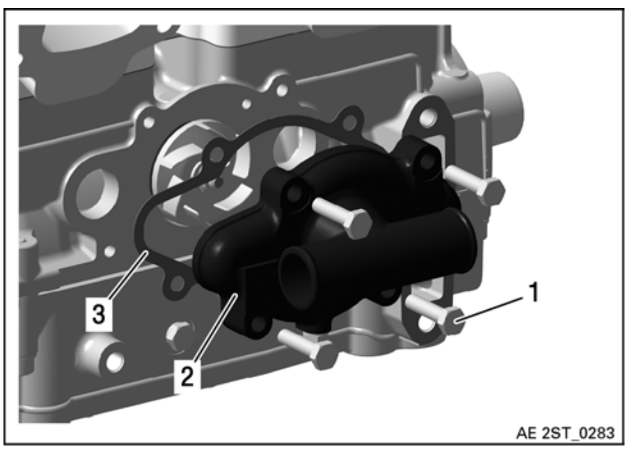
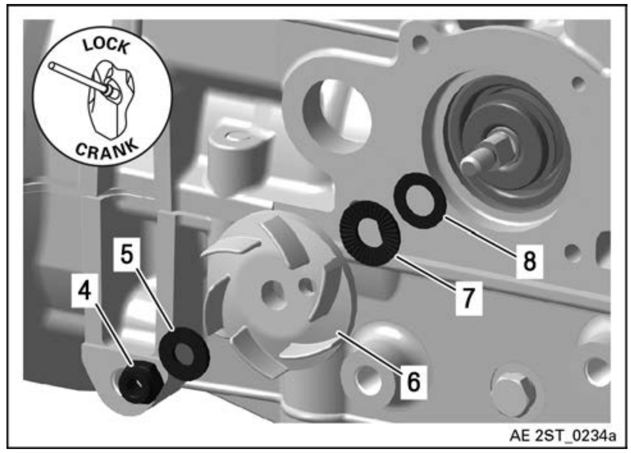


Figure 4.4

1 Hex. screw M6x25 *2 Water pump housing*
3 Gasket

Step	Procedure
2	Lock the crankshaft using the locking pin part no. 876640.
3	Remove lock nut (4) and washer (5), followed by impeller (6) along with the friction washer (7) and thrust washer (8) placed behind impeller.



4 Lock nut M6 *5 Washer 6.4*
6 Impeller *7 Friction washer*
8 Thrust washer

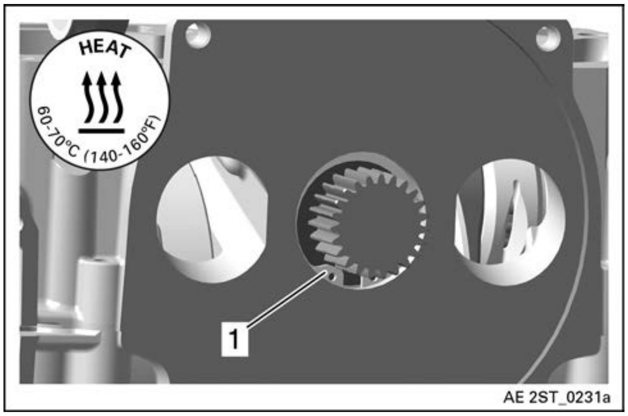
Figure 4.5

ROTARY VALVE SHAFT - REMOVAL AND DISASSEMBLY

Preparation
Prior to disassembly check backlash of rotary valve drive. Nominal backlash is 0,3 mm (.012 in.) but not exceeding 0,9 mm (.035 in.). See section Rotary valve shaft – Inspection.

REMOVAL

Step	Procedure
1	Extract the retaining ring (1) on the rotary valve side using circlip pliers.



1 Retaining ring

Figure 4.6

Step	Procedure
2	Heat crankcase up to 60 - 70 °C (140 - 160 °F) around rotary valve and tap out rotary valve shaft assy.
3	Fit extrusion jig part no. 876612 (2) to rotary valve shaft on water pump side. **NOTE** *Thread the tool carefully and fully until it stops against the rotary valve shaft.*

NOTE

Use hard plastic hammer only.

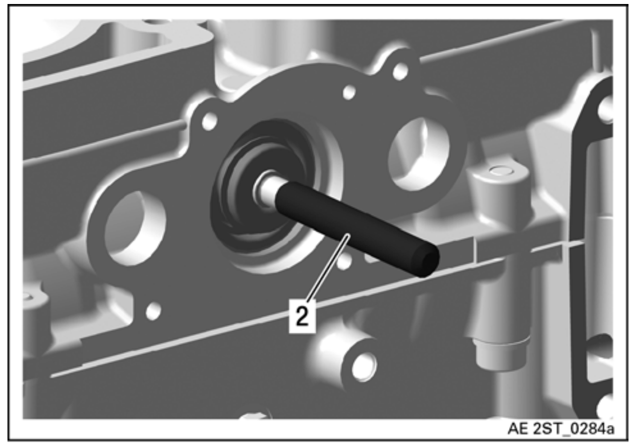


Figure 4.7

2 Extrusion jig part no. 876612

DISASSEMBLY

Step	Procedure
1	Depress spring holding cup (1) and remove circlip (2), then carefully release spring.
2	Remove the compression spring (3), rotary valve gear (4), O-ring (5) and spacer (6).
3	Remove retaining ring (7) and shim (8).

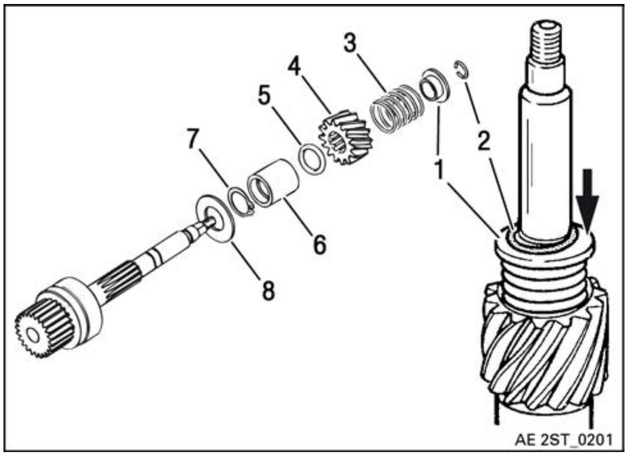


Figure 4.8

1	*Spring holding cup*	2	*Circlip 12*
3	*Compression spring 25.1 mm*	4	*Rotary valve gear*
5	*O-ring 14-3*	6	*Spacer*
7	*Retaining ring 17x1*	8	*Shim 17.2/32.5/1.5*

Step	Procedure
4	Using extrusion jig part no. 876612 (9), press off the ball bearing (10) and remove and discard the oil seal (11).

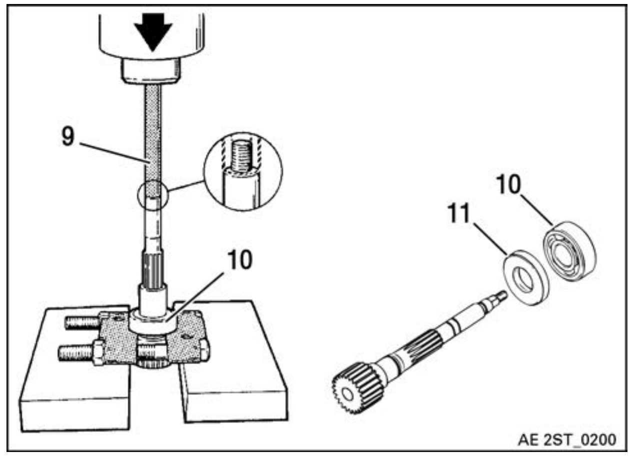


Figure 4.9

9	*Extrusion jig part no. 876612*	10	*Ball bearing 6203*
11	*Oil seal 20x40x7*		

CRANKCASE - DISASSEMBLY

Step	Procedure
1	Place 4 M8x65 cylinder mounting screws (1) loosely into the crank case and turn the engine over, resting on the screws.
2	Loosen all fasteners, starting from outside towards inside.

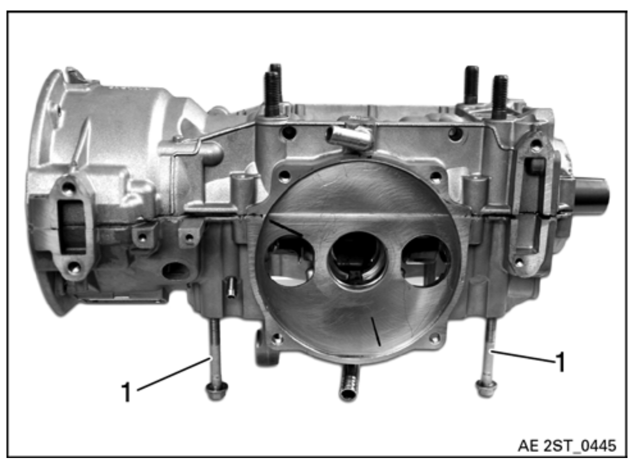


Figure 4.10

1	*Mounting screws*

Step	Procedure
3	Split crankcase in its 2 halves by carefully twisting with 2 large screwdrivers between the reinforcement ribs at joint face (2). **NOTE** *Do not damage crankcase sealing surface.*

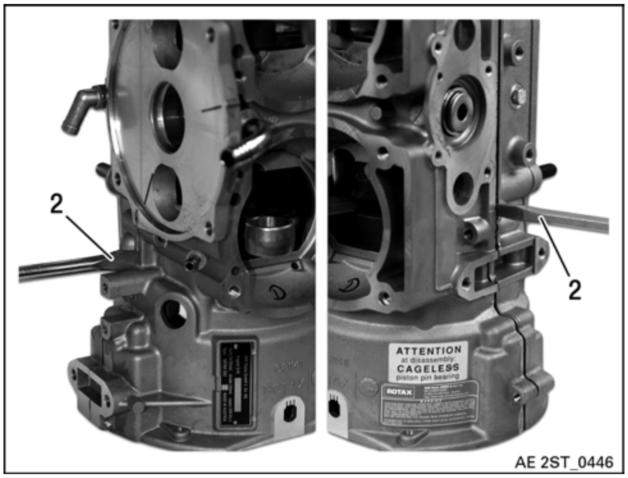


Figure 4.11

2 *Reinforcement ribs at joint face*

Step	Procedure
4	Remove bottom crankcase half carefully allowing the crankshaft to rest in the upper case-half.
5	Hold crankshaft at both ends with an other person tapping loose the remaining crankcase half, but without hitting the sealing surfaces.

ATTENTION

Do not set the crankcase half down on the sealing surfaces.

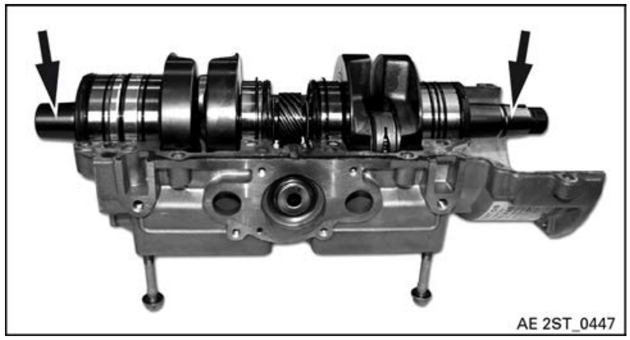


Figure 4.12

ATTENTION

Renew rotary seal, oil seal and bearing.

Step	Procedure
6	Break out the rotary seal (3) and pull out the remaining part with puller assy 877860 (4).

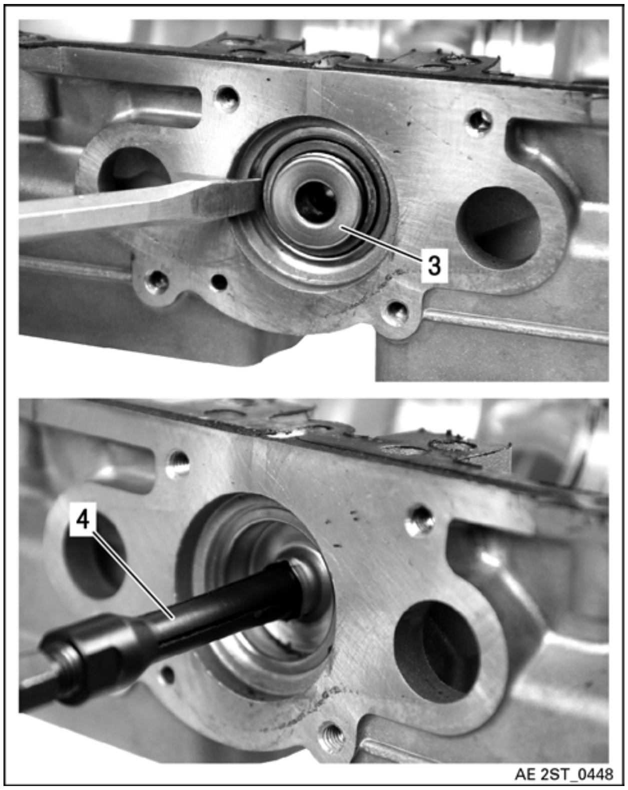


Figure 4.13

3 *Rotary seal*	4 *Puller assy. 877860*

Step	Procedure
7	Remove the retaining ring (5) at rotary valve shaft bearing.
8	Heat up top half of crankcase in the vicinity of rotary valve shaft bearing to 60 - 70 °C (140 - 160 °F) and push out bearing and oil seal from outside using punch part no. 877512 (6).

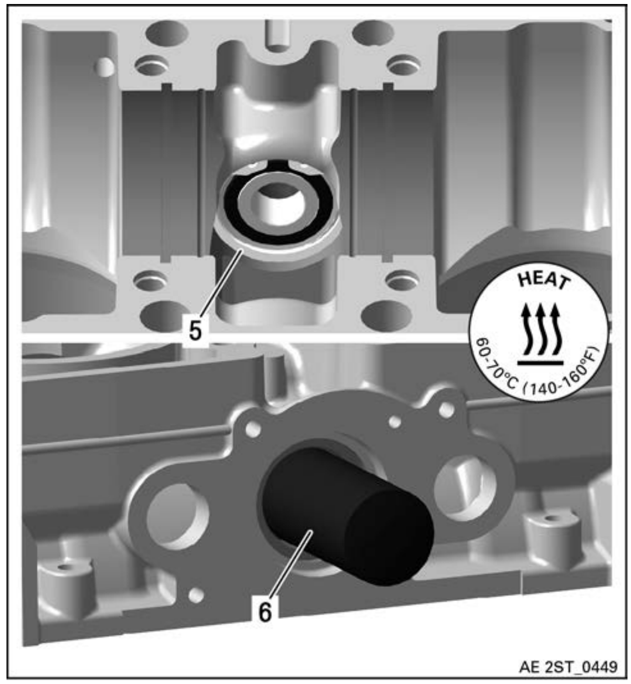


Figure 4.14

5 *Retaining ring*	6 *Punch part no. 877512*

CRANKSHAFT — DISASSEMBLY PTO END

Step	Procedure
1	Remove outside oil seal from crankshaft and O-rings from bearings.
2	Support crankshaft on magneto side and place 2 puller-ring halves part no. 977475 (1) on the lower bearing and center with ring part no. 977490 (2).
3	Place mushroom shaped protection piece part no. 876552 (3) to protect crankshaft.
4	Fit puller assy. part no. 877636 (4) using 4 hex. head screws M8x70.

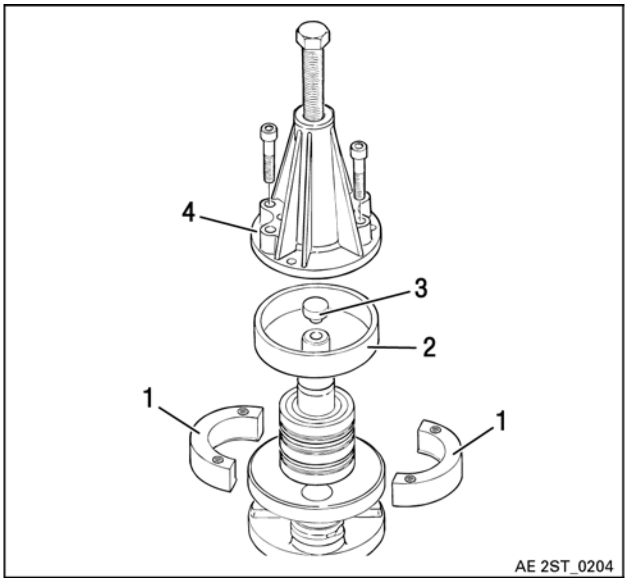


Figure 4.15

1	*Ring half part no. 977475*	2	*Ring part no. 977490*
3	*Protection mushroom part no. 876552*	4	*Puller assy. part no. 877636*

Step	Procedure
5	Pull off both bearings together along with labyrinth sleeve (5) by turning puller tool hex. head screw clockwise.
6	Remove distance ring (6).

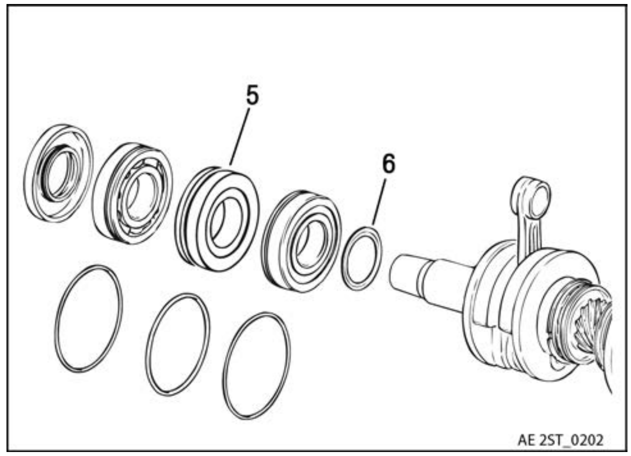


Figure 4.16

5	*Labyrinth sleeve*	6	*Distance ring 35.5/4*

CRANKSHAFT — DISASSEMBLY MAG END

Step	Procedure
1	Remove outside oil seal from crankshaft.
2	Support crankshaft on P.T:O side and place the 2 puller ring halves part no. 276025 (1) under the lower bearing and center with ring part no. 977490 (2).
3	Place mushroom shaped protection piece part no. 876557(3) to protect crankshaft.
4	Fit distance ring part no. 876569 (5) and puller assy. part no. 877636 (4) to puller-ring halves using 4 hex. head screws M8x70.

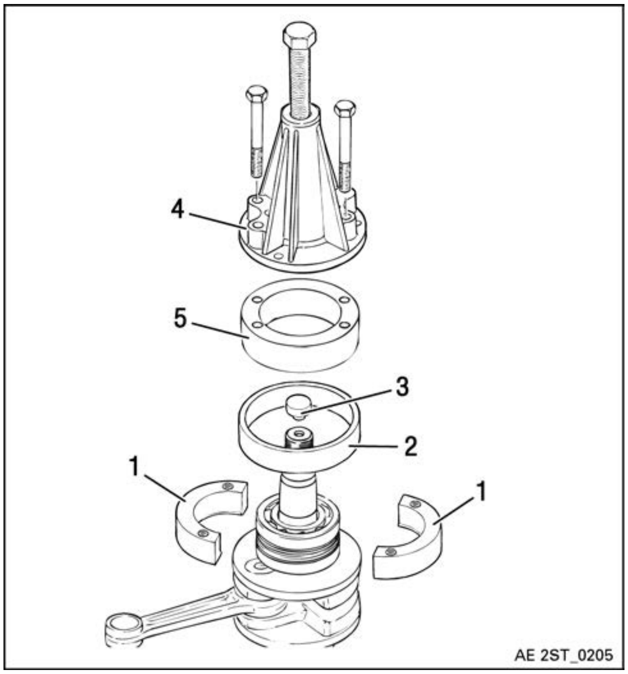


Figure 4.17

1	*Ring halves part no. 276025*	*2*	*Ring part no. 977490*
3	*Protection mushroom part no. 876557*	*4*	*Puller assy. part no. 877636*
5	*Distance ring part no. 876569*		

Step	Procedure
5	Pull off both bearings together along with stop shim (6) by turning puller tool hex. head screw clockwise.
6	Remove spacer ring (7).

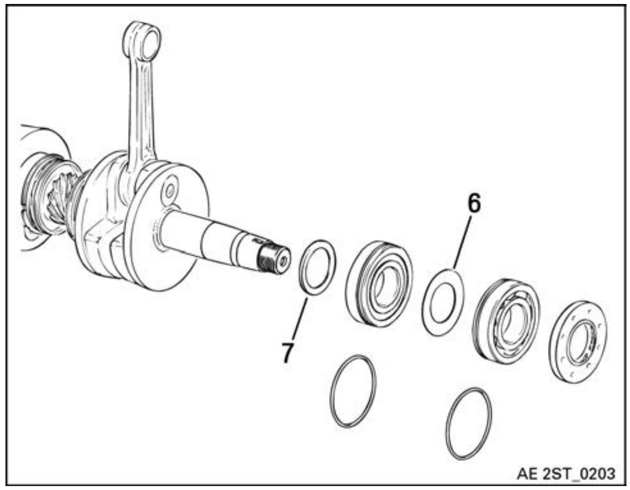


Figure 4.18

6	*Stop shim 30.4/51/1*	*7*	*Spacer ring 30.5/ 42/2*

INSPECTION

Preparation

- Clean crankcase. See Chapter 00-00-00 – Section Cleaning of components
- Check all tapped holes
- Inspect mating face of rotary valve for wear and score marks
- Visual check for cracks and traces for wear on bearing seats. Look for marks indicating that any of the bearing outer races had been rotating during engine operation

CRANKCASE BORE MEASUREMENT

NOTE

All crankcase fasteners to be tightened, otherwise readings will be false.

Step	Procedure
1	For taking dimensions of the bearing seats, join clean, dry crankcase halves, align with ball bearings and tighten screws as specified: (M8 to 24 Nm, M6 to 10 Nm)

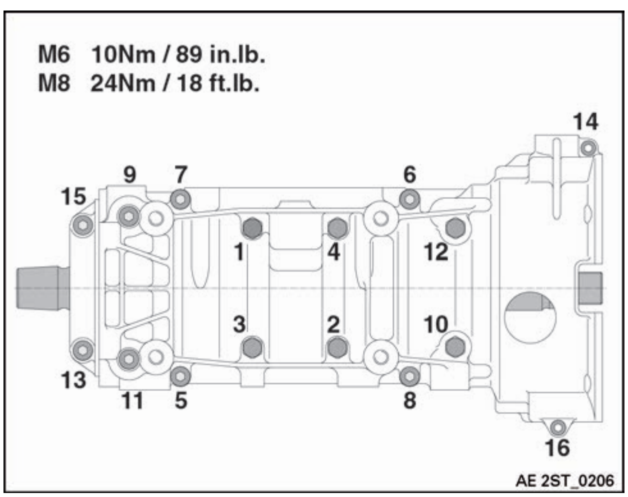


Figure 4.19: Torque sequence

Step	Procedure
2	Take readings in cylinder axis on all 3 bearing locations. See section Wear Limits (CC01, CC02 and CC03).

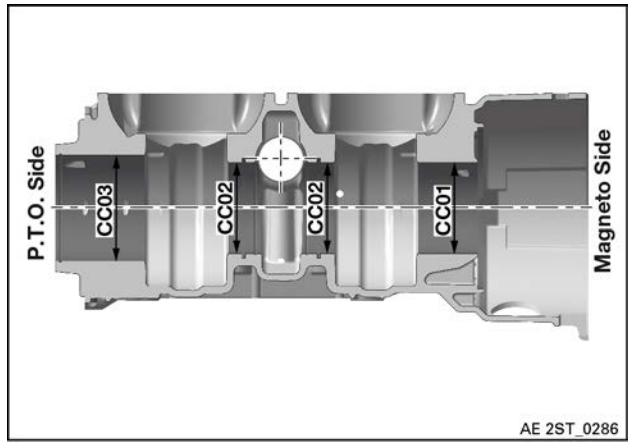


Figure 4.20

NOTE

The clearance of rotary valve between cover and crankcase is decisive for starting behavior. The bigger the clearance, the higher the starting speed needed to compensate for losses.

Step	Procedure
3	Place the rotary valve cover on crank case and measure clearance. See section Wear Limits (RV05).

NOTE

To determine the actual clearance at different spots, place putty evenly over face of crankcase and fit rotary valve and cover.

After removal of cover and valve, the thickness of the compressed putty represents the actual clearance. Wear occurs mainly in the vicinity of intake openings

Step	Procedure
4	In both intake ducts a cast deviation vane will prevent scavenging of oil out of con rod bearing. Never cut off this vane.

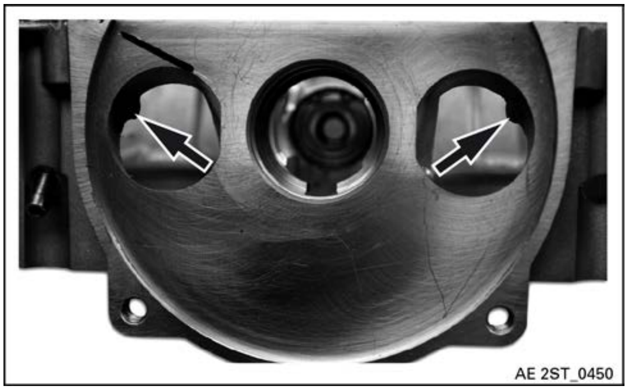


Figure 4.21

CRANKCASE - INSPECTION

Preparation

- Clean all removed bearings in non-flammable cleaning agent. See Chapter 00-00-00.
- Check every bearing for smooth running - it is advisable to replace a bearing even with only slight traces of wear or pitting

NOTE

It is recommended or advisable to replace all removable ball bearings in the course of an engine repair.

NOTE

If the oil consumption of the rotary valve drive is above 1 cc/hour, the possible reason could be leaking inner oil seals, allowing oil to reach the crank space, and it is burnt during combustion process. In case of faulty inner oil seals or bearings, renew crankshaft.

Step	Procedure
1	With crankshaft supported on the outer bearing seats (1), check concentricity at the inner bearings (2). See section Wear Limits (CS01/CS03/CS05/CS06). **NOTE** *Readings are taken with bearings fitted.*
2	Check concentricity at the P,T.O. end (3) and the magneto end (4) of the crankshaft. See section Wear Limits (CS02) and (CS04).
3	Check con rod axial clearance (5) by feeler gauge. See section Wear Limits (CS09).
4	Check con rod small end (6). See section Wear Limits (CS07).

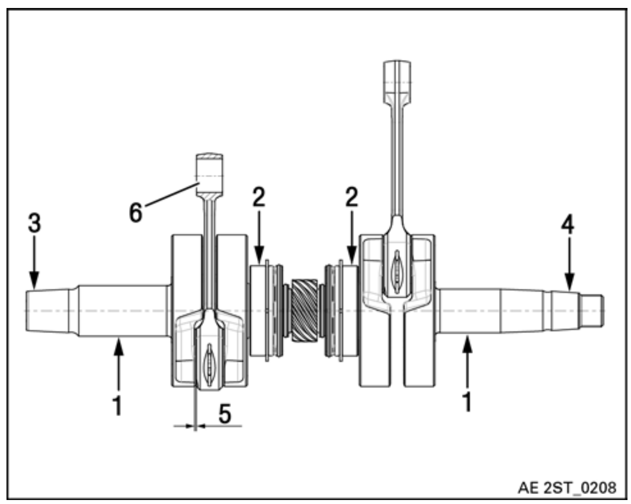


Figure 4.22

1	*Outer bearing seats*	2	*Inner bearings*
3	*Concentricity P.T.O. end*	4	*Concentricity MAG end*
5	*Con rod axial clearance*	6	*Con rod small end*

Step	Procedure
5	Check con rod radial clearance (6), utilizing dial gauge and suitable fixture. See section Wear Limits (CS08) **NOTE** *Prior to check, clean con rod bearings in gasoline and blow out.*
6	Visually examine big end con rod bearing through lubrication slot (7) for wear (pitting, discoloration etc.) and corrosion.

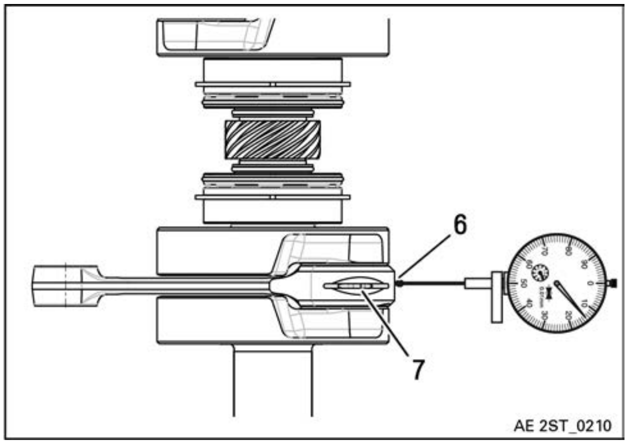


Figure 4.23

6 Con rod radial clearance
7 Lubrication slot

ATTENTION

If con rod axial or radial clearance exceeds wear limit or shows signs of damage, pitting or corrosion as viewed through lubrication slot, crankshaft must be replaced with new.

Step	Procedure
7	Check taper (8) on both ends of crankshaft. Check external (9) and internal (10) threads. Check groove for Woodruff key (11) on magneto-side. Inspect oil seal contact surfaces (12).
8	Check rotary valve gear (13) for wear and damage. In case of damaged gear, renew crankshaft.

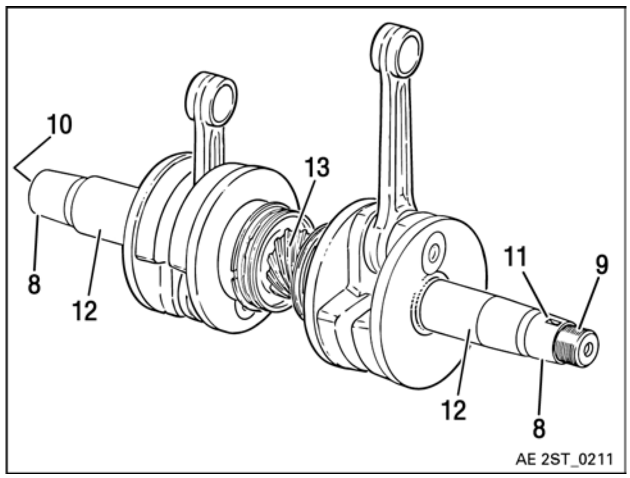


Figure 4.24

8 Taper
9 External threads
10 Internal threads
11 Key groove
12 Seal surface
13 Rotary valve gear

ROTARY VALVE COVER - INSPECTION

Step	Procedure
1	Place the rotary valve cover on crankcase and measure clearance. See section Wear Limits (RV05). **NOTE** *Wear occurs mainly in the vicinity of intake openings.*

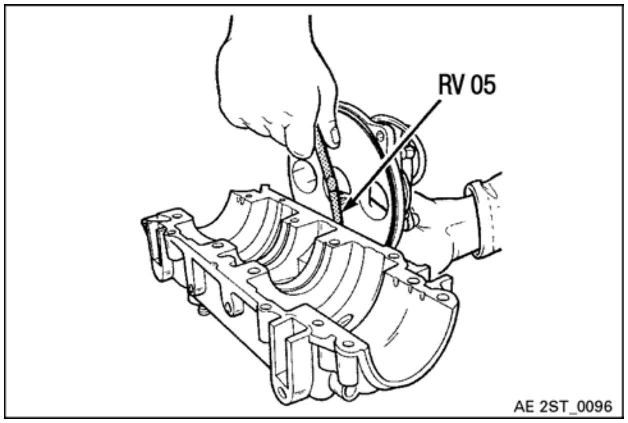


Figure 4.25

NOTE

The clearance of rotary valve between cover and crankcase is important for starting behavior. The bigger the clearance, the higher the starting speed needed to compensate for losses.

NOTE

To determine the actual clearance at different spots, place putty evenly over face of crankcase and fit rotary valve and cover. After removal of cover and valve, the thickness of the compressed putty represents the actual clearance.

ROTARY VALVE SHAFT - INSPECTION

Step	Procedure
1	Check shaft for deflection (1). See section Wear Limits (RV01/02).
2	Visual inspection of contact face for oil seals (2). At traces of wear above 0.05 mm (0.0019 in.) renew rotary valve shaft.
3	Check shaft splines (3) for bronze gear. This gear needs easy axial movement for trouble free operation.

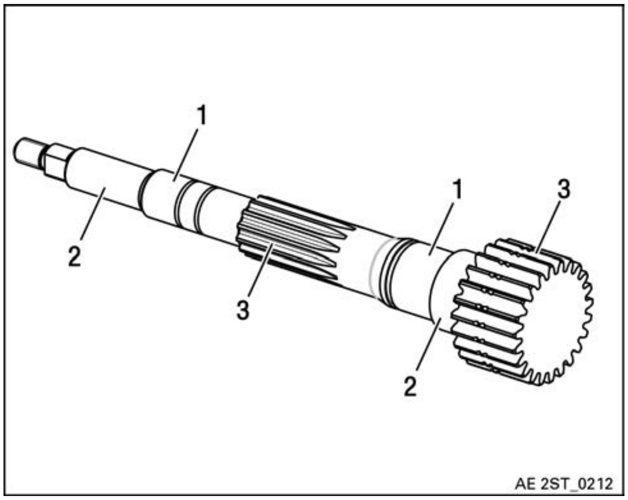


Figure 4.26

1 Deflection RV01/02 *2 Seal contact face*

3 Splines

Step	Procedure
4	Inspect helical teeth of rotary valve gear (4). **NOTE** *A reason for damage of gear could be a broken compression spring.*
5	Visually inspect the spring for wear or discoloration. Measure free length of compression spring (5). Renew as required. See Wear Limits (RV03).
6	The O-ring (6) behind rotary valve gear serves as damping element and should be renewed at an engine repair.

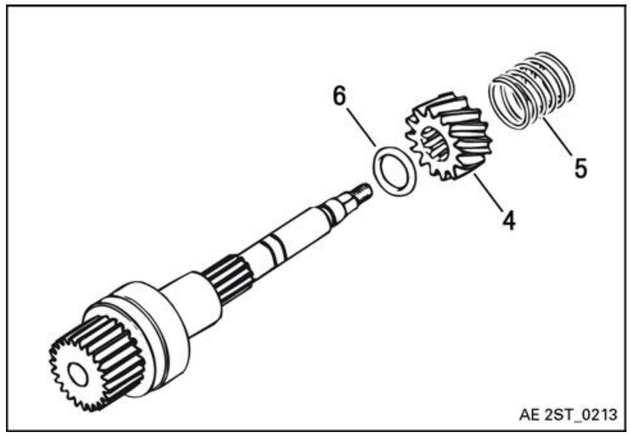


Figure 4.27

4 Rotary valve gear 14 t. *5 Compression spring*

6 O-ring 14-3

WATER PUMP - INSPECTION

Step	Procedure
1	Pay attention to free passage of venting bore (1) at water pump side. Check thread of tapped holes M6 (2) for attaching water pump housing. If need be, repair by using Heli-Coil inserts. **NOTE** *On the bottom crankcase half, the vent screw M6 (3) for the rotary valve drive is located.*

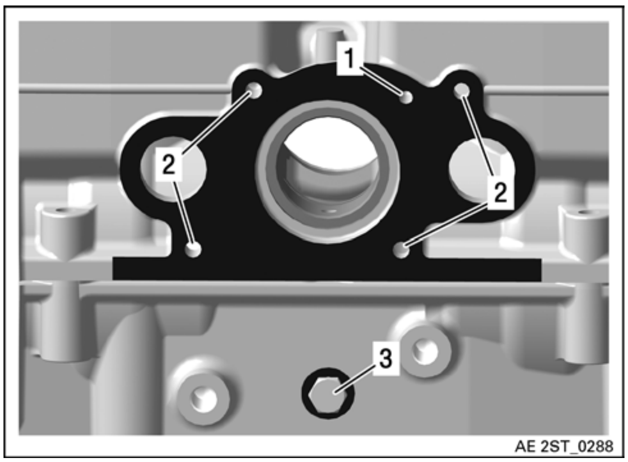


Figure 4.28

1	*Venting bore*	2	*M6 threads*
3	*Vent screw M6*		

WEAR LIMITS

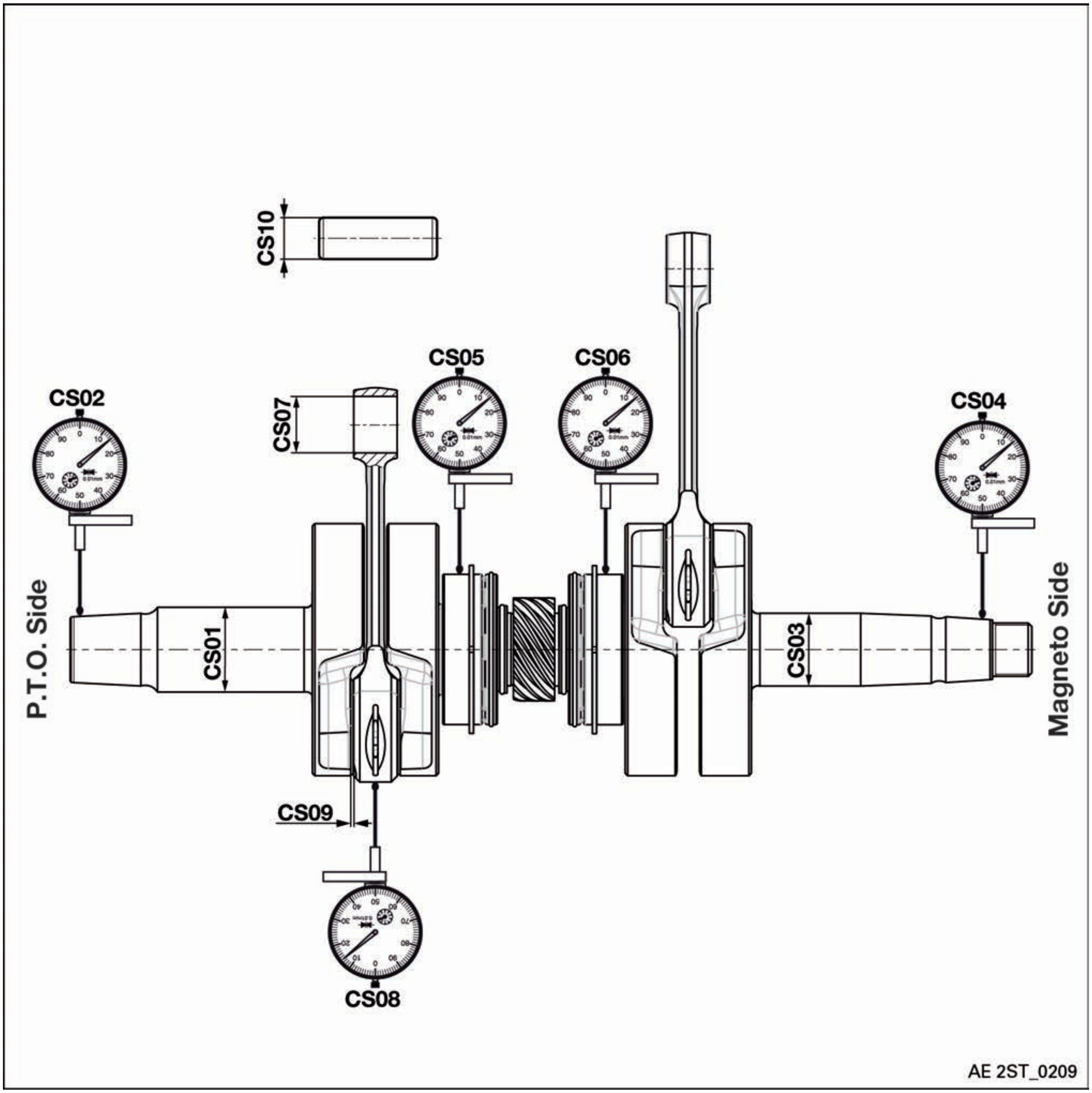


Figure 4.29: Wear limits

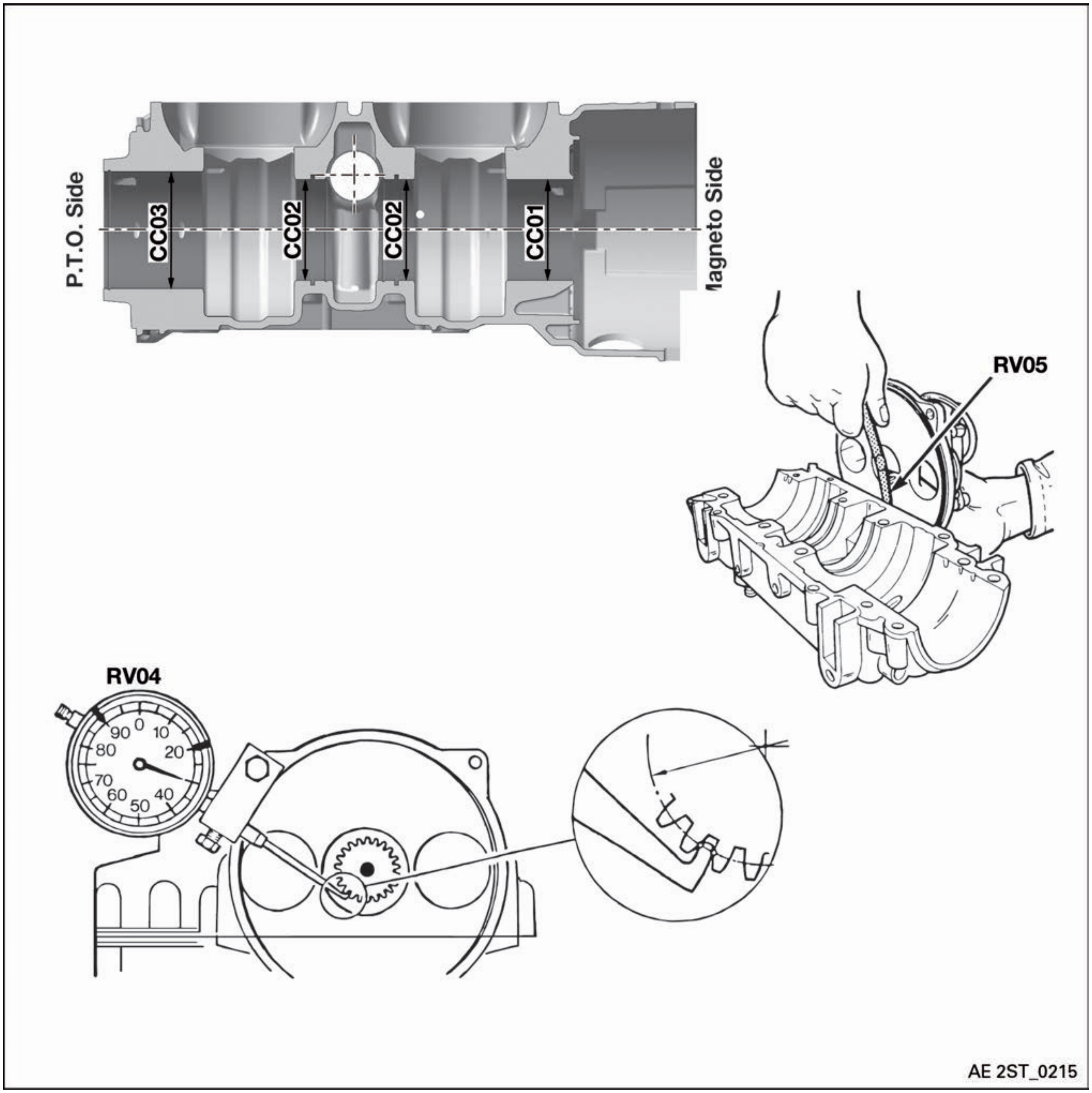


Figure 4.30: Wear limits

Description	Code	Reading new		Wear limit		Readings
		min	max	100 %		
Crankcase						
Bearing seat ball bearing	CC02/ 03	71.940 mm 2.832 in.	71.958 mm 2.833 in.	71.960 mm 2.833 in.	actual	
					renewed	
Bearing seat ball bearing	CC01/ 02	61.940 mm 2.438 in.	61.958 mm 2.439 in.	61.960 mm 2.439 in.	actual	
					renewed	
Ball bearing 6206 MAG end		61.989 mm 2.440 in.	62.000 mm 2.441 in.	61.987 mm 2.440 in.	actual	
					renewed	
Ball bearing 6207 P.T.O. end		71.989 mm 2.834 in.	72.000 mm 2.835 in.	71.987 mm 2.834 in.	actual	
					renewed	
Interference of press fit		0.029 mm 0.0011 in.	0.060 mm 0.002 in.	0.027 mm 0.001 in.	actual	
					renewed	
Clearance (cover/ case)	RV05	0.3 mm 0.012 in.	0.45 mm 0.018 in.	0.177 mm 0.007 in.	actual	
					renewed	
Crankshaft						
Con rod small end	CS07	21.997 mm 0.8662 in.	22.005 mm 0.8663 in.	22.010 mm 0.8665 in.	actual	
					renewed	
Radial clearance	CS08	0.020 mm 0.0008 in.	0.033 mm 0.0013 in.	0.050 mm 0.0020 in.	actual	
					renewed	
Axial clearance	CS09	0.400 mm 0.0157 in.	0.727 mm 0.0286 in.	1.00 mm 0.0393 in.	actual	
					renewed	
Concentricity P.T.O. end	CS02	0.00 mm 0.000 in.	0.05 mm 0.0019 in.	0.06 mm 0.0024 in.	actual	
					renewed	
Concentricity MAG end	CS04	0.00 mm 0.000 in.	0.03 mm 0.0012 in.	0.06 mm 0.0024 in.	actual	
					renewed	
Piston pin	CS10	17.997 mm 0.708 in.	18.000 mm 0.709 in.	17.970 mm 0.707 in.	actual	
					renewed	
Radial clearance, Piston pin		0.003 mm 0.0001 in.	0.012 mm 0.0005 in.	0.030 mm 0.0010 in.	actual	
					renewed	
Crankshaft, P.T.O side	CS01	35.003 mm 1.378 in.	35.013 mm 1.379 in.	35.000 mm 1.378 in.	actual	
					renewed	
Ball bearing P.T.O side	CS05	34.988 mm 1.377 in.	35.000 mm 1.378 in.	35.000 mm 1.378 in.	actual	

					renewed	
Bearing clearance		0.015 mm 0.0006 in.	0.033 mm 0.0013 in.	0.05 mm 0.002 in.	actual	
					renewed	
Crankshaft Magneto side	CS03	30.003 mm 1.1810 in.	30.013 mm 1.1820 in.	30.000 mm 0.1810 in.	actual	
					renewed	
Ball bearing Magneto side	CS06	29.990 mm 1.1807 in.	30.000 mm 0.1810 in.	30.000 mm 0.1810 in.	actual	
					renewed	
Bearing clearance		0.023 mm 0.001 in.	0.041 mm 0.0016 in.	0.060 mm 0.002 in.	actual	
					renewed	
Rotary valve drive						
Backlash	RV04	0.3 mm 0.0118 in.	0.5 mm 0.0196 in.	0.9 mm 0.0354 in.	actual	
					renewed	

INSTALLATION AND ASSEMBLY

Generally, always pay attention to absolute cleanliness. Small amount of foreign matter in the oil circuit could cause severe damage or reduce the lifespan of the engine essentially.
Lubricate all bearings and moving parts in the course of assembly.
All O-rings, oil seals and gaskets have to be renewed at re-assembly.
The axial position of crankshaft is predetermined by the two ball bearings at crankshaft center with one each locating ring engaging in groove of crankcase. Fitting and completing of crankshaft assembly generally in reverse sequence to disassembly. Clean and degrease all bearing seats. For correct arrangement of ball bearings, distance rings and oil seals, consult illustrations in the respective spare parts list.
The ball bearings are furnished with an O-ring on the circumference, to avoid possible rotation of the outer race in the crankcase. To prevent squeezing of the O-rings when joining the crankcase halves, clearances are provided on jointing face of crankcase.

CRANKSHAFT - INSTALLATION PTO END

Step	Procedure
1	Warm up ball bearings to 70 - 80 °C (160 - 175 °F).
2	To prevent fretting corrosion, apply LOCTITE Anti-Seize on crankshaft bearing seats.
3	Support crankshaft on magneto side and place distance ring (1) with rounded side towards crank blade, followed by pre-heated 6207 ball bearing (2) with O-ring groove outwards, on crankshaft.
4	Fit labyrinth sleeve (3) with O-ring groove outwards followed by pre-heated 6207 ball bearing (4) with O-ring groove inwards.

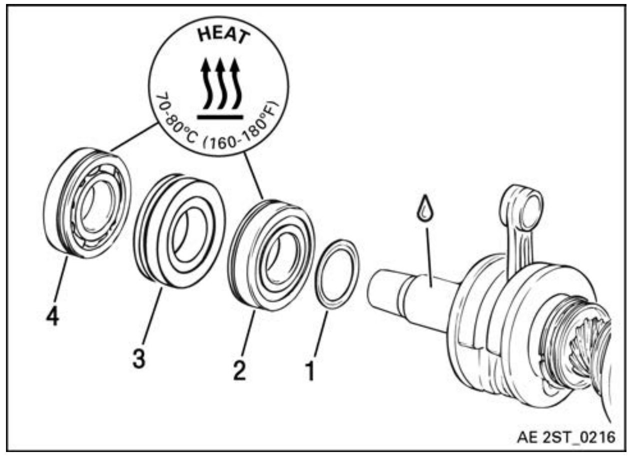


Figure 4.31

1	*Distance ring 35.5/47/2*	2	*Ball bearing 6207*
3	*Labyrinth sleeve*	4	*Ball bearing 6207*

NOTE

Properly pre-heated bearings can be fitted easily onto journals of crankshaft.

Step	Procedure
5	The labyrinth sleeve must not be clamped by the two bearings. Ensure axial clearance of 0.5 mm (0.019 in.) by suitable shimming (5). Remove shims from both sides of labyrinth after bearings have cooled down.

