



INSTALLATION AND MAINTENANCE MANUAL

AUSTART AS50U VANE STARTER



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NOTICE

THIS MANUAL CONTAINS IMPORTANT SAFETY INFORMATION. IT IS IMPORTANT THAT THE ENTIRE CONTENTS BE STUDIED BEFORE INSTALLATION AND OPERATION. IT REFLECTS INFORMATION RELATING TO A SPECIFIC AUSTART AS50-5849U AIR STARTER.

FOREWORD

This manual contains instructions for the installation, maintenance and operation of your new AS50 AUSTART Air Starter Motor. It has been designed to provide you with safe and reliable service. However, it is both a pressure vessel and a piece of rotating machinery. Therefore, operators and maintenance personnel must exercise good judgement and appropriate safety practices to avoid damage to the equipment and prevent personal injury. The instructions in this manual are intended for personnel with a general training in the operation and maintenance of air starter equipment.

It should be understood that the information contained in this manual does not relieve the operating and maintenance personnel of the responsibility for exercising good normal judgement in the operation and care of air start equipment and their associated systems.

Throughout this manual you will encounter the words **WARNING**, **CAUTION** and **NOTICE**.

These paragraphs are intended to emphasise certain areas where personnel safety and satisfactory starter operation may be compromised should the message be ignored. The definitions of these words are as follows -



An operating procedure, practice etc. that if not strictly observed, could result in personal injury.

CAUTION

An operating procedure, condition etc. that if not followed could result in damage to, or the destruction of equipment.

NOTICE

An operating procedure, condition etc. that is essential to highlight and observe.

It is advisable that a safety program be established to address the safety issues detailed within this manual before installing, operating or maintaining this equipment. It is important such a program covers the hazards associated with compressed air.



Do not install this starter other than in accordance with the instructions detailed in this manual.

These instructions should be read completely before beginning installation and should be available to personnel responsible for operating and maintaining this equipment. The unit is capable of trouble free operation when properly applied, installed and maintained.

Extra copies of this manual are available from your local Austart Air Starter Distributor or the Factory.

This manual is designed to cover all situations normally experienced when installing, operating and maintaining this equipment. In the event situations are encountered that are not covered by this manual, consult your AUSTART agent or K.H. Equipment Pty Ltd direct.

AUSTART PRODUCT NUMBERING



MODEL PREFIX CODES: **AS** AUSTART VANE STARTER
ATS AUSTART TURBINE STARTER

STARTER MODEL	FLANGE CODE	PINION CODE	SPECIAL FEATURES
AS50 AUSTART AIR STARTER	01 SAE 1	09 9TH 3MOD R	B BCB (Beryllium Copper Bronze Pinion)
ATS53 AUSTART TURBINE STARTER	02 SAE 2	10 10TH 8/10 R	E Threaded Exhaust 1.5"
ATS54 (ATS53 OH) AUSTART TURBINE STARTER	03 SAE 3	11 11TH 6/8 R	F Threaded Exhaust 2" Bolt On
AS55 (AS50 OH) AUSTART AIR STARTER	04 SAE 4	12 12TH 8/10 R	G Threaded Exhaust 2"
AS61 AUSTART AIR STARTER		13 12TH 8/10 L	H Highway Special
ATS63 AUSTART TURBINE STARTER	Other options	14 11TH 6/8 L	I Inertia Drive
ATS64 (ATS63 OH) AUSTART TURBINE STARTER	available	15 10TH 8/10 L	J Threaded Exhaust Elbow 2"
AS66 AUSTART AIR STARTER		16 9TH 3MOD L	K Kelly Spinner Muffler
AS67 AUSTART AIR STARTER			M Mining Spec.(Cast Iron)
AS68 (AS6070) AUSTART AIR STARTER		Other options	N Short Nose (Inertia ATS77)
AS69 (AS67OH) AUSTART AIR STARTER		available	P Motor Ports 90°
AS70 AUSTART AIR STARTER			R Reduced Muffler
ATS73 AUSTART TURBINE STARTER			S Short Muffler
ATS77 AUSTART TURBINE STARTER			T Threaded Exhaust 3"
AS75 (AS70 OH) AUSTART AIR STARTER			U U Configuration
AS78 (AS7080) AUSTART AIR STARTER			V Value Muffler (ATS77)
AS80 AUSTART AIR STARTER			X Special – Refer Factory
ATS83 AUSTART TURBINE STARTER			
ATS84 (ATS83 OH) AUSTART TURBINE STARTER			
AS85 (AS80 OH) AUSTART AIR STARTER			
AS90 AUSTART AIR STARTER			
ATS93 AUSTART TURBINE STARTER			
ATS94 (ATS93 OH) AUSTART TURBINE STARTER			
AS95 (AS90 OH) AUSTART AIR STARTER			
AS100 AUSTART AIR STARTER			
ATS103 AUSTART TURBINE STARTER			
ATS183 AUSTART TURBINE STARTER			

EXAMPLES OF BASIC STARTER PRODUCT NUMBERING

ATS63-0110M	PERKINS 1006	SAE1	10TH	MINING SPEC
ATS63-0409M	MWM D916-6	SAE4	9TH	MINING SPEC
ATS73-0311	CUMMINS N14	SAE3	11TH	
ATS73-0314	CUMMINS N14	SAE3	11TH	LH
ATS73-03111	DETROIT 12V71	SAE3	11TH	INERTIA DRIVE
ATS73-03141	DETROIT 12V71	SAE3	11TH	INERTIA DRIVE LH
ATS73-0312M	CATERPILLAR 3306	SAE3	12TH	MINING SPEC
ATS83-0311IT	WAUKESHA 7072	SAE3	11TH	INERTIA THREADED EXHAUST