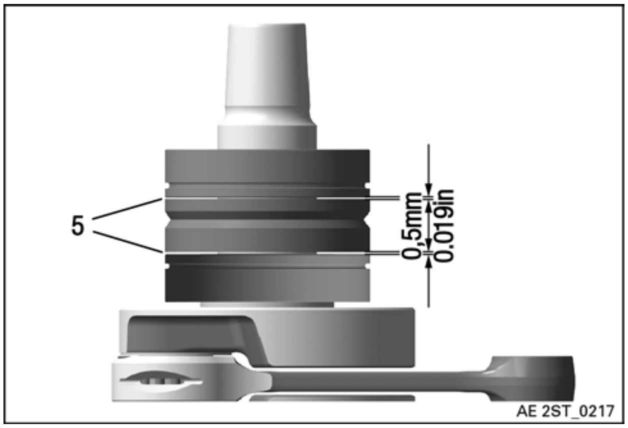


Figure 4.32

5 0.5 mm shim

Step	Procedure
6	Fit O-rings (6) on ball bearings and labyrinth seal and slide greased oil seal (8) on crankshaft end.

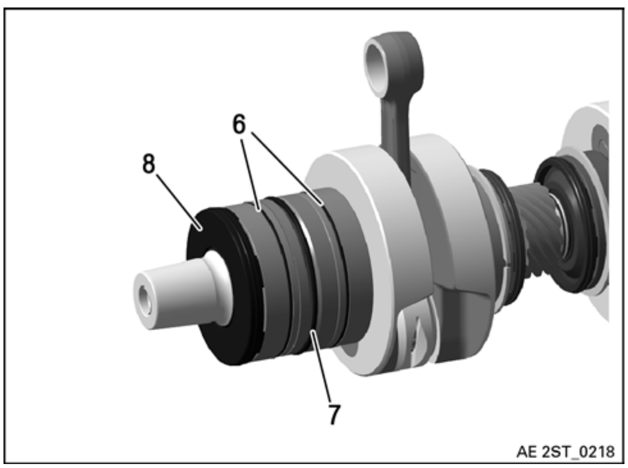


Figure 4.33

6 O-ring 64-2
7 O-ring 63-2.5
8 Oil seal 35x72x7/8.5

CRANKSHAFT - INSTALLATION MAG END

Step	Procedure
1	Warm up ball bearings to 70 - 80 °C (160 - 175 °F).
2	To prevent fretting corrosion, apply LOCTITE Anti-Seize on crankshaft bearing seats.
3	Support crankshaft on PTO side and place distance ring (1) with rounded side towards crank blade, followed by preheated 6206 ball bearing (2) with O-ring groove outwards, on crankshaft.
4	Fit stop shim (3) and add pre-heated 6206 ball bearing (4) with O-ring groove inwards.

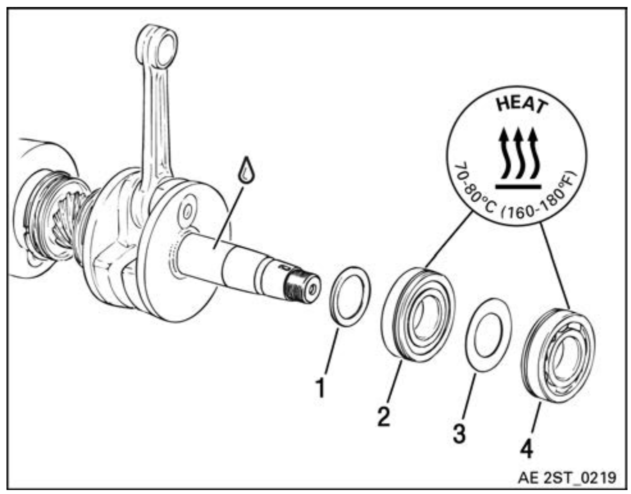


Figure 4.34

1 Spacer ring 30.5/42/2
2 Ball bearing 6206
3 Stop shim 30.4/51/1
4 Ball bearing 6206

Step	Procedure
5	Allow bearings to cool and fit O-rings (5) on ball bearings and slide greased oil seal (6) on crankshaft end.

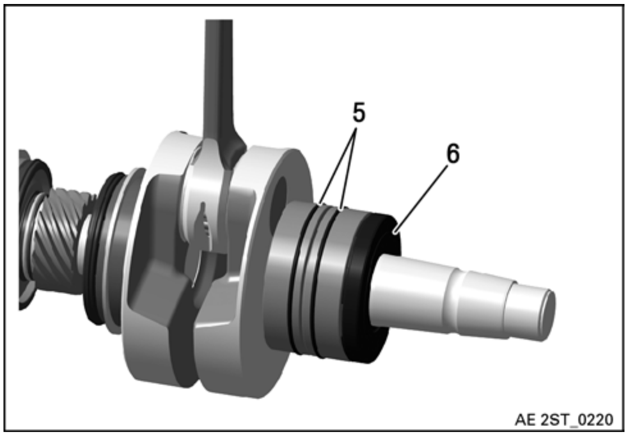


Figure 4.35

5 O-ring 49.2-1.8
6 Oil seal 30x62x7/7.5

CRANKCASE - ASSEMBLY

Step	Procedure
1	Pre-heat crankcase to 70 - 80 °C (160 - 175 °F).
2	Press bearing (1) for rotary valve shaft on water pump side into position, using punch part no. 876500 (2) and secure bearing with retaining ring 32 x 1.2 (3). **NOTE** *Closed side of ball bearing to point towards inside.*

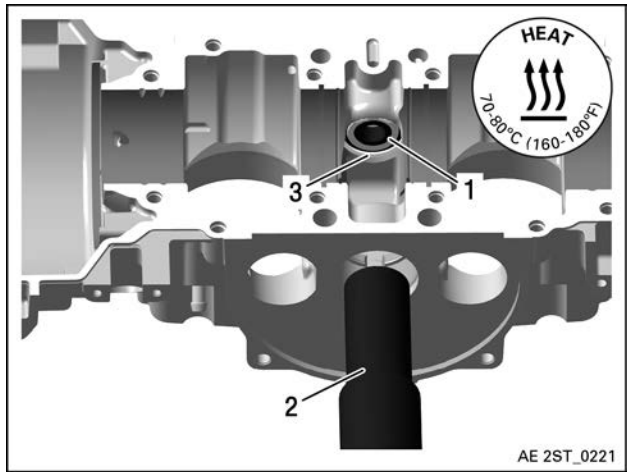


Figure 4.36

1 Ball bearing 6201
2 Punch part no. 876500
3 Retaining ring 32 x 1.2

Step	Procedure
3	To facilitate assembly, support upper half of crankcase on cylinders (1).
4	Place crankshaft with con rods down into crankcase, ensuring the 2 inner ball bearing locating rings (2) are seated within the grooves of the crankcase.
5	Push oil seals at crankshaft center (3) outwards onto ball bearings. Ensure that the retaining bead comes to rest in the assigned groove in the crankcase.

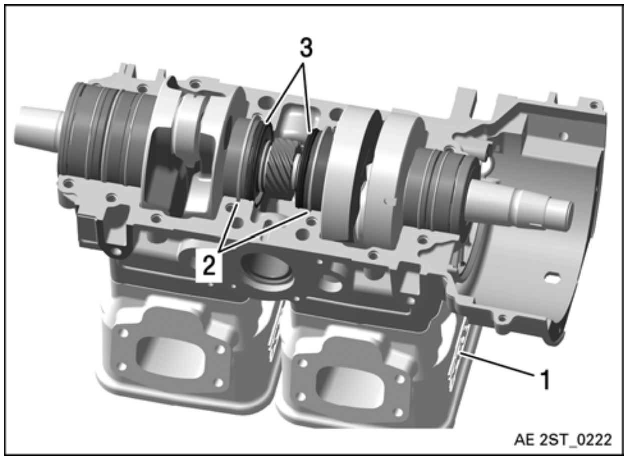


Figure 4.37

1 Cylinder *2 Locating ring*

3 Oil seal

Step	Procedure
6	Push outer oil seals (4) also against ball bearing. The retaining bead of the oil seal on P.T.O. side has to fit into the provided groove in crankcase.
7	Rotate the oil seal so that the oil gallery (5) is not obstructed by the seal's spacer feet.

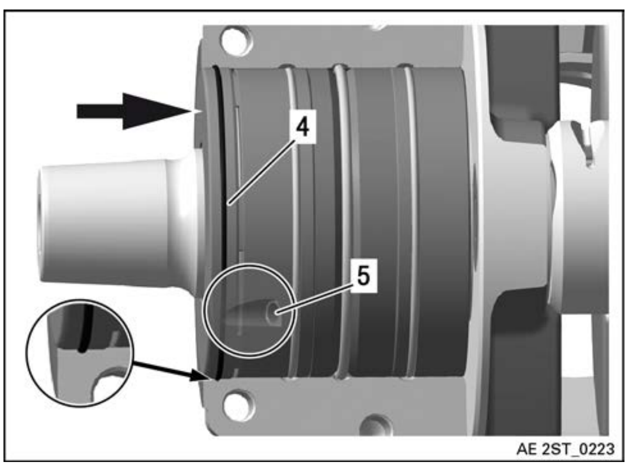


Figure 4.38

4 Oil seal 35x72x7/8.5 *5 Oil gallery*

Step	Procedure
8	Degrease the sealing surface of lower crankcase half and apply a thin coat of LOCTITE 5910 sealing compound. Keep a 1 - 2 mm (0.04 – 0.08 in.) wide strip free of sealing compound along bearings (6) to prevent sealant from entering in bearing. Ensure that narrow bridge area (7) adjacent to drain hole is coated with sealant.

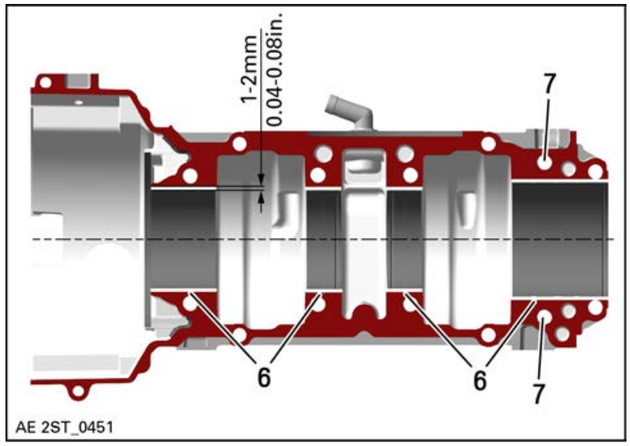


Figure 4.39

6 Bearings *7 Narrow bridge area*

Step	Procedure
9	Carefully place the lower crankcase half over the crankshaft and upper case-half.
10	Place 16 case bolts into their respective positions using new lock washers. See IPC chapter 72-20-00 Crankcase.
11	Prior to tightening of crankcase screws, align the two halves on the face at P.T.O side (8), utilizing a straightedge or by running a finger across joint at P.T.O end and also across rotary valve face (9). If need be, align by mallet.

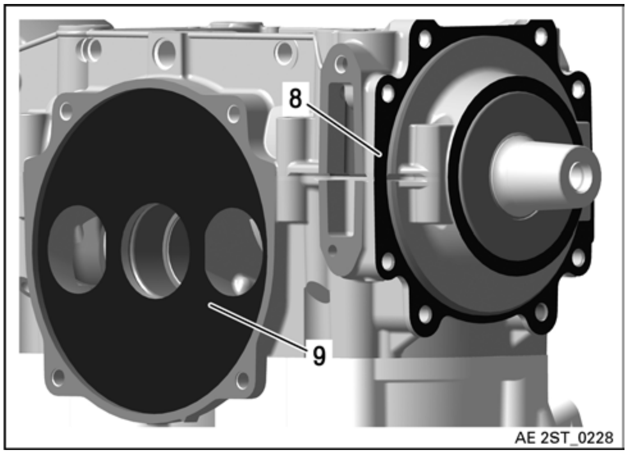


Figure 4.40

8 P.T.O face *9 Rotary valve face*

Step	Procedure
12	Tighten screws crosswise, beginning at center as per the following diagram, to prevent any locking up of stresses in the crankcase assembly. Tightening torque for M6 screws 10 Nm (89 in.lb). Tightening torque for M8 screws 24 Nm (18 ft.lb).

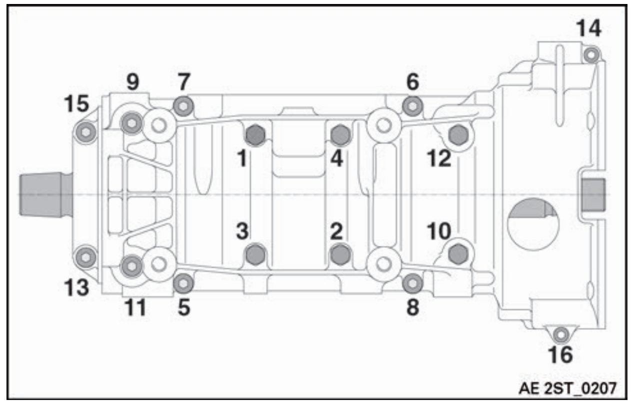


Figure 4.41: Crank case torque sequence

Step	Procedure
13	Lift crankcase assembly, turn upright and relieve stress in the bearings by a blow with a plastic hammer. Crankshaft must turn freely now. Check with a few rotations cranking on con rods. **NOTE** *If crankshaft won't turn freely, disassemble crankcase again, find reason and rectify.*
14	To ensure that sealing face won't get damaged by the con rods, feed an O-ring through small end of both con rods and attach ring on 2 hex. head screws.
15	Attach crankcase assembly to mounting plate part no. 876746 using 2 M10 hex. nuts. Place mounting plate on trestle part no. 876740.
16	Lubricate all crankshaft bearings sufficiently with 2-stroke oil. Apply oil to oil ducts (10) in crankcase as well.

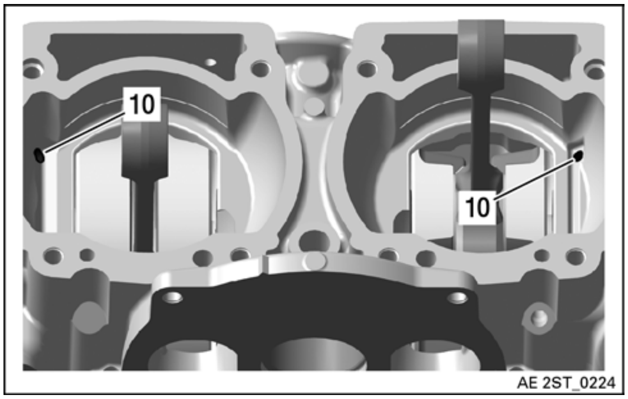


Figure 4.42

10 Oil duct

ROTARY VALVE ASSEMBLY, INSTALLATION AND TIMING

ASSEMBLY

Step	Procedure
1	Grease oil seal (1) and fit with open side towards inside on rotary valve shaft. Add ball bearing (2) and shim (3).
2	Attach retaining ring (4) with circlip pliers.

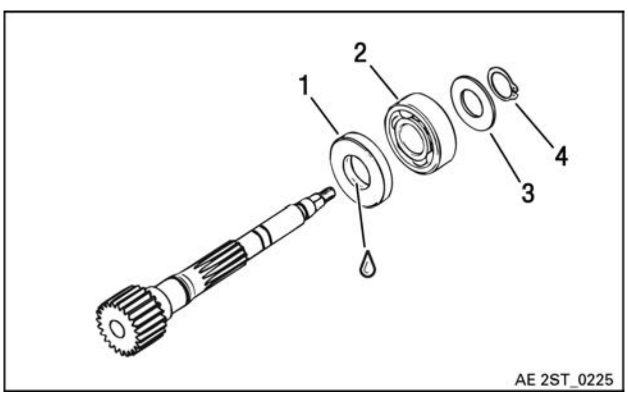


Figure 4.43

1 Oil seal 20x40x7 | *2 Ball bearing 6203*
3 Shim 15.1/22.5/0.5 | *4 Retaining ring 17x1*

Step	Procedure
3	Slide (with step inside downwards) on spacer (5), new O-ring (6) and rotary valve gear (7), followed by spring (8) and spring holding cup (9).
4	Depress spring via spring cup and insert circlip (10). Mount on second position (11).

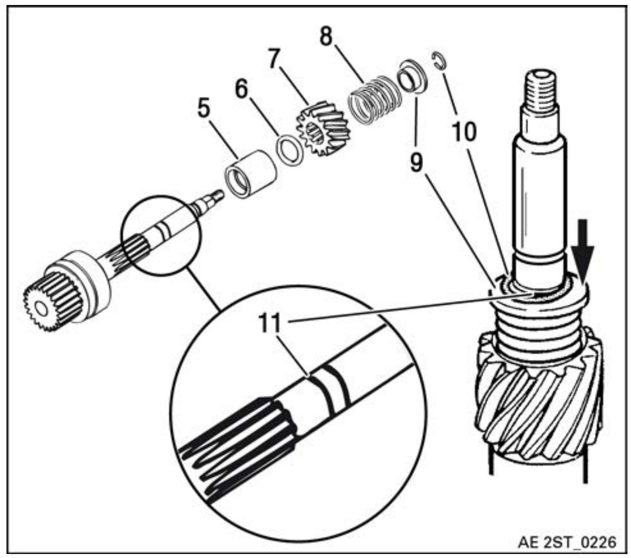


Figure 4.44

5 Spacer | *6 O-ring 14-3*
7 Rotary valve gear 14 T | *8 Compression spring 25.1 mm (0.99 in.)*
9 Spring holding cup | *10 Circlip 12*
11 Second position

INSTALLATION

Step	Procedure
1	Tap pre-lubricated oil seal (1), with open side inwards, into crankcase utilizing insertion jig. part no. 876512 (2). **NOTE** *Coolant rotary seal will be installed after rotary valve shaft.*

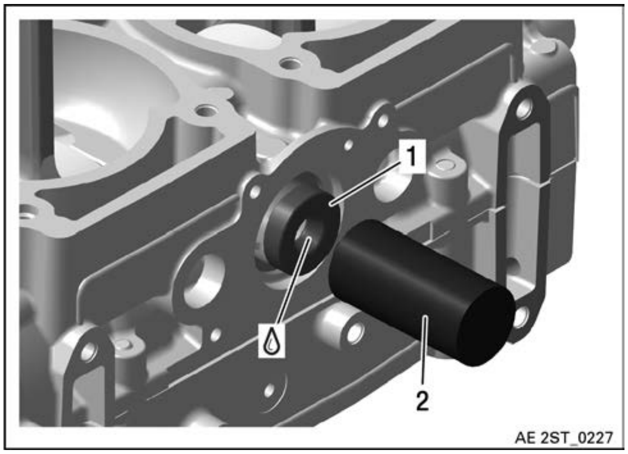


Figure 4.45

1	*Oil seal 10x30x8*	2	*Insertion jig part no. 876512*

Step	Procedure
2	Pre-heat crankcase rotary valve area to 70 - 80 °C (160 - 175 °F).
3	Fit guide sleeve part no. 876980 (3) on rotary valve shaft and place through the crank case into the water pump ball bearing.

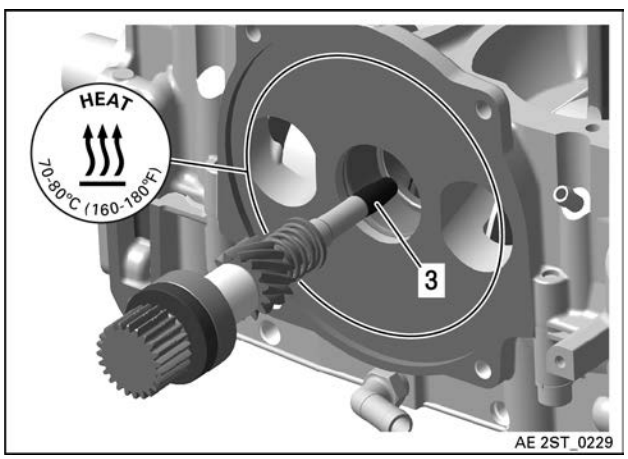


Figure 4.46

3	*Guide sleeve part no. 876980*

Step	Procedure
4	Tap shaft using insertion jig. part no. 876602 (4) into locally pre-heated crank-case to positive stop. This insertion jig. is used also to push oil seal into correct position. **NOTE** *Take care of easy engagement of the rotary valve gear with mating gear on crankshaft.*

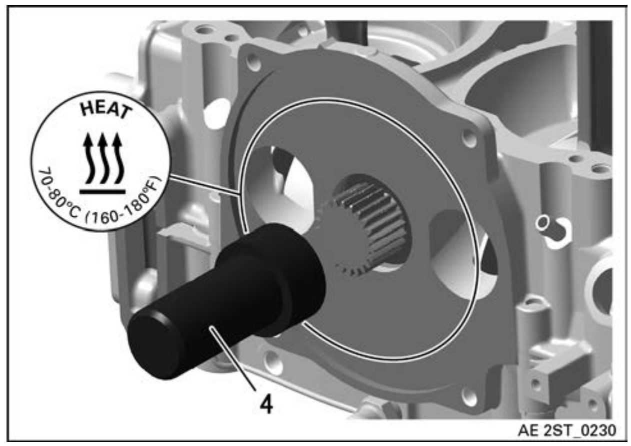


Figure 4.47

4	*Insertion jig. part no. 876602*

Step	Procedure
5	Fit snap-ring 40 x 1.75 (5) on rotary valve side. **NOTE** *Snap ring must be fully engaged in groove.*

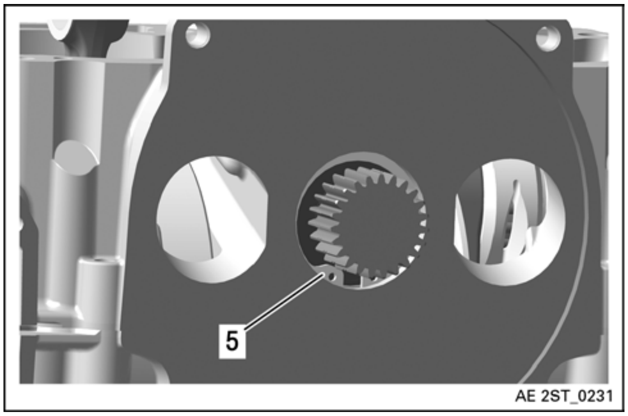


Figure 4.48

5 Retaining ring 40x1.75

Step	Procedure
6	Rotate crankshaft and check backlash on rotary valve drive. See section Wear Limits (RV04).

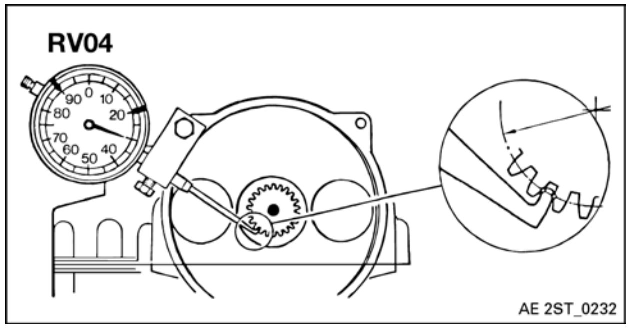


Figure 4.49: Backlash check (RV04)

WATER PUMP - ASSEMBLY

Step	Procedure
1	Place new rotary seal (1) over rotary valve shaft so that the shoulder (2) seats against the crank case. **NOTE** *The shoulder has pre-applied blue LOCTITE 243.*
2	Attach insertion jig part no. 877825 (3) to crankcase at water pump using 4 M6x25 hex. screws.
3	Rotate the insertion jig screw (4) clockwise until the rotary seal stops against the crankcase.

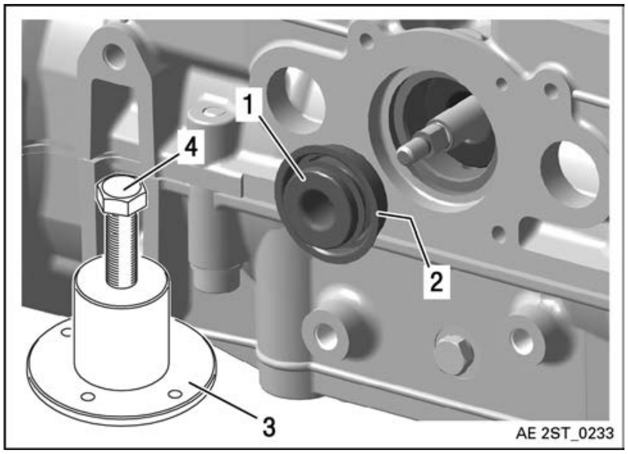


Figure 4.50

1	*Rotary seal*	2	*Seal shoulder*
3	*Insertion jig part no. 877825*	4	*Insertion jig screw*

Step	Procedure
4	Place thrust washer (5) and friction washer (6) over rotary valve shaft with washer serrations outward.
5	Place impeller (7) and washer (8) onto shaft.
6	Lock crankshaft with assigned pin, thus also locking rotary valve shaft.
7	Apply a small amount of LOCTITE 648 to threads and tighten new M6 lock nut (9) to 6 Nm (53 in.lb).
8	Withdraw crankshaft locking pin and check crankshaft for easy rotation.

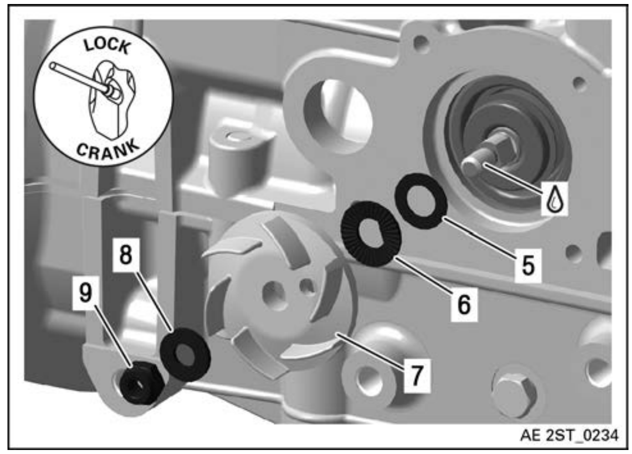


Figure 4.51

5	*Thrust washer 8.1/15/ 0.5*	6	*Friction washer*
7	*Impeller*	8	*Washer 6.4*
9	*Lock nut M6*		

Step	Procedure
9	Attach water pump housing (10) with new gasket (11). Apply a small amount of LOCTITE 243 to threads of 4 hex. screws M6x25 (12) and tighten to 8 Nm (70 in.lb).
10	Vent hole (13) can be oriented up or down and plugged with hex screw (14) or hose nipple (15) and tighten to 8 Nm (70 in.lb). See Illustrated Parts Catalog for engine type 582 mod. 99 / mod. 17 Chapter 72-20-00 Crankcase.

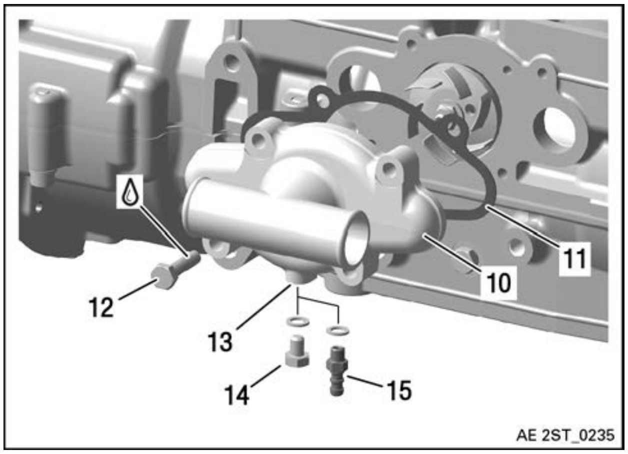


Figure 4.52

10	*Water pump housing*	*11*	*Gasket*
12	*Hex. screw M6x25*	*13*	*Vent hole*
14	*Hex. screw M6x8*	*15*	*Hose nipple M6*

FINISHING WORK

- Setting of ignition timing see Chapter Chapter 24-00-00 must be completed after pistons, cylinders and heads are installed. See Chapters 72-30-00 “Displacement Parts” and 72-30-00 “Cylinder Head”
- Rotary valve installation. and timing, see Chapter Chapter 79-00-00

Chapter: 72–30–00
CYLINDER HEAD

TOPICS IN THIS CHAPTER

SERVICE PRODUCTS

Description	Part number
LOCTITE 243	897651
LITHIUM-BASED GREASE	897330

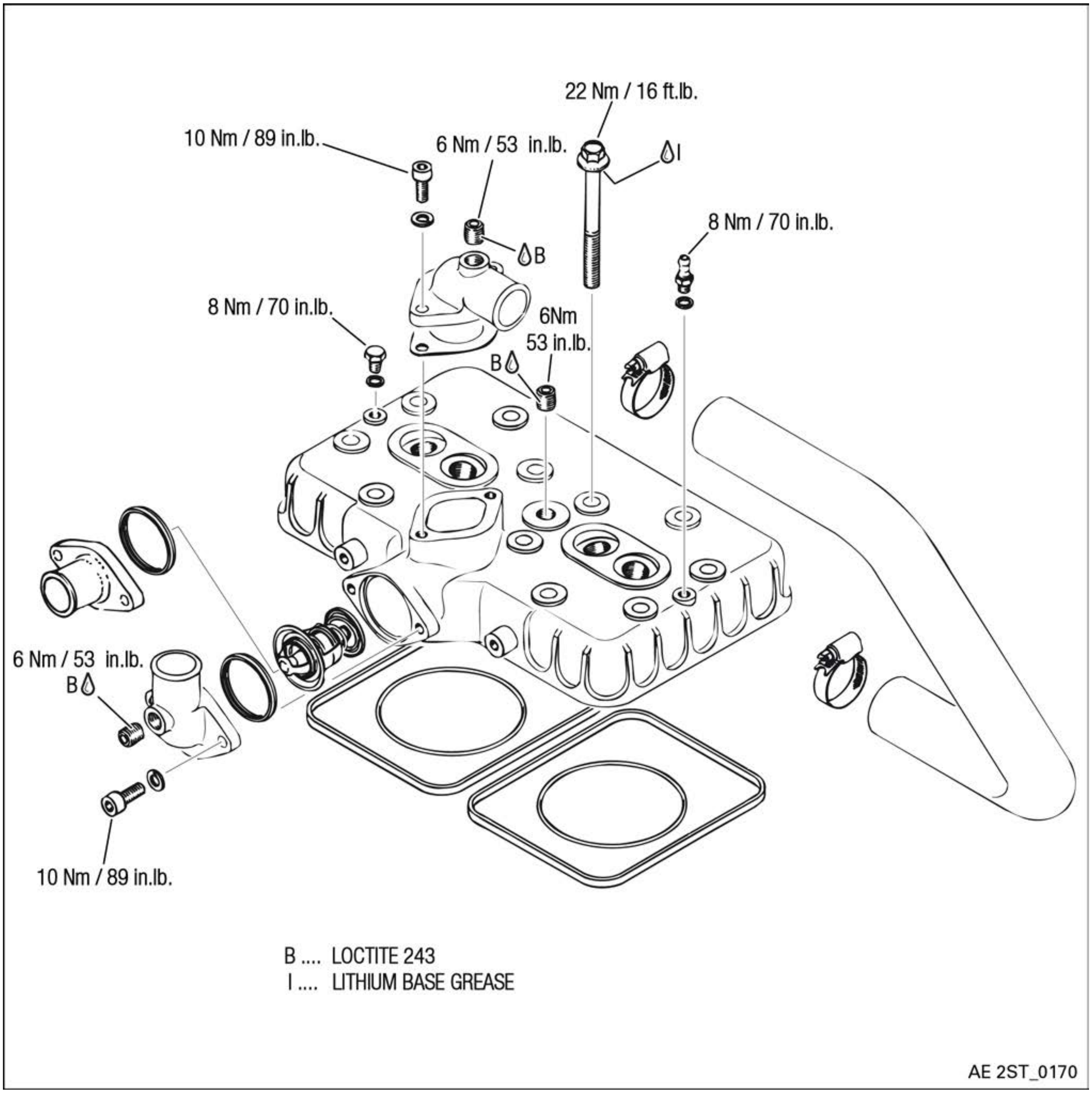


Figure 5.1: Components

SYSTEM DESCRIPTION

The 582 UL engine has 1 common liquid-cooled cylinder head for both cylinders.

SAFETY INSTRUCTIONS

⚠ WARNING

Danger of severe burns and scalds! Always allow the engine to cool down to ambient temperature before starting any work.

MAINTENANCE

As well as the maintenance and special checks, see current Maintenance Manual Line for the respective engine type.

REMOVAL

Preparation

- Remove intake silencer (1) (if optionally equipped) and carburetors (2). See Chapter 73-00-00 “Fuel system”
- Remove ignition coils (3), supporting plate (4) and disconnect the spark plug connectors (5) to remove the spark plugs. See Chapter 24-00-00 “Electrical power”
- Remove oil tank. See Chapter 79-00-00 section “Oil tank - removal”
- If optionally equipped, remove 2-piece radiator. See Chapter 75-00-00 “Cooling System”.

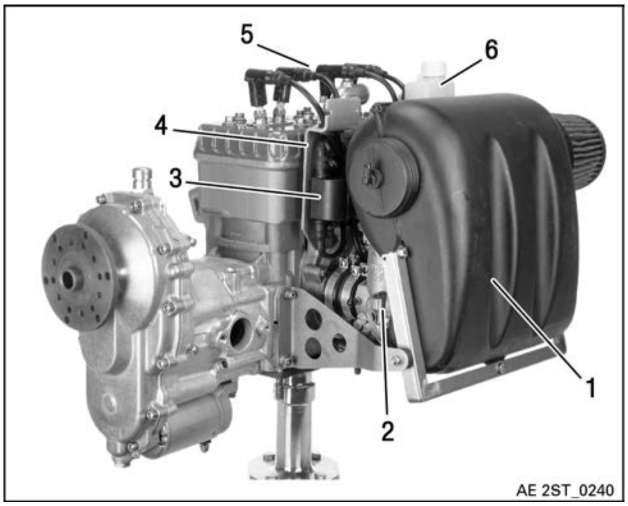


Figure 5.2

1	*Intake silencer*	2	*Carburetors*
3	*Ignition coils*	4	*Supporting plate*
5	*Spark plug connectors*	6	*Oil tank*

CYLINDER HEAD – REMOVAL

Step	Procedure
1	Drain coolant, see the relevant Maintenance Manual Line for the respective engine type 582 mod. 99 / mod. 17.
2	Remove coolant hoses from outlet elbow (1) and thermostat elbow (2). **NOTE** *If necessary, remove the coolant elbow and hose nipple. See bent socket removal in this chapter.*

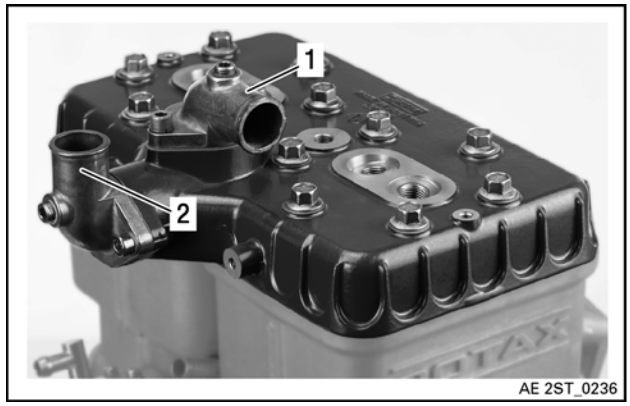


Figure 5.3

1	*Outlet elbow*	2	*Thermostat elbow*

Step	Procedure
3	Loosen 12 hex. collar screws M8x65 (3) from cylinder head crosswise, beginning with the outer screws Lift off cylinder head. Take off O-rings (4) at compression chamber and rubber rings (5) for water jacket. **NOTE** *The optional mounted brackets for the intake silencer, oil tank and coolers are disassembled at the same time.*

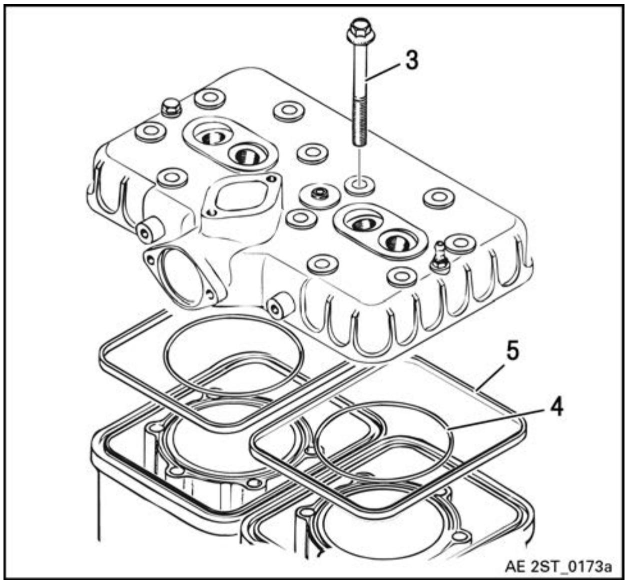


Figure 5.4

3	*Hex. collar screw M8x65*	*4*	*O-ring*
5	*Rubber ring*		

BENT SOCKET - REMOVAL

Bent socket thermostat

Step	Procedure
1	Remove 2 Allen Screw M6x20 with lock washers (1) and remove the bent socket (2).
2	Remove the rubber gasket (3) and ther-mostat (4)

Bent outlet socket

Step	Procedure
1	Remove 2 Allen Screw M6x20 with lock washers (6) and remove the bent outlet socket (7) with gasket (8).

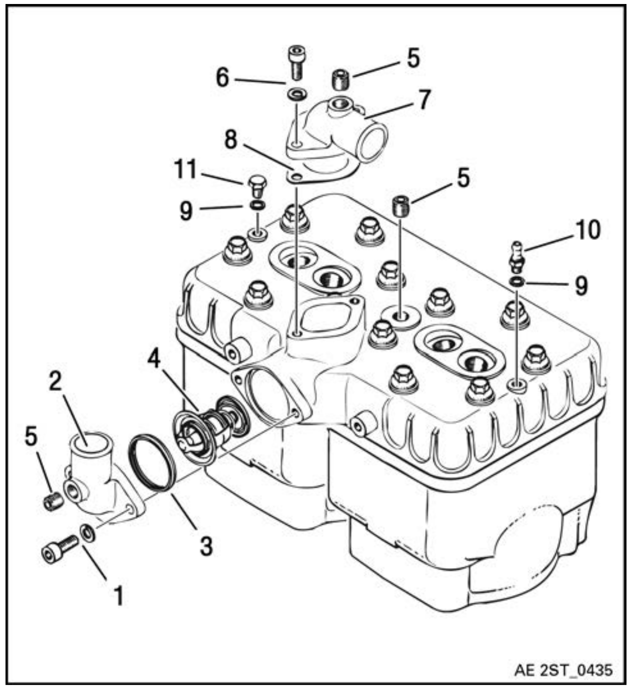


Figure 5.5

1	*Lock washers*	*2*	*Bent socket*
3	*Rubber gasket*	*4*	*Thermostat*
5	*Plug screw*	*6*	*Lock washers*
7	*Bent outlet socket*	*8*	*Gasket*
9	*Sealing ring*	*10*	*Hose nipple M6*
11	*Hex. screw M6x8*		

INSPECTION

CYLINDER HEAD — INSPECTION

Step	Procedure
1	Visual check of sealing face (1) for cracks and distortion. Inspect thread and sealing face of spark plug holes (2).
2	True sealing face of cylinder head using straight edge (3).

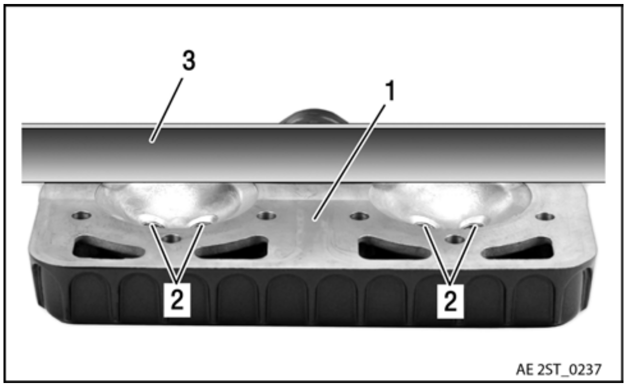


Figure 5.6

1 Sealing face *2 Spark plug holes*

3 Straight edge

ATTENTION

For safety's sake, do not repair tapped holes for spark plugs, exchange the cylinder head instead. HELICOIL cannot be used.

Step	Procedure
3	Visual check of sealing faces (4). **NOTE** *Cylinder head collar screws are designed to seal against the cylinder head. Damage here will result in a coolant leak.*

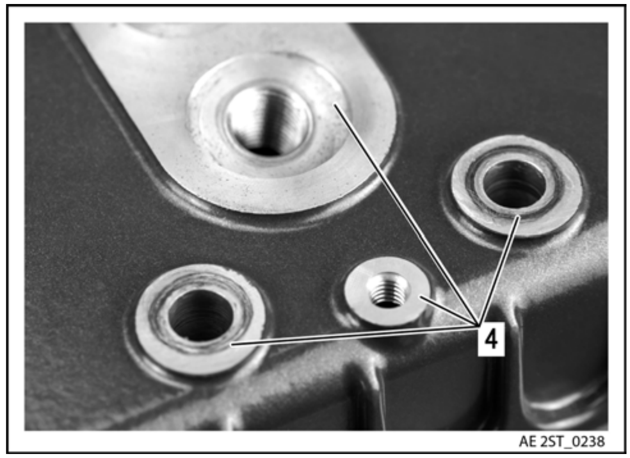


Figure 5.7

4 Sealing faces

THERMOSTAT — INSPECTION

Step	Procedure
1	To make an operational test, drop thermostat into a glass filled with water, heat it up and watch at which temperature it starts opening (standard opening temperature 55 – 60 °C (130 – 140 °F).

Figure 5.8

Thermostat operational test

INSTALLATION

CYLINDER HEAD — INSTALLATION

If a single or both cylinders have been removed, they must be aligned and torqued together, see Chapter 72-30-10 “Displacement parts”.

Step	Procedure
1	Insert a rubber ring 152.5x2.5x5 (1) and an O-ring 78-2 (2) on to each cylinder.
2	Place the cylinder head in position, taking care not to move or pinch the rubber rings.
3	Lubricate support face of 12 collar hex. screws M8x65 (3) with LITHIUM-BASED GREASE to minimize friction and use to attach cylinder head. **NOTE** *If equipped with optional oil tank, intake silencer and 2-piece radiator, the brackets must be in position with all collar hex. screws finger tight at this point. See Chapter 75-00-00 section cooling System, Chapter 79-00–00 lubrication System and Chapter 73-00-00 Fuel System.*

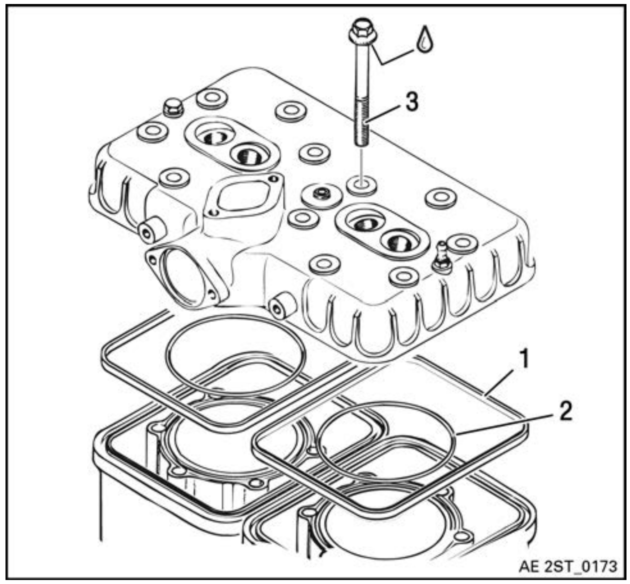


Figure 5.9

1 Rubber ring *2 O-ring 78–2*

3 Hex- screw M8.

Step	Procedure
4	Tighten the head screws in the depicted sequence. Tightening torque: 22 Nm (16 ft.lb)

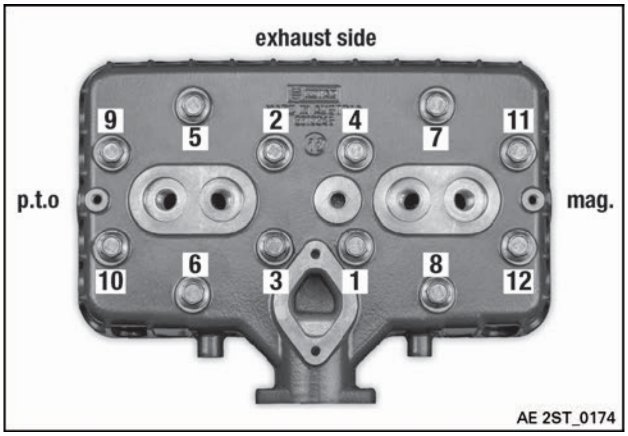


Figure 5.10: Torque sequence

NOTE

Pay attention to additional sealing considerations required for optional brackets.

Step	Procedure
5	With new gasket (4) attach bent outlet socket using 2 Allen screws M6x20 (5) and lock-washers.
6	2 positions are available on the cylinder head for attachment of coolant system vent: • Fit hose nipple (6) with gasket (7). Tightening torque 8 Nm (70 in. lb) • Fit hex. screw M6x8 (8) with gasket in un-used position. Tightening torque 8 Nm (70 in. lb)
7	A single position is provided for Coolant Temperature Sensor: If un-used, fit plug screw 1/8-27 NPT (9) with LOCTITE 243. Tightening torque 6 Nm (53 in. lb)

NOTE

Use protective plugs until spark plugs are installed.

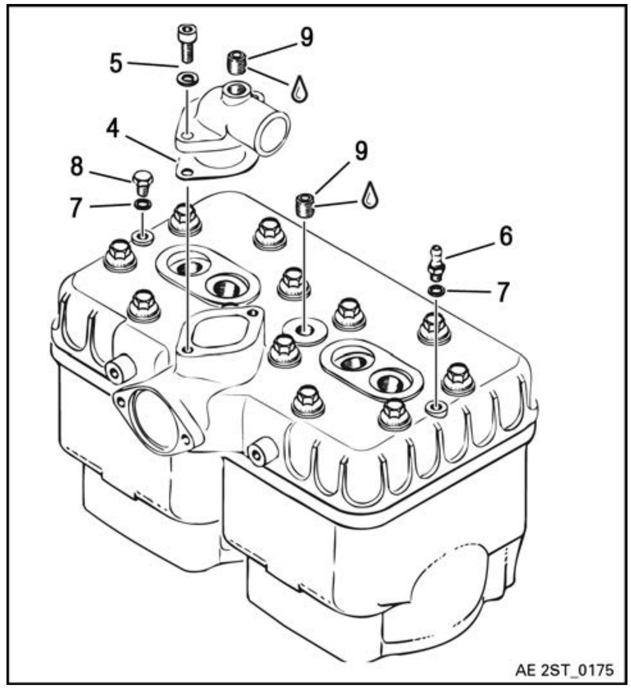


Figure 5.11

4	*Gasket*	5	*Allen screws M6x20*
6	*Hose nipple*	7	*Gasket*
8	*Hex. screw M8*	9	*Plug screws*

THERMOSTAT - INSTALLATION

Step	Procedure
1	Ensure the rubber gasket (1) is placed onto the thermostat (2) evenly with no distortion or pinching.
2	Place thermostat into cylinder head with spring facing inward and attach bent outlet socket (3) with 2 Allen screws M6x20 (4) and lock washers. Tightening torque 10 Nm (89 in.lb).
3	Fit plug screw 1/8-27 NPT (5) with LOCTITE 243. Tightening torque 6 Nm (53 in. lb)

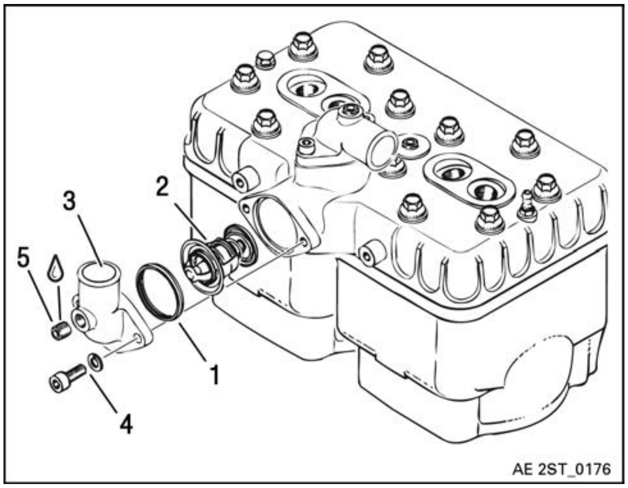


Figure 5.12

1	*Gasket*	2	*Thermostat*
3	*Bent socket*	4	*Allen screw M6x20*
5	*Plug screw*		

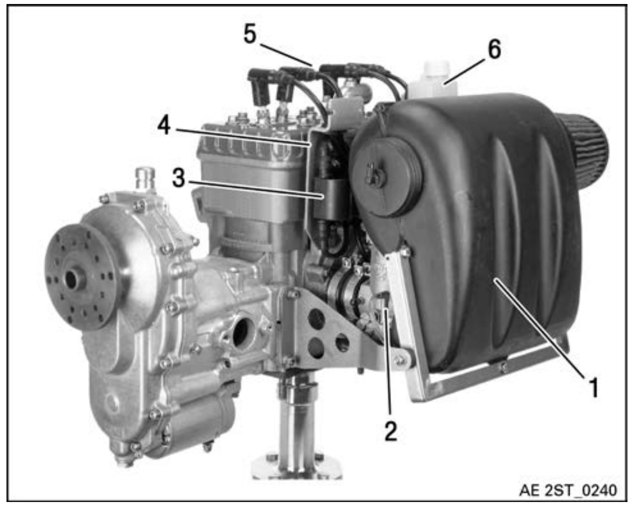


Figure 5.13

1	*Intake silencer*	2	*Carburetors*
3	*Ignition coils*	4	*Supporting plate*
5	*Spark plugs*	6	*Oil tank*

FINISHING WORK

NOTE

Re-torque collar hex. screws of cylinder head after 10 hours of operation.

- If optionally equipped, remove 2-piece radiator. See Chapter 75-00-00 “Cooling System”.
- Install oil tank. See Chapter 79-00-00 section “Oil tank - installation”
- Install ignition coils (3), supporting plate (4) and spark plugs with spark plug connectors (5). See Chapter 24-00-00 “Electrical power”
- If optionally equipped, install intake silencer (1) and carburetors (2). See Chapter 73-00-00 “Fuel system”

Chapter: 72–30–10
DISPLACEMENT PARTS

TOPICS IN THIS CHAPTER

SPECIAL TOOLS

Description	Part number
Circlip installation tool	877805
Piston pin extractor	877091
Aligning tool	876572
Aligning tool	876904
Mono-hook circlip remover	976380

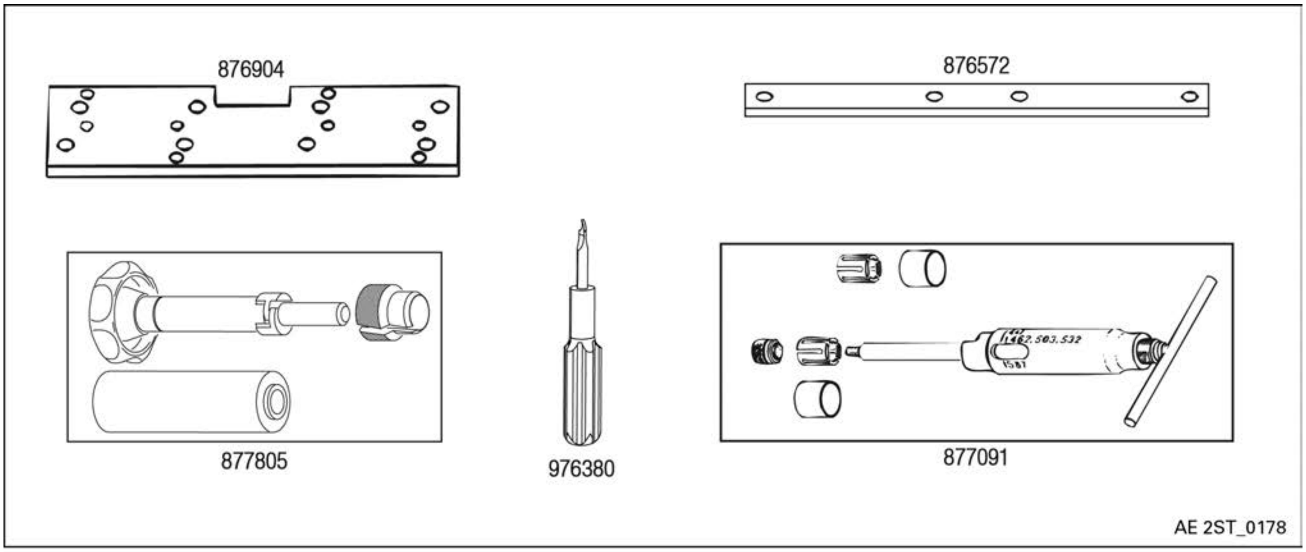


Figure 6.1: Components

SERVICE PRODUCTS

Description	Part number
LOCTITE 243	897651
LITHIUM-BASED GREASE	897330
ENGINE OIL	n.a

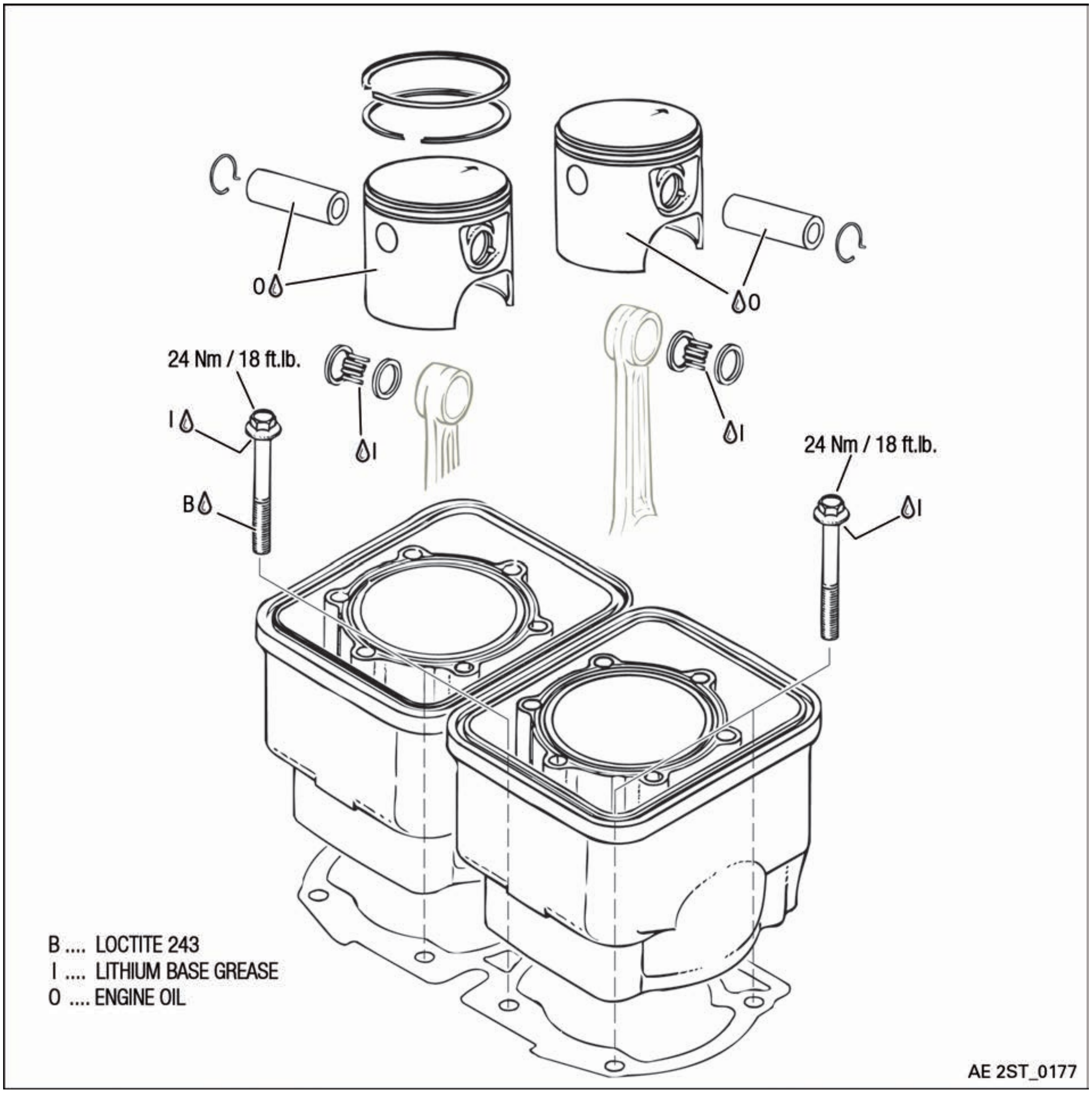


Figure 6.2: Components

SYSTEM DESCRIPTION

Preparation

- Remove carburetors. See Chapter 73-00-00 “Fuel System”.
- Remove ignition coil supporting plate. See Chapter 24-00-00 “Electrical power”.
- If optionally equipped, remove oil tank. See Chapter 79-00-00 “Lubrication system”.
- If optionally equipped, remove 2-piece radiator. See Chapter 75-00-00 “Cooling System”.
- Remove cylinder head. See Chapter 72-30-00 “Cylinder Head”.

SAFETY INSTRUCTIONS

⚠ WARNING

Danger of severe burns and scalds! Always allow the engine to cool down to ambient temperature before starting any work.

MAINTENANCE

As well as the maintenance and special checks, see current Maintenance Manual Line for the respective engine type.

REMOVAL

NOTE

Cover openings in crankcase to protect against entry of foreign objects.

Clean all parts carefully.
See relevant Maintenance Manual Line Chapter 05-00-00 section Procedure.

CYLINDER - REMOVAL

NOTE

Prior to disassembly place coordination marks on cylinder and piston to ensure their matched running in case of re-use.

Step	Procedure
1	Remove 4 hex. collar screws M8x68.5 (1) per cylinder.

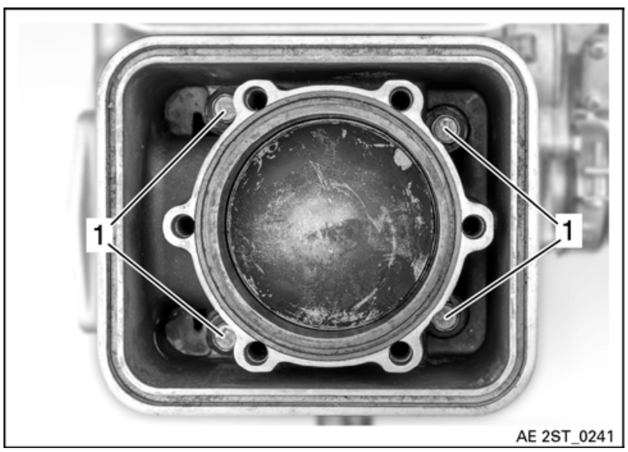


Figure 6.3

1 *Hex. collar screws*

Step	Procedure
2	Lift off cylinder whilst supporting piston by hand (2) to make sure that a tilting piston won't damage crankcase sealing face. If need be, loosen cylinder by a plastic hammer.
3	Take off cylinder base gasket (3). Cover crankcase completely (4) to avoid any foreign matter from dropping into crankcase.

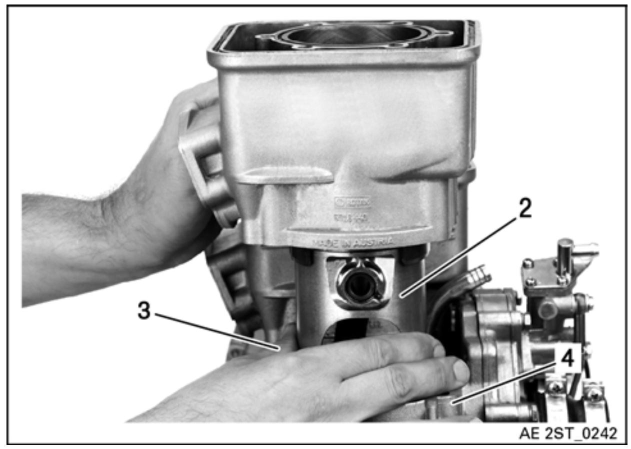


Figure 6.4

2 *Support piston*
3 *Base gasket*
4 *Cover crankcase*

PISTON AND PISTON PIN - REMOVAL

ATTENTION

Cover crankcase completely to avoid any foreign matter from dropping into crankcase.

Step	Procedure
1	Remove piston pin circlip (1) with mono hook circlips remover part no. 976380 (2) and discard it.

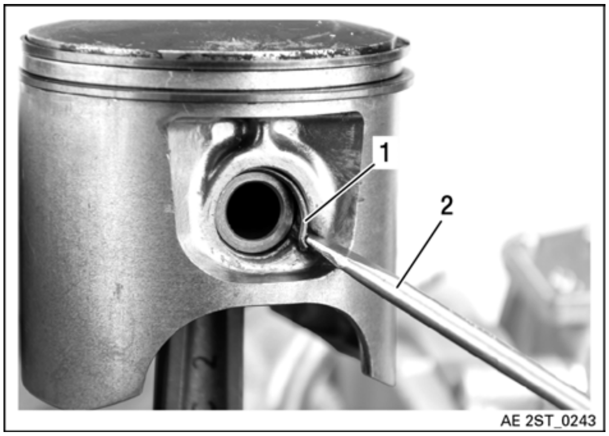


Figure 6.5

1 Circlip *2 Circlip remover*

ATTENTION
Circlips are damaged during removal and must always be replaced with new.

ATTENTION
Mark installation direction of pistons, in direction of exhaust.

Step	Procedure
2	Insert the piston pin extractor tool part no. 877091 (3) into piston pin and fit expansion sleeve (4) and extracting nut (5) onto extractor spindle.

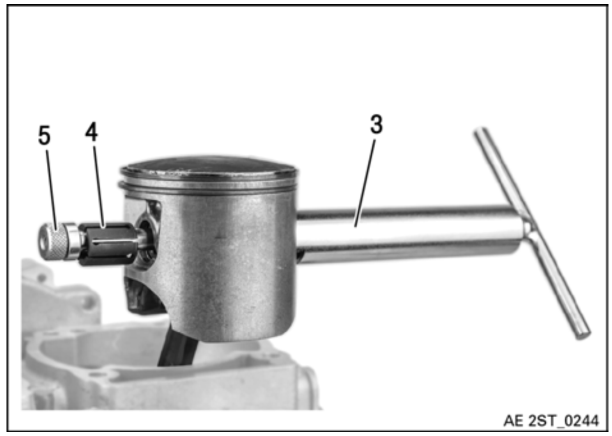


Figure 6.6

3 Extractor tool *4 Expansion sleeve*
5 Extracting nut

Step	Procedure
3	By turning the spindle clockwise, pull out piston pin until its end (6) aligns with the engine-specific mark on extractor sleeve. When pulling out the piston pin, the expansion sleeve will be pulled in instead , thus keeping bearing needles as well as thrust washers in position in con rod.
4	Do not yet pull the piston pin completely from the piston. Remove extracting nut and withdraw extraction tool. Finally, take off piston.
5	Once piston has been removed from the con rod, leaving the needle bearing behind, the piston pin can be fully removed.

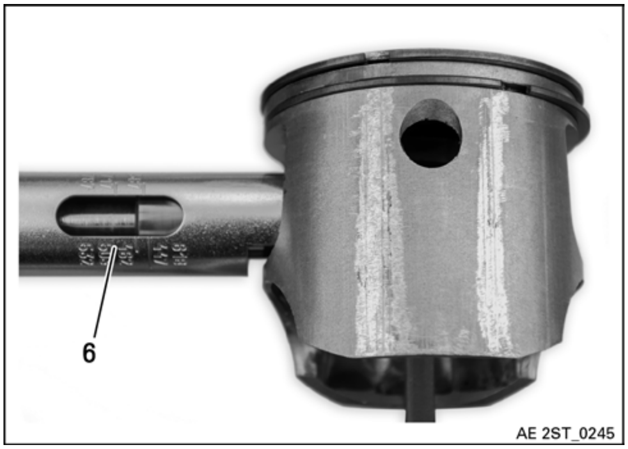


Figure 6.7

6 Piston pin stop mark

Step	Procedure
6	The bearing needles, thrust washers and expansion sleeve located in the small end of the con rod can be pushed out into a plastic tube (7) (as supplied with new bearing) and stored this way for further use. **NOTE** *Store needle bearing without fail coordinated with piston.*

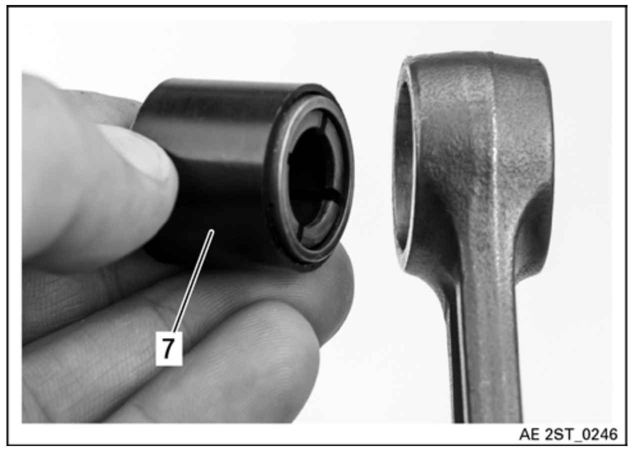


Figure 6.8

7 Plastic tube

ATTENTION

Ensure that wrist pin needle bearings and piston rings remain paired with the piston and cylinder.

PISTON RINGS - REMOVAL

Step	Procedure
1	Carefully spread the upper, semi trapeze piston ring (1) by hand or by using spreader type pliers and pull it off the piston. **NOTE** *Use caution not to damage piston during ring removal.* *With heavy carbon buildup, soak the piston and rings in solvent to help with removal.*
2	Repeat the removal procedure for the lower rectangular ring (2). **NOTE** *Each piston rings end gap is held in position with a steel pin (3), do not damage during ring removal or cleaning.*

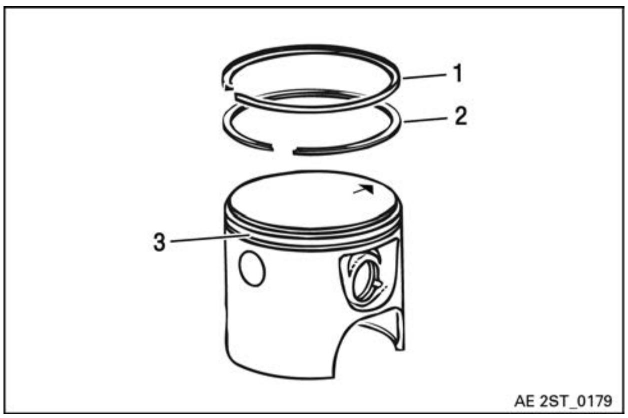


Figure 6.9

1 Semi-trapeze ring *2 Rectangular ring*

3 Alignment pin

INSPECTION

PISTON - INSPECTION

Step	Procedure
1	Remove carbon residues from piston rings grooves and from the piston crown. **NOTE** *Use only plastic scrapers or plastic media to clean pistons.*
2	Check pistons for cracks, seizure or scuffing marks. Visually inspect ring securing pins and groove for piston pin circlip.

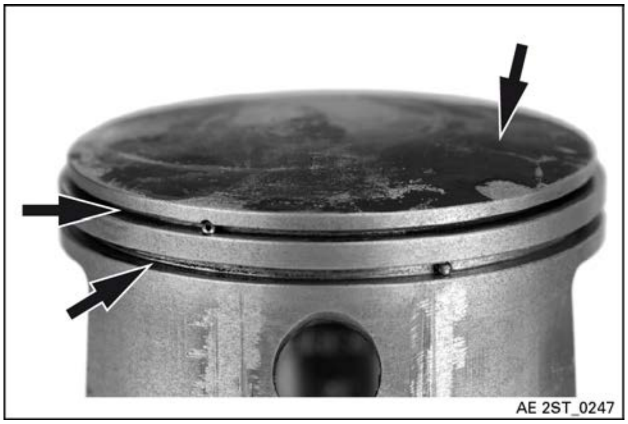


Figure 6.10: Carbon residues

Step	Procedure
3	Inspect pistons for signs of seizure (four-corner, cold and other seizure).
4	Inspect for vertical scoring.
5	Inspect for transfer of material.
6	Inspect for excessive heat or discoloration.

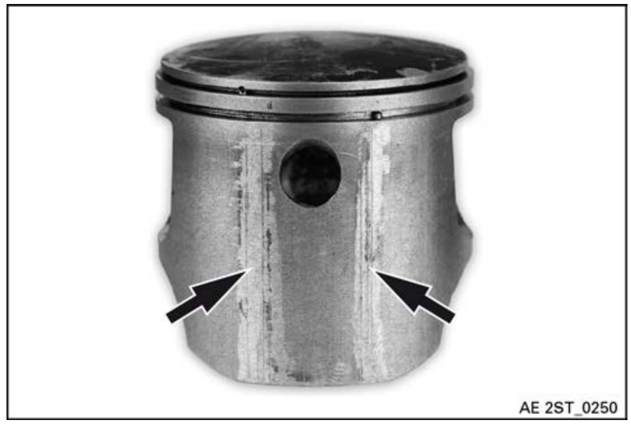


Figure 6.11: For example

4 corner seizure

Step	Procedure
7	Take readings of piston pin bore and determine the permissible installation clearance. See section Wear Limits (PI02). **NOTE** *Bore readings are taken vertically.*

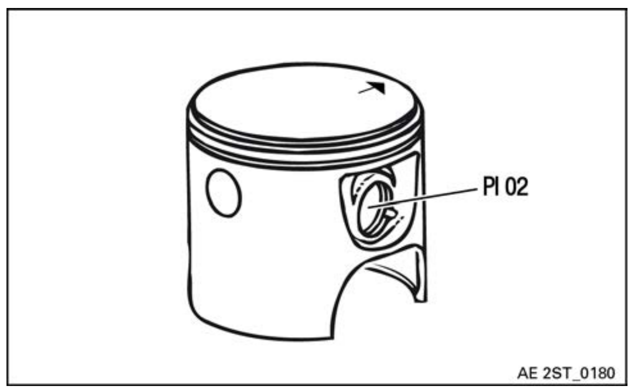


Figure 6.12: PI02

Step	Procedure
8	Measure the piston skirt diameter at 20 mm (0.8 in.) from end of piston skirt. See section Wear Limits (PI01).
9	Determine the piston-to-wall clearance by deducting biggest piston diameter from smallest cylinder bore diameter.

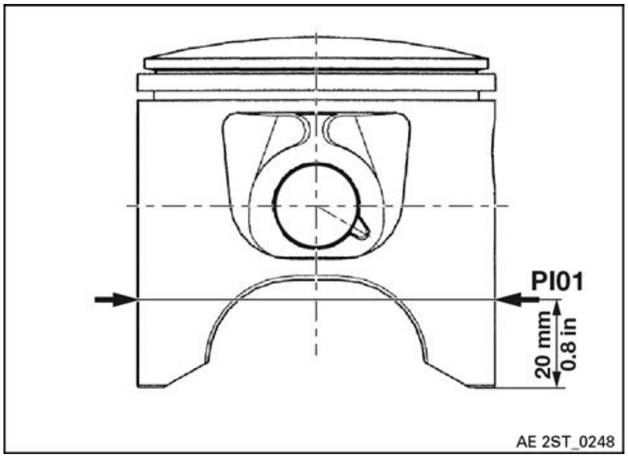


Figure 6.13: PI01

Step	Procedure
10	With cleaned rings installed in piston, measure piston ring flank clearance. See section Wear Limits (PI04/PI05).

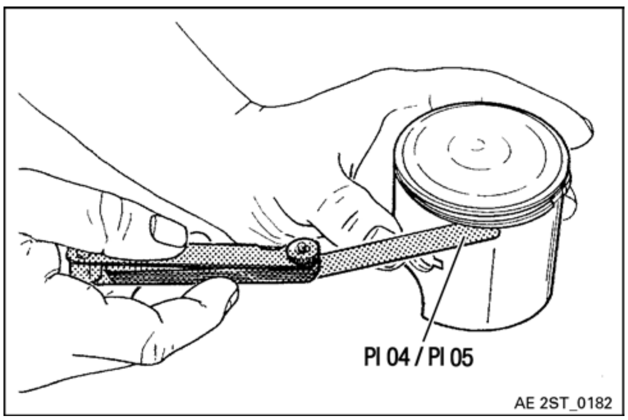


Figure 6.14: PI04/PI05

PISTON RINGS - INSPECTION

Step	Procedure
1	To measure the end gap (5) of a piston ring, position ring in cylinder using piston as pusher and check gap by feeler gauge. See section Wear Limits (PI06/PI07).

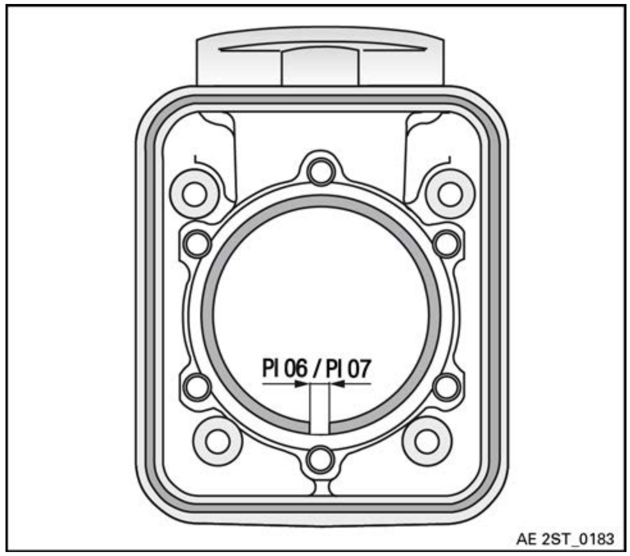


Figure 6.15: PI06/PI07

PISTON PIN - INSPECTION

Step	Procedure
1	Check the piston pin for traces of wear in the region of the conrod bearing and in the region of the piston bearing and measure its diameter. See section Wear Limits (PI03).

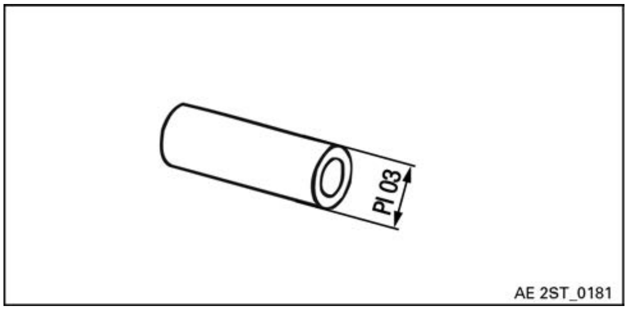


Figure 6.16: PI03

PISTON PIN BEARING - INSPECTION

Step	Procedure
1	Inspect needles (1) for wear and pitting. **NOTE** *With one needle visibly damaged, renew the whole lot (all 31 needles).* **NOTE** *If piston pin must be replaced, also replace the piston pin bearing.*

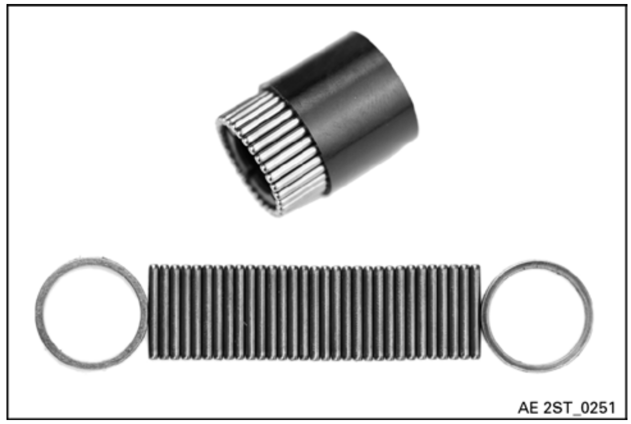


Figure 6.17: Needles

CYLINDER - INSPECTION

Step	Procedure
1	Visual check of cylinder bore for scratches and seizing marks. **NOTE** *Cylinders must be acid etched if any aluminum has been transferred from piston to cylinder.* **NOTE** *Cylinders may be re-honed to remove damage due to seizure but pay attention to maintain correct diameter. If out of tolerance, re-bore and hone to next oversize.* **NOTE** *Honing can be done only after acid etching.*

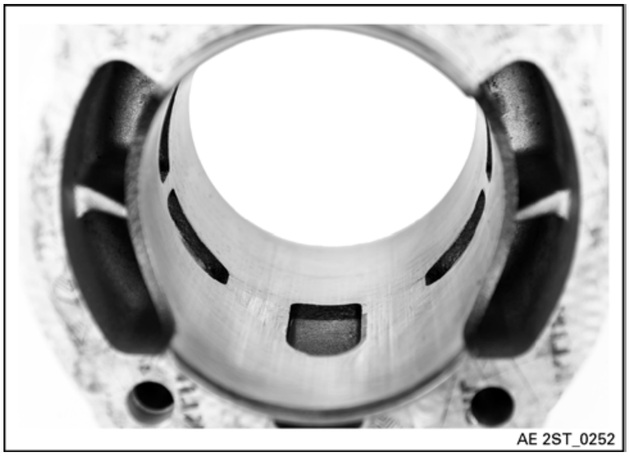


Figure 6.18: Cylinder check

Step	Procedure
2	Measure cylinder diameter at depicted points. See section Wear Limits (CY01). **NOTE** *Diameter readings are taken in crankshaft axis and 90° across.*

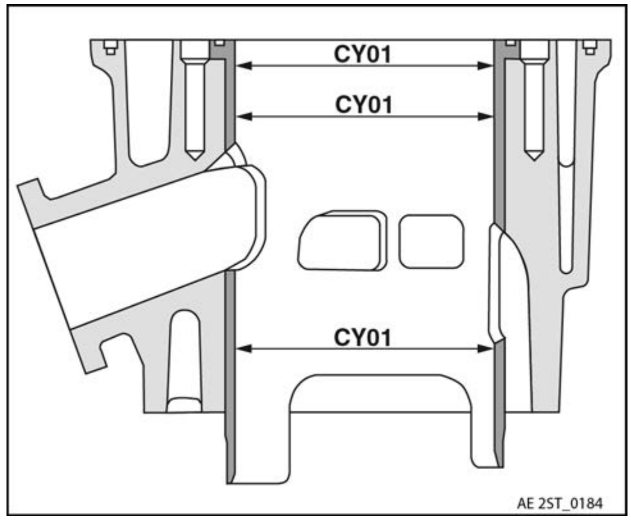


Figure 6.19: CY01/CY02/CY03

WEAR LIMITS

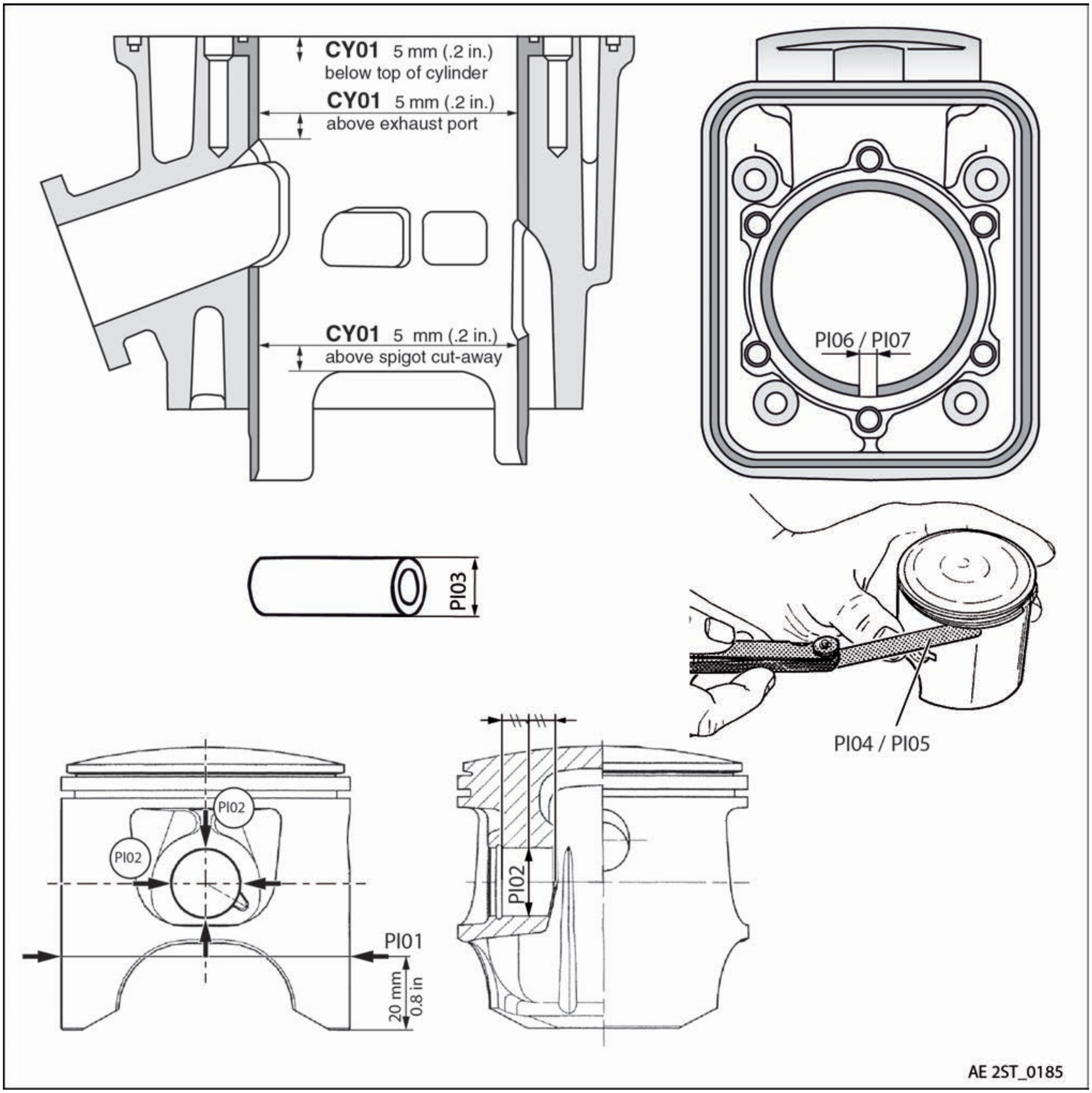


Figure 6.20

NOTE

Cylinders are machined to 2 tolerance groups, marked on the spigot either red or green. The difference in bore diameter is 0.01 mm. Suitable pistons are available in the same color code

Description	**Code**	**Reading new**		**Wear limit**		**Readings**
		min	**max**	**100 %**		
1. Cylinder						
Cylinder diameter standard red	CY01	76.01 mm 2.9925 in.	76.02 mm 2.9929 in.	76.10 mm 2.9960 in.	actual	
					renewed	
Cylinder diameter standard green	CY01	76.02 mm 2.9929 in.	76.03 mm 2.9933 in.	76.10 mm 2.9960 in.	actual	
					renewed	
Cylinder diameter 1st oversize red	CY01	76.26 mm 3.0023 in.	76.27 mm 3.0027 in.	76.35 mm 3.0060 in.	actual	
					renewed	
Cylinder diameter 1st oversize green	CY01	76.27 mm 3.0027 in.	76.28 mm 3.0031 in.	76.35 mm 3.0060 in.	actual	
					renewed	
Cylinder diameter 2nd oversize red	CY01	76.51 mm 3.0122 in.	76.52 mm 3.0126 in.	76.60 mm 3.0160 in.	actual	
					renewed	
Cylinder diameter 2nd oversize green	CY01	76.52 mm 3.0126 in.	76.53 mm 3.0130 in.	76.60 mm 3.0160 in.	actual	
					renewed	
Out of round		0.00 mm 0.0000 in.	0.02 mm 0.0008 in.	0.05 mm 0.0020 in.	actual	
					renewed	
Conicity		0.00 mm 0.0000 in.	0.03 mm 0.0012 in.	0.08 mm 0.0032 in.	actual	
					renewed	
2. Piston pin/ring						
Piston skirt diameter, red	PI01	75.94 mm 2.989 in.	75.95 mm 2.990 in.	75.87 mm 2.987 in.	actual	
					renewed	
Piston skirt diameter, green	PI01	75.95 mm 2.9901 in.	75.96 mm 2.9905 in..	75.87 mm 2.987 in.	actual	
					renewed	
Clearance of piston to cylinder wall		0.06 mm 0.002 in.	0.08 mm 0.003 in.	0.15 mm 0.006 in.	actual	
					renewed	
Piston pin bore	PI02	18.001 mm 0.709 in.	18.005 mm 0.709 in.	18.04 mm 0.710 in.	actual	
					renewed	
Piston pin	PI03	17.997 mm 0.7085 in.	18.000 mm 0.7087 in.	17.97 mm 0.700 in.	actual	
					renewed	

Clearance of pin in piston		0.001 mm 0.0000 in.	0.008 mm 0.0003 in.	0.03 mm 0.001 in.	actual	
					renewed	
Piston ring, height of groove	PI04/ PI05	2.04 mm 0.080 in.	2.06 mm 0.081 in.	2.15 mm 0.085 in.	actual	
					renewed	
Piston ring, height of ring	PI04/ PI05	1.978 mm 0.770 in.	1.990 mm 0.780 in.	1.900 mm 0.750 in.	actual	
					renewed	
Piston ring, flank clearance	PI04/ PI05	0.05 mm 0.002 in.	0.082 mm 0.003 in.	0.20 mm 0.008 in.	actual	
					renewed	
Piston ring, end gap	PI06/ PI07	0.30 mm 0.012 in.	0.45 mm 0.017 in.	1.00 mm 0.040 in.	actual	
					renewed	

INSTALLATION

NOTE

Cover openings in crankcase to protect against entry of foreign objects.

PISTON RINGS - ASSEMBLY

Step	Procedure
1	Fit the piston rings beginning with the lower rectangular ring (1). **NOTE** *With its directional mark (2) facing upwards, carefully spread the piston ring by hand or by using spreader type pliers.*
2	Align the ring's end gap (3) with the piston ring groove's steel pin (4). **NOTE** *Piston ring end gaps must be properly aligned with pins to avoid engine damage.*

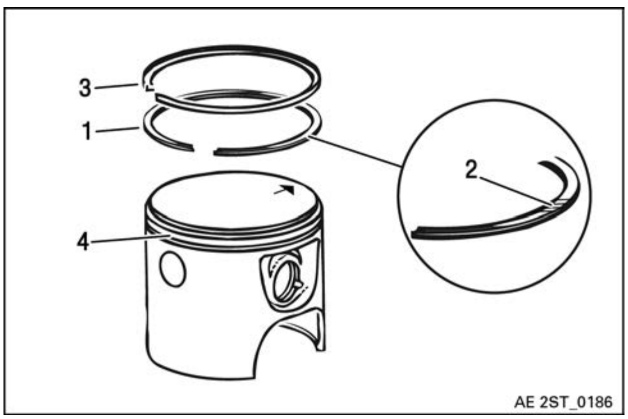


Figure 6.21

1	*Rectangular ring*	2	*Directional mark*
3	*End gap*	4	*Steel pin*

PISTON - INSTALLATION

Step	Procedure
1	Push cage-less piston pin bearing, with expansion sleeve placed inside (1), from the plastic sleeve (2) into the respectively marked con rod end and grease needles and the two thrust washers with lithium grease. **NOTE** *To facilitate pushing the bearing into position, use dial gauge adapter part no. 876940 (3) or a pin with ø 21 mm (0.826 in.).*

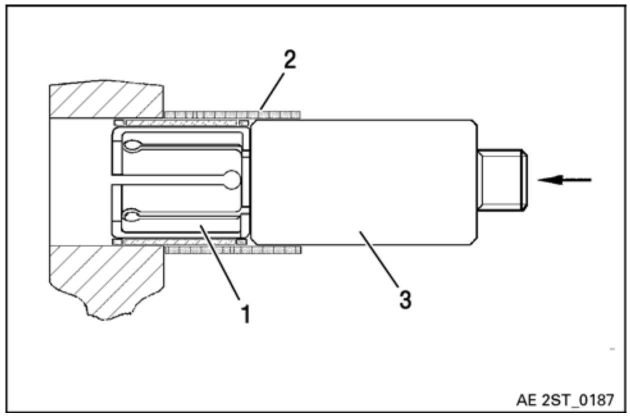


Figure 6.22

1	*Expansion sleeve*	2	*Plastic sleeve*
3	*21 mm pin*		

Step	Procedure
2	Place collar (4) of insertion tool part no. 877805 onto base (5) and fit a new piston circlip (6) into the collar, aligning the circlip hook with gap in collar.
3	Push the tool (7) into the collar until it stops on base.

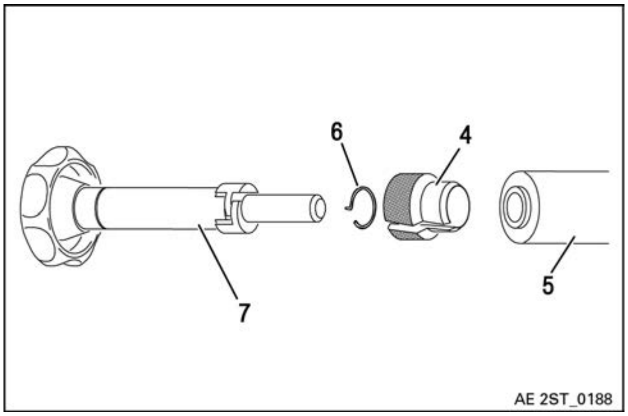


Figure 6.23

4	*Collar*	*5*	*Base*
6	*Circlip*	*7*	*Tool*

⚠ WARNING

Danger of severe burns and scalds!
Wear heat resistant gloves!

ATTENTION

Circlips which are used or have already been installed have insufficient tangential tension, can twist and consequently abrade the groove in the piston.
Always use new mono hook circlips.

Step	Procedure
4	Pre-heat piston up to 100-120 °C (212° to 248 °F).
5	Oil piston pin (8) and push into piston bore that has had circlip removed until level with face of con rod boss (9). **NOTE** *Piston pin should slide easily into piston bore. Carefully dress any damage caused by circlip removal with fine lapping fleece.*

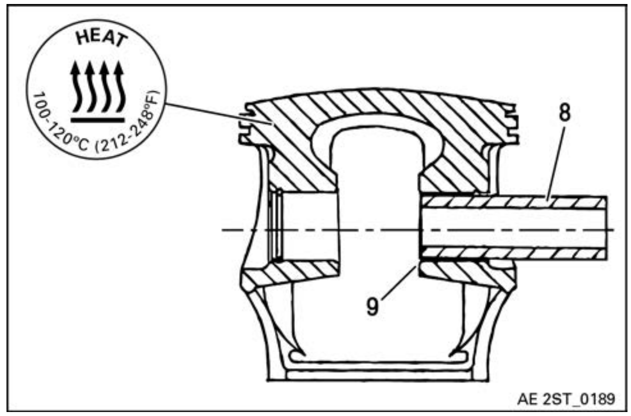


Figure 6.24

8	*Piston pin*	*9*	*Facing with con rod boss*

ATTENTION

Non-secured piston pin may lead to severe engine damage.
Ensure that all circlips are engaging properly in groove and fitted in correct position.

Step	Procedure
6	Install one circlip in piston with the preloaded tool (7). Hit the end of the insertion tool by hand, with a quick, solid blow to insert the circlip
7	Place the piston with piston pin inserted over the corresponding con rod with needle bearing inserted. **NOTE** *Ensure the arrow and “AUS” (or marked position) on the piston dome are pointing towards the exhaust side of the engine.*
8	Align the piston pin bore with the con rod bore and carefully push the piston pin through the con rod, pushing out the expansion sleeve.

Step	Procedure
9	Insert spindle of piston pin extractor part no. 877091 (10) into piston pin and screw on the extracting nut (11). Pull piston pin carefully into piston till stop on circlip, by turning the extractor spindle.
10	Turn spindle backwards several turns, remove extracting nut and withdraw extractor.

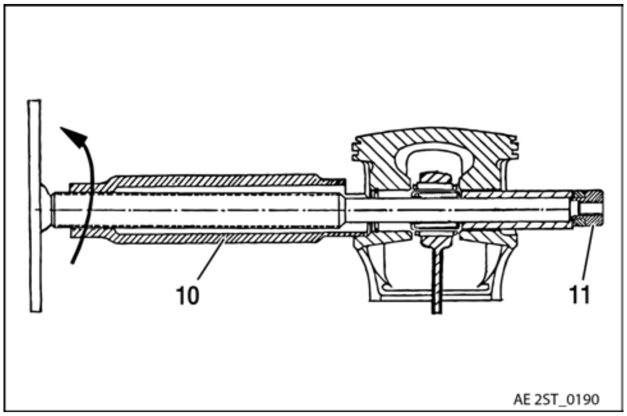


Figure 6.25

10 Piston pin extractor *11 Nut*

Step	Procedure
11	Place insertion tool part no. 877805 (12) with new circlip into wrist pin, aligning circlip hook with slot in piston.
12	Brace the piston and con rod.
13	Hit the end of the insertion tool by hand, with a quick, solid blow to insert the circlip. **NOTE** *It is important to brace the piston and con rod and absorb the impact of the mallet to prevent damage.*
14	Ensure that all circlips are engaging properly in grooves and circlip hooks are fitted in correct position.

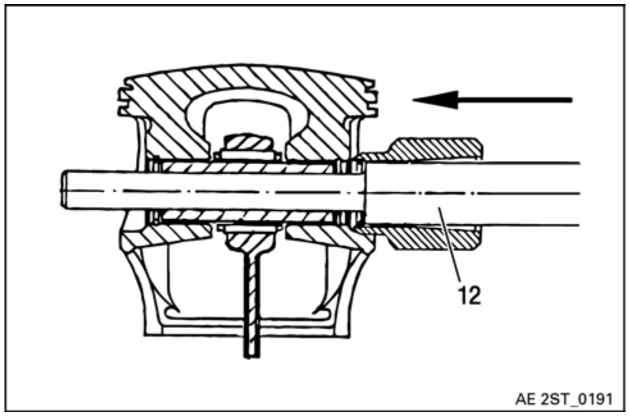


Figure 6.26

12 Insertion tool

CYLINDER - INSTALLATION

Step	Procedure
1	Place cylinder base gasket on crankcase.
2	Apply engine oil to cylinder wall.
3	Ensure piston ring end gaps are correctly engaged on securing pins and place piston at T.D.C.

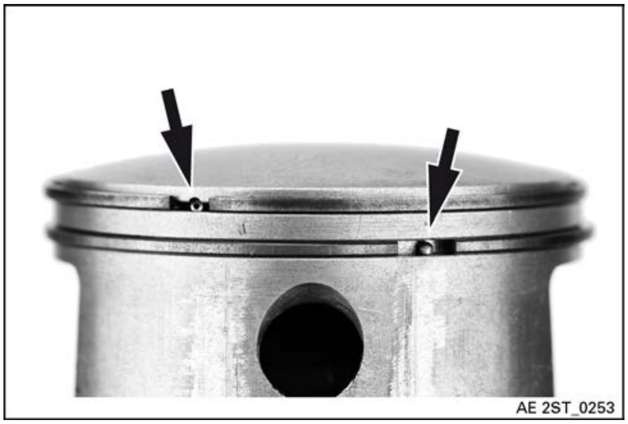


Figure 6.27

ATTENTION

Cylinder must move easily onto piston, without too much turning. Otherwise one of the ring ends could engage on the edge of a port, causing ring breakage.

Step	Procedure
4	Compress rings with fingers and carefully push cylinder over piston, while slightly pushing and turning cylinder.
5	Put cylinder to rest on crankcase. If necessary, set second piston to T.D.C. and repeat procedure.

ATTENTION

Do not clamp the sealing.

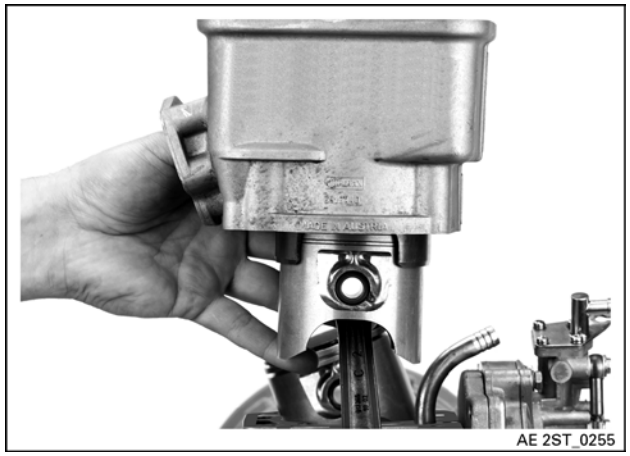


Figure 6.28: Cylinder installation

Step	Procedure
6	To enable the subsequent assembly of cylinder head, the two cylinders must be aligned. **NOTE** *Aligning tools provide correct distance between cylinders and ensure plane face of exhaust flanges.*
7	Attach cylinder alignment tool 876572 (1) using 4 hex screws M8x60. Hand tighten only!
8	Attach exhaust manifold alignment tool part no. 876904 (2) using 4 hex screws M8x25. Hand tighten only!

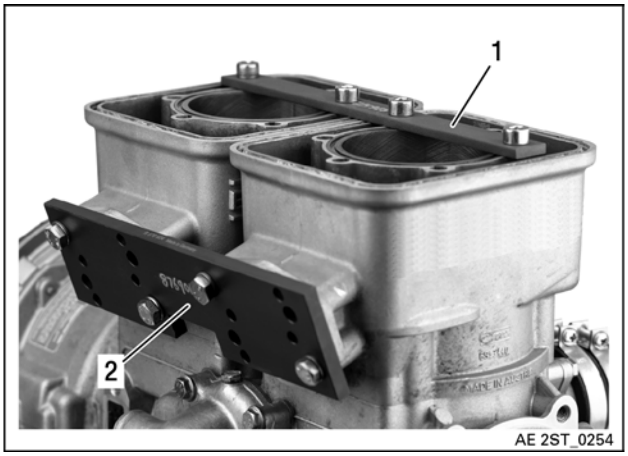


Figure 6.29

1	*Alignment tool 876572*	2	*Alignment tool 876904*

Step	Procedure
9	Lubricate bearing area of 8 hex. collar screws M8x68.5 with LITHIUM-BASED GREASE and tighten crosswise. Apply LOCTITE 243 to screws depicted as position 1. Tightening torque 24 Nm (18 ft. lb).

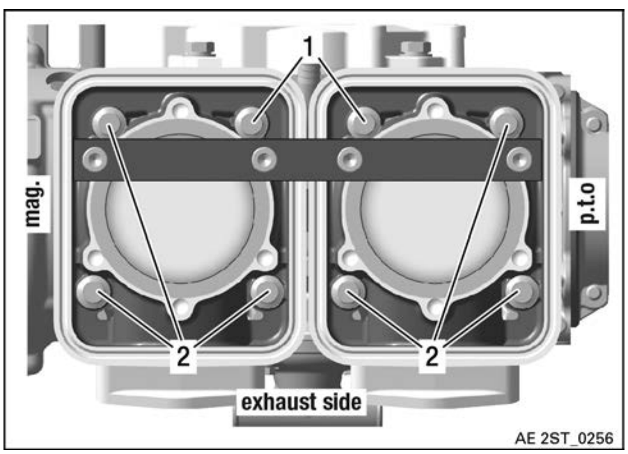


Figure 6.30

1	*With LOCTITE 243*	2	*Without LOCTITE 243*

FINISHING WORK

- Continue with Cylinder head - assembly, see Chapter 72-30-00

If cylinders were machined or new piston rings were installed, perform engine test run. See latest Operators Manual for the engine type 582 mod. 99 / mod. 17.