INSTALLATION AND PREPARATION FOR OPERATION



- **Ensure air supply is isolated before installation, removal, maintenance or adjustment of your AUSTART starter.**
- **Before any starter is taken out of service first bleed the Air Receiver of air and any moisture that may have accumulated by opening up the drain valve. Do not bleed by removing Receiver plugs.**
- **Remove air hoses to ensure complete safety once the air supply has been isolated and the Receiver has been bled.**
- **The Air Receiver must be manufactured to an applicable pressure vessel code such as AS 1210, or similar.**
- **Only use air hoses and fittings that are of adequate size as indicated in the installation schematic (page 6)**
- **Always carry out a pressure test on the complete starting system according to Clause 7 on Page 5 before beginning operation. Do not begin operations until satisfied the unit has been installed correctly.**
- **Always use recommended lubricants where prescribed by this manual. Under no circumstances use flammable or volatile liquids.**
- **Ensure all fasteners are torqued to the values prescribed in this manual. Use thread sealant where indicated.**
- **To ensure warranty provisions are not invalidated use only genuine AUSTART replacement parts. Non-genuine parts may cause service and performance problems and may affect the safe operation of your starter.**

INSTALLING THE STARTER AND PIPEWORK

Refer to the Starter Installation Schematic drawing on page 6

1. The air supply line should ideally exit from the top or side of the Air Receiver.

CAUTION

Do not connect Air Supply Line to the bottom of the Air Receiver. Moisture and system contaminants collect at the receiver bottom and can damage the Austart Starter internals if allowed to pass through. Periodically drain moisture from the Air Receiver using a drain valve connected at the Receiver bottom.

2. Install a LS1000M lube relay valve. The Austart AS50 series air starter should be lubricated with light weight oil or diesel fuel.
3. Mount the Starter Control Button SC25 onto the vehicle dash-board or appropriate control panel and connect to the Air Receiver using a minimum of 1/4" (6mm) line.

NOTICE

Ensure the inlet side of the Starter Control Button connects to the line from the Receiver. Any Safety "Switches" should be installed in this line between the Starter Control Button and the Air Receiver.

4. Determine the practicality of running the main air supply hose or pipe from the exit of the Relay Valve to the inlet of the Austart Starter after the Austart Starter is mounted. It may be easier to fit the hose before the Austart Starter is mounted in position.
5. Once the Austart Starter is mounted, fit the remaining 1/4" (6mm) control lines from the Austart Starter to the Starter Control Button and Relay Valve respectively (Refer page 6).
6. Make all hose or pipe connections leak proof using a suitable thread sealant.
7. Once the connections have been made pressurise the system and check for leaks using "soapy" water or similar solution.

ALL CONTROL LINES
MINIMUM 1/4" (6mm) O.D
OR #4

STARTER CONTROL
BUTTON SC25

INSTALL ALL SAFETY CUT OUTS
SUPPLY SIDE OF START VALVE

AIR SUPPLY FROM
COMPRESSOR

LUBRICATION LINES
PORT 'F'
MINIMUM 1/4" (6mm) O.D
OR #4

ONE WAY
CHECK VALVE

LUBRICATION TO
PASS THROUGH
LUBRICATOR

LUBRICATOR
RELAY VALVE
LS1000M

AIR
RECEIVER

FLANGE
ADAPTOR
LSA50

MAIN SUPPLY LINES
MINIMUM 3/4" I.D

EXHAUST PORT

INPUT LUBRICATION TO LOWEST PORT ON LUBRICATOR RELAY VALVE (LRV)
AND RETURN TO TANK VIA HIGHEST PORT.
(TO MAINTAIN OIL IN VALVE AND REDUCE DRAIN BACK OF OIL.)

- IT IS ADVISABLE TO INTRODUCE A SQUIRT OF OIL TO
INLET SIDE OF STARTER PRIOR TO FIRST OPERATION.

TITLE

AS50U - Schematic

SCALE: 1:3

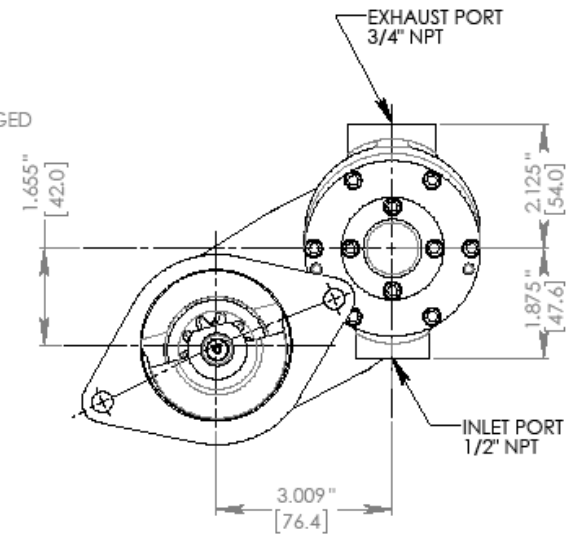