Chapter: 73-00-00
FUEL SYSTEM AND DISTRIBUTION

TOPICS IN THIS CHAPTER

SERVICE PRODUCTS

Description	Part number
LOCTITE 243	897651

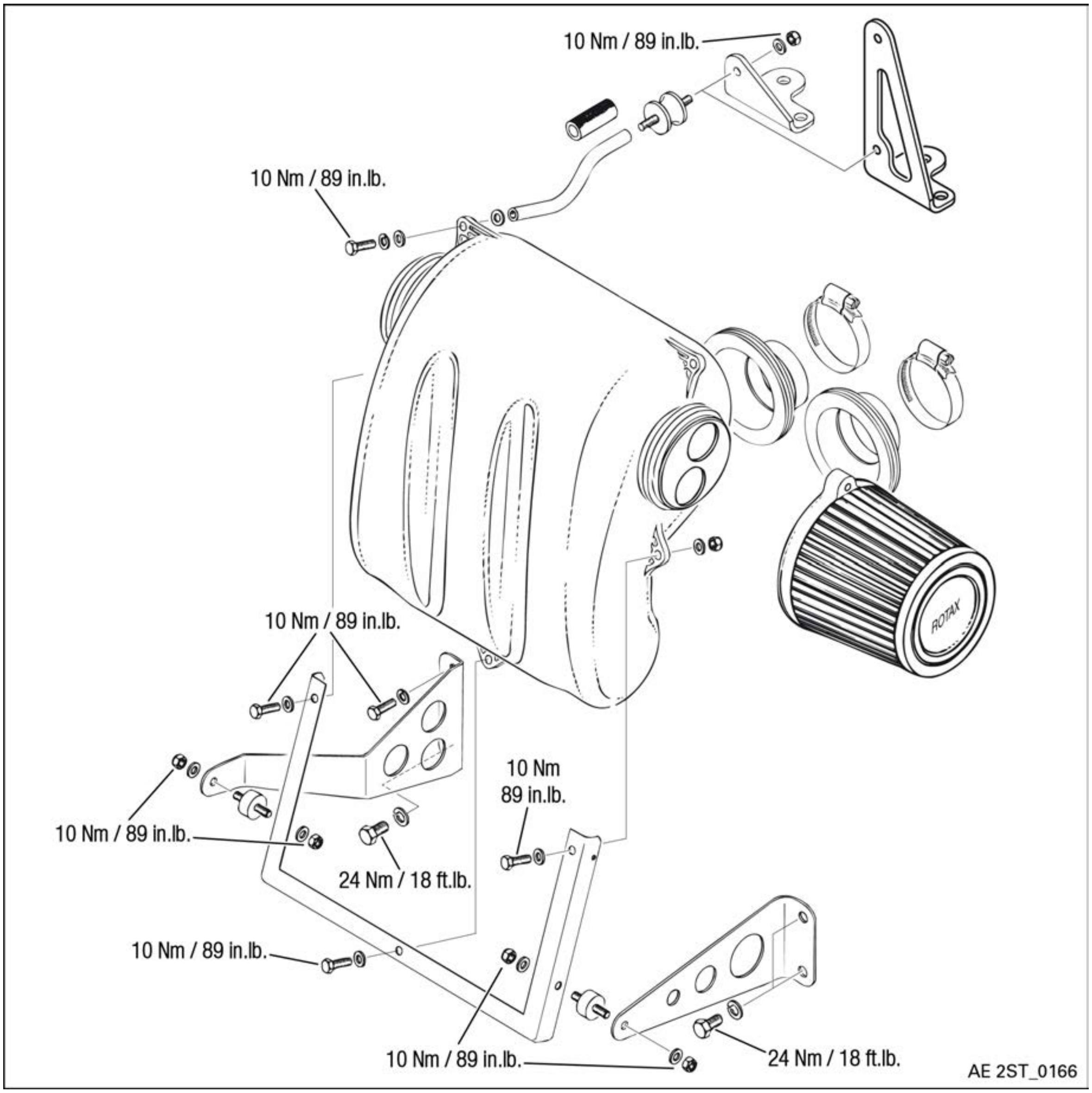


Figure 7.1: Components

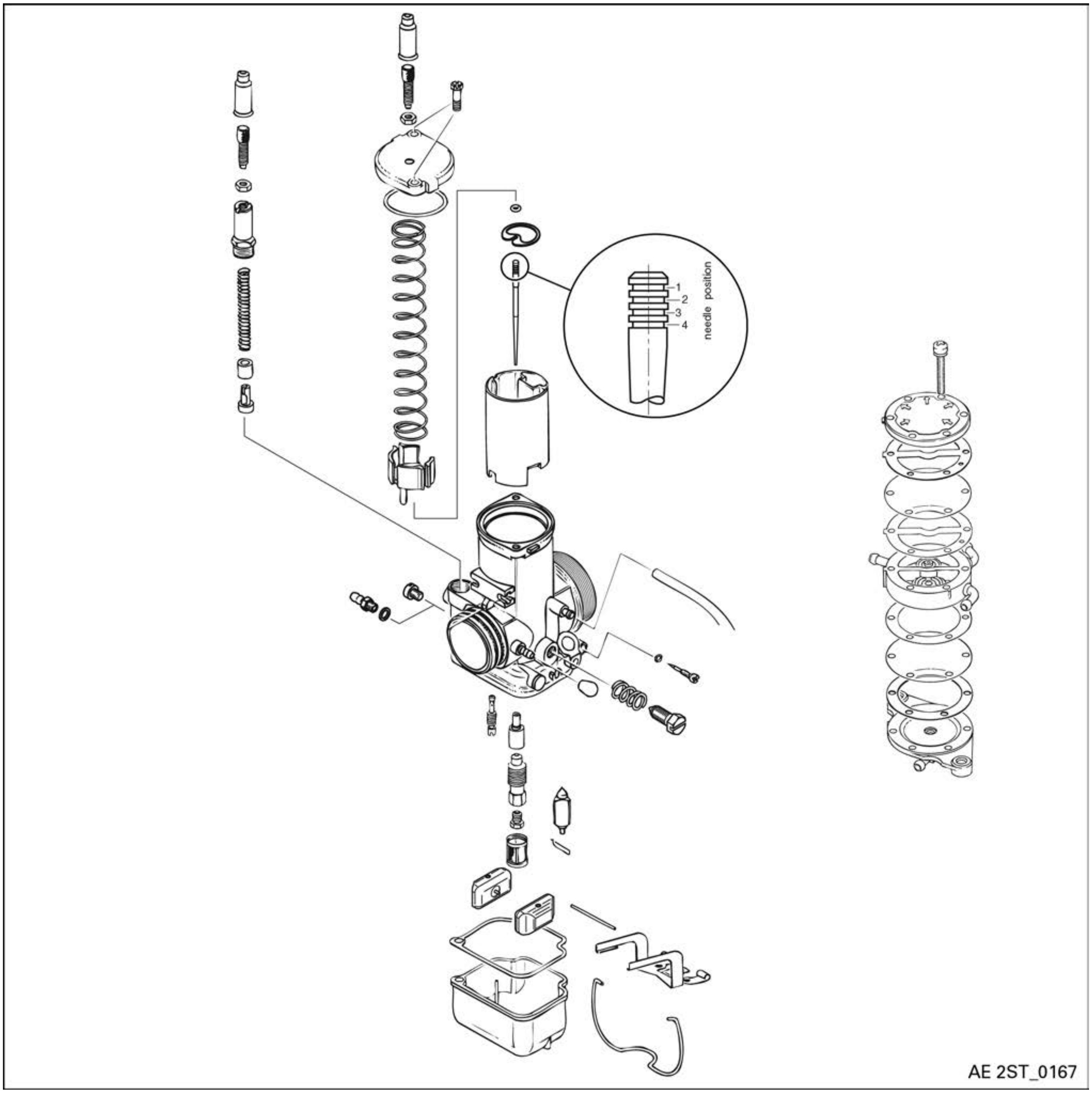


Figure 7.2: Components

SYSTEM DESCRIPTION

General

Generally, the engines are designed to run on a gasoline-oil mixture of 50:1. This mixture supplies proper engine lubrication.
If the engine has been assembled for oil injection lubrication, the carburetors are supplied with pure gasoline.
The integrated oil pump will deliver the exact amount of oil required for engine lubrication.
Make sure that adequate amount of oil is in the oil tank before putting engine into service.

Carburetor

For more details see latest Operators and Installation Manual.

Fuel pump

For more details see latest Operators and Installation Manual.

SAFETY INSTRUCTION

⚠ WARNING

Danger of severe burns and scalds!
Always allow the engine to cool down to ambient temperature before starting any work.

ATTENTION

The design of the fuel system is the responsibility of the aircraft manufacturer.The fuel system must be designed to ensure that the engine is supplied with sufficient fuel at the correct pressure in every operational situation. Operating limits must be adhered to!

⚠ WARNING

Risk of fire and explosion!
Make sure that fuel will not splash onto hot engine components or equipment.

⚠ WARNING

Non-compliance can result in serious injuries or death!
When handling with fuel, do not smoke or allow open flames. Gasoline and gasoline vapor are highly flammable and explosive under certain conditions.

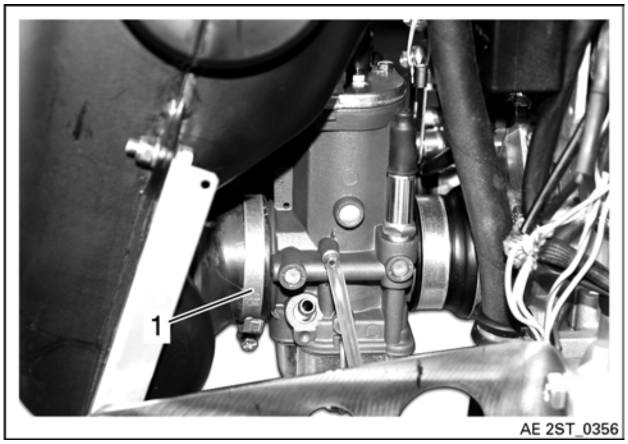
MAINTENANCE

As well as the maintenance and special checks, see current Maintenance Manual Line for the respective engine type.

REMOVAL

INTAKE SILENCER - REMOVAL

Step	Procedure
1	Loosen the 2 rubber socket clamps (1) carburetor side



1 Clamp

Figure 7.3

Step	Procedure
2	Remove the lock nut M6 with washer from the rubber buffer (2).
3	Remove 4 hex. screws with washers (3).

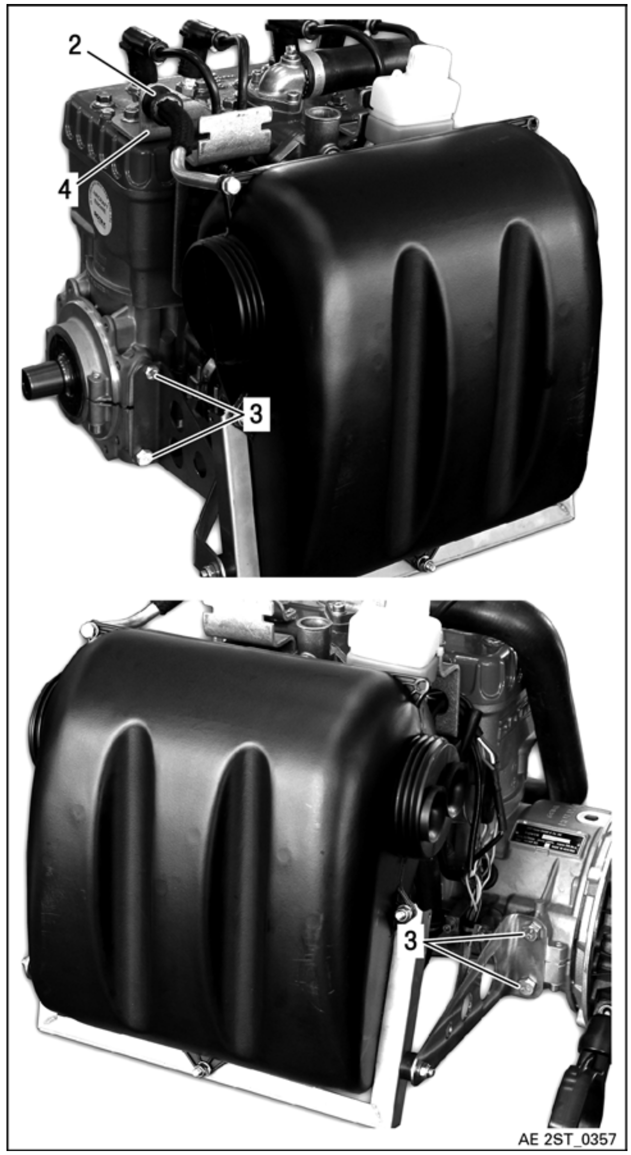


Figure 7.4

2 Rubber buffer

3 Hex. screws with washer

4 Bracket

Step	Procedure
4	Pull the silencer assembly from the engine. **NOTE** *Cover the open sockets to prevent foreign object entry and set aside.*
5	Remove bracket (4) only if necessary. See Chapter 72-30-00 Cylinder head.

INTAKE SILENCER - DISASSEMBLY

Step	Procedure
1	Loosen the hex. screw M6x20 (3) and remove the distance bar (6) including the lock washer (4) and 2 washers (5).
2	Unscrew the rubber buffer (1) from the distance bar (6) and pull off the protection hose (2).

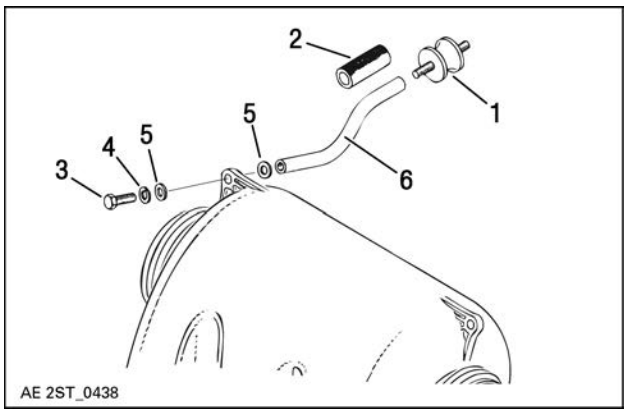


Figure 7.5

1 Rubber buffer *2 Protection hose*
3 Hex. screw M6x20 *4 Lock washer*
5 Washer *6 Distance bar*

Step	Procedure
3	Loosen lock nuts M6 (7), remove washers, rubber buffer (9) and intake silencer bracket (8).

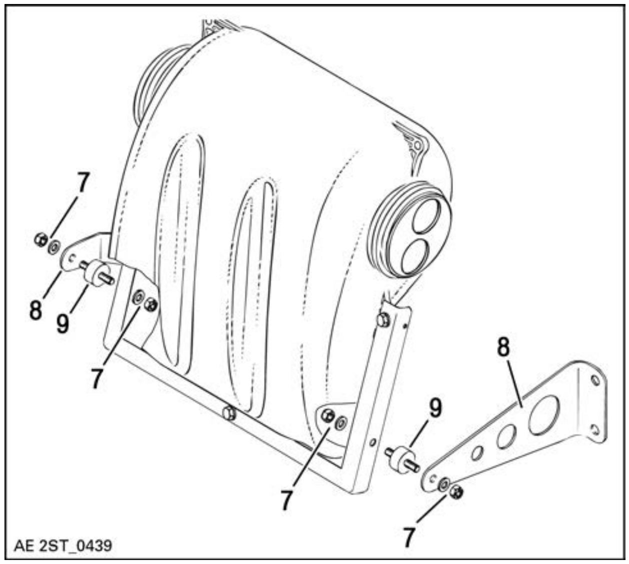


Figure 7.6

7 Lock nuts M6 *8 Intake silencer bracket*
9 Rubber buffer

Step	Procedure
4	Loosen 3 hex. screws M6x20 (10) with washers 6.4 (11) and lock nuts M6 (12), at least remove the frame (13).

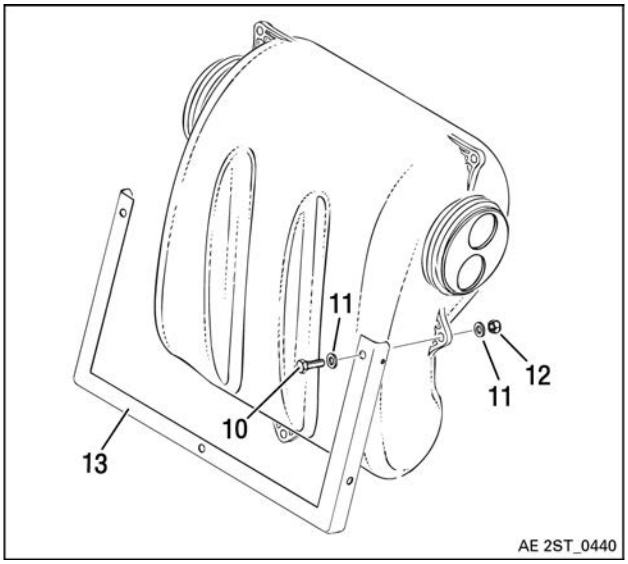


Figure 7.7

10	*Hex. screws M6x20*	*11*	*Washer 6.4*
12	*Lock nuts M6*	*13*	*Frame*

Step	Procedure
5	Remove clamp 50-70 (14) and silencer socket (15) from the intake silencer.

ATTENTION

Non-observance may lead to engine damage!
Cover all openings of the intake silencer.

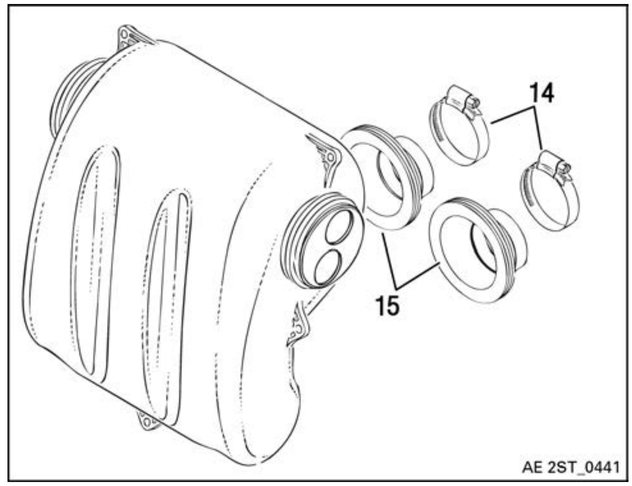


Figure 7.8

14	*Clamp 50–70*	*15*	*Silencer socket*

CARBURETOR - REMOVAL

For the subsequent works see Maintenance Manual Line for engine type 582 mod. 99 / mod.17.

General
Before the carburetors are removed, the work described below must be carried out to identify any further faults in the fuel system and rectify them as part of repair work.

- General visual inspection.
- Engine cleaning.
- Carry out an engine test run.

NOTE

If these checks are omitted, it may be necessary to dismantle the carburetors again to rectify any faults after repair work.

NOTE

If both carburetors should be removed, start with the right one at first.

Step	Procedure
1	Place throttle at idle position. Loosen 2 hex. screws M5x12 (1), remove cover plate (2) along with connected piston (3) and piston spring (4).

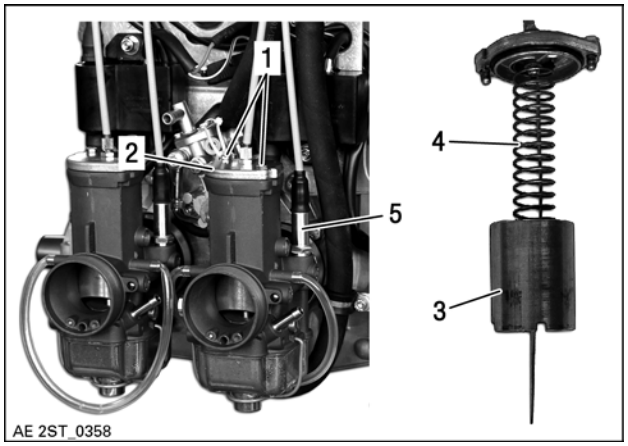


Figure 7.9

1	*Hex. screws M5x12*	2	*Cover plate with pin*
3	*Piston*	4	*Piston spring*
5	*Choke housing*		

Step	Procedure
2	Compress spring and slide spring cup (6) out from slide.
3	Push slackened throttle cable through piston, then slide the cable end out through keyhole slot (7).
4	Release spring tension and remove piston along with needle, spring cup, spring and cover plate.

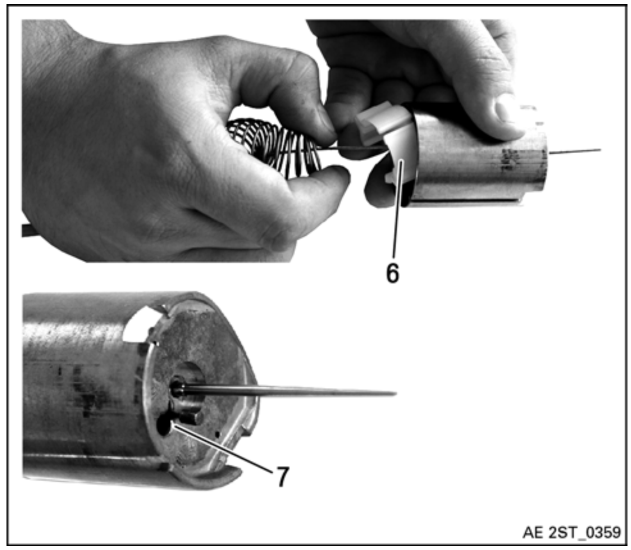


Figure 7.10

6	*Spring cup*	7	*Keyhole slot*

Step	Procedure
5	Loosen choke housing (5) and remove choke assembly from carburetor.
6	Compress spring (8) and slide sleeve (9) up. Push choke cable end through keyhole slot in choke piston (10).

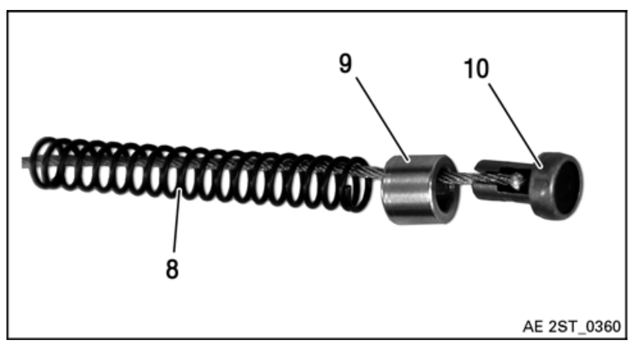


Figure 7.11

8	*Compression spring*	9	*Sleeve*
10	*Chock piston with gasket*		

Step	Procedure
7	Remove fuel line (11) and primer line (12) if optionally equipped.
8	Loosen the rubber socket clamp (13) carburetor side and pull carburetor from rubber socket.

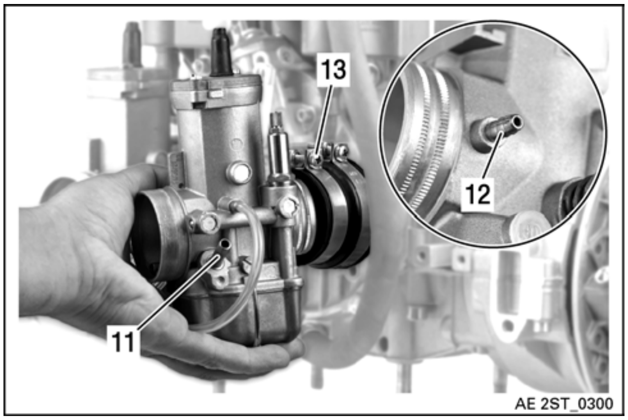


Figure 7.12

11 Fuel line *12 Primer line*
13 Clamp

Step	Procedure
9	Loosen the rubber socket clamp (14) engine side and remove socket.
10	Inspect socket (15) for cracks and replace as necessary or after 5 years of service.

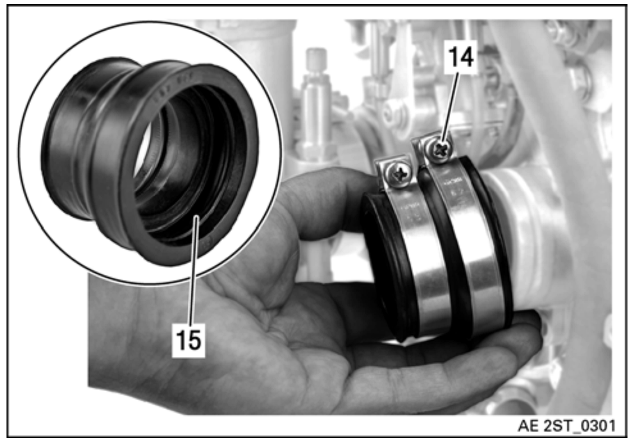


Figure 7.13

14 Clamp *15 Socket*

CARBURETOR - DISASSEMBLY

Step	Procedure
1	Slide float bowl spring clip (1) to the side and remove float bowl along with floats. **NOTE** *It may be necessary to pry the clip using a flat blade screwdriver.*

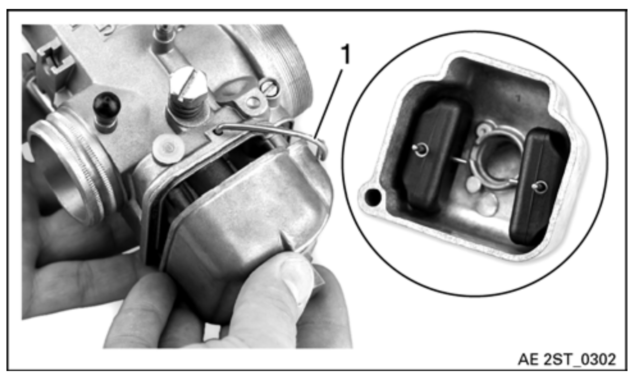


Figure 7.14

1 Spring clip

Step	Procedure
2	Remove sieve sleeve (2).
3	Tap out float bracket pin (3) using small punch. **NOTE** *Pin is serrated on one side (4). Tap out pin from smooth end.*
4	Remove float bracket (5) and float needle valve along with clip (6).

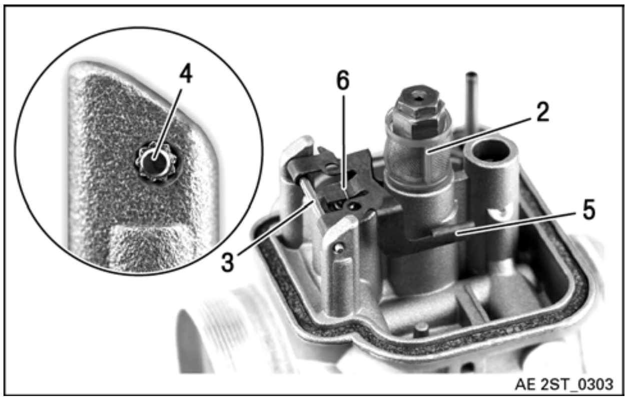


Figure 7.15

2 Sieve sleeve
3 Bracket pin
4 Serrations
5 Float bracket
6 Clip

Step	Procedure
5	Hold the mixing tube (8) in place with 10 mm wrench and remove main jet (9).
6	Remove mixing tube (8) and needle jet (10).
7	Remove idle jet (11).

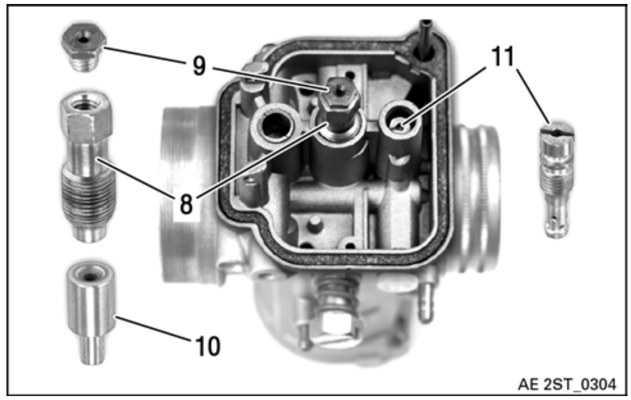


Figure 7.16

8 Mixing tube
9 Main jet
10 Needle jet
11 Idle jet

Step	Procedure
8	Remove idle screw (12) and spring (13).
9	Remove air screw (14) and discard O-ring (15).

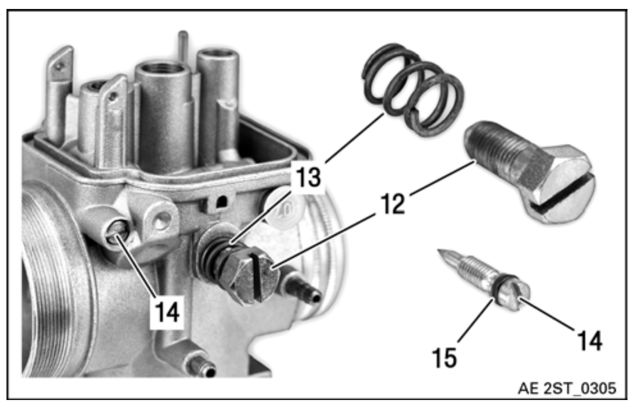


Figure 7.17

12 Idle screw
13 Spring
14 Air screw
15 O-Ring

FUEL PUMP - DISASSEMBLY

Step	Procedure
1	Loosen the 6 M4x28 screws (1) and separate the fuel pump
2	Set aside diaphragms (2) and gaskets (3).

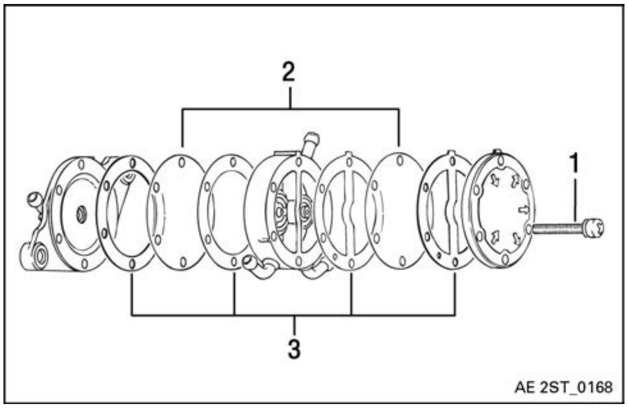


Figure 7.18

1 Screws M4x28 *2 Diaphragms*

3 Gaskets

NOTE

Replace all diaphragms and gaskets, especially if the fuel pump has been in service for longer than 5 years.

INSPECTION

CARBURETOR - INSPECTION

Preparation
Wash carburetor parts with clean solvent. High volatility solvents may be required to dissolve deposits left behind by fuel

ENVIRONMENTAL NOTE

All the operating fluids and cleaning agents can damage the environment if not disposed of properly.
Dispose of operating fluids in an eco-friendly manner!

⚠ WARNING

Risk of eye injury!
Wear safety goggles.

Step	Procedure
1	Blow out passages with compressed air. Check all fuel ducts (1) and air ducts (2) for free passage.

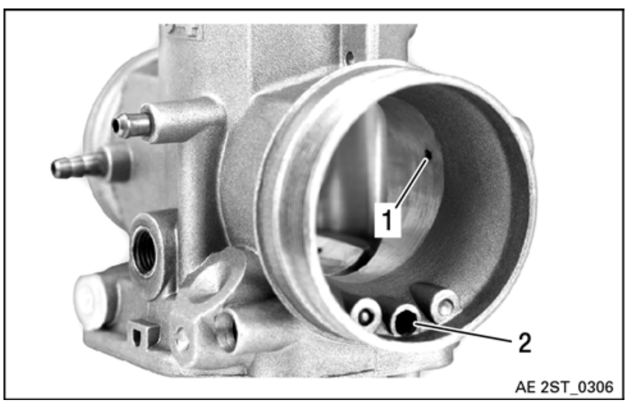


Figure 7.19

1 Fuel duct *2 Air duct*

Step	Procedure
2	Inspect carburetor piston (4) for wear. **NOTE** *Chafing on the piston or the carburetor piston bore may cause rough running.*
3	Inspect jet needle (5), retaining clip (6) and needle jet (7) for wear. Replace as necessary.

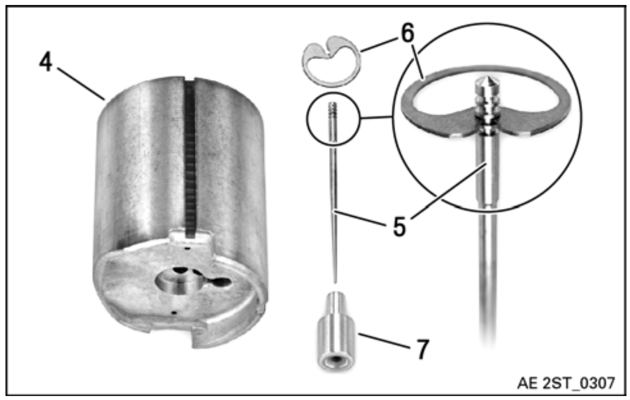


Figure 7.20

4 Piston *5 Jet needle*
6 Retaining clip *7 Needle jet*

Step	Procedure
4	Inspect floats for deterioration or cracking of the float material. See ASB-2ST-003 Exchange of floats.
5	Inspect float pin (8) and guide tubes (9) for wear. Replace floats if necessary. **NOTE** *Do not flip floats to place wear on opposite side of pin 8, if pin 8 is worn - replace float with new.*
6	Inspect float bowl (10) for corrosion . Check guide pins (11) for wear and solid attachment to bowl.

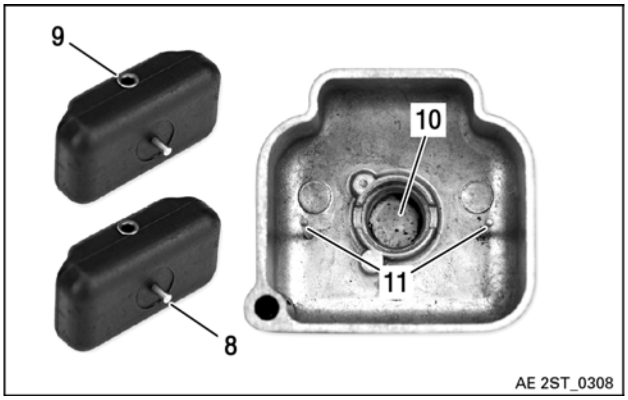


Figure 7.21

8	*Float pin*	9	*Guide tube*
10	*Float bowl*	11	*Guide pin*

Step	Procedure
7	Check float needle valve for wear, especially at grooves for clip (12). **NOTE** *Float needle and clip must be replaced together.*
8	Inspect float bracket for wear at contact faces (13). Replace if worn or damaged.
9	Inspect float bracket pin (14) for wear or flaking of coating.
10	Inspect sieve sleeve (15) for damage, distortion and mesh condition. Replace if worn or damaged.

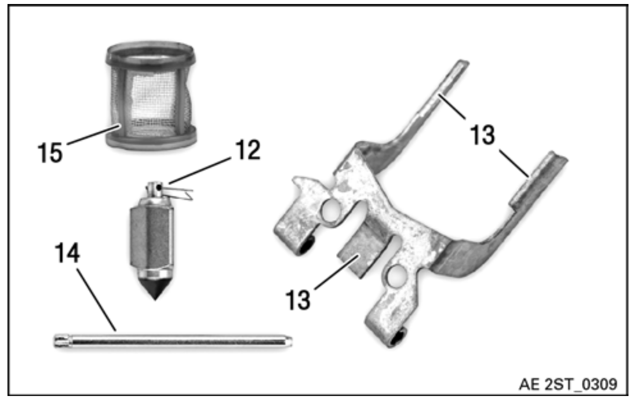


Figure 7.22

12	*Clip groove*	13	*Float bracket*
14	*Bracket pin*	15	*Sieve sleeve*

Step	Procedure
11	Inspect main jet (16) for free passage and record the jet size.
12	Inspect idle jet (17) for free passage.
13	Inspect the air screw (18) for wear and damage.
14	Inspect the choke cable piston (19).

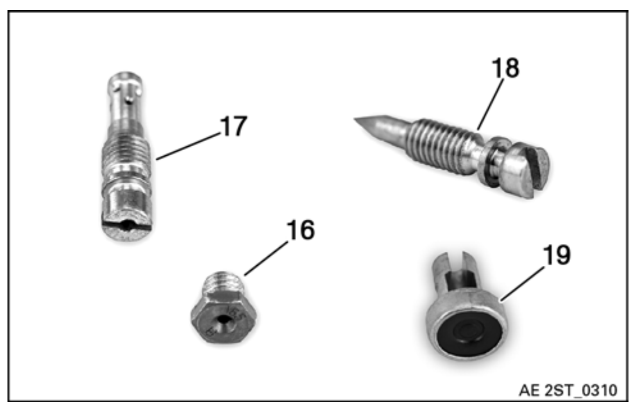


Figure 7.23

16	*Main jet*	17	*Idle jet*
18	*Air screw*	19	*Cable piston*

FUEL PUMP - INSPECTION

Step	Procedure
1	Inspect the inlet (1) and outlet (2) one-way valves for wear and damage. **NOTE** *BRP-Rotax does not supply fuel pump valve components, however they are available "after-market".*

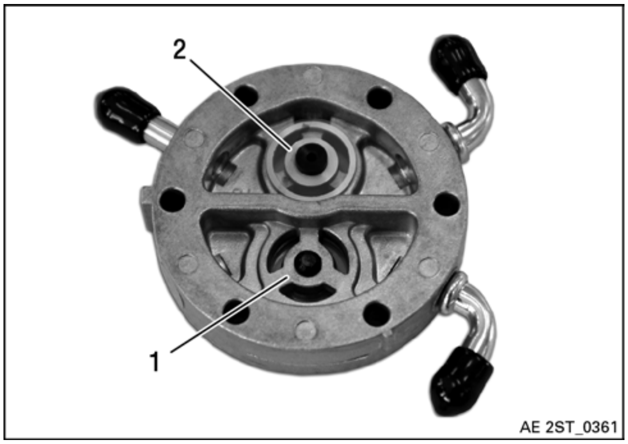


Figure 7.24

1 Inlet valve
2 Outlet valve

FLOAT LEVEL CHECK

For float level check, see latest Maintenance Manual Line of engine type 582 mod. 99 / mod. 17.

INTAKE SILENCER - INSPECTION

Step	Procedure
1	Check intake silencer (1) for damage and dirt. Cover all openings of the intake silencer.
2	Check silencer socket (2) for cracks and damage.

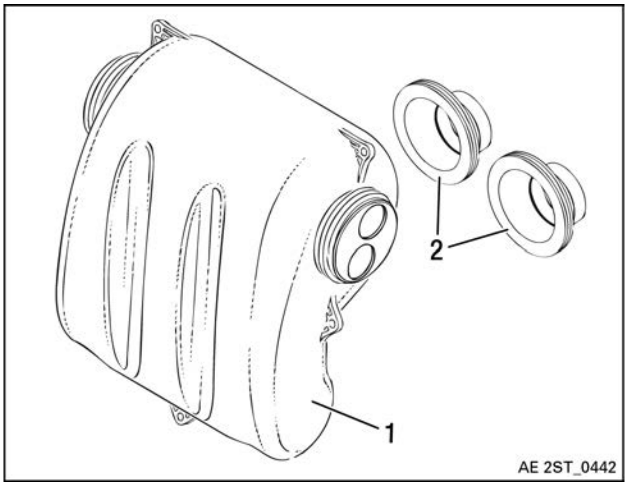


Figure 7.25

1 Intake silencer *2 Silencer socket*

Step	Procedure
3	Check frame (3), brackets (4) and distance bar (5) for damage and wear.
4	Check rubber buffers (6) for cracks and damage.

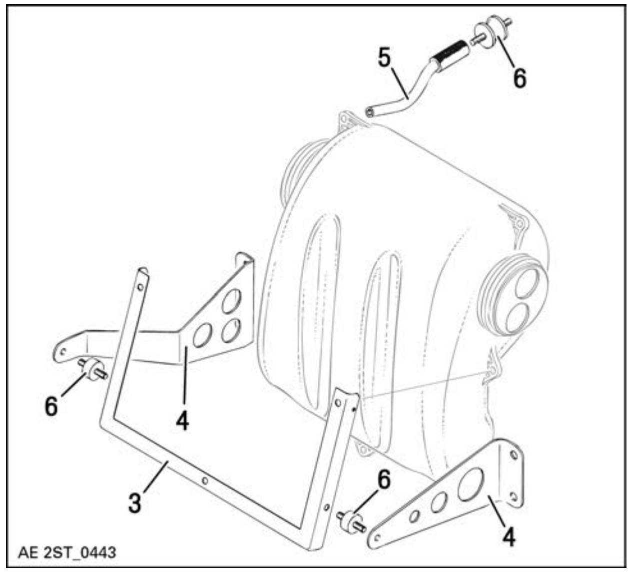


Figure 7.26

3 Frame *4 Intake silencer bracket*

5 Distance bar *6 Rubber buffers*

ASSEMBLY

CARBURETOR - ASSEMBLY

Preparation
During assembly process, all components and assembly area must remain clean.

Step	Procedure
1	Place the float needle with clip (1) on ear of float bracket (2) so valve hangs by its clip.
2	Fit the float bracket so that float needle sits within the seat (3).
3	Insert the float bracket pin (4) and tap the splinted end into place. **NOTE** *Pin is serrated on one side. Tap in pin with smooth end.*

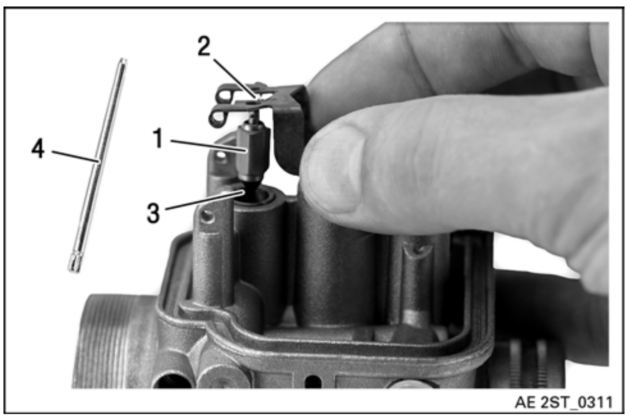


Figure 7.27

1	*Float needle*	2	*Clip*
3	*Needle seat*	4	*Bracket pin*

Step	Procedure
4	Set the float bracket parallel to float chamber by bending the bracket lobe (5) accordingly. **NOTE** *With the bracket parallel, the dimension shown should be approximately 10.5 mm (0.413 in.).*

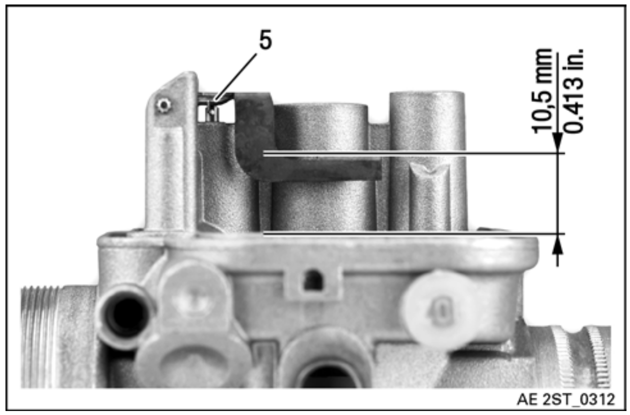


Figure 7.28

5 *Bracket lobe*

Step	Procedure
5	Place Needle jet (6) into place with small shoulder facing inwards.
6	Thread the mixing tube (7) into carburetor body.
7	Attach the main jet (8) to the mixing tube.

Step	Procedure
8	Place the sieve sleeve (9) over the mixing tube. **NOTE** *In particularly severe operating conditions this ensures that the fuel is not spun away from the main jet. The strainer does not act as a filter!* **NOTE** *Do not crush sieve screen on mixing tube. Sieve screen must be free floating.*
9	Place the idle jet (10) into carburetor body and tighten using flat blade screwdriver.

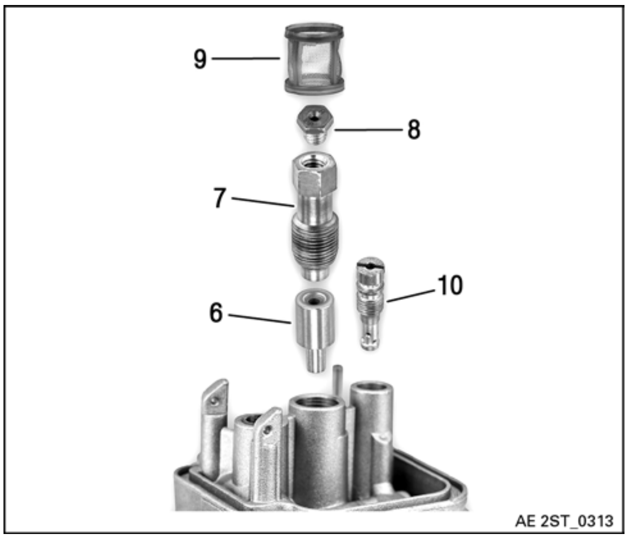


Figure 7.29

6	*Needle jet*	7	*Mixing tube*
8	*Main jet*	9	*Sieve sleeve*
10	*Idle jet*		

Step	Procedure
10	Attach the float bowl clip (11) with the bump facing engine side.
11	Place new gasket (12) in position within the carburetor body groove.
12	Place the floats (13) onto the float bowl guide pins (14).
13	Turn the carburetor body upright, bring the float bowl into place from below and secure with spring clip. **NOTE** *The sieve sleeve (15) must stay in position to avoid being damaged during float bowl attachment. The sleeve can be pinched slightly oval before installation.*

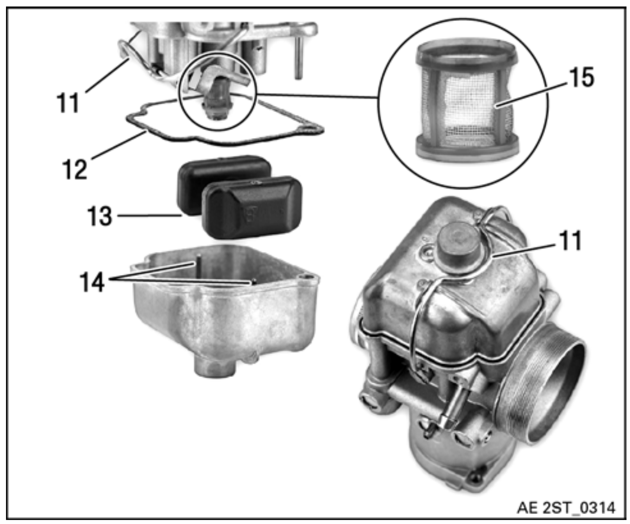


Figure 7.30

11	*Spring clip*	12	*Gasket*
13	*Floats*	14	*Guide pins*
15	*Sieve sleeve*		

Step	Procedure
14	Place tensioner spring (16) over the idle adjustment screw (17) and thread into carburetor body.
15	Place idle air regulating screw (18) with new O-ring (19) into carburetor body.
16	Turn air screw clockwise until it stops but do not tighten. Now turn the screw counter clockwise 1.5 rotations. **NOTE** *The rubber O-ring will hold the adjustment screw in place.*

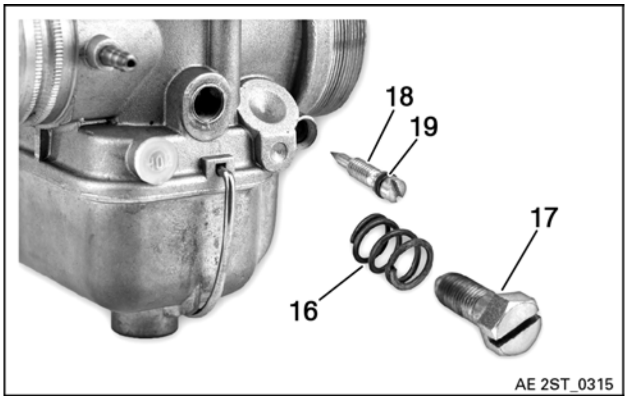


Figure 7.31

16 Tensioner spring   *17 Idle screw*

18 Air screw   *19 O-ring*

Step	Procedure
17	Press clip (20) over jet needle (21) in the same clip position as recorded.
18	Place O-ring (22) on needle jet and place assembled needle jet into carburetor piston (23). The needle clip must be oriented as depicted (24).

For default jet needle clip position as well as adjustments for altitude etc., see Maintenance Manual Line for engine type 582 mod. 99 / mod. 17.

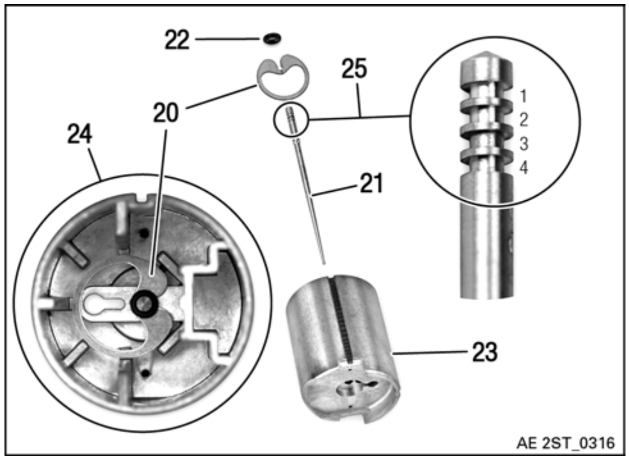


Figure 7.32

20 Clip   *21 Jet needle*

22 O-Ring   *23 Carburetor piston*

24 Clip orientation   *25 Needle position*

NOTE

Ensure that the jet needle seats within the needle jet.
For attachment of throttle cable, see section Carburetor Installation.

Step	Procedure
19	Set piston into carburetor body, aligning the piston slot (26) with key (27).

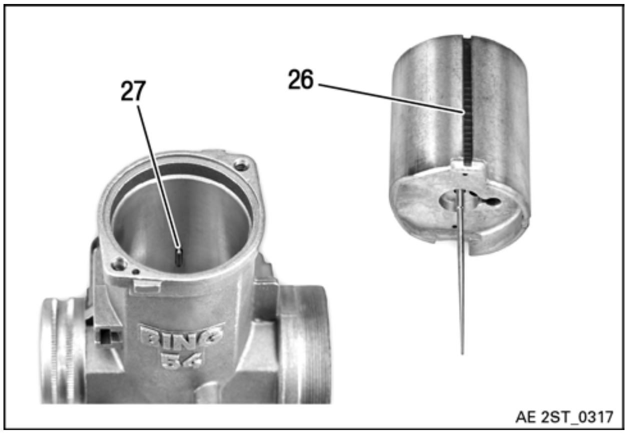


Figure 7.33

26 Piston slot *27 Key*

Step	Procedure
20	Place spring cup (28) into piston aligning the 3 slots with piston tabs (29).
21	Set spring (30) into spring cup.

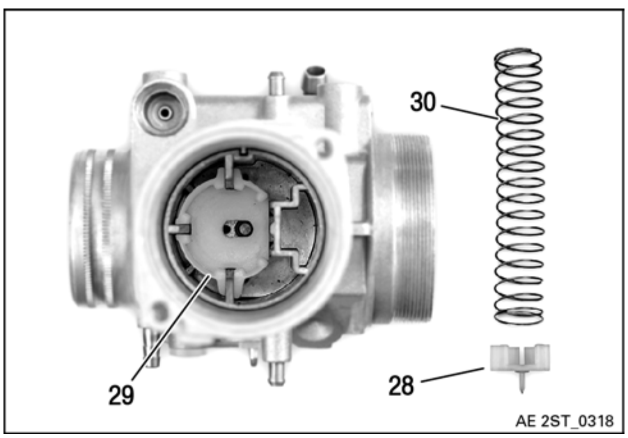


Figure 7.34

28 Spring cup *29 Piston tabs*

30 Spring

Step	Procedure
22	With a new O-ring (31), set cover plate (32) onto carburetor, compressing spring and aligning cover pin with hole (33). Attach cap with 2 hex. screws M5x12 (34).

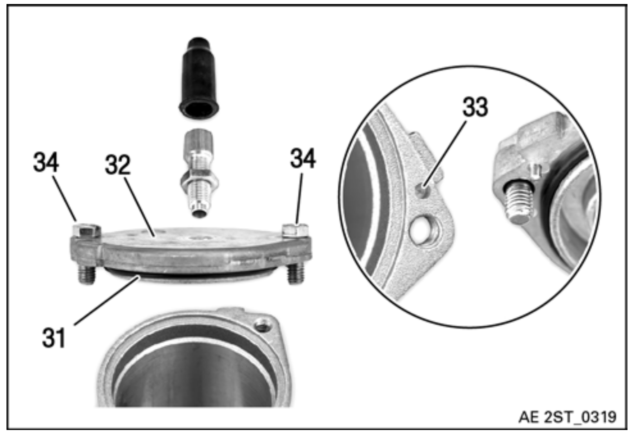


Figure 7.35

31 O–ring *32 Cover plate*

33 Hole *34 Hex. screw M5x12*

CARBURETOR CHOKE - ASSEMBLY

NOTE

For attachment of choke cable, see section Carburetor Installation.

Step	Procedure
1	Put the sleeve (2) with the choke piston with gasket (1) and the compression spring (3) into the carburetor body (4).
2	Thread adjustment screw with nut (5) into choke housing (6).
3	Place rubber grommet (7) over choke cable sheath.
4	Thread choke assembly into carburetor body (4) and tighten it.

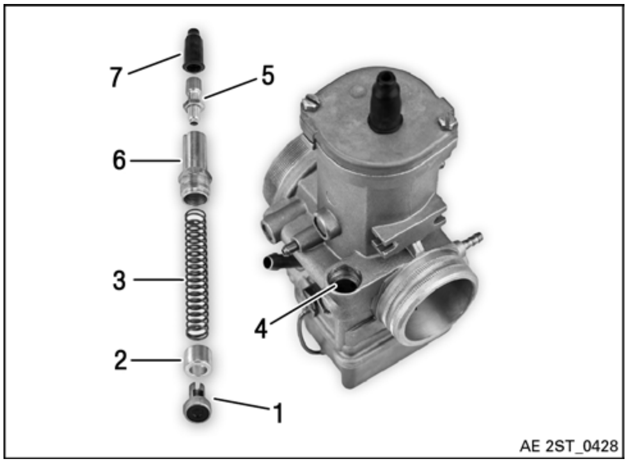


Figure 7.36

1	*Choke piston with gasket*	2	*Sleeve*
3	*Compression spring*	4	*Carburetor body*
5	*Adjustment screw with nut*	6	*Choke housing*
7	*Rubber grommet*		

FUEL PUMP - ASSEMBLY

For identification of correct gasket order, see Illustrated Parts Catalog of engine type 582 mod. 99 / mod. 17.

Step	Procedure
1	Beginning with the fuel pump base (1), stack a thick, single chamber gasket (2) followed by a diaphragm (3) and a thin, single chamber gasket (4).
2	Next stack the center pump housing (5) with split chambers facing up, followed by a thin, double chamber gasket (6), a diaphragm (7) and a thick, double chamber gasket (8). **NOTE** *Ensure that the shape of the gasket aligns with the center housing.*

Step	Procedure
3	Place the fuel pump cover (9) in position with the alignment tab aligned with the center housing tab.
4	Carefully feed 6 combined screw M4x28 (10), thread into fuel pump base and tighten evenly in a cross pattern using a screwdriver.

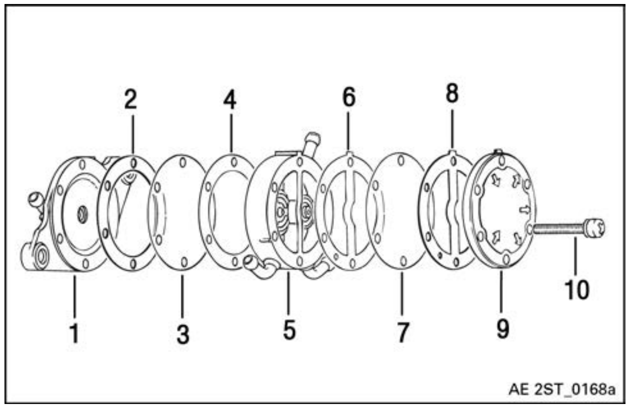


Figure 7.37

1	*Fuel pump base*	2	*Gasket*
3	*Diaphragm*	4	*Gasket*
5	*Center pump housing*	6	*Gasket*
7	*Diaphragm*	8	*Gasket*
9	*Cover*	10	*M4x28*

Step	Procedure
5	If the center pump housing, split chamber gaskets and pump cover are properly assembled, all 4 tabs will be aligned (11).

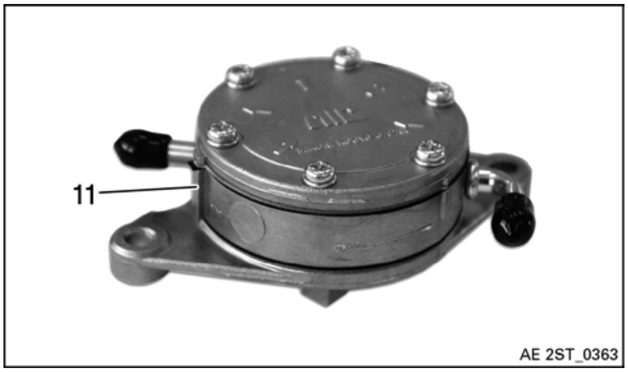


Figure 7.38

11 Alignment tabs

CARBURETOR TEST

Float needle valve leakage check
This check is carried out to ensure that the float valve seat is not leaking.
If the pressure is not maintained, pay particular attention during disassembly to the float valve with the Viton tip and the seat in the carburetor housing

Step	Procedure
1	Turn the carburetor upside down, allowing gravity and the floats to hold the float needle closed.
2	Connect pressure source (1) to the carburetor fuel supply line (2) and apply approx. 0.4 bar (5.8 psi.) of pressure.
3	The pressure must be maintained for about 5 seconds. **NOTE** *If pressure drops, this indicates leakage which may cause fuel overflow and in consequent engine damage due to hydraulic lock. Replacement of the float valve seat is not permissible.*

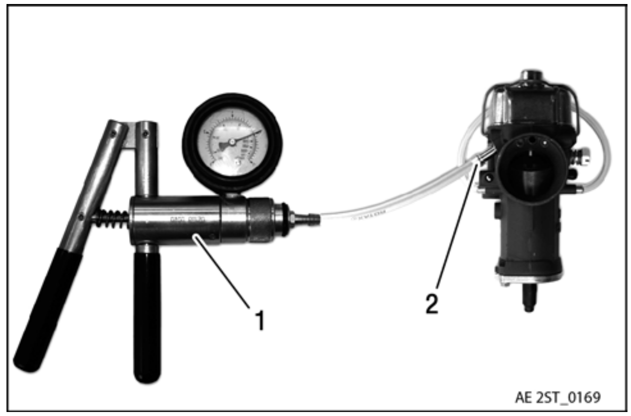


Figure 7.39

1 Pressure source *2 Fuel inlet*

INSTALLATION

ATTENTION
All parts must always be clean and in good condition. Clean and inspect disassembled parts and assemble them in accordance with the instructions. Inspect surfaces, bores and threads for damage.

CARBURETOR - INSTALLATION

The following instructions show installation of new or repaired carburetors in original configuration.

Step	Procedure
1	Attach carburetor to rubber socket engine side (1). **NOTE** *Ensure that the rubber socket and carburetor spigot are clean and free of grease or oil before attaching.*

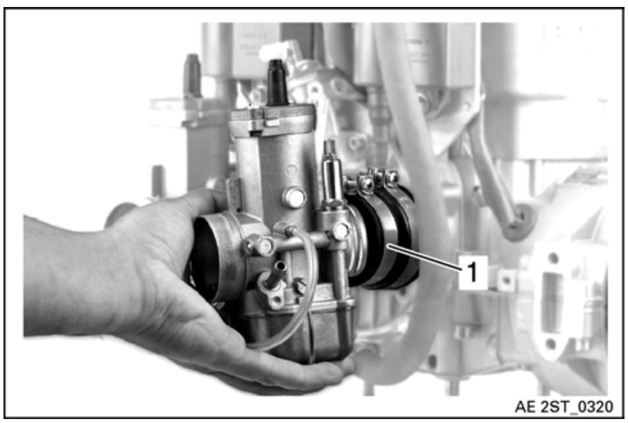


Figure 7.40

1 *Socket*

THROTTLE CABLE - INSTALLATION

Step	Procedure
1	Loosen 2 hex. screws M5x12 (1) and remove cover plate (2), adjustment screw +nut (3) spring (4) and piston (5) along with spring cup (6) and jet needle with clip + O-ring (7).

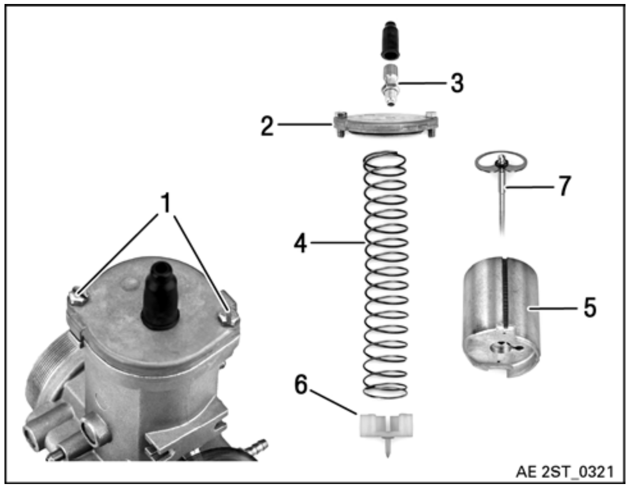
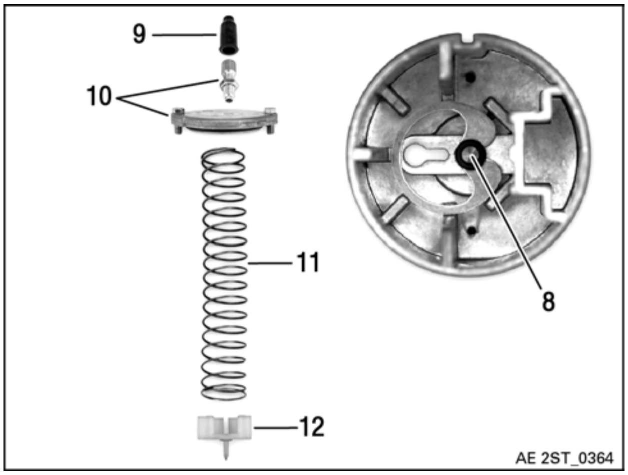


Figure 7.41

1	*Hex. screws M5x12*	2	*Cover plate*
3	*Adjustment screw +nut*	4	*Piston spring 1.25/14*
5	*Piston*	6	*Spring cup*
7	*Needle+clip+O-ring*		

Step	Procedure
2	Ensure jet needle (8) with clip and new O-ring is correctly oriented within the carburetor piston.
3	Slide rubber grommet (9) over throttle cable sheath.
4	Place throttle cable end through adjustment screw and cover plate (10), spring (11) and spring cup (12).



8	*Jet needle*	*9*	*Rubber grommet*
10	*Cover plate and adjustment screw*	*11*	*Piston spring 1.25/14*
12	*Spring cup*		

Figure 7.42

Step	Procedure
5	Compress the spring, place cable end through key slot (13) in the piston.

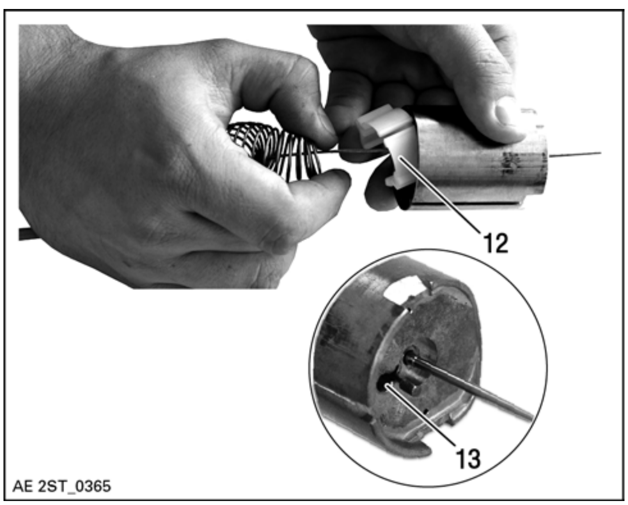


Figure 7.43

12 Spring cup *13 Key slot*

Step	Procedure
6	With cable end secure in the smaller key slot (14), align spring cup slots with piston tabs (15) and slowly release spring tension.

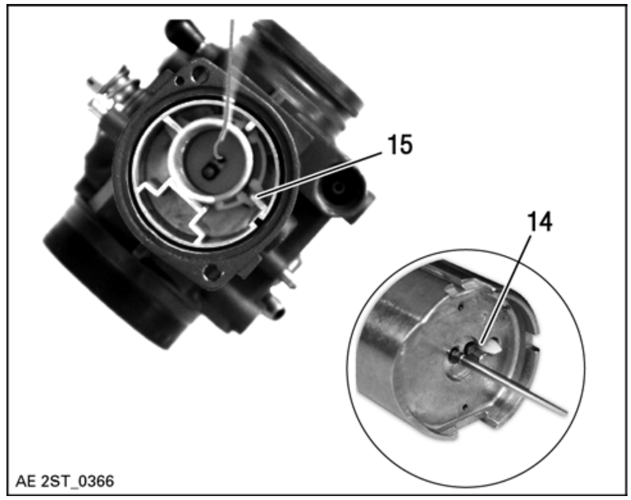


Figure 7.44

14 Key slot *15 Piston tabs*

Step	Procedure
7	Slide the piston assembly into the carburetor body, aligning the piston groove (16) with pin (17).
8	Secure cover plate with 2 M5x12 screws.

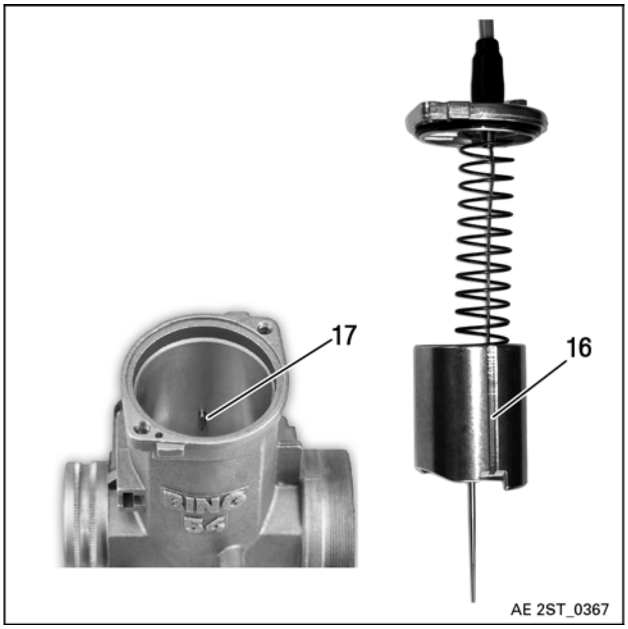


Figure 7.45

16 Groove *17 Pin*

Step	Procedure
9	Connect fuel line (18) and secure with appropriate clamp.

NOTE

If air vent line (19) is damaged, replace it.

NOTE

Check to see that air vent line (19) is free of any blockage, holes must not be blocked or covered.

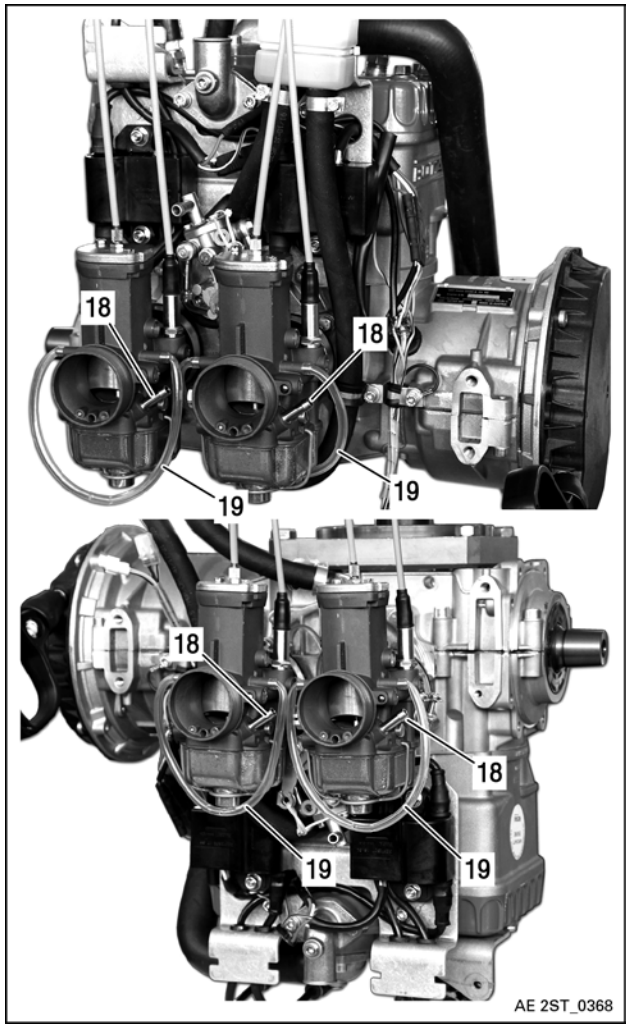


Figure 7.46

18 Fuel line *19 Vent line*

CARBURETOR CHOKE (CABLE ACTUATED) - ASSEMBLY

ATTENTION

Do not induce twist into the choke cable during choke housing tightening.

Step	Procedure
1	Thread adjustment screw with nut (2) into choke housing (3).
2	Place rubber grommet (1) over choke cable sheath.
3	Feed choke cable crimped end through ferrule and choke housing, followed by compression spring (4) and sleeve (5).
4	Compress the spring with sleeve and feed choke cable end into the choke piston key slot (6).
5	Thread choke assy. into carburetor body (7) and tighten using 13 mm wrench.
6	Check for free movement of choke cable and that choke returns to fully closed position.

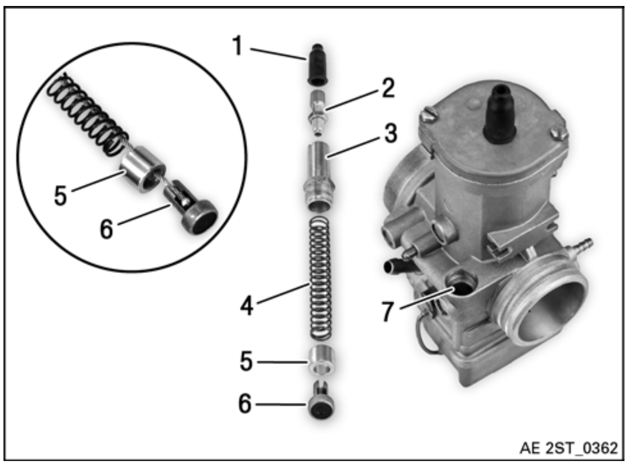


Figure 7.47

1	*Rubber grommet*	2	*Adjustment screw with nut*
3	*Choke housing*	4	*Compression spring*
5	*Sleeve*	6	*Choke piston with gasket*
7	*Carburetor body*		

CARBURETOR SYNCHRONIZATION

For carburetor synchronization see latest Maintenance Manual Line of engine type 582 mod. 99 / mod. 17.

FUEL PUMP - CONNECTIONS

The fuel pump must be isolated from vibration and installed with drainage bores at the bottom, see Installation Manual of engine type 582 mod. 99 / mod. 17.

Step	Procedure
1	Connect the lower chamber (1) to the crank case impulse nipple (2).
2	Connect the fuel inlet line (3) and fuel outlets (4) to carburetors. **NOTE** *Arrows indicating flow directions are cast into the cover.*

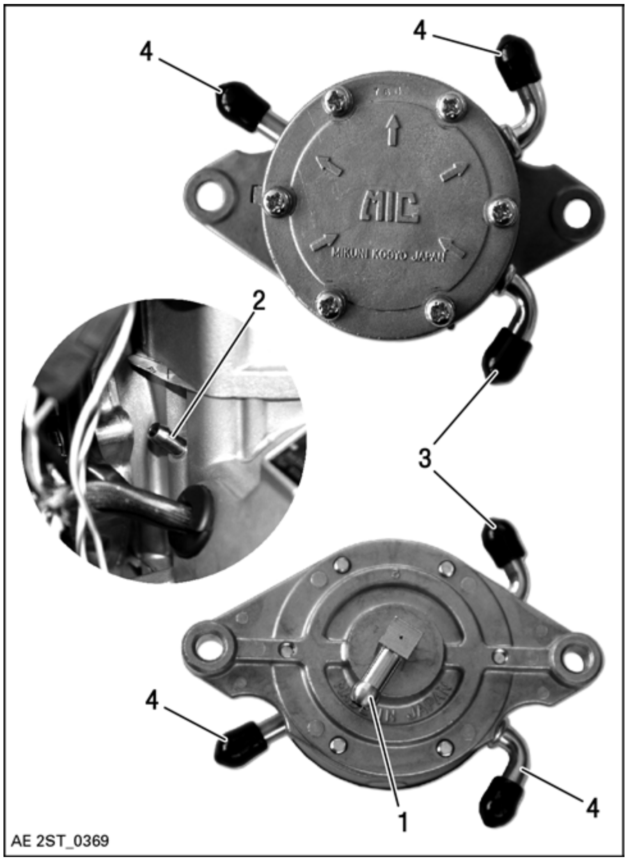


Figure 7.48

1	*Lower chamber*	2	*Impulse nipple*
3	*Fuel inlet line*	4	*Fuel outlet*

INTAKE SILENCER - ASSEMBLY

NOTE

Check intake silencer for contamination before assembly.

NOTE

Always use new lock nuts.

Step	Procedure
1	Install silencer socket (2) onto intake silencer (1).

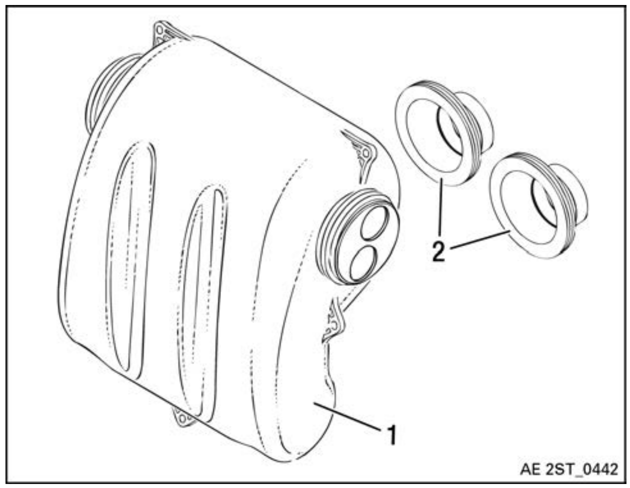


Figure 7.49

1	*Intake silencer*	2	*Silencer socket*

Step	Procedure
2	Secure frame (3) to the intake silencer using 3 hex. screws M6x20 (4) with 2 washers (5) and new lock nuts M6 (6). Tightening torque 10 Nm (89 in.lb)

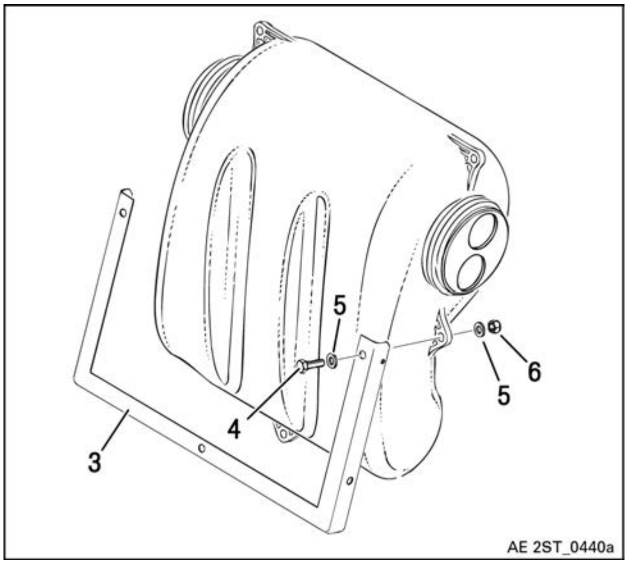


Figure 7.50

3	*Frame*	*4*	*Hex. screw M6x20*
5	*Washers 6.4*	*6*	*Lock nuts M6*

Step	Procedure
3	Secure the rubber buffers (7) to the frame with new lock nut M6 and washer 6.4 (8). Tightening torque 10 Nm (89 in.lb.)
4	Hand-tighten intake silencer bracket (9) with new lock nut M6 and washer 6.4 (8) to rubber buffer (7).

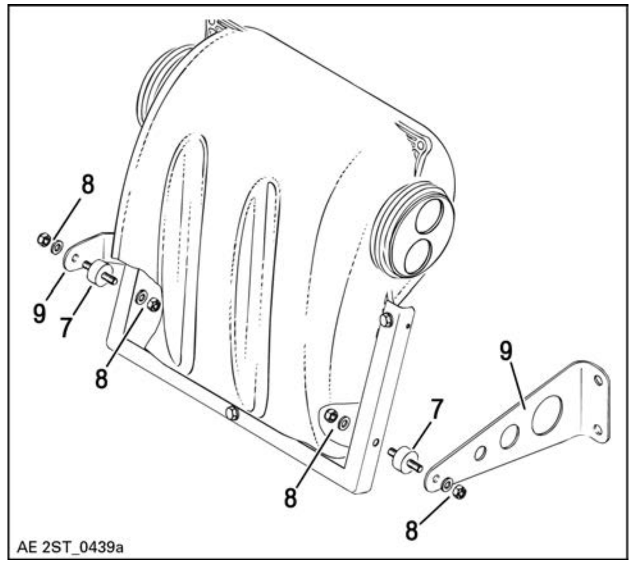


Figure 7.51

7	*Rubber buffer*	*8*	*Washer 6.4*
9	*Intake silencer bracket*		

Step	Procedure
5	Push the protection hose (11) onto the distance bar (10) and screw on the rubber buffer (12).
6	Fasten distance bar (10) to intake silencer using a hex. screw M6x20 (13), lock washer A6 (14) and 2 washers 6,4 (15).

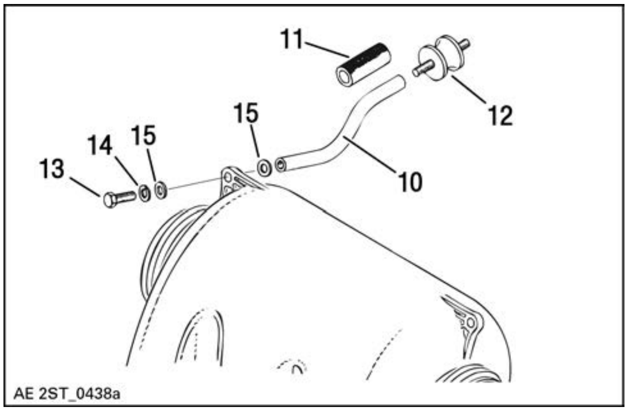


Figure 7.52

10	*Distance bar*	*11*	*Protection hose*
12	*Rubber buffer*	*13*	*Hex. screw M6x20*
14	*Lock washer A6*	*15*	*Washers 6.4*

Step	Procedure
7	Install the 2 rubber socket clamps (16) onto intake silencer.
8	Pull the silencer assy. on the engine and tighten the 2 rubber socket clamps (16). **NOTE** *Uncover the sockets, if necessary.*

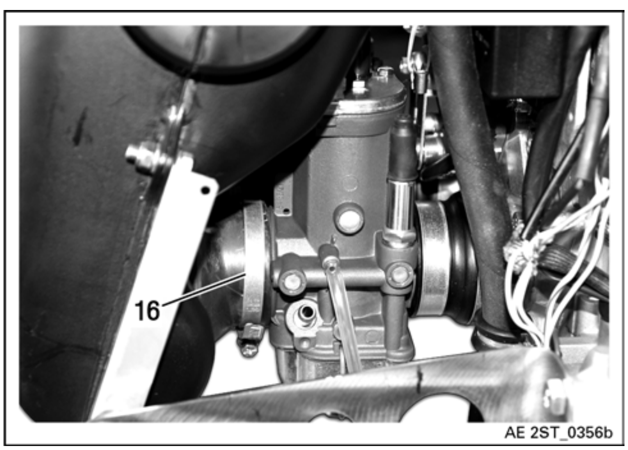


Figure 7.53

16 *Socket clamp 50-70*

Step	Procedure
9	Tighten 1 hex. screw M6x20 (17) to 10 Nm (89 in. lb) and 3 hex screws M8x16 (18) with washers to 24 Nm (18 ft. lb).
10	Install a new lock nut M6 with washer 6.4 (19). Tightening torque 10 Nm (89 in.lb)
11	Tighten lock nuts M6 (20) and hex. screw M6x20 (21). Tightening torque 10 Nm (89 in. lb)

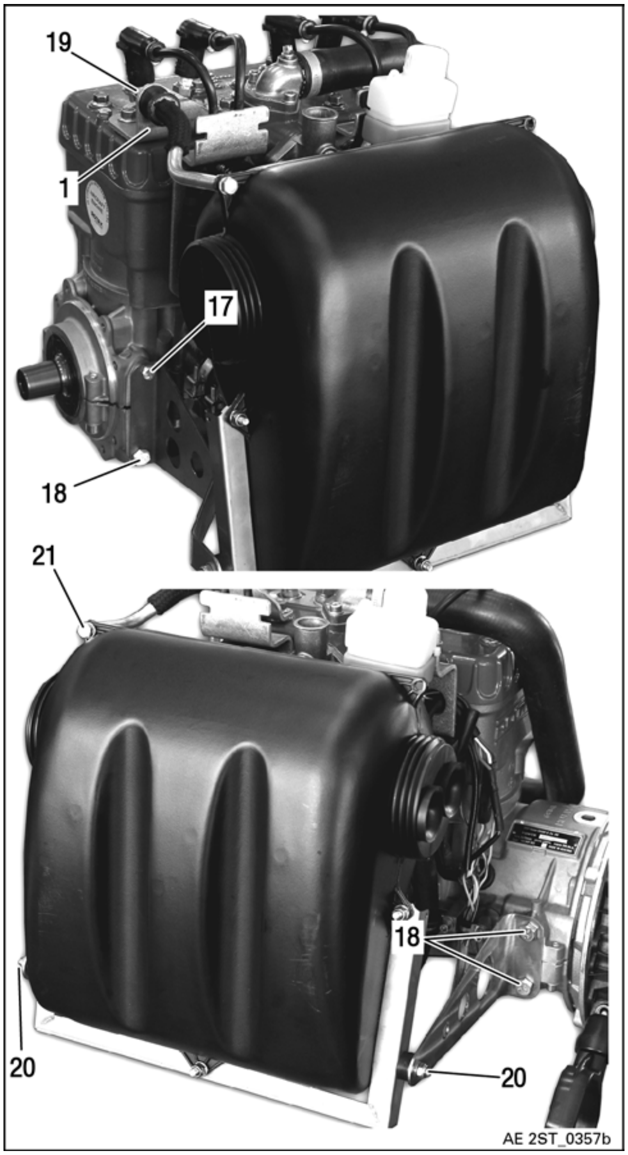


Figure 7.54

17	*Hex. screw M6x20*	*18*	*Hex screws M8x16*
19	*Washer 6.4*	*20*	*Lock nuts M6*
21	*Hex. screw M6x20*		

INTAKE SILENCER - INSTALLATION

NOTE

Installation only if not been disassembled.

Step	Procedure
1	Install bracket (1) if necessary. See Chapter 72-30-00 Cylinder head.
2	Pull the silencer assembly on the engine. **NOTE** *Uncover the sockets, if necessary.*
3	Install 1 hex. screw M6x20 (2) (Tightening torque 10 Nm / 89 in.lb) and 3 hex screws M8x16 (3) (Tightening torque 24 Nm/ 18 ft.lb) with washers.
4	Install a new lock nut M6 with washer and rubber buffer (4).

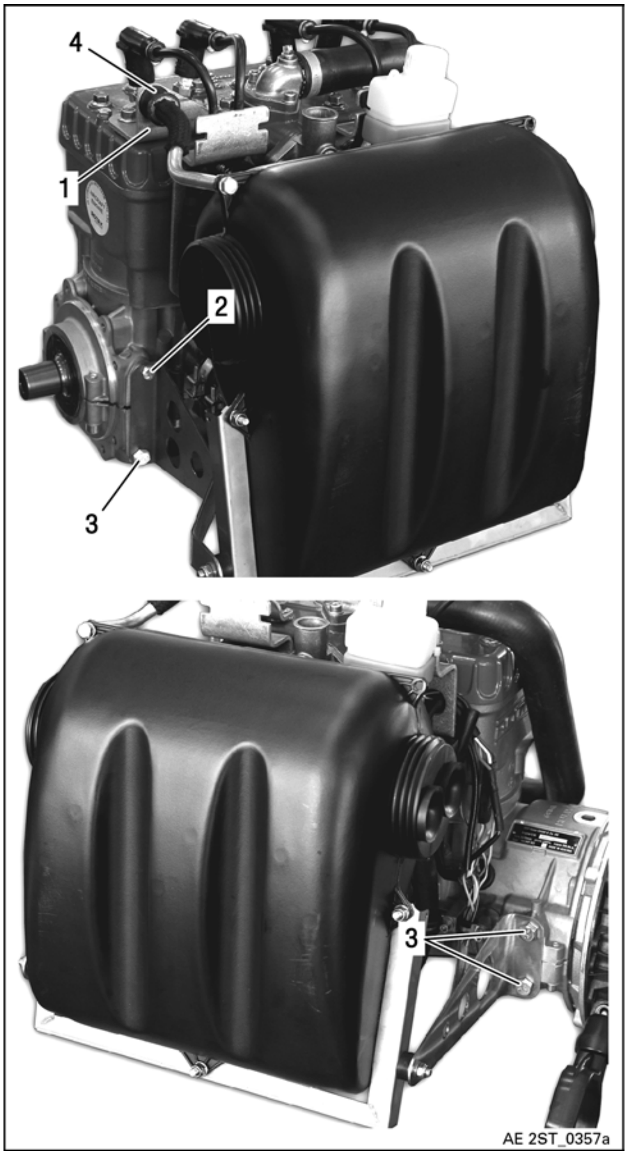


Figure 7.55

1	*Bracket*	*2*	*Hex. screw M6x20*
3	*Hex. screw M8x16*	*4*	*Rubber buffer*

Step	Procedure
5	Install the 2 rubber socket clamps (5) on carburetor side.

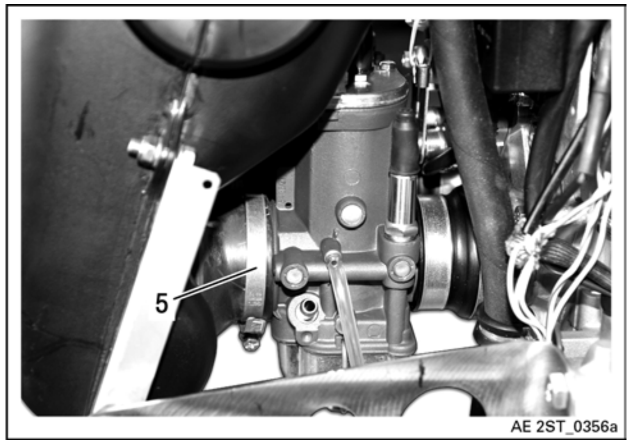


Figure 7.56

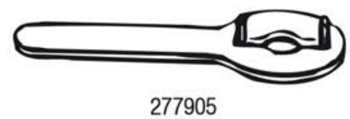
5 *Clamp*

Chapter: 79–00–00
LUBRICATION SYSTEM

TOPICS IN THIS CHAPTER

SPECIAL TOOLS

Description	Part number
Wrench	277905

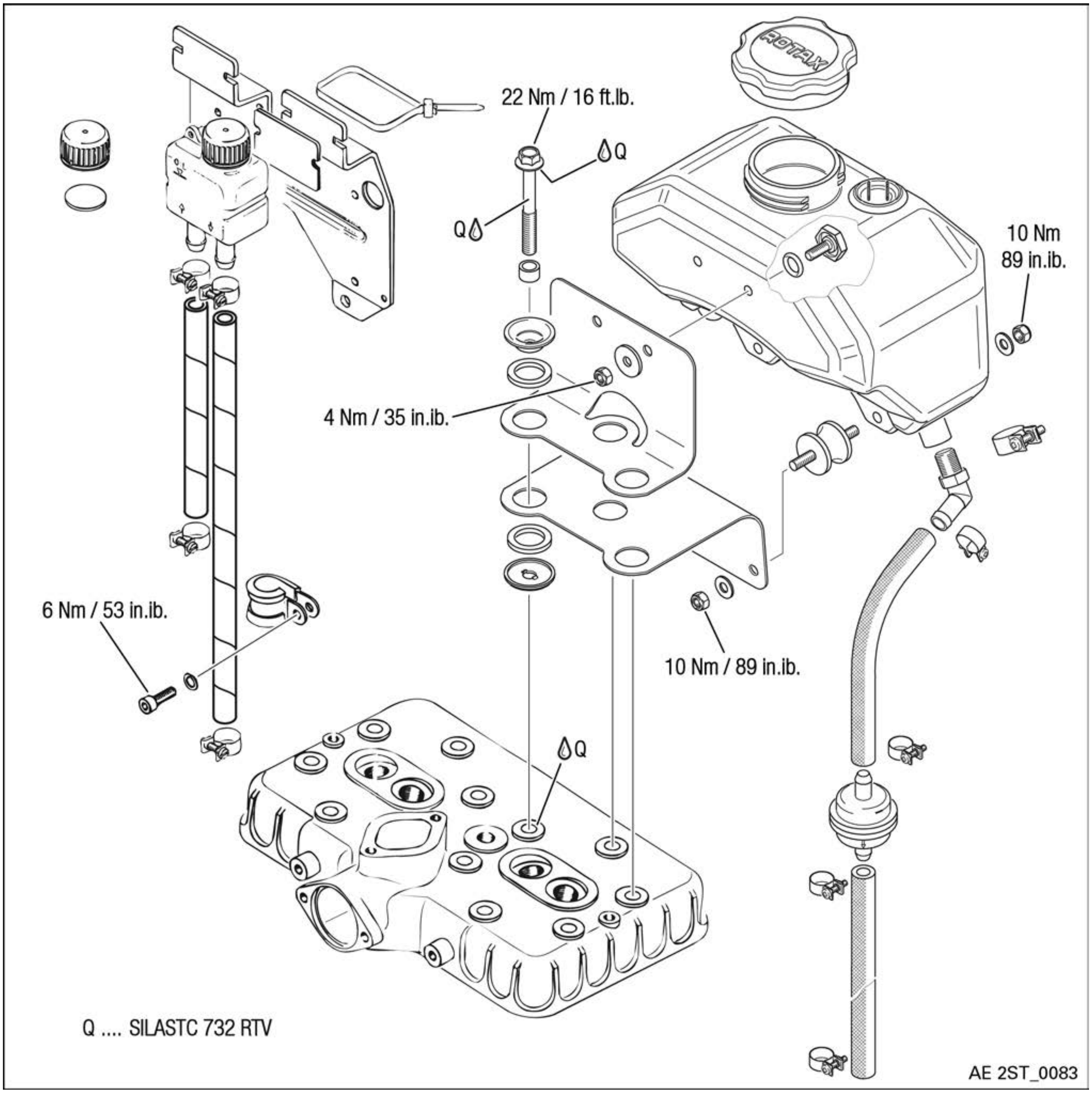


AE 2ST_0084

Figure 8.1

SERVICE PRODUCTS

Description	Part number
SILASTIC 732 RTV	297386
LOCTITE 243	897651
LITHIUM-BASE GREASE	897330


22 Nm / 16 ft.lb.
Q
Q
10 Nm
89 in.lb.
4 Nm / 35 in.lb.
6 Nm / 53 in.lb.
10 Nm / 89 in.lb.
Q
Q .... SILASTC 732 RTV
AE 2ST_0083

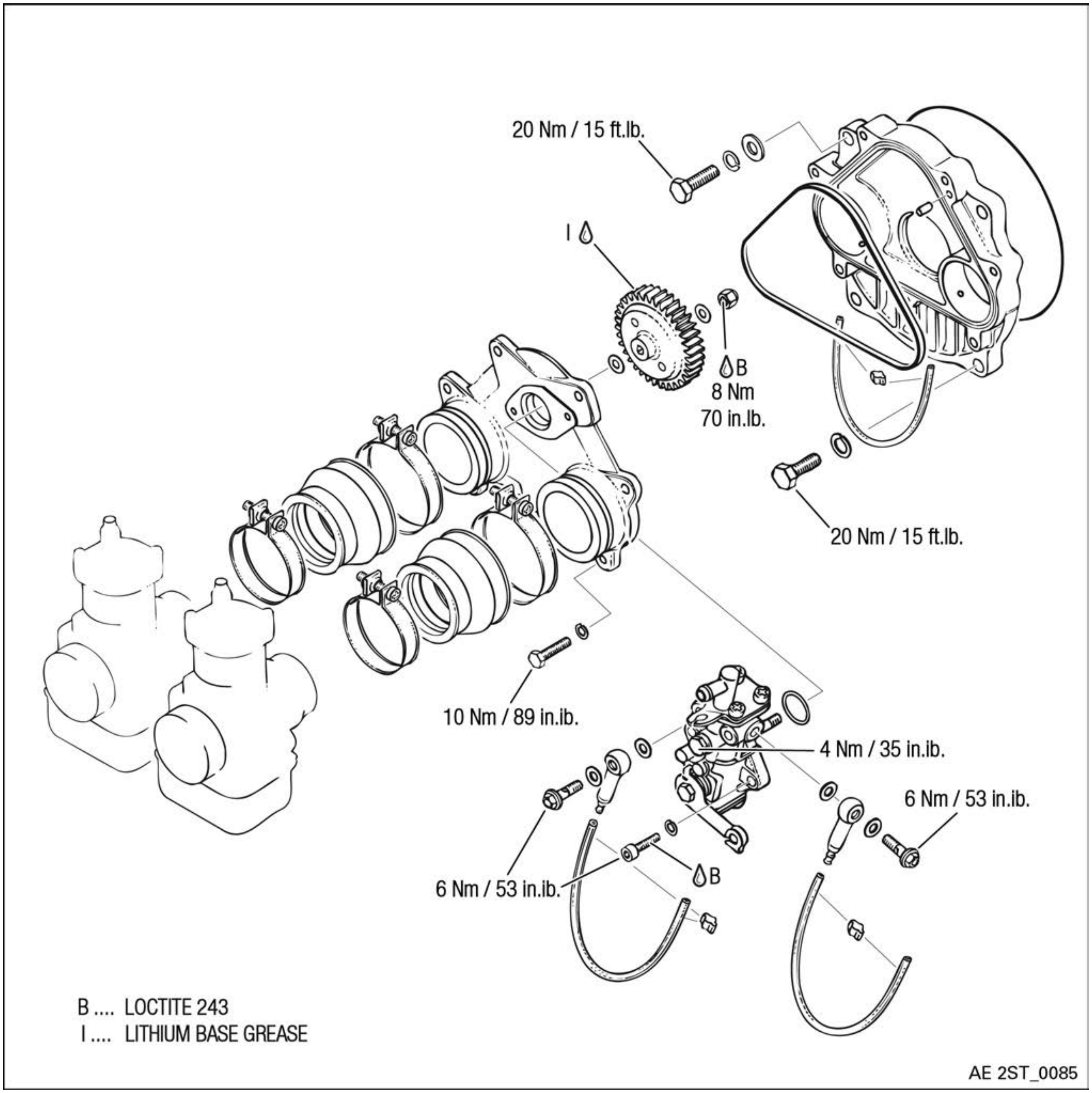


Figure 8.2: Components

SYSTEM DESCRIPTION

Engine lubrication

⚠ WARNING
In case of fresh oil injection lubrication the carburetors are supplied with pure gasoline (no oil/gasoline mixture).

This engine is equipped with an oil pump, gear driven from the rotary valve shaft. It supplies the exact quantity of Super 2-stroke oil to each cylinder via one each atomizer jet in rotary valve cover. The pump used is a plunger pump with proportioning system. The amount of oil is determined by engine speed and pump lever position. This lever is actuated by a Bowden cable connected with the throttle cable. The oil pump is gravity fed from an oil tank.

Rotary valve lubrication
An oil hose leads from the oil tank (rotary valve) to the bottom side of the crankcase, and a return line from top of the gear leads back to the tank for venting.

ATTENTION
Before every operation check the oil level (approx. mid height of the rotary valve oil tank). Check oil tubes for security and condition of connections.In case of notable oil consumption (more than 1 cc/hour) look for the leak and check the oil seals inside the crankshaft, as necessary.

SAFETY INSTRUCTIONS

⚠ WARNING
Danger of severe burns and scalds! Always allow the engine to cool down to ambient temperature before starting any work.

MAINTENANCE

As well as the maintenance and special checks, see current Maintenance Manual Line for the respective engine type.

REMOVAL AND DISASSEMBLY

Preparation

- Remove carburetors. See Chapter 73-00-00 Fuel System section Carburetor removal
- Remove ignition coils and supporting plate. See Chapter 24-00-00 Electrical power, section Ignition coils removal.

OIL TANK (ENGINE) - REMOVAL

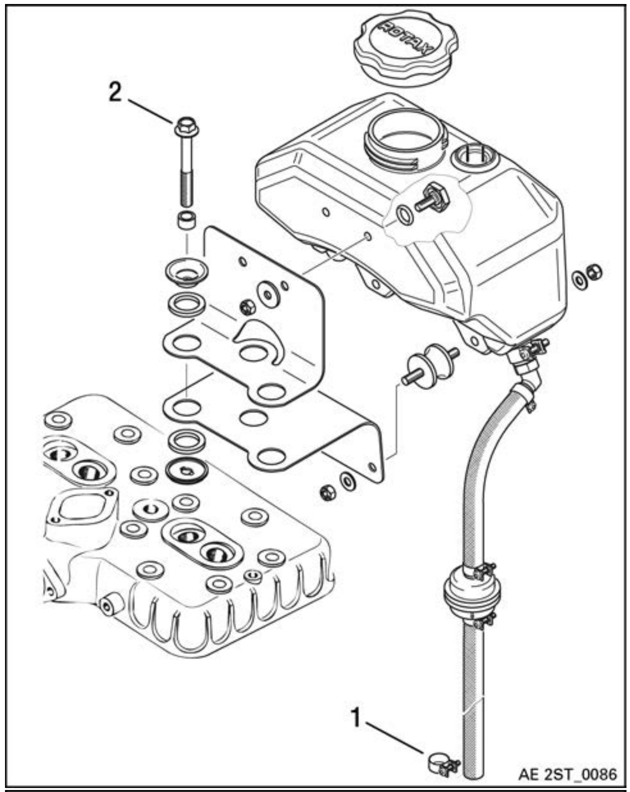
ENVIRONMENTAL NOTE

Ensure that no oil gets into the waste water system or the ground – risk of contaminating drinking water!

NOTE

If the engine is to be operated without the oil tank brackets installed, the 3 M8x65 collar screws must be re-installed and torqued.
See Chapter 72-30-00 section Cylinder head removal.

Step	Procedure
1	Loosen clamp and remove oil supply line (1) from oil pump and drain oil into suitable container.
2	Loosen 3 collar hex. screws M8x65 (2) and remove oil tank and bracket assembly.



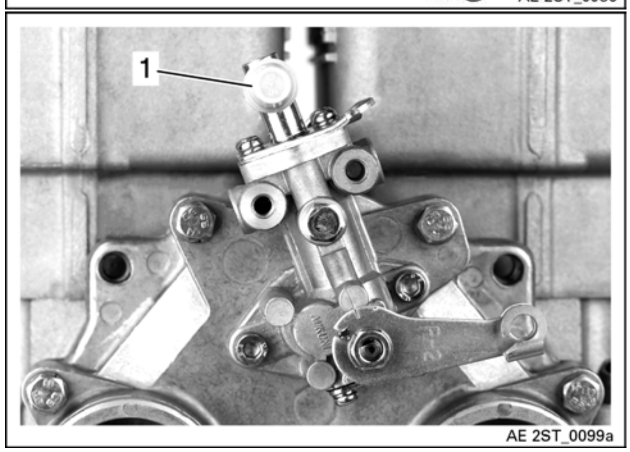


Figure 8.3

1	*Clamp (supply line)*	2	*Collar hex. screw M8x65*

OIL TANK (ROTARY VALVE) - REMOVAL

ENVIRONMENTAL NOTE

Ensure that no oil gets into the waste water system or the ground – risk of contaminating drinking water!

Step	Procedure
1	Loosen Allen screw M5x15 with lock washer (1) and remove clamp 18/M5.
2	Loosen clamp (2+3) and remove oil supply lines from the elbows. Drain oil into suitable container.

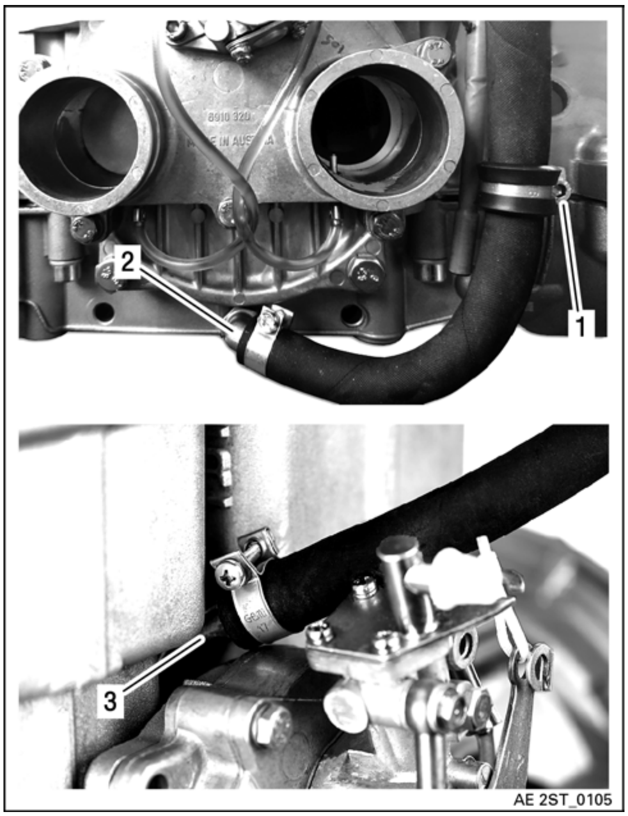


Figure 8.4

1 Allen screw M5x15 with lock washer *2 Clamp (lower elbow)*
3 Clamp (upper elbow)

Step	Procedure
3	Carefully cut tie wrap (4) and remove rubber spacer (5).
4	Remove oil tank with oil lines.

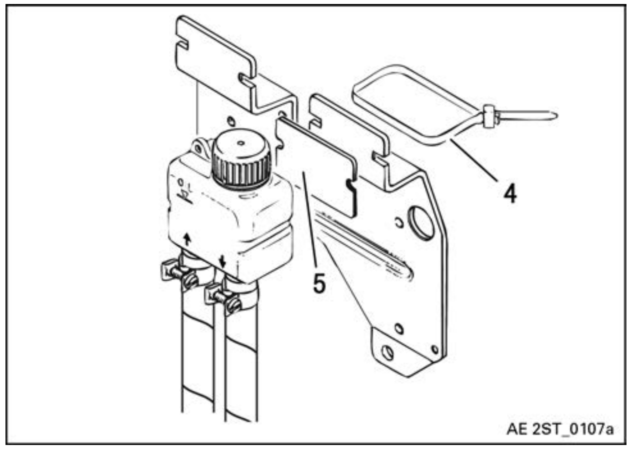


Figure 8.5

4 Tie wrap *5 Rubber spacer*

OIL PUMP - REMOVAL

Step	Procedure
1	Disconnect oil outlet fittings by removing 2 banjo bolts M6x12 (1) with one washer on each side..
2	Loosen 7 hex. screws M6x20 with lock washers (2) and remove the pump mounting flange (3).

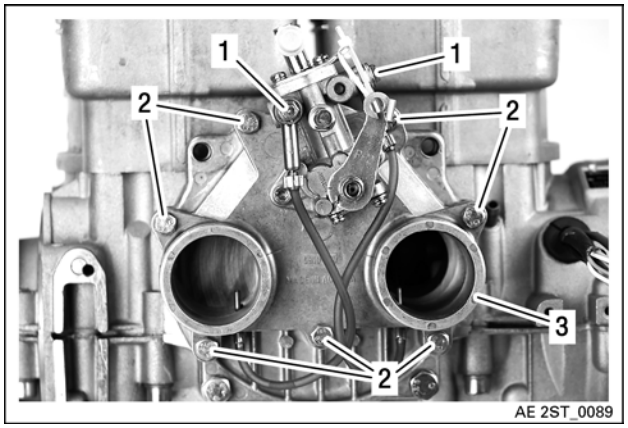


Figure 8.6

1	*Banjo bolt M6x12*	2	*Hex. screw M6x20 with lock washers*
3	*Pump mounting flange*		

Step	Procedure
3	Remove lock nut M5 (4) and pump gear (5) along with one washer (6) each side. During this operation hold unit with wrench part no. 277905 (7) as shown.

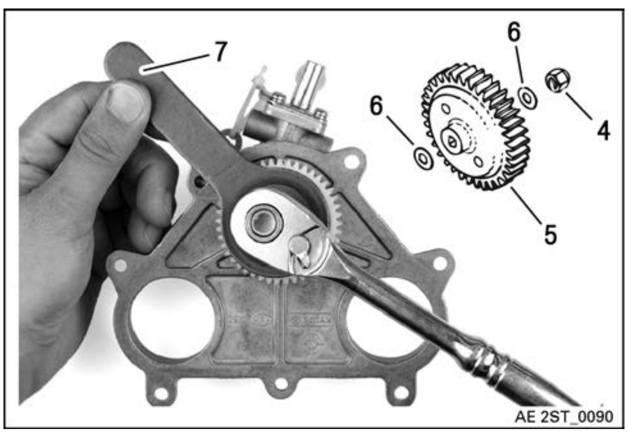


Figure 8.7

4	*Lock nut M5*	5	*Pump gear*
6	*Washer*	7	*Wrench part no. 277905*

Step	Procedure
4	Loosen 2 Allen screws M5x16 (8) and remove oil pump along with lock washers (9).

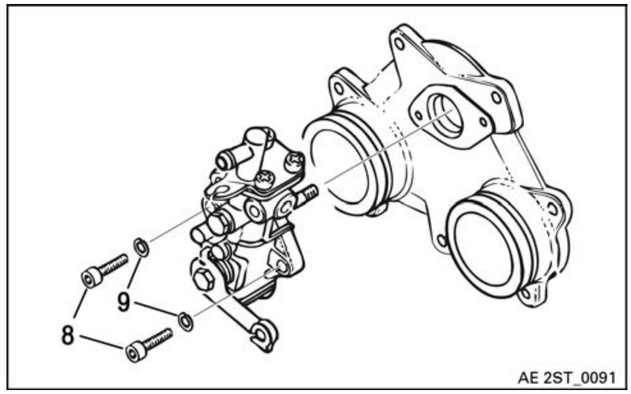


Figure 8.8

8	*Allen screws M5x16*	9	*M5 lock washers*

ROTARY VALVE COVER - REMOVAL

Preparation

- Lock the crankshaft using the locking pin to align position of P.T.O side piston at T.D.C. See also Chapter 72-20-00 for locking the crankshaft.

Step	Procedure
1	Loosen 4 hex. screws M8 (1+2) and remove rotary valve cover. **NOTE** *Upper hex. screws M8x25 (2) attach also ignition support plate.*
2	Before removing the rotary valve cover, hold the rotary valve (3) in position against the crankcase with a suitable tool. **NOTE** *Do not allow the rotary valve to come off the shaft splines.*

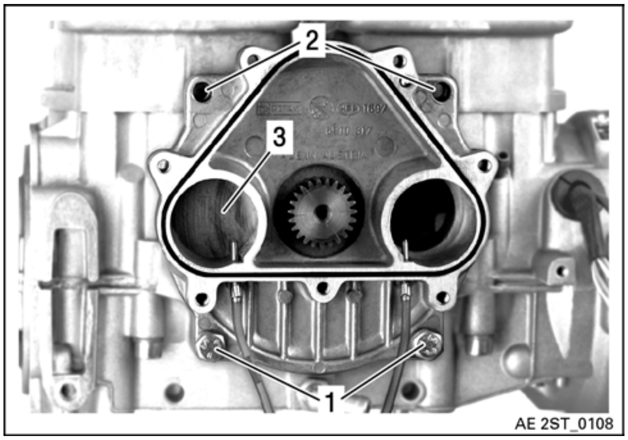


Figure 8.9

1	*Hex. screws M8 (lower position)*	2	*Hex. screws M8 (upper position)*
3	*Rotary valve*		

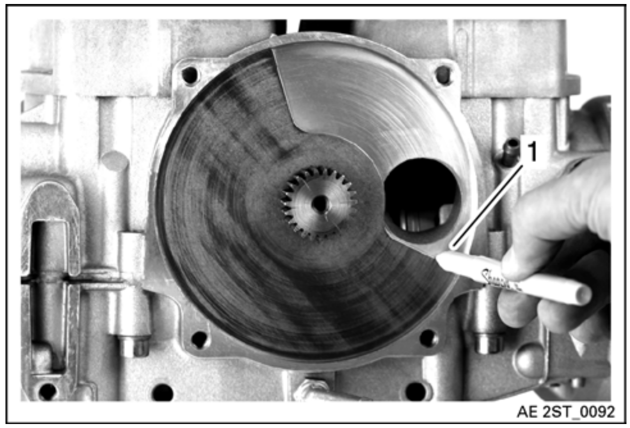


Figure 8.10

1	*Pencil*

NOTE

Ensuring that the valve stays in position verifies if rotary valve timing was correct.

ATTENTION

Personal injury or engine damage may occur.
Do not rotate the crankshaft while holding rotary valve in position.

ROTARY VALVE - REMOVAL

Step	Procedure
1	Mark the position of rotary valve as depicted with a pencil (1).
2	Remove rotary valve.

INSPECTION

For inspection of rotary valve cover see Chapter 72-20-00.

OIL TANK (ENGINE) - INSPECTION

Step	Procedure
1	Visually inspect the tank for cracks or wear, especially at attachment points (1) and outlet elbow (2). Renew as required.
2	Inspect level indicator (3). **NOTE** *When the internal float is near the bottom of its travel, the two contacts are joined, providing continuity for a low oil level warning lamp.*
3	Inspect rubber buffers (4) and rubber washers (5) for deterioration. Replace as necessary.
4	Inspect oil filter (6) for any cracks or visible debris or moisture within.

See Maintenance Manual Line for engine type 582 mod. 99 / mod. 17, Chapter 05-50-00 section Maintenance Checks for scheduled filter replacement.

Step	Procedure
5	Inspect the oil tank cap (7) for wear and damage and for proper fit. Vent hole must be clear.

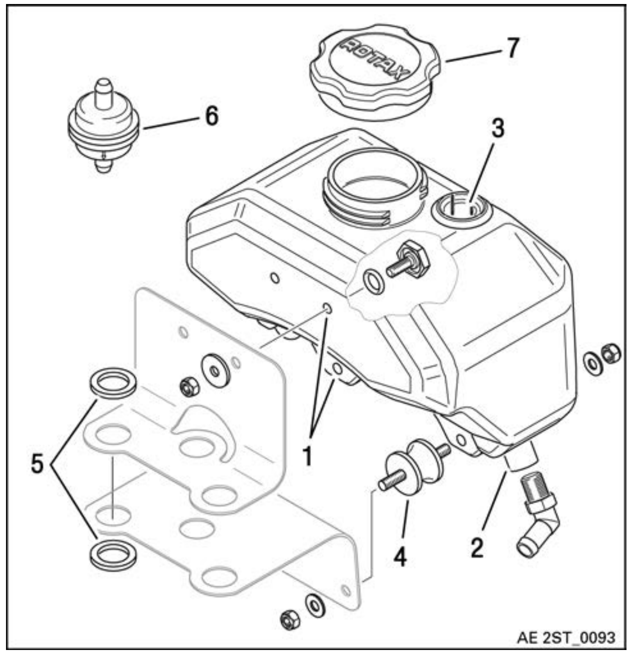


Figure 8.11

1	*Attachment points*	2	*Outlet elbow*
3	*Level indicator*	4	*Rubber buffer*
5	*Rubber washer*	6	*Oil filter*
7	*Oil tank cap*		

OIL TANK (ROTARY VALVE) - INSPECTION

Step	Procedure
1	Visually inspect the tank for cracks or wear, especially at clamp location (1) and inlet and outlet connections (2). Renew as required.
2	Inspect the oil tank cap with gasket for wear and damage and for proper fit. Vent hole (3) must be clear. Renew as required.

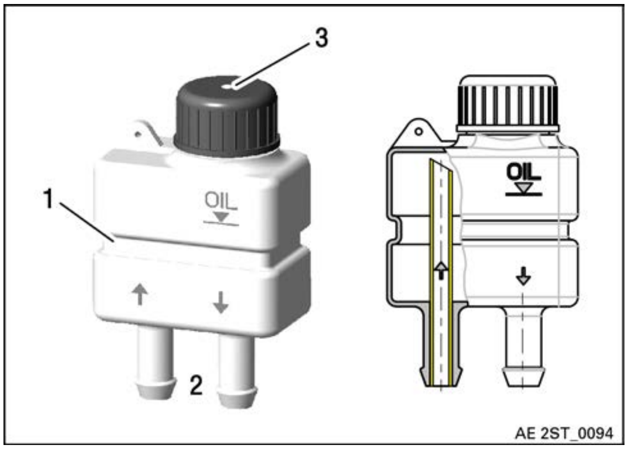


Figure 8.12

1	*Clamp location*	2	*Inlet and outlet connections*
3	*Vent hole*		

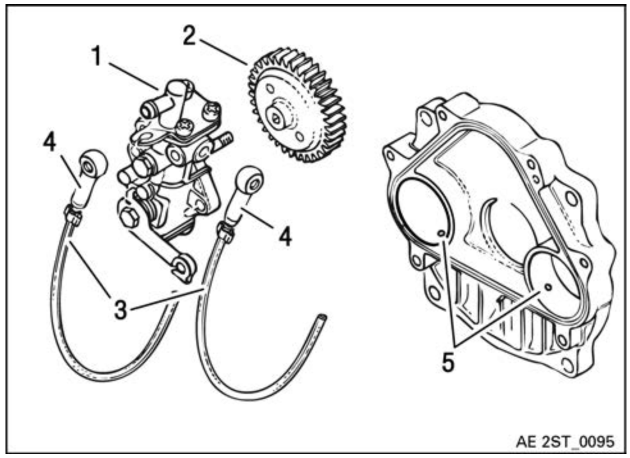


Figure 8.13

1	*Oil pump*	2	*Drive gear*
3	*Oil lines*	4	*Check valves*
5	*Oil bore*		

OIL PUMP - INSPECTION

Step	Procedure
1	Inspect oil pump (1), drive gear (2), oil lines (3) and pump mounting flange for wear or damage, renew as required.
2	Both check valves (4) must block the flow in direction to oil pump and provide free passage to rotary valve cover.
3	Check oil bore (5) in rotary valve cover for free passage.

NOTE

Oil pump flow test can be completed on a running engine.

NOTE

If the oil pump is not working perfectly, the complete pump assembly must be exchanged. Further dis-assembly or repair of pump is not allowed.

ATTENTION

If for some reason fresh oil lubrication is not utilized, then it is absolutely necessary to connect oil supply line to pump and warrant adequate oil quantity, otherwise oil pump would seize.A better alternative is to remove the oil pump and replace with cover plate part no. 810827 and gasket part no. 931566.

INSTALLATION AND ASSEMBLY

OIL PUMP - INSTALLATION

Step	Procedure
1	Place a new O-ring (1) on oil pump, apply LOCTITE 243 to 2 Allen screws M5x16 (2) and attach pump with lock-washers (3) to mounting flange. Tightening torque 6 Nm (53 in. lb)

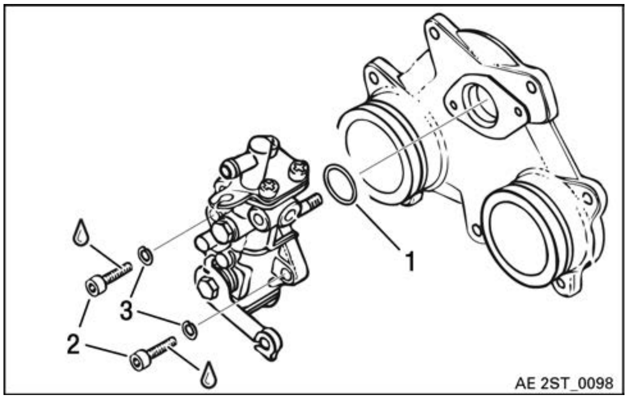


Figure 8.14

1 O-ring
2 Allen screw M5x16
3 Lock washer

Step	Procedure
2	Place thrust washer (4), followed by oil pump gear (5) onto oil pump shaft.
3	Apply LOCTITE 243 to new lock nut M5 (6) and thrust washer (4), hold gear in place with wrench part no. 277905 (7) and tighten it. Tightening torque 8Nm (70 in. lb)

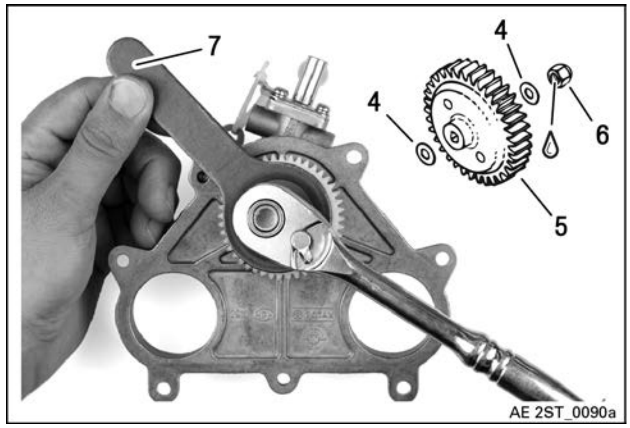


Figure 8.15

4 Thrust washer
5 Oil pump gear
6 Lock nut M5
7 Wrench part no. 277905

ROTARY VALVE - SETTING AND INSTALLATION

Prior to final installation of rotary valve, determine valve timing. It is easier if timing marks were made at disassembly (see Chapter 79-00-00 section rotary valve -removal). Even with marks existing, timing has to be checked.
Rotary valve timing has to be set to the TDC of magneto side cylinder and piston. See also for reference Chapter 24-00-00 section of ignition timing step 1 up to 4.

Relevant timing for 582 MY99 and 582 MY17:

rotary valve opens	B.T.D.C. 130°
rotary valve closes	A.T.D.C. 50°
cut–away portion	132°

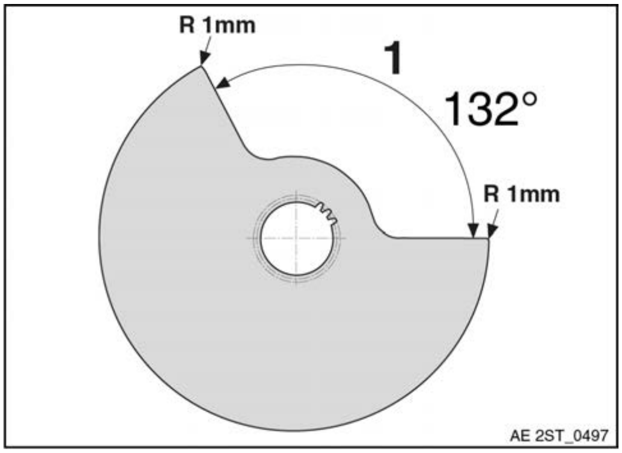


Figure 8.16

1 rotary valve cut–away portion

Step	Procedure
1	Utilizing an degree disc mark (2) β 50° on face of crankcase from closing edge (3) of magneto side inlet port (4).

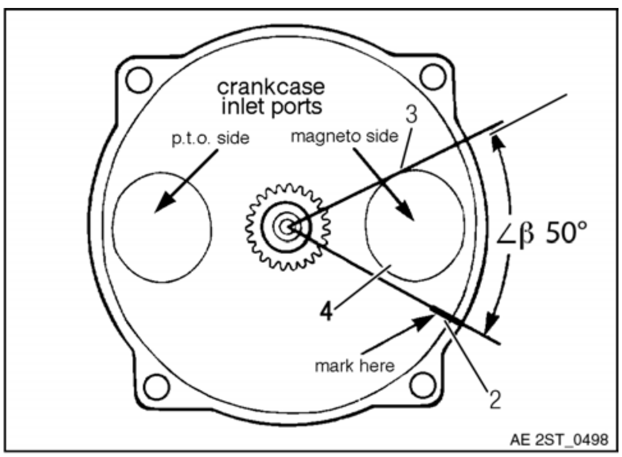


Figure 8.17

2 degree disc mark *3 closing edge*

4 inlet port

⚠ CAUTION

Personal injury or engine damage may occur
Do not rotate the crankshaft while holding rotary valve in position.

Step	Procedure
2	Fit dial gauge into magneto side spark plug thread and turn crankshaft against direction of operation to T.D.C. of magneto side piston. See also for reference Chapter 24-00-00 section of ignition timing step 1 up to 4.

NOTE

By turning against direction of operation, the backslash of rotary valve drive will be eliminated.

Step	Procedure
3	Check flatness and cut-away portion of rotary valve. Place rotary valve on gear of rotary shaft, trying to align the closing edge (5). of rotary valve as exactly as possible with marking on crankcase (2). Max. allowance +/- 4°. **NOTE** *The toothing (6) of the rotary valve is asymmetrical respective to closing edge. Therefore, at assembly, try by turning over best possible installation.*
4	Apply oil on both sides of the rotary valve for reasons of adequate lubrication at beginning of engine run.

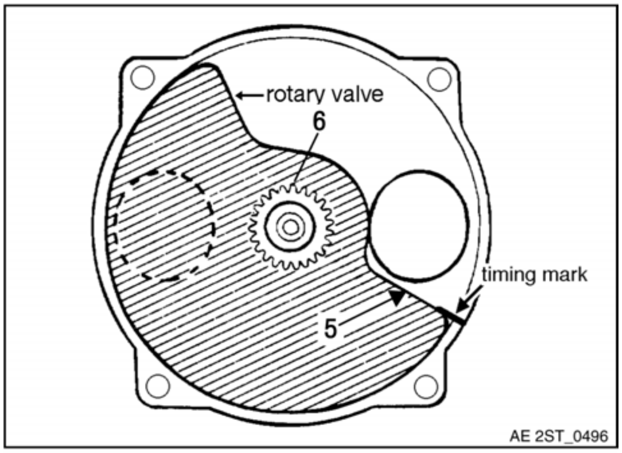


Figure 8.18

5 Closing edge *6 Toothing*

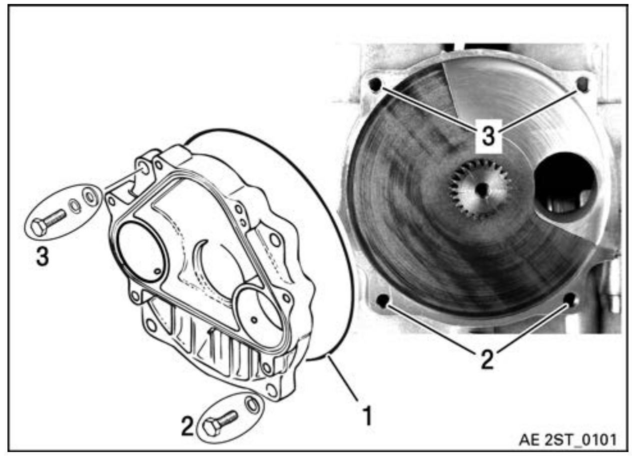


Figure 8.19

1 O-ring *2 Lower position*

3 Upper position

ROTARY VALVE COVER - INSTALLATION

Step	Procedure
1	Place new O-ring (1) on the inside of the rotary valve cover.
2	Attach the rotary valve cover hand-tight to the crankcase using 2 hex. screws M8x20 with new lock washers in the lower position (2). **NOTE** *Upper 2 hex. screws (3) are longer as they also attach ignition plate. See Chapter 24-00-00 Electrical power.*
3	Place new rubber ring (4) into rotary valve cover slot.
4	Ensure alignment dowel (5) is in place in rotary valve cover.
5	Lubricate oil pump gear with lithium based grease.
6	Attach pump mounting flange to rotary valve cover using 7 hex. screws M6x20 (6) with lock-washers. Tighten evenly in a cross-wise pattern. Tightening torque 10 Nm (89 in. lb)
7	Connect oil outlet fittings by 2 banjo bolts M6x12 (7) and washers (on both sides). Tighten to 6 Nm (53 in.lb).

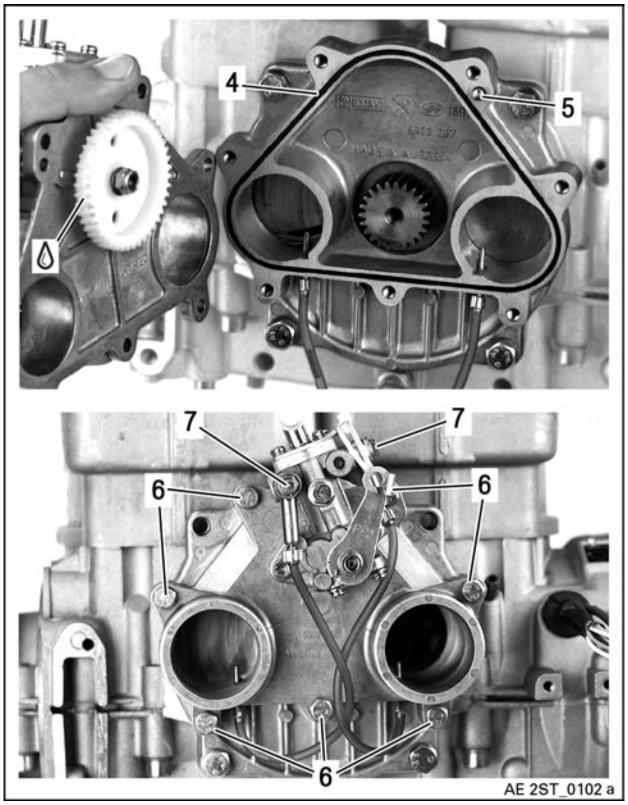


Figure 8.20

4	*Rubber ring*	5	*Dowel*
6	*Hex. screws M6x20*	7	*Banjo bolt with washer*

OIL PUMP - ADJUSTMENT

Attach Bowden cable to pump lever simultaneously with the carburetors.

See Installation Manual for engine type 582 mod. 99 / mod. 17, Chapter 79-00-00 Lubrication System and Chapter 73-00-00 Fuel system.

Step	Procedure
1	Connect the Oil pump inlet (1) to the oil tank and fill with super 2 stroke oil. See Service Bulletin SB-2ST-008 for selection of suitable operating fluids.
2	Open the oil pump vent plug (2) until all air has been vented from the oil supply line, then tighten plug. Tightening torque 4 Nm (35 in.lb)

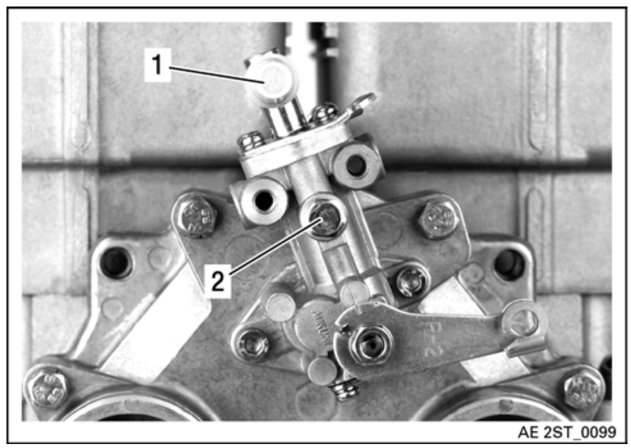


Figure 8.21

1	*Oil pump inlet*	2	*Vent plug*

Step	Procedure
3	Set throttle lever to idle position.
4	Alignment marks on the oil pump body (3) and the pump arm (4) must align.
5	Make coarse adjustments at throttle cable splitter or at throttle lever. See Installation Manual Chapter 73-00-00 Fuel and Control

Step	Procedure
6	Make fine adjustments at ferrule (5).
7	Lock ferrule in place with nut (6).

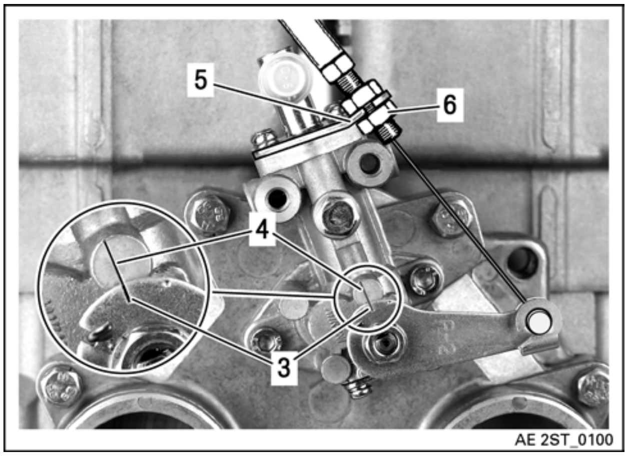


Figure 8.22

3	*Mark on oil pump body*	4	*Mark on oil pump arm*
5	*Ferrule*	6	*Nut*

NOTE

It is recommended to fill the first tank of fuel with a gasoline oil mixture at a mixing ratio of 100: 1. This is for safety until the complete system is properly filled with oil.

OIL TANK (ROTARY VALVE) - INSTALLATION

Step	Procedure
1	Attach a new 360 mm (14.17 in.) length oil hose part no. 956140 to lower rotary shaft oil elbow (1) and to the oil tank outlet fitting (2) and secure with clamps

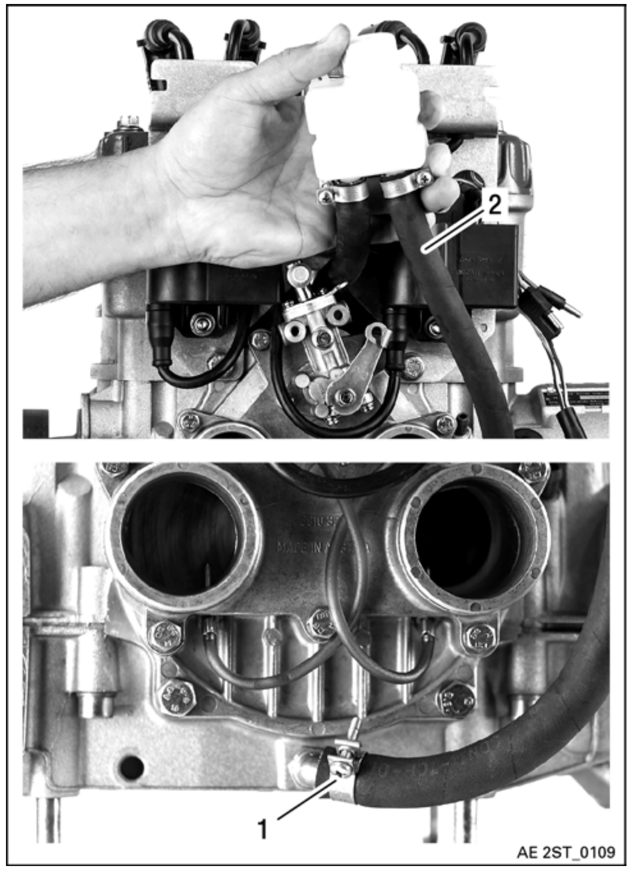


Figure 8.23

1	*Hose (lower rotary shaft oil elbow)*	2	*Hose (outlet fitting)*

Step	Procedure
2	Attach a new 155 mm (6.10 in.) length oil hose part no. 956140 to upper rotary shaft vent elbow (3) and to the oil tank vent fitting (4) and secure with clamps.

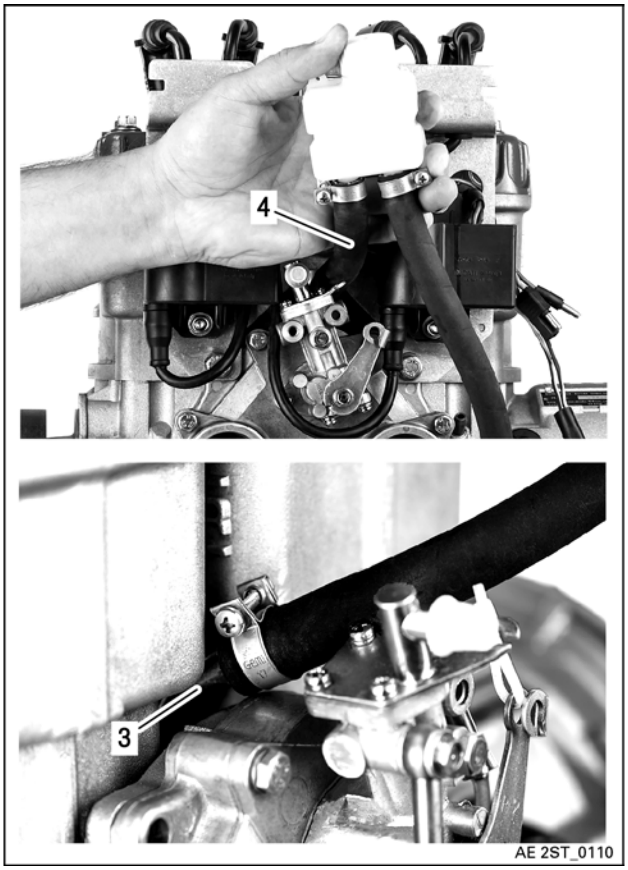


Figure 8.24

3 Vent elbow *4 Vent fitting*

Step	Procedure
3	Mount hose clamp and secure with hex. screw M5x16 and circlip. Tightening torque 6 Nm (53in.lb)
4	Re-install ignition coils and supporting plate. See Chapter 24-00-00 Electrical power.

Step	Procedure
5	Place rubber spacer (5) between oil tank and support plate and secure oil tank with tie wrap (6).
6	Fill the oil tank to the maximum level mark with super 2 stroke oil, see Service Bulletin SB-2ST-008 for selection of suitable operating fluids. **NOTE** *Allow time for the rotary valve oil to fill the crankcase cavity. Several oil tank refills may be necessary.* **NOTE** *Minimum 315 ml total oil to fill cavity and tank. Vent cavity if inverted engine, see latest Installation Manual.*

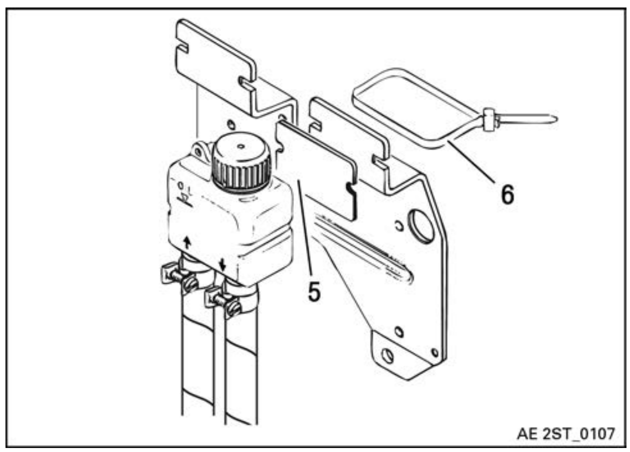


Figure 8.25

5 Rubber spacer *6 Tie wrap*

OIL TANK (ENGINE) - INSTALLATION

Use the installation instructions in Chapter 72-30–00 section Cylinder head installation with the addition of the following steps for oil tank bracket installation.

Step	Procedure
1	Attach oil tank to upper bracket (1) with washer (4) and new lock nuts (5). Tighten lock nuts to 4 Nm (35 in.lb). **NOTE** *Tightening screw (2) and O-ring (3) are inside of the tank.*
2	Attach lower bracket (6) to oil tank with rubber buffers (7), washers (8) and new lock nuts (9). Tightening torque 10 Nm (89 in. lb)

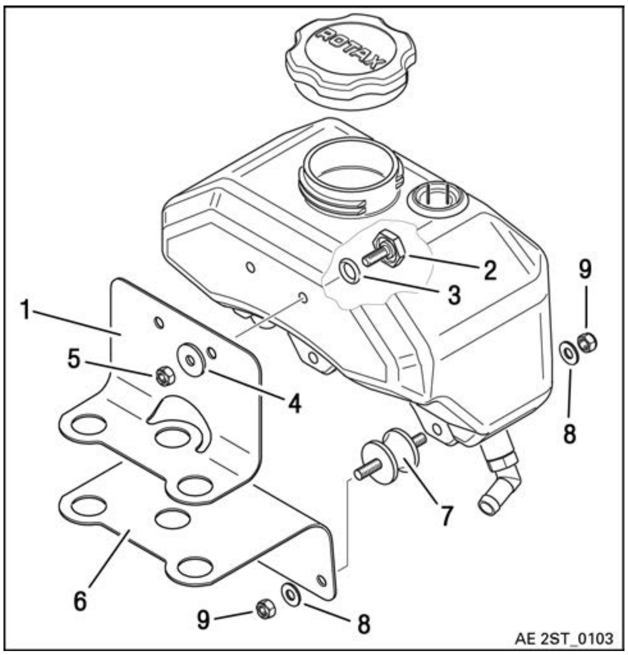


Figure 8.26

1	*Upper bracket*	2	*Tightening screw*
3	*O-ring*	4	*Washer 6.2/20/2*
5	*Lock nut M6*	6	*Lower bracket*
7	*Rubber buffer*	8	*Washer 6.4*
9	*Lock nuts M6*		

Step	Procedure
3	At the 3 cylinder-head screw positions required for oil tank bracket attachment, place a film of Silastic 732 RTV.
4	Place a shim (10) followed by a rubber washer (11) then oil tank brackets (12), followed by another rubber washer and a cup washer (13).
5	Lubricate the support face and upper shaft of 3 collar hex screws M8x65 (14) with Silastic 732 RTV.
6	Place a spacer (15) and hex. screw into each of the 3 positions and hand-tighten the screws.
7	Torque the screws M8x65 to 22 Nm (16 ft. lb). **NOTE** *If adding the oil tank brackets at the time of cylinder head installation, torque all screws in pattern shown in Chapter 72-30–00 section Cylinder head installation.*

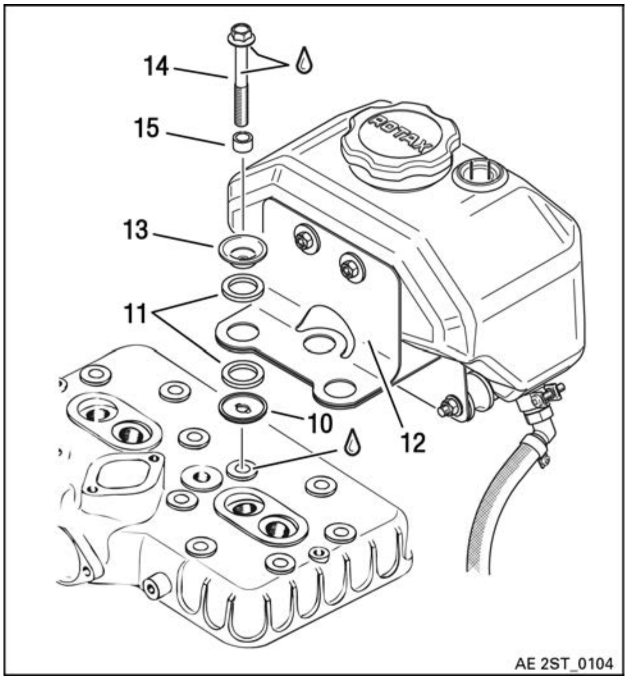


Figure 8.27

10	*Shim 8.2*	*11*	*Rubber washer 18/26/3*
12	*Bracket*	*13*	*Cup washer*
14	*Hex. screw M8x65*	*15*	*Spacer 8.4/12/7.5*

FINISHING WORK

- Re-install carburetors. See Chapter 73-00-00 section Carburetor installation.
- Cover all openings.

⚠ WARNING

Non-compliance can result in serious injuries or death!
All work performed must be checked by an iRMT with current Heavy Maintenance endorsement.

Chapter: 80–10–00
ELECTRIC STARTER

TOPICS IN THIS CHAPTER

SPECIAL TOOLS

Description	Part number
Locking pin	876640

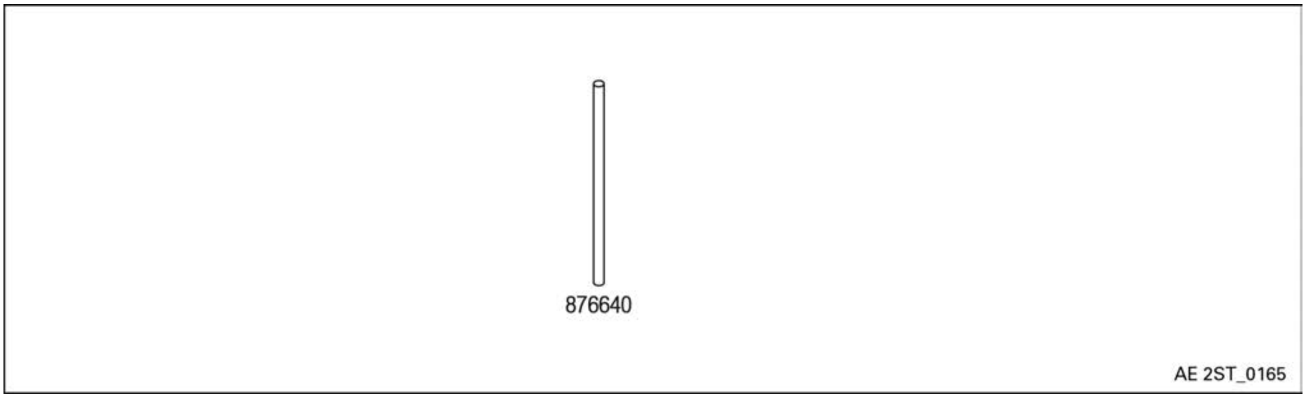


Figure 9.1

SERVICE PRODUCTS

Description	Part number
LOCTITE 243	897651
LOCTITE 648	899788
SILASTIC 732 RTV	297386
MOLYKOTE PG 54	n.a.

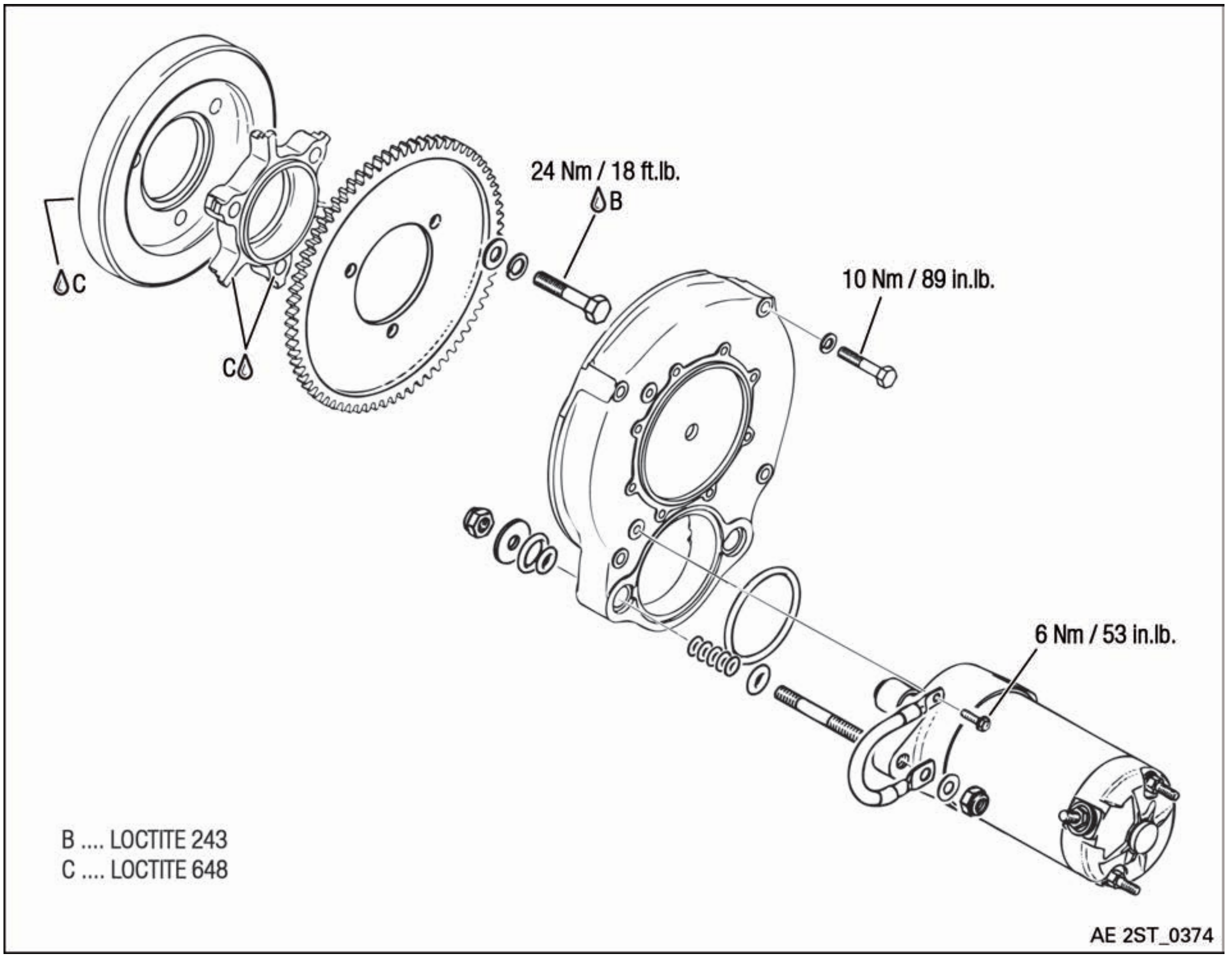


Figure 9.2

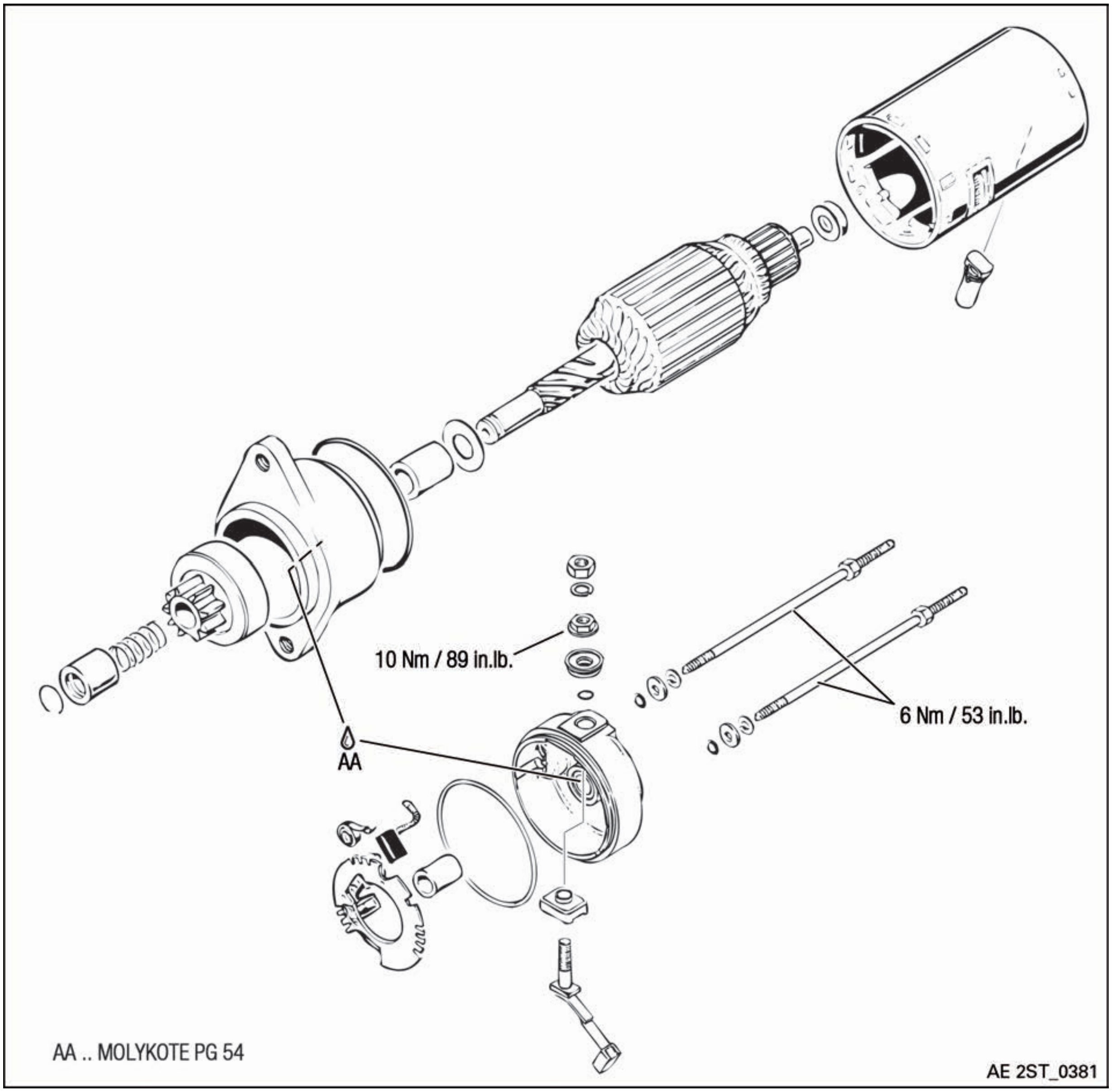


Figure 9.3

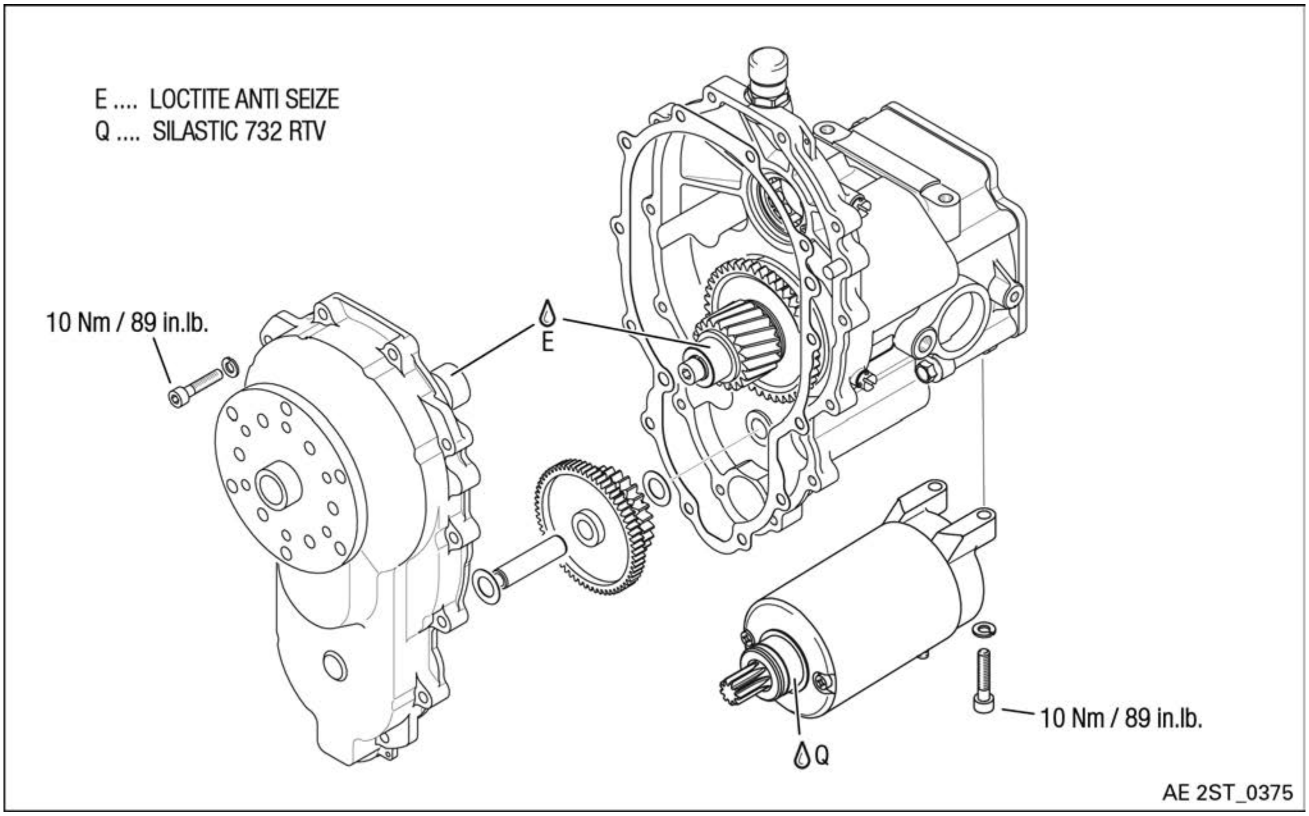


Figure 9.4: Electric starter, gearbox E

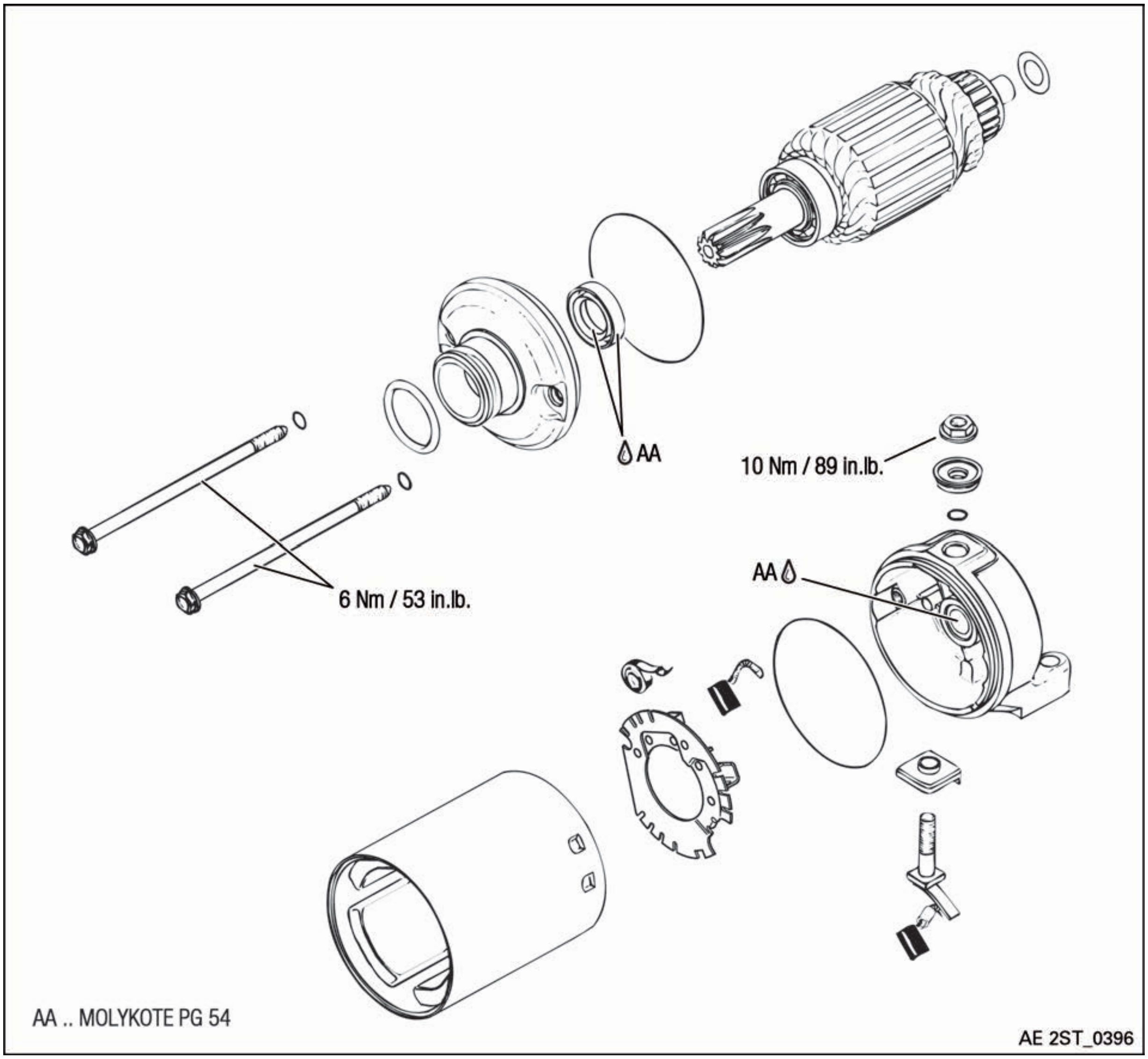


Figure 9.5: Electric starter – single parts, gearbox E

SYSTEM DESCRIPTION

The electric starter is a DC motor with permanent magnets and carbon brushes.

The pinion gear of the electric starter engages the crankshaft starter gear via a Bendix® style centrifugal mechanism.

Optionally available is a magneto side electric starter assy.

SAFETY INSTRUCTION

⚠ WARNING

Danger of severe burns and scalds!
Always allow the engine to cool down to ambient temperature before starting any work.

ATTENTION

Danger of damage to engine! There is a risk of short circuits and cable fires during work on the electric starter!

- All installation work on the rewind starter must be carried out with the engine switched OFF and the battery (negative pole) disconnected!

MAINTENANCE

As well as the maintenance and special checks, see current Maintenance Manual Line for the respective engine type.

REMOVAL

Preparation

- Switch the ignition key OFF.
- Disconnect the battery (negative pole).

ELECTRIC STARTER (MAG END) – REMOVAL

Preparation

- Before removing electric starter, record its orientation
- Lock the crankshaft

Step	Procedure
1	Loosen 4 hex. screws M6x40 (1) and remove starter assy. (2) complete with starter.

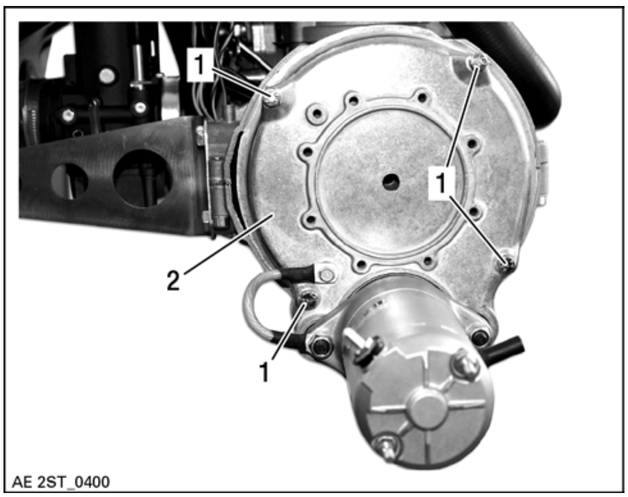


Figure 9.6

1 Hex. screws M6x40   *2 Starter assy.*

Step	Procedure
2	Loosen 3 hex. screws M8x40 (3) and remove starter gear (4), starter adapter (5) and hydro damper placed behind. **NOTE** *Starter gear adapter is attached to starter gear and hydro damper with LOCTITE 648. Use caution not to damage while removing.*

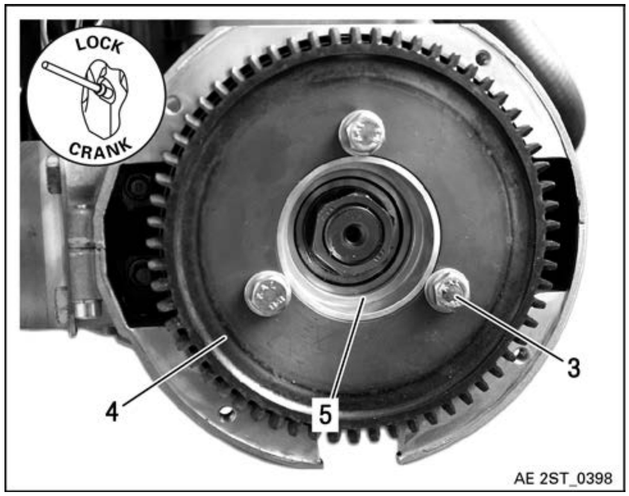


Figure 9.7

3 Hex. screw M8x40   *4 Starter gear*

5 Starter adapter

ELECTRIC STARTER (MAG END) – DISASSEMBLY

Step	Procedure
1	Remove M8 lock nuts (1) from the starter studs (2) along with washer and O-rings (3). **NOTE** *Studs are not attached rigidly to the starter nor the starter cover. This allows the O-rings to absorb vibration and protect against stress and cracking.*
2	Loosen TAPTITE screw M5x8 (4) and remove grounding cable.
3	Loosen 2 M5 studs (5) and remove along with washers and O-rings followed by starter end frame (6).
4	Remove the yoke assy. (7) from the drive housing (8) and rotor assy. (9). Set aside shims (10). **NOTE** *The yoke assy. contains strong magnets, use caution to avoid damage and injury when removing from the rotor assy.*
5	Push down on stop collar (11) to compress spring (12) and remove circlip (13) from rotor assembly shaft.

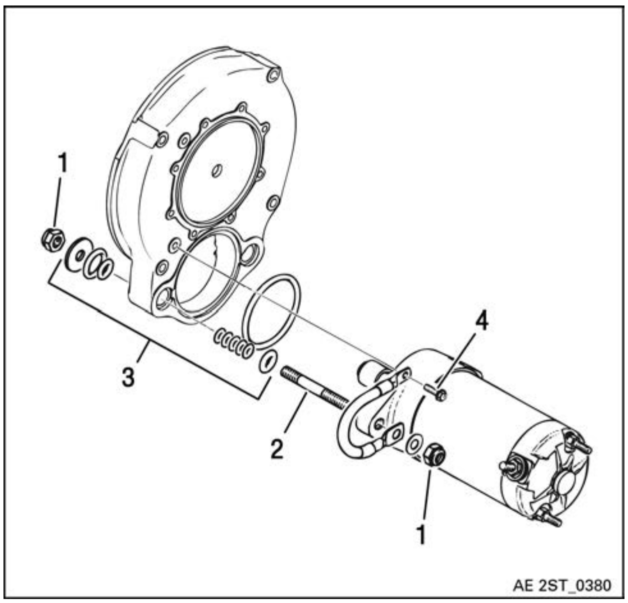


Figure 9.8

1	*Lock nut M8*	2	*Stud*
3	*O-rings*	4	*TAPTITE screw M5x8*

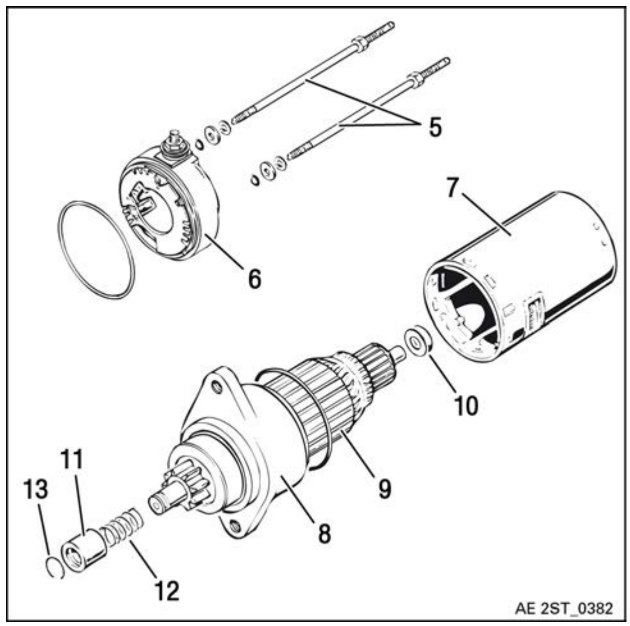


Figure 9.9

5	*M5 stud*	6	*End frame*
7	*Yoke assy.*	8	*Drive housing*
9	*Rotor assy.*	10	*Shim*
11	*Stop collar*	12	*Spring*
13	*Circlip*		

NOTE

Put aside yoke in a way to prevent any metallic matter collecting on magnets.

Step	Procedure
6	Remove the over-running clutch drive (14) and the rotor assy. (15).
7	Remove the O-ring (16) from the drive housing (17) as well as the thrust washer (18) from the rotor assy.

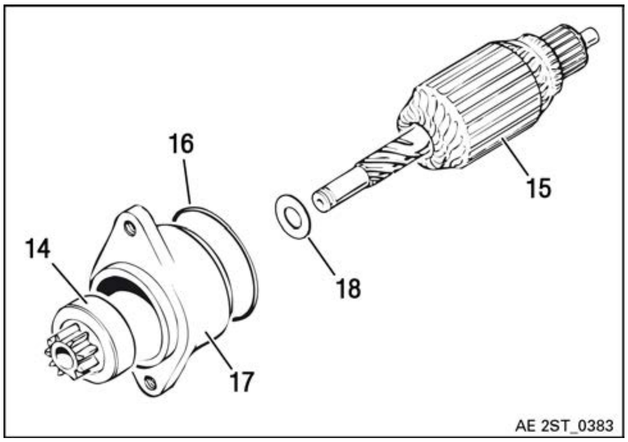


Figure 9.10

14 Clutch drive
15 Rotor assy.
16 O-ring
17 Drive housing
18 Thrust washer

Step	Procedure
8	Remove negative brush assy. (19) along with the O-ring (20).
9	Unscrew combined nut (21) and remove connector sheath (22) and O-ring (23).
10	Remove positive brush stud (24) and isolating bushing (25).

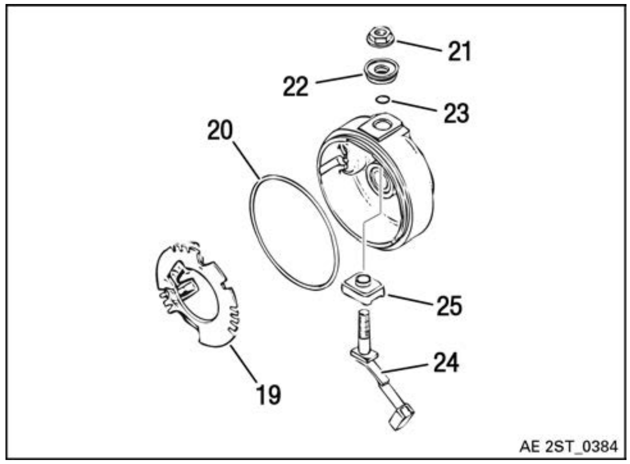


Figure 9.11

19 Neg. brush assy.
20 O-ring 62–1.5
21 Combined nut
22 Sheath
23 O-ring 6x1.7
24 Pos. brush stud
25 Isolating bushing

ELECTRIC STARTER (GEARBOX E) – REMOVAL

NOTE

For removal of the electric starter (gearbox E), see Chapter 72-10-00, section Propeller gearbox E - removal.

ELECTRIC STARTER (GEARBOX E) – DISASSEMBLY

Step	Procedure
1	Loosen and remove the hex. screws M5x100 (1) with O-rings (2) from the starter.

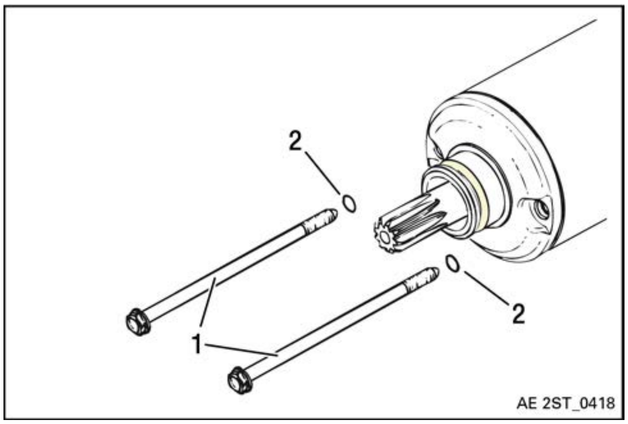


Figure 9.12

1	*Hex. screws M5x100*	2	*O-rings*

Step	Procedure
2	Remove front (3) and end frame (4) from the starter housing (5).
3	Pull or press out rotor assy. (6) from yoke assy. (5) and remove the washer (7).

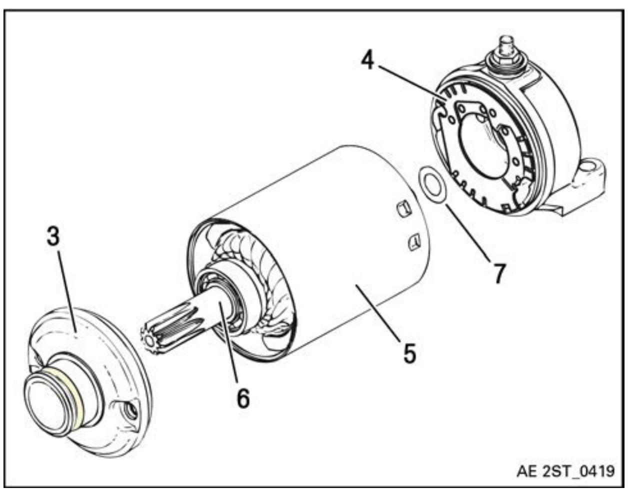


Figure 9.13

3	*Front frame*	4	*End frame*
5	*Yoke assy.*	6	*Rotor assy.*
7	*Washer*		

Step	Procedure
4	Remove brush holder assy. (8) and O-ring (9) from end frame.
5	Loosen the combined nut M6 (10) with sheath (11) and O-ring (12) and remove the carbon brush with screw (13) with isolating bushing (14).

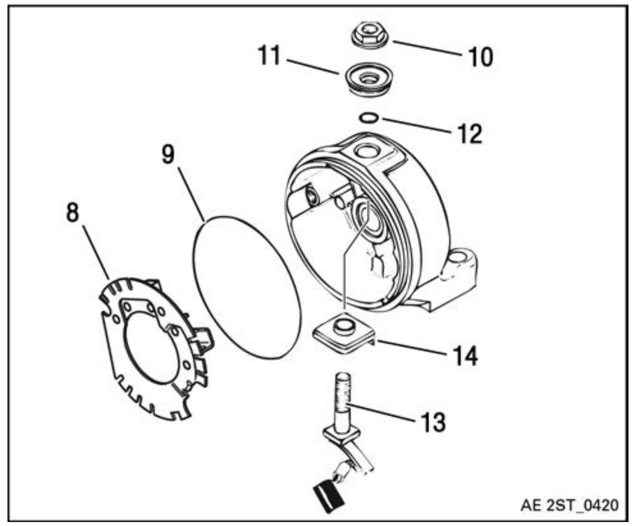


Figure 9.14

8	*Brush holder assy.*	9	*O-ring 62–1.5*
10	*Combined nut M6*	11	*Connector sheath*
12	*O-ring 6x1.7*	13	*Carbon brush with screw*
14	*Isolating bushing*		

Step	Procedure
6	Remove the O-rings (15+16) from the front frame. Press out the oil seal (17), if damaged.

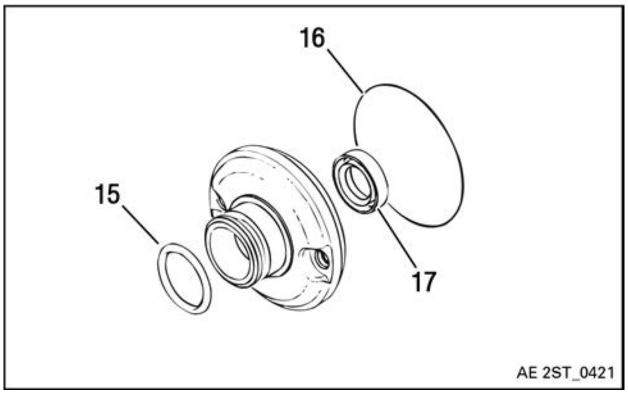


Figure 9.15

15 O-ring 24.4-3.1 *16 O-ring 62-1.5*

17 Oil seal

INSPECTION

Preparation

Clean all parts carefully.
See Maintenance Manual Line for the engine type 582 mod. 99 / mod. 17.

HYDRO DAMPER – INSPECTION

General
The hydro damper reduces crankshaft vibrations. The inside of the damper consists of a steel ring floating in oil. The freely moving damper ring inside the case transforms vibration energy into heat.
The damper case is sealed by 2 O-rings and cannot be taken apart. In case of leakage, the damper assembly has to be renewed.

Step	Procedure
1	Carry out a visual inspection of the hydro damper for any cracks, deformation or leaks.

Figure 9.16

STARTER GEAR – INSPECTION

Step	Procedure
1	Clean starter gear and inspect both sides for cracks starting at root circle. At presence of cracks, exchange starter gear without fail.

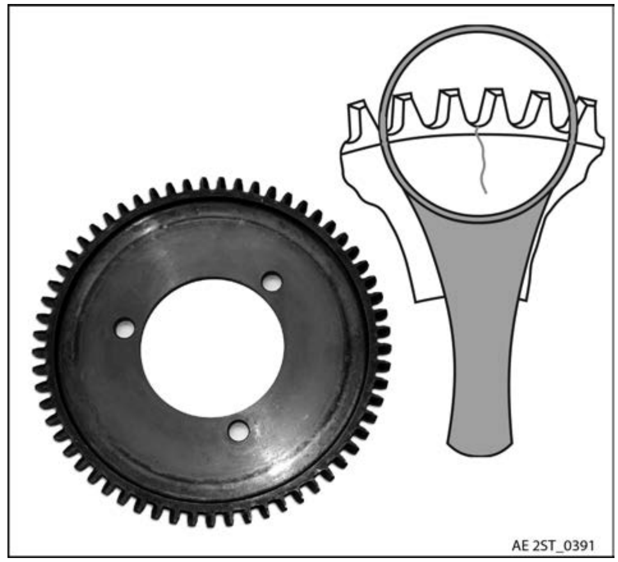


Figure 9.17

ELECTRIC STARTER (MAG END) — SINGLE PARTS — INSPECTION

Step	Procedure
1	Clean commutator, check for run out, carry out visual inspection, if necessary fine machine and undercut commutator ribs (1). The insulation should be 0.5 mm (0.02 in.) lower than the ribs (2). **NOTE** *If the rotor shows clear signs of over-heating, replace it.*
2	Check armature with continuity tester or 12 Volt test lamp between commutator (4) and iron core (3) for connection to ground. If continuity to ground exists, re-place rotor.
3	Check rotor coils (5) for interruption at 2 or 4 Volts and an interposed ammeter (measuring range 60 A). If there are great differences between the individual ribs, the rotor must be replaced.

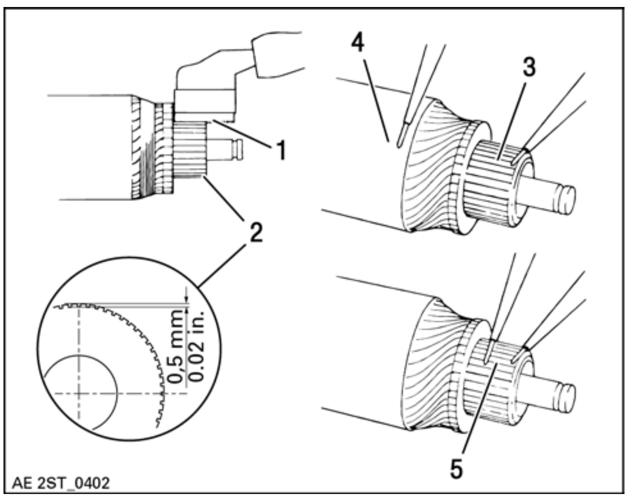


Figure 9.18

1 Ribs
2 Ribs
3 Ground - iron core
4 Commutator
5 Rotor coils

Step	Procedure
4	Inspect teeth and check free-wheeling of overrun clutch (6). Ensure clutch moves freely on rotor shaft coarse threads.
5	Inspect starter rotor shaft at coarse thread (7) and bearing stud (8) for wear and damage.

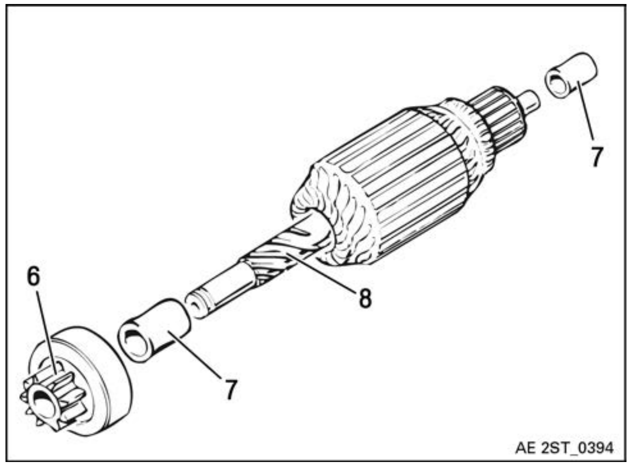


Figure 9.19

6 Overrun clutch
7 Coarse thread
8 Bearing stud

Step	Procedure
6	Carbon brushes (9) must move freely in their guides. Measure brush length. See wear limits (ES09). Replace the brushes if the starter has been overheated.
7	Carry out visual inspection of the yoke in-ner magnets (10) for cracks. **NOTE** *If cracks or loose magnets are found, yoke must be replaced with new.*

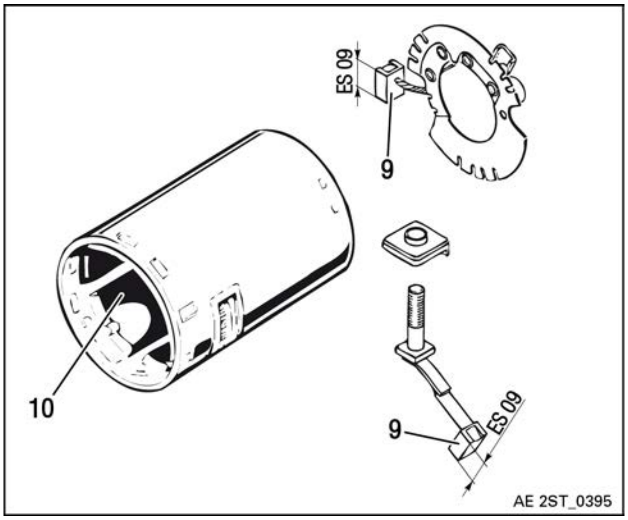


Figure 9.20

9 Carbon brushes *10 Magnets*

Step	Procedure
8	Inspect bushings (11) and oil seal (12) for wear and damage. **NOTE** *If bushings or oil seal are worn, they must be replaced along with their respective end frame or drive housing.*

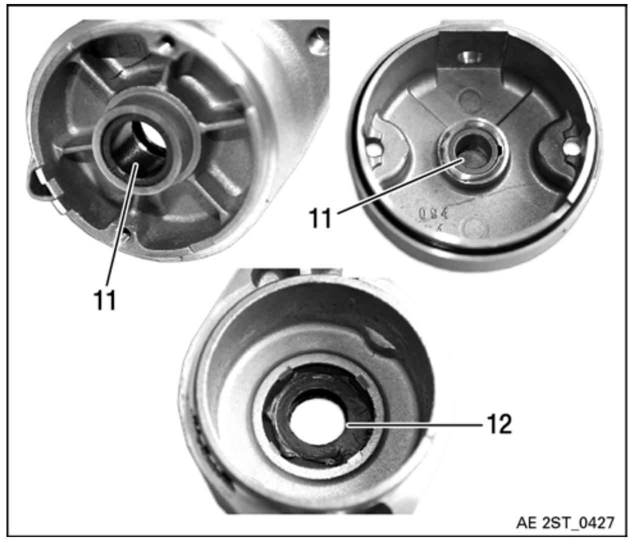


Figure 9.21

11 Bushings *12 Oil seal*

ELECTRIC STARTER (GEARBOX E) - SINGLE PARTS - INSPECTION

Step	Procedure
1	Clean commutator, check for run out, carry out visual inspection, if necessary fine machine and undercut commutator ribs (1). The insulation should be 0.5 mm (0.02 in.) lower than the ribs (2). **NOTE** *If the rotor shows clear signs of overheating, replace it.*
2	Check armature with continuity tester or 12 Volt test lamp between commutator (4) and iron core (3) for connection to ground. If continuity to ground exists, replace rotor.
3	Check rotor coils (5) for interruption at 2 or 4 Volts and an interposed ammeter (measuring range 60 A). If there are great differences between the individual ribs, the rotor must be replaced.

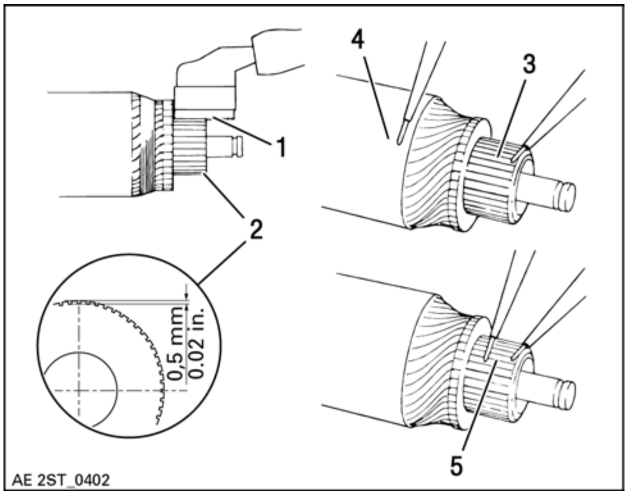


Figure 9.22

1	*Undercut commutator ribs*	2	*Ribs*
3	*Ground - iron core*	4	*Commutator*
5	*Rotor coils*		

Step	Procedure
4	Inspect teeth (6), oil seal running surface (7) and bearing point (8).
5	Check bearing (9) for free movement.

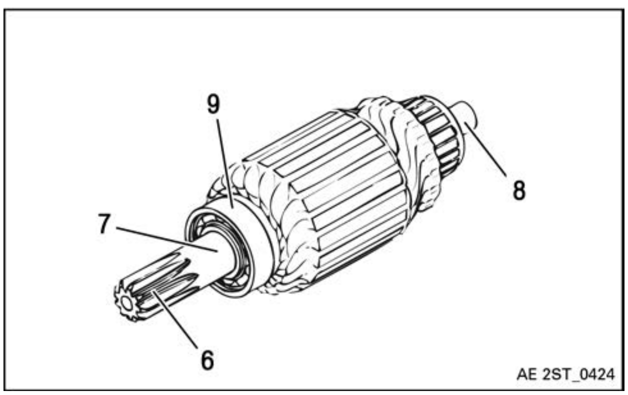


Figure 9.23

6	*Teeth*	7	*Oil seal running surface*
8	*Bearing point*	9	*Bearing*

Step	Procedure
6	Carbon brushes (10) must move freely in their guides. Measure brush length. See wear limits (ES09). Replace the brushes if the starter has been overheated.
7	Carry out visual inspection of the yoke inner magnets (11) for cracks. **NOTE** *If cracks or loose magnets are found, yoke must be replaced with new.*

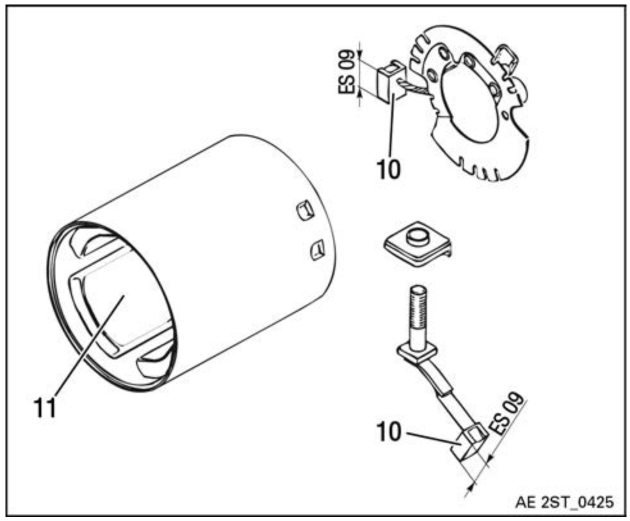


Figure 9.24

10	*Carbon brushes*	11	*Magnets*

Step	Procedure
8	Check bearing (12) in end cap for damage
9	Check bearing and oil seal seat (13) in the front housing for damage

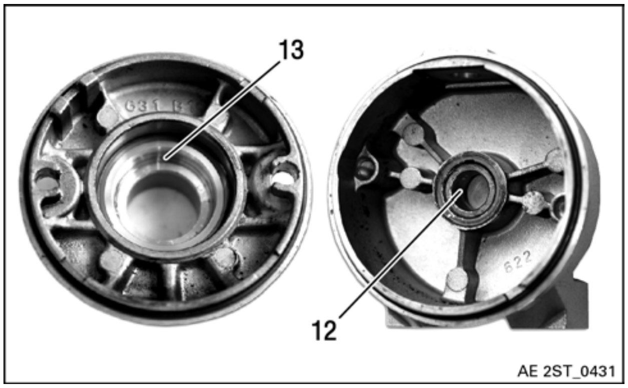


Figure 9.25

12	*Bearing*	13	*Bearing and oil seal seat*

WEAR LIMITS

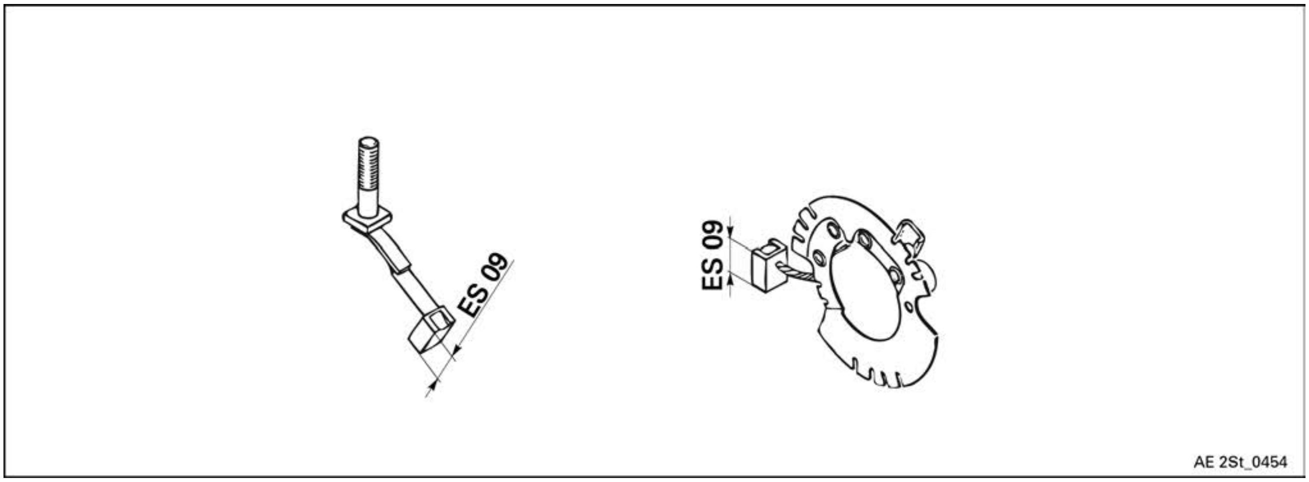


Figure 9.26

Description	Code	Reading new		Wear limit		Readings
		min	max	100 %		
Brush length	ES09	12.0 mm 0.4724 in.	12.5 mm 0.4921 in.	8.5 mm 0.3346 in.	actual	
					renewed	

INSTALLATION

ELECTRIC STARTER (MAG END) – ASSEMBLY

Step	Procedure
1	Place the connector stud of a new positive brush assembly (1) through the Isolating bushing (2) and then through the end cap (3). **NOTE** *The rectangular shaped base of the positive brush must sit securely within the isolating bushing so that the carbon brush lays to the right side of the end housing.*
2	Place a new O-ring (4) over the stud followed by the connector sheath (5) and M6 combined nut (6). Tighten nut to 10 Nm (89 in.lb).
3	Place a new O-ring (7) over the end cap and place the bushing (2) into the end cap bore. **NOTE** *Press bearing until end stop on a new end cap.*

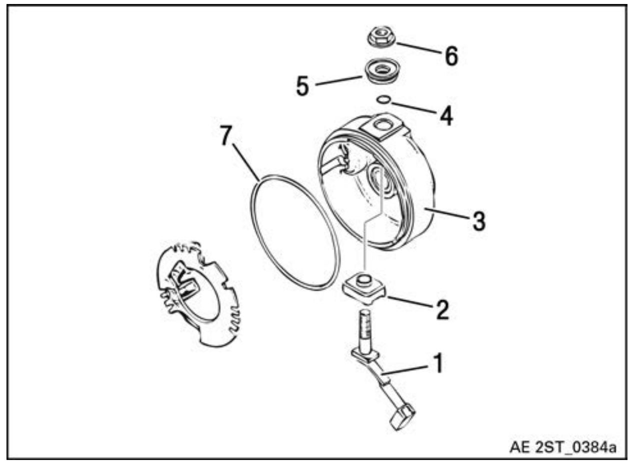


Figure 9.27

1	*Positive brush*	2	*Isolating bushing*
3	*End cap*	4	*O-ring*
5	*Sheath*	6	*Nut*
7	*O-ring*		

Step	Procedure
4	Place the negative brush assy. (8) into the end cap with the carbon brush (9) facing inwards at the 8 o'clock position so that the positive carbon brush fits easily into the empty brush holder and spring.
5	Align the gap in the brush assy. with the tab in the end cap (10).

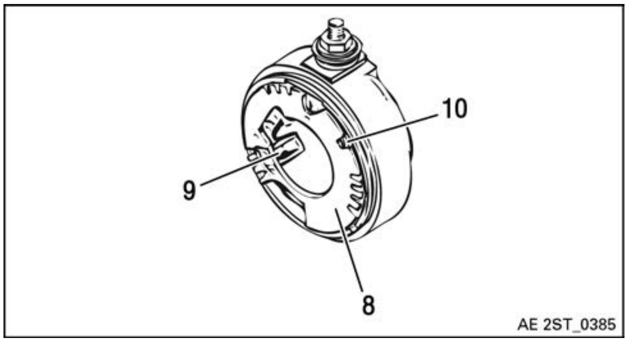


Figure 9.28

8 Neg. brush assy. *9 Carbon brush*

10 Tab in end cap

Step	Procedure
6	Place the shim(s) (11) over the commutator end of the rotor shaft. Lubricate the bearing stud with MOLYKOTE PG 54.
7	Gently place the rotor shaft (12) into the assembled end cap (13). **NOTE** *Carefully compress both carbon brushes and springs to allow the commutator to fit between. Ensure the rotor shaft sits within the bushing and end cap* **NOTE** *Take care not to damage the carbon brushes while inserting the rotor and commutator.*

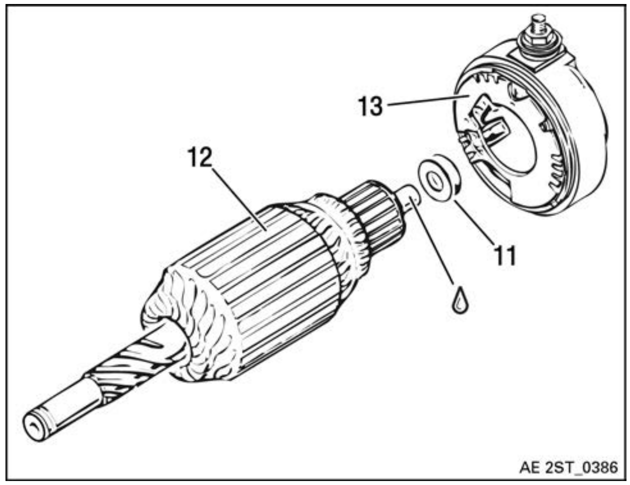


Figure 9.29

11 Shim(s) *12 Rotor shaft*

13 Tab in the end cap

Step	Procedure
8	Place the end cap and rotor (14) on a sturdy surface.
9	Slide the yoke assy. (15) over the rotor so that the alignment tab on the yoke fits within the slot of the brush assy. **NOTE** *Yoke contains strong magnets. To avoid injury and damage, hold the rotor in place in a safe manner, as the yoke will pull down towards the rotor as well as pulling the rotor upwards.*
10	Place the thrust washer (16) over the rotor shaft.
11	If necessary, replace the yoke assy. vent rubber (17).

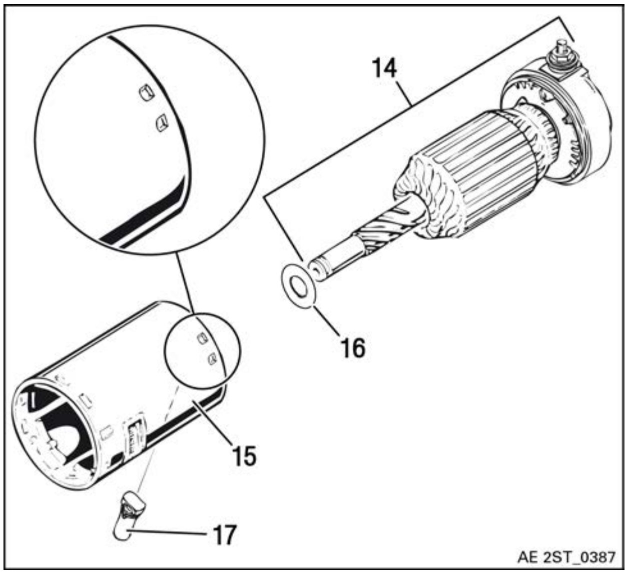


Figure 9.30

14 End cap and rotor	*15 Yoke assy.*
16 Thrust washer	*17 Vent rubber*

Step	Procedure
12	Place lock washers (18), washers (19) and O-rings (20) over M5 studs (21) and slide the studs through the end cap. **NOTE** *Ensure that the alignment of yoke, brush assy. and end cap is correct.*
13	Place O-ring (22) on the drive housing (23), lubricate oil seal and bearing point with MOLYKOTE PG 54. Place housing over the rotor shaft, aligning the inner threads with the two M5 studs (21). Tighten the studs to 6 Nm (55 in.lb). **NOTE** *Press bearing until end stop on a new end cap.*
14	Place overrun clutch drive assy. (24) over rotor shaft, followed by spring (25) and stop collar (26).

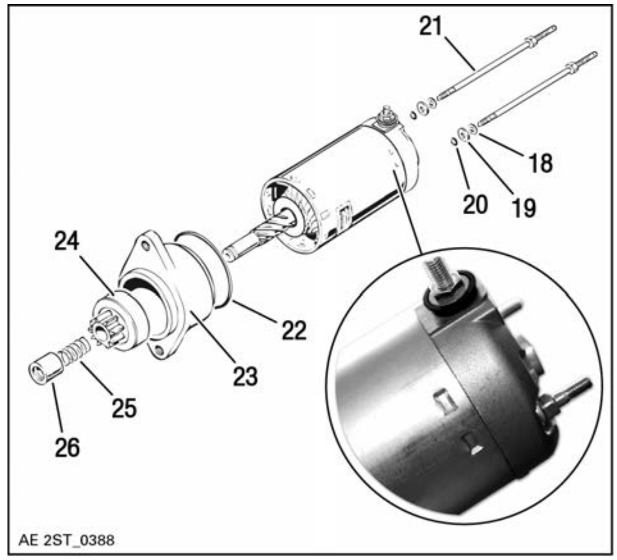


Figure 9.31

18 Lock washer	*19 Washer*
20 O-ring	*21 M5 stud*
22 O-ring	*23 Drive housing*
24 Overrun clutch	*25 Spring*
26 Stop collar	

Step	Procedure
15	Push down on stop collar so that groove in rotor shaft is exposed and place circlip (27) in position within groove.
16	The circlip will be bent during assembly and must now be compressed again with suitable pliers, so that the stepped sleeve can slip over the ring.

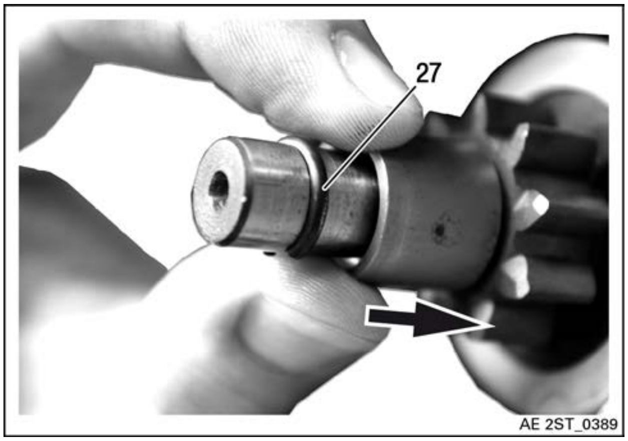


Figure 9.32

27 Circlip

Step	Procedure
17	Lightly grease O-ring 60x4 (28) with lithium grease and place in position within the starter housing.
18	Thread M8 studs (31) through starter assy. attachment and place M8 lock nuts (29) with washers (30) over it. **NOTE** *The left M8 stud must be placed through grounding cable lug (32).*
19	Over each M8 stud place an O-ring 8x5 (33) followed by 5 O-rings 6x3 (34) and place the starter with studs and O-rings into place in the starter housing.
20	From the inside of the starter housing, place over each M8 stud an O-ring 8x4 (35) and a O-ring 16x4 (36) followed by washer (37) and M8 lock nut (38).
21	Tighten the nuts until a gap of 1 mm (0.04 in.) is left between the gearbox cover (39) and the electric starter (40).
22	Attach grounding cable (32) to gearbox cover (39) with TAPTITE screw M5x8 (41). Tighten to 6 Nm (55 in.lb).

ATTENTION

Damage to cover or studs, starter must not be attached rigidly on the gearbox cover.
A gap of 1 mm (0.04 in.) has to be kept without fail, otherwise engine vibration would be transferred on to the rather long projecting starter.Adjustment of this gap is made by tightening or loosening nuts.

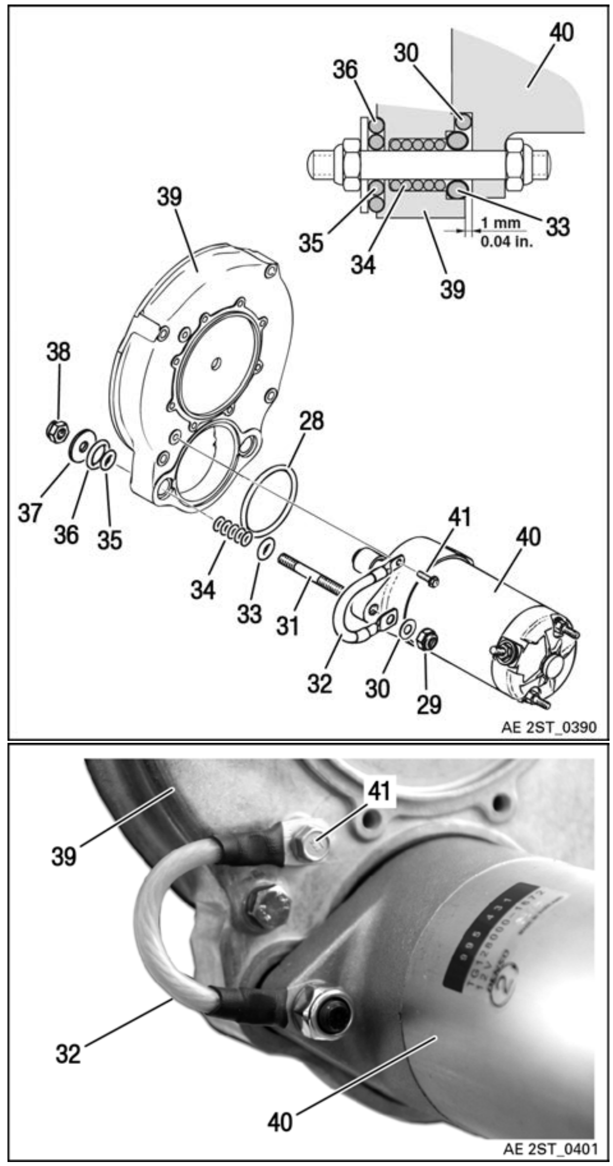


Figure 9.33

28	*O-ring 60x4*	29	*Lock nut M8*
30	*Washer A8*	31	*Stud M8*
32	*Grounding cable lug*	33	*O-ring 8x5*
34	*O-rings 6x3*	35	*O-ring 8x4*
36	*O-ring 16x4*	37	*Washer A8*
38	*Lock nut M8*	39	*Gearbox cover*
40	*Electric starter*	41	*TAPTITE screw M5x8*

ELECTRIC STARTER (MAG END) – INSTALLATION

Preparation

- Clean all components and remove any residual LOCTITE.
- Lock the crankshaft.

Step	Procedure
1	Apply a thin film of LOCTITE 648 on the flat face of the magneto flywheel (1) and the contact faces of the starter gear adapter (3).
2	Position the hydro damper (2), adapter (3) and starter gear (4) aligning holes with magneto flywheel.
3	Apply LOCTITE 243 to the threads of 3 hex. screws M8x40 (5) along with lock washers (6) and washers (7). Place screws through starter gear, adapter and hydro damper into magneto flywheel. Tighten to 24 Nm (18 ft.lb).

ATTENTION

Use only M8x40 mm screws. Longer screws would damage stator assy. coils.

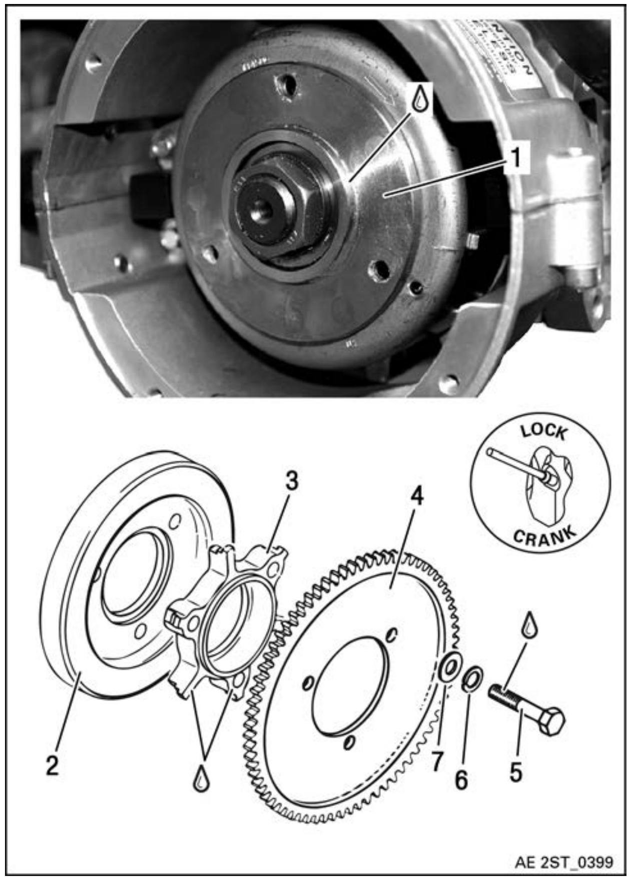


Figure 9.34

1	*Magneto flywheel*	2	*Hydro damper*
3	*Adapter*	4	*Starter gear*
5	*Hex. screw M8x40*	6	*Lock washer*
7	*Washer*		

ATTENTION

Electric starter (magneto end) is allowed to be installed with starter facing up or down only.

Step	Procedure
4	Place the electric starter assy. (8) to its original position and attach to the crankcase using 4 hex. screws M6x40 with lock washers (9). Tightening torque 10 Nm (89 in. lb)

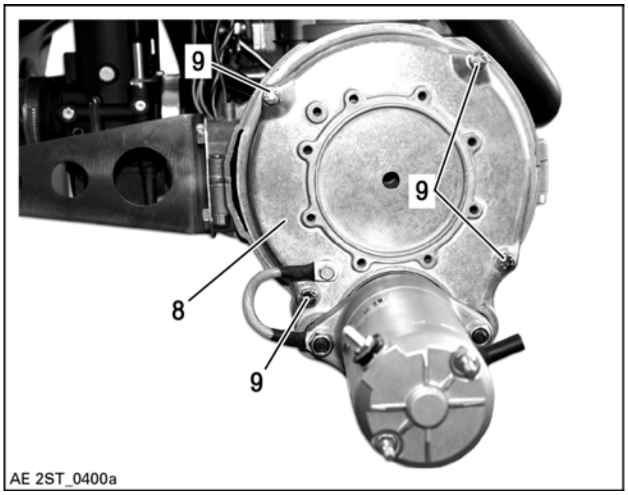


Figure 9.35

8	*Electric starter assy.*	9	*Hex. screws M6x40 with washers*

ELECTRIC STARTER (GEARBOX E) – ASSEMBLY

Step	Procedure
1	Place the connector stud of a new positive brush assy. (1) through the isolating bushing (2) and then through the end cap (3). **NOTE** *The rectangular shaped base of the positive brush must sit securely within the isolating bushing so that the carbon brush lays to the right side of the end housing.*
2	Place a new O-ring (4) over the stud followed by the connector sheath (5) and combined nut M6 (6). Tighten nut to 10 Nm (89 in.lb).
3	Place a new O-ring (7) over the end cap. **NOTE** *Press bearing until end stop on a new end cap.*

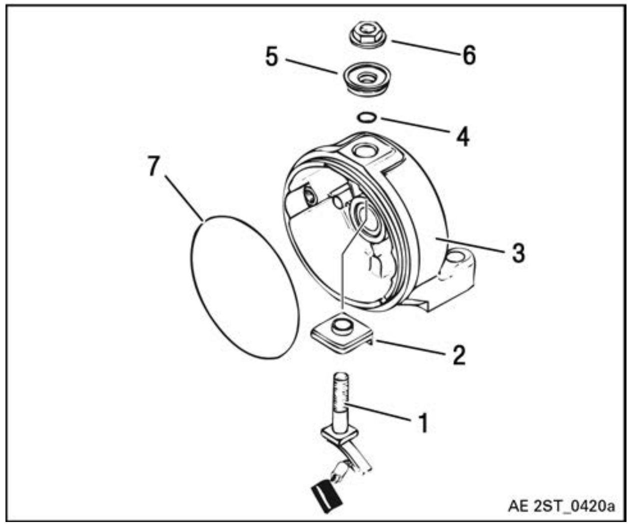


Figure 9.36

1	*Positive brush assy.*	2	*Isolating bushing*
3	*End cap*	4	*O-ring 6x1.7*
5	*Connector sheath*	6	*Combined nut M6*
7	*O-ring 62–1.5*		

Step	Procedure
4	Place the negative brush assy. (8) into the end cap with the carbon brush (9) facing inwards so that the positive carbon brush fits easily into the empty brush holder and spring.
5	Align the gap in the brush assy. with the tab (10) in the end cap.

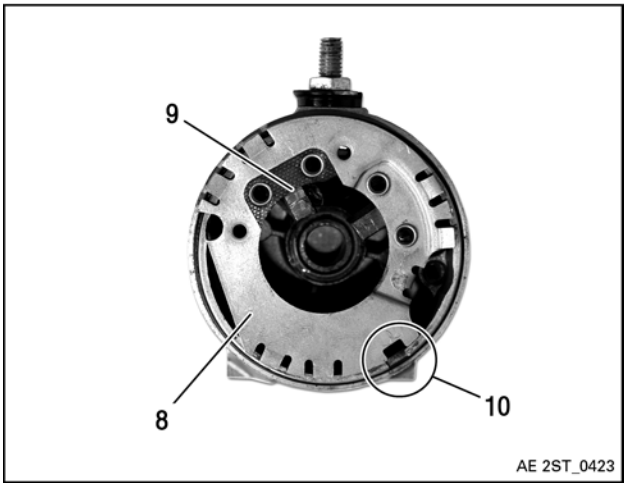


Figure 9.37

8 Negative brush assy. *9 Carbon brush*

10 Tab in the end cap

Step	Procedure
6	Grease the oil seal (11) with Molycote PG 54 with the open side outwards. Mount O-rings (12 + 13).

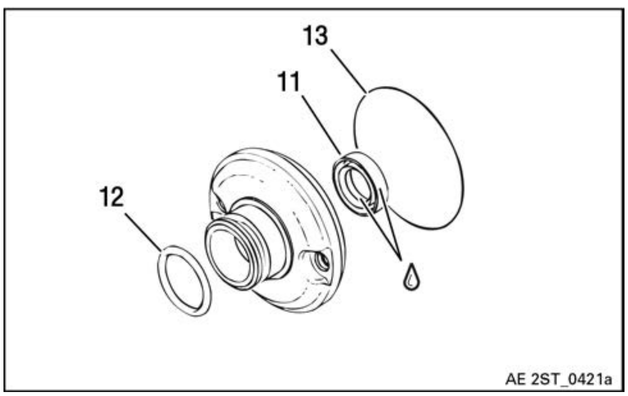


Figure 9.38

11 Oil seal *12 O-ring 24.4-3.1*

13 O-ring 62–1.5

Step	Procedure
7	Fit the washer (14) on the rotor (16) and slide it into the end cap (15). Lubricate bearing of the end cap with Molykote PG 54.

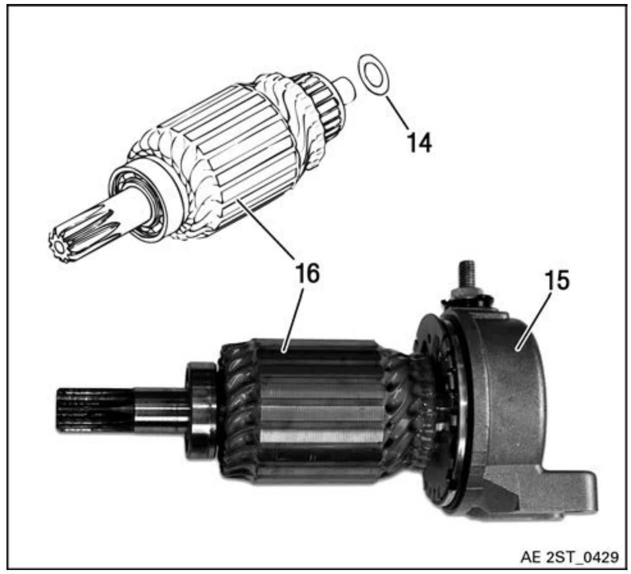


Figure 9.39

14 Washer *15 End cap*

16 Rotor

Step	Procedure
8	Slide stator yoke assy. (17) over the rotor (16).
9	Carefully slide front cap (18) onto rotor (16). **NOTE** *Take care not to damage the oil seal.*
10	Slide the front cap (18) and the stator yoke assy (17) further on to end cap (15). Mount and align with marking (19).

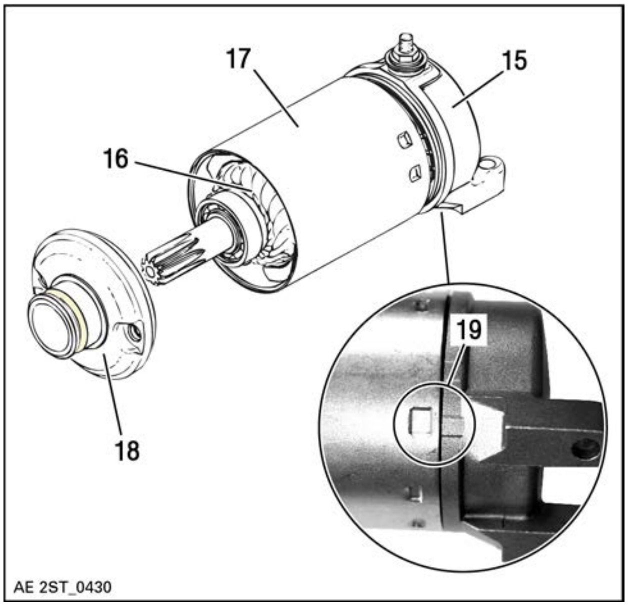


Figure 9.40

15 End cap | *16 Rotor*
17 Stator yoke assy. | *18 Front cap*
19 Marking

Step	Procedure
11	Place O-rings (20) on to hex. screws M5x100 (21) and tighten starter. Tightening torque 6 Nm (55 in.lb) **NOTE** *Observe the marking (19).*

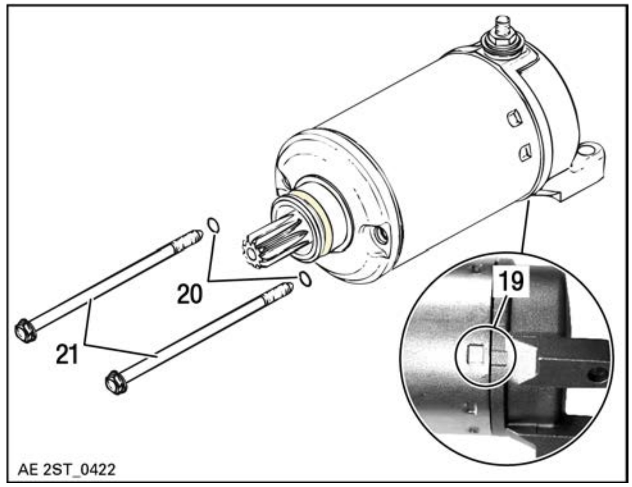


Figure 9.41

19 Marking | *20 O-rings*
21 Hex. screws M5x100

ELECTRIC STARTER (GEARBOX E) – INSTALLATION

NOTE

For installation of the electric starter (gearbox E), see Chapter 72-10-00, section Propeller gearbox E - installation.

FINISHING WORK

- Remove the crankshaft locking pin
- Re-connect the negative terminal of the onboard battery

Carry out an engine test run.
See Maintenance Manual Line for engine type 582 mod. 99 / mod. 17.

Chapter: 80-20-00
REWIND STARTER

TOPICS IN THIS CHAPTER

SPECIAL TOOLS

Description	Part number
Locking pin	876640

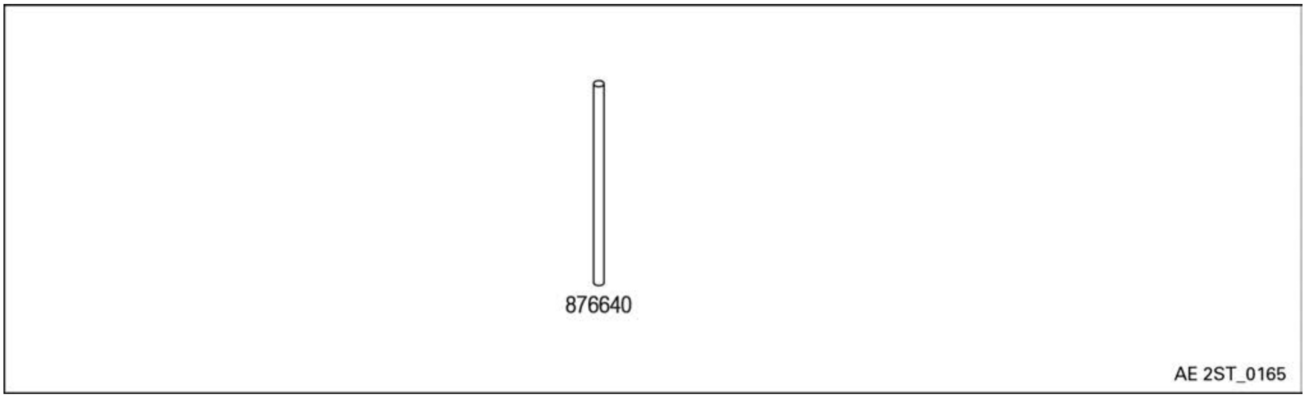


Figure 10.1

SERVICE PRODUCTS

Description	Part number
LOCTITE 243	897651
LOCTITE 648	899788
MOLYKOTE PG 54	n.a.

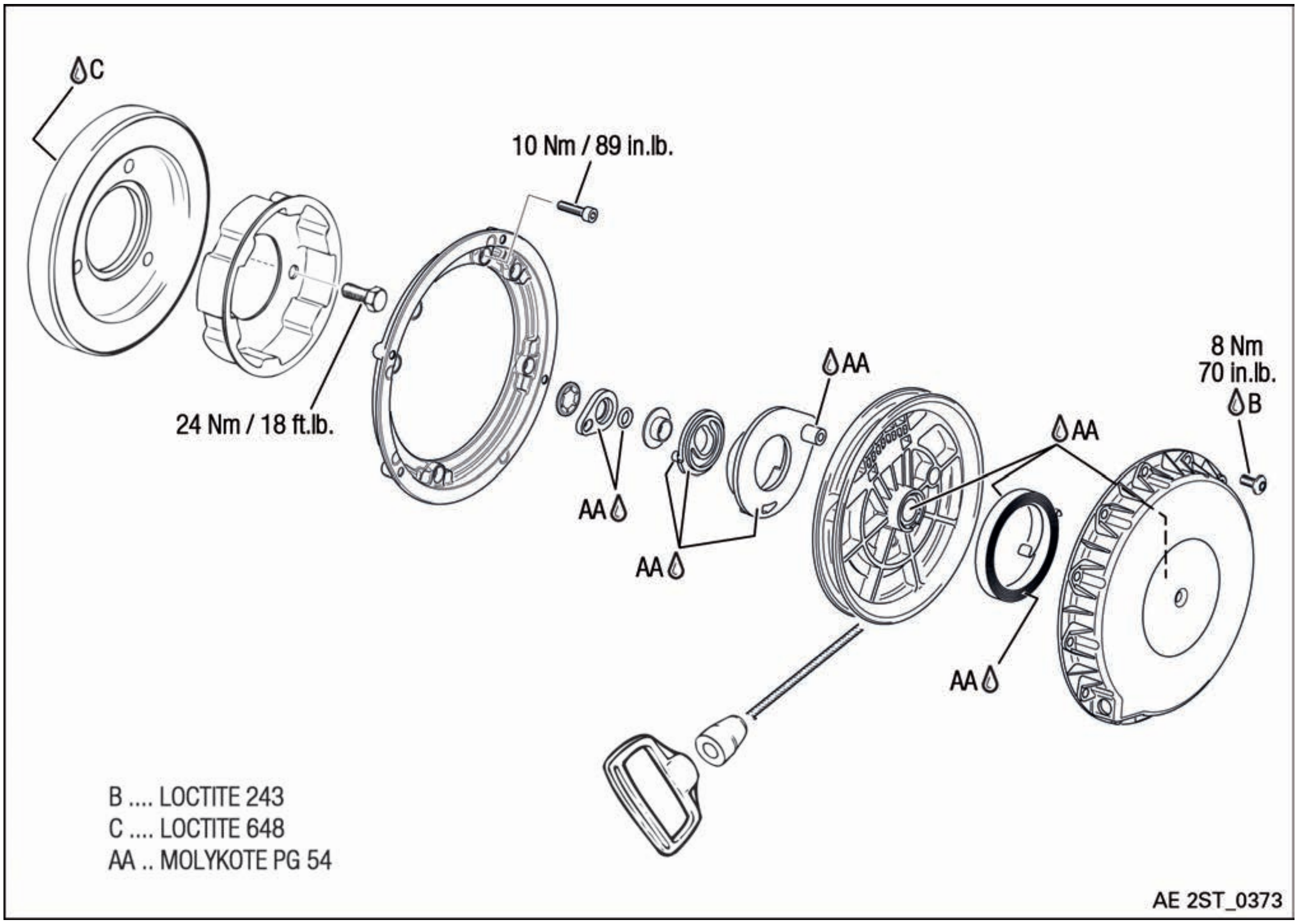


Figure 10.2

SYSTEM DESCRIPTION

The ROTAX engine type 582 mod. 99 / mod. 17 is equipped with an integrated rewind starter.

SAFETY INSTRUCTION

⚠ WARNING

Danger of severe burns and scalds!
Always allow the engine to cool down to ambient temperature before starting any work.

ATTENTION

Danger of damage to engine! There is a risk of short circuits and cable fires during work on the electric starter!

- All installation work on the rewind starter must be carried out with the engine switched OFF and the battery (negative pole) disconnected!

MAINTENANCE

As well as the maintenance and special checks, see current Maintenance Manual Line for the respective engine type.

REMOVAL

Preparation

- Switch the ignition key OFF.
- Disconnect the battery (negative pole).

REWIND STARTER – REMOVAL

Step	Procedure
1	Loosen 4 TAPTITE screws M6x20 (1) and remove rewind starter cover (2).

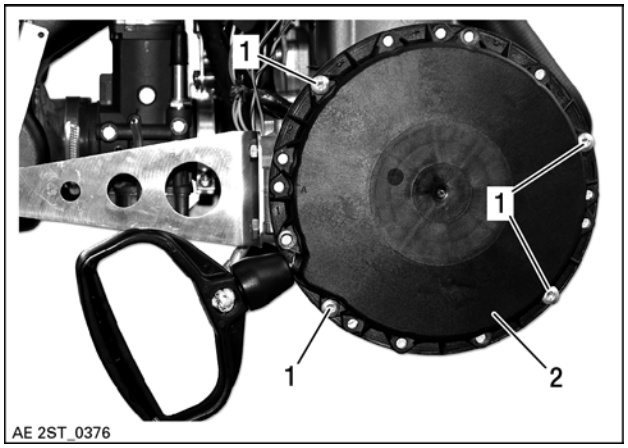


Figure 10.3

1 TAPTITE screws M6x20 *2 Rewind starter cover*

Step	Procedure
2	Loosen Allen screws M6 (4) and remove connecting flange (3).

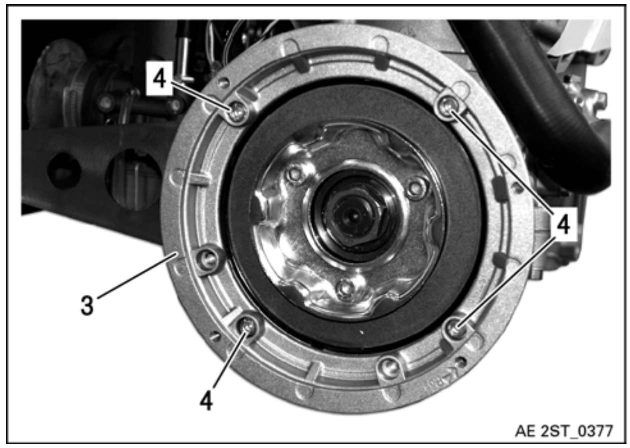


Figure 10.4

3 Connecting flange *4 Allen screws M6x16*

Step	Procedure
3	Lock the crankshaft with locking pin part no. 876640.
4	Loosen 3 hex. screws M8 (7) and remove starting pulley (5) and hydro damper assy. (6). **NOTE** *Hydro damper is attached to magneto flywheel with LOCTITE 648, use caution not to damage while removing.*

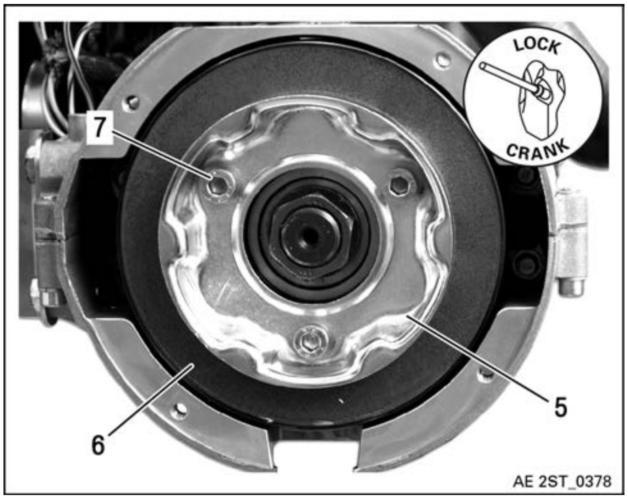


Figure 10.5

5 Starting pulley *6 Hydro damper assy.*

7 Hex. screws M8x20

REWIND STARTER - ROPE REPLACEMENT

Step	Procedure
1	Completely pull out rope. Hold rewind starter in a vise. Slide rope and untie the knot (1). Pull out the rope completely.

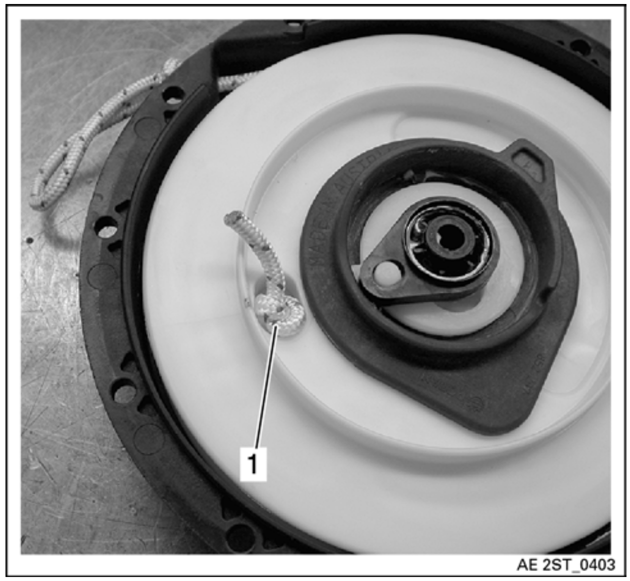


Figure 10.6

1 Knot to be untied

NOTE

When rope is completely pulled out, spring pre-load is 4-1/2 turns.

Step	Procedure
2	To install rope, insert rope into sheave orifice and lock it by making a knot, leaving behind a free portion of about 25 mm (0.98 in.) in length.

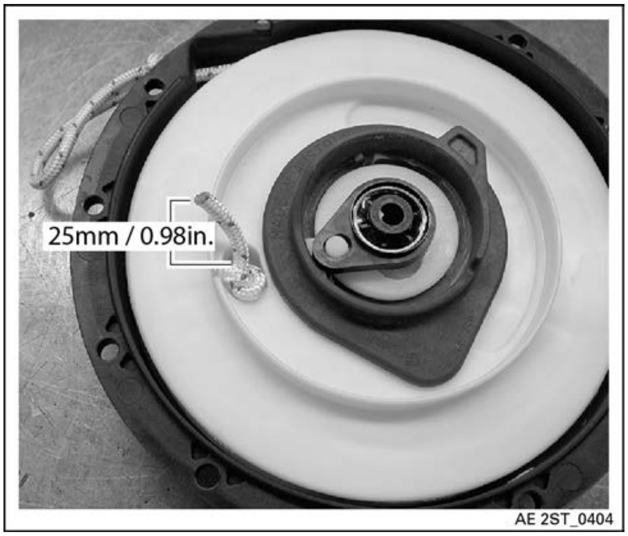


Figure 10.7

Free portion of about 25 mm (0.98 in.)

Step	Procedure
3	Fuse rope end with a lit match and insert it into sheave.

Figure 10.8

Free portion inserted into sheave

REWIND STARTER – DISASSEMBLY

Step	Procedure
1	Pull out rope about 50 cm (20 in.) and attach with hose pliers or similar near the starter housing.
2	Using a small screwdriver, extract rope knot (1) from starter handle (2). Cut rope close to knot.
3	Remove the hose pliers. Let sheave get free to release spring preload.

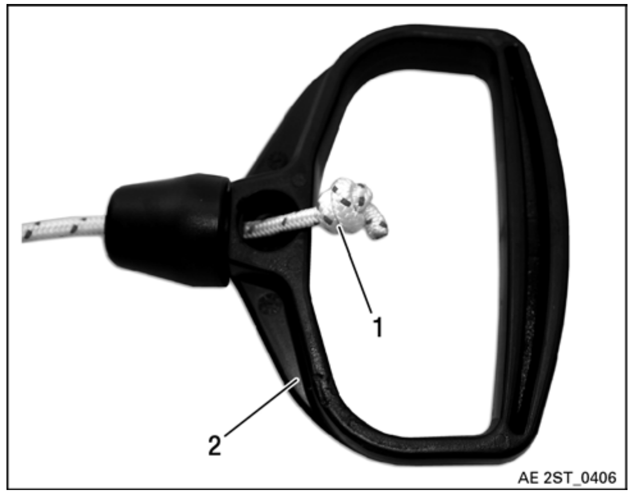


Figure 10.9

1 Knot *2 Starter handle*

Step	Procedure
4	Cut push nut (3) and discard.
5	Remove lock lever with O-ring (4), collar sleeve (5), pawl lock (6) and pawl (7).

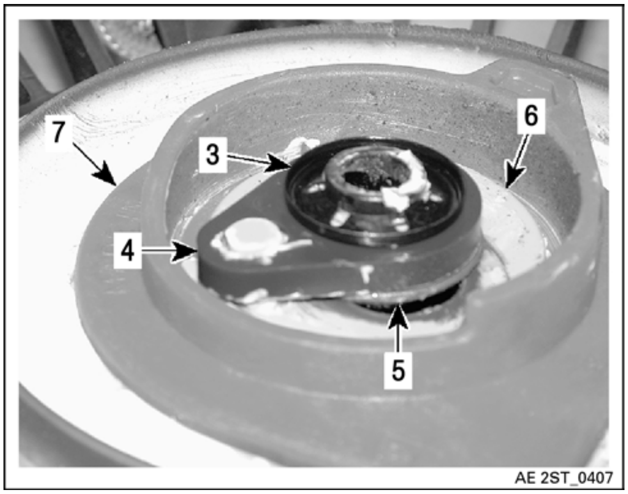


Figure 10.10

3	*Push nut*	*4*	*O-ring*
5	*Collar sleeve*	*6*	*Pawl lock*
7	*Pawl*		

Step	Procedure
6	Remove sheave from starter housing. Hold spring with a screwdriver.
7	First take out the knot and then the rope.

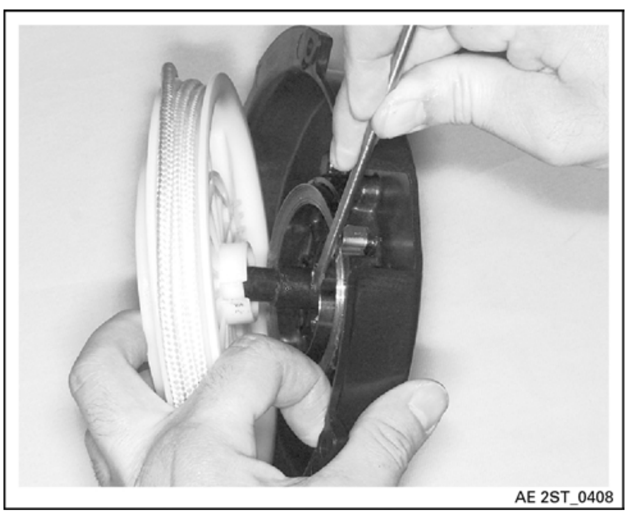


Figure 10.11

INSPECTION

Preparation

Clean all parts carefully.
See Maintenance Manual Line for the engine type 582 mod. 99 / mod. 17.

REWIND STARTER - INSPECTION

ATTENTION

Rewind starter component life will be shortened and/or rewind starter will not operate properly under very cold temperatures.
It is of the utmost importance that the rewind starter spring be lubricated periodically using specific lubricant.

- Due to dust accumulation, rewind starter must be periodically cleaned, inspected and lubricated
- Check if rope is fraying, replace if so
- When pulling starter grip, mechanism must engage within 30 cm (1 ft) of rope pulled. If not, disassemble rewind starter, clean and check for damaged plastic parts. Replace as required, lubricate, reassemble and recheck
- When releasing starter grip, it must return to its stopper and stay against it. If not, check for proper spring preload or damage. Readjust or replace as required
- When pulling starter grip 10 times in a row, it must return freely. If not, check for damaged parts or lack of lubrication. Replace parts or lubricate accordingly.

REWIND STARTER SINGLE PARTS - INSPECTION

Step	Procedure
1	Inspect the bearing pin (1) for wear and cracks and inspect the rope guide (2) in starter housing.
2	Inspect the rope sheave for cracks and wear, especially at spring engagement (3).

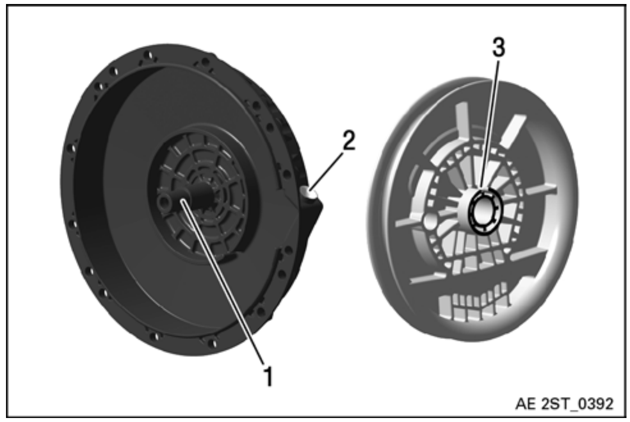


Figure 10.12

1 Bearing pin
2 Rope guide
3 Spring engagement

Step	Procedure
3	Inspect pawl (4) for cracks and wear at guide pin (5), engaging nose (6) and supporting edge (7).
4	Inspect pawl lock (8) at guide pin (9) and gliding face (10).

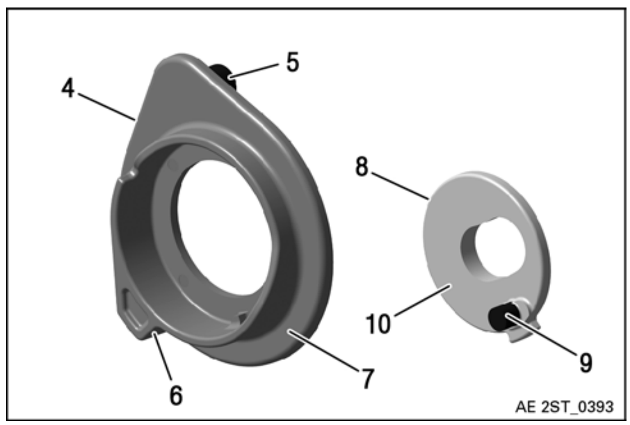


Figure 10.13

4 Pawl
5 Guide pin
6 Engaging nose
7 Support edge
8 Pawl lock
9 Guide pin
10 Gliding face

INSTALLATION

REWIND STARTER — ASSEMBLY

Step	Procedure
1	Lubricate spring contact area and spring guide inside housing with MOLYKOTE PG 54.

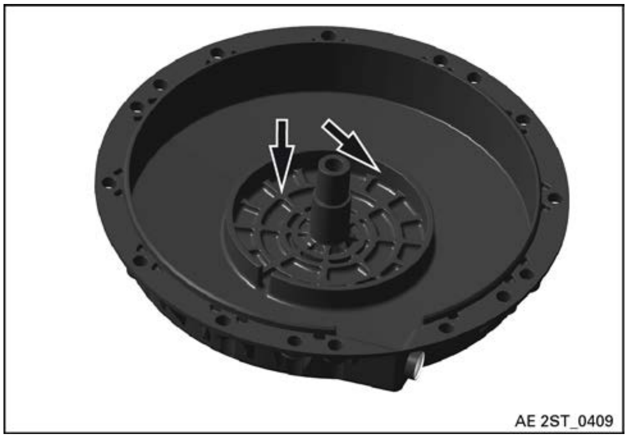


Figure 10.14

Step	Procedure
2	At assembly, position spring outer end into spring guide notch then wind the spring counterclockwise into guide. **NOTE** *Always handle with care! Since the spring is tightly wound inside the guide it may fly out when rewind is handled.*

Figure 10.15

ATTENTION

It is of the utmost importance to lubricate the rewind starter spring periodically using MOLYKOTE PG 54. The use of standard multipurpose grease could result in rewind starter malfunction under very cold temperatures and components life will be shortened.

Step	Procedure
3	Lubricate spring assy. (1) and 1 cm (1/2 in) wide on bottom of housing (2) with MOLYKOTE PG 54.

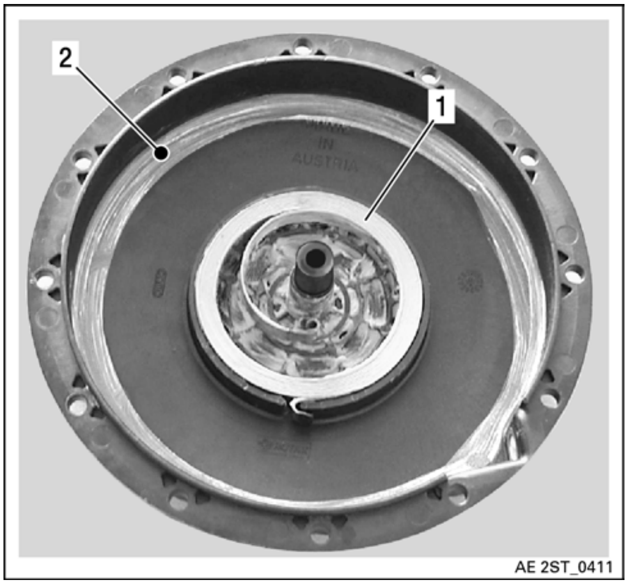


Figure 10.16

1 *Spring assy.* 2 *Bottom of housing*

Step	Procedure
4	Lubricate housing post with MOLYKOTE PG 54. Install sheave.

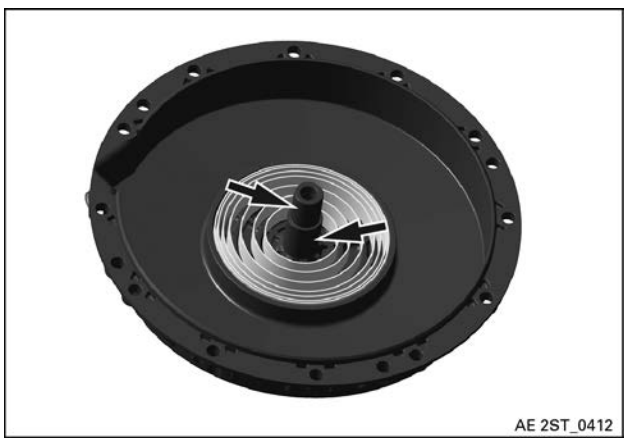


Figure 10.17

Step	Procedure
5	**SPRING TENSION ADJUSTMENT:** Wind rope on sheave and place rope sheave into starter housing making sure that the sheave hub notch engages in the rewind spring hook. Rotate the sheave counterclockwise until rope end is accessible through rope exit hole. This will give 1/2 turn of preload. Pull the rope out of the starter housing and temporarily make a knot to hold it.

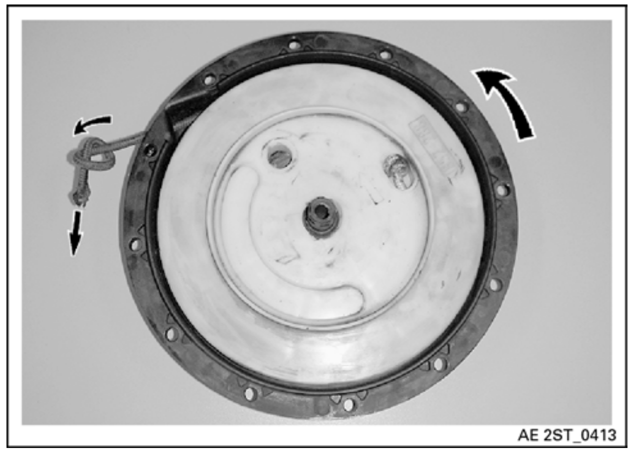


Figure 10.18

Step	Procedure
6	Lubricate pawl with MOLYKOTE PG 54 then install over rope sheave.

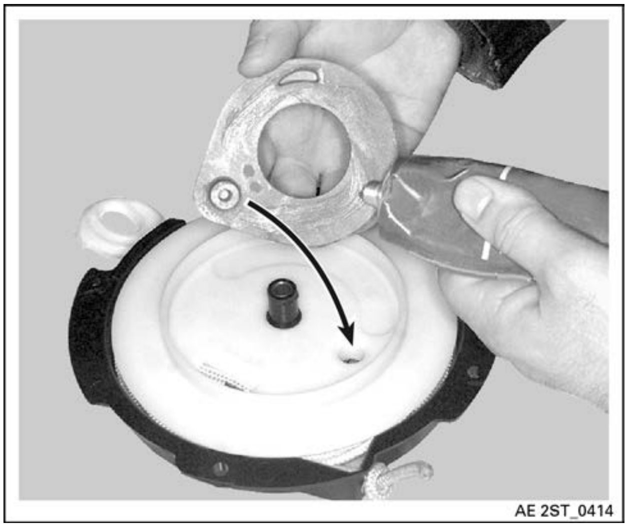


Figure 10.19

Step	Procedure
7	Lubricate pawl lock with MOLYKOTE PG 54. Install over pawl.

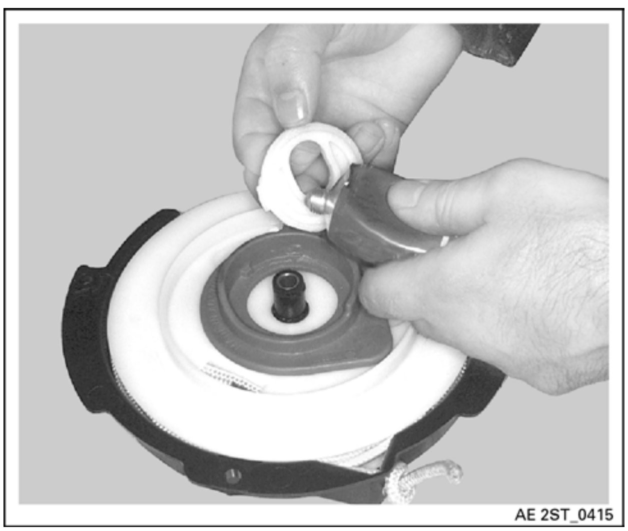


Figure 10.20

Step	Procedure
8	Install collar sleeve (3) with its collar first. Lubricate a new O-ring (4) and lock lever (5) with MOLYKOTE PG 54. Install over pawl lock with O-ring downwards.

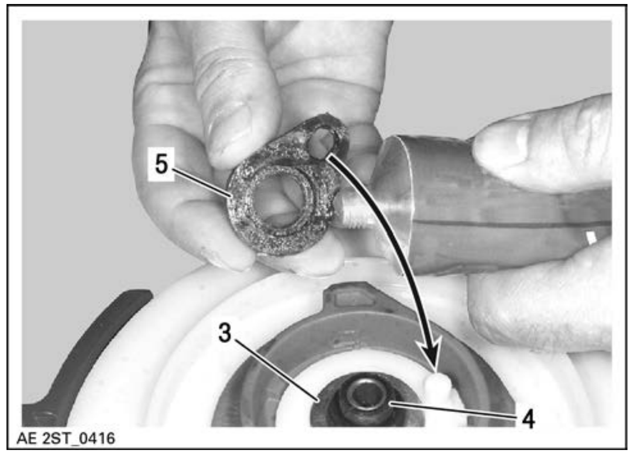


Figure 10.21

3 Collar sleeve
4 O-ring
5 Lock lever

Step	Procedure
9	Secure lock lever with a new push nut.

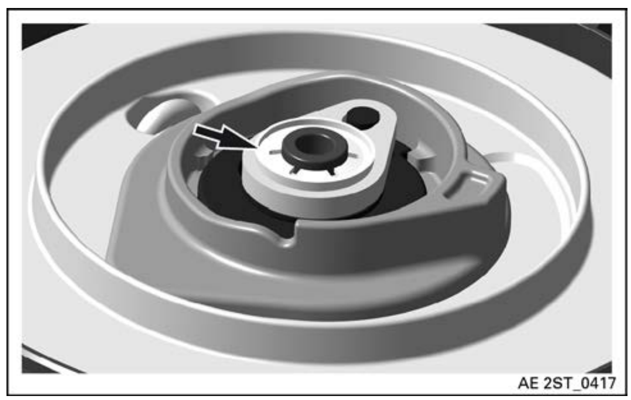


Figure 10.22

Step	Procedure
10	Pull out rope about 50 cm (20 in.) and attach with hose pliers or similar near the starter housing.
11	Before installing starter handle on the rope, it is necessary to fuse the rope end with a lit match. Pass rope through starter handle and tie a knot on the rope end.
12	Remove the hose pliers.

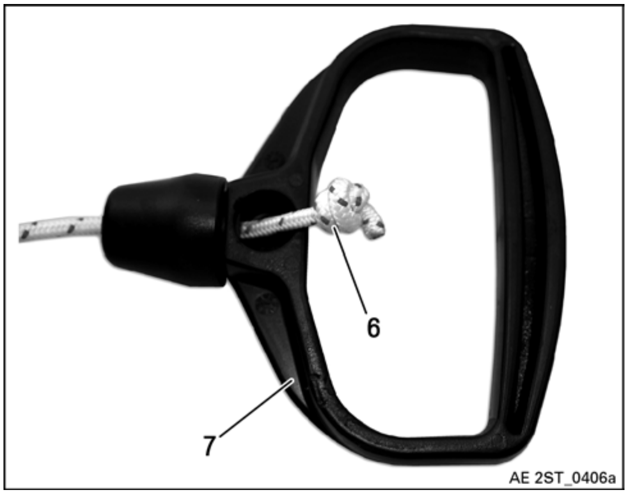


Figure 10.23

6 Knot *7 Starter handle*

REWIND STARTER – INSTALLATION

Step	Procedure
1	Lock the crankshaft with locking pin part no. 876640.
2	Apply LOCTITE 648 on contact area of magneto flywheel with hydro damper assy. / starting pulley.
3	Install starting pulley (3) and hydro damper assy. (1) onto magneto flywheel (2) using 3 hex. screws M8 (4). Tightening torque 24 Nm (18 ft.lb)

ATTENTION

Use only M8x20 mm screws. Longer screws would damage stator assy. coils.

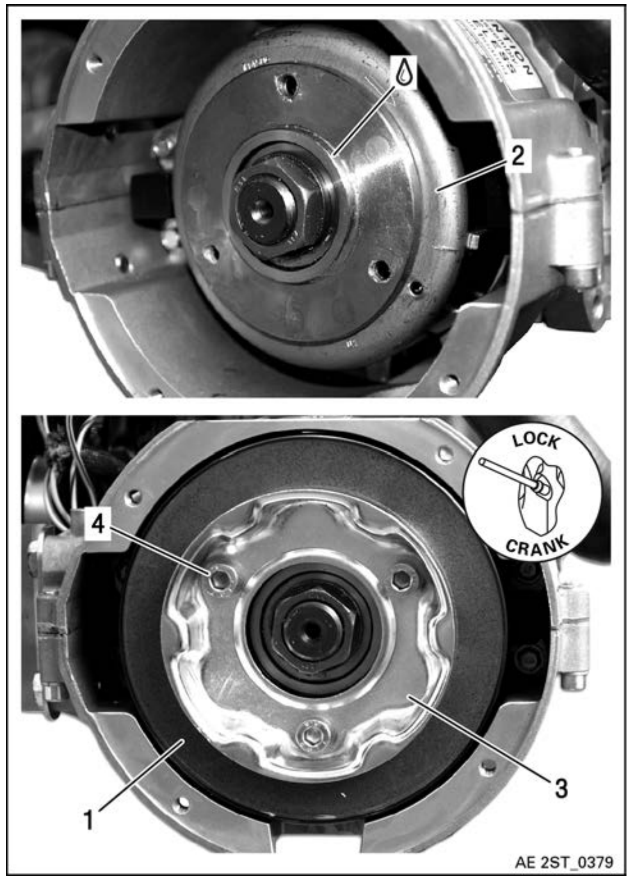


Figure 10.24

1 Hydro damper assy. *2 Magneto flywheel*
3 Starting pulley *4 Hex. screws M8x20*

Step	Procedure
4	Install connecting flange (5) with Allen screws M6 (6). Tightening torque 10 Nm (89 in.lb)

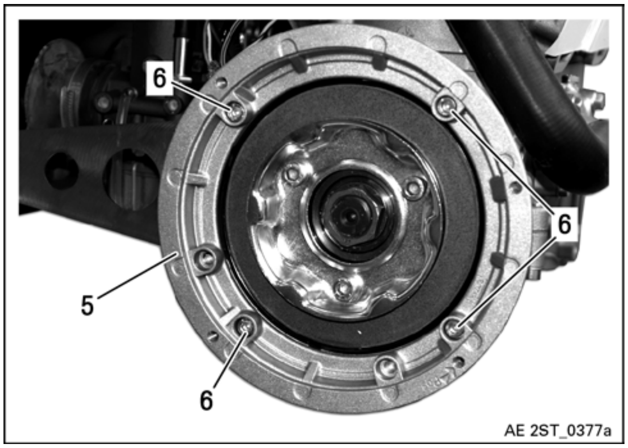


Figure 10.25

5	*Connecting flange*	6	*Allen screws M6x16*

Step	Procedure
5	Install starter cover (7) using 4 TAPTITE screws (8) with LOCTITE 243. Tightening torque 8 Nm (70 in.lb)

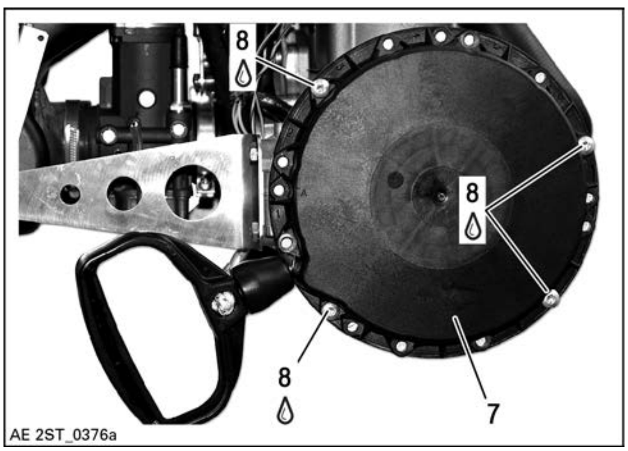


Figure 10.26

7	*Rewind starter cover*	8	*TAPTITE screws M6x20*

FINISHING WORK

- Remove the crankshaft locking pin
- Re-connect the negative terminal of the onboard battery

Carry out an engine test run.
See Maintenance Manual Line for engine type 582 mod. 99 / mod. 17.

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Engine serial no.

Type of aircraft

Aircraft registration no.

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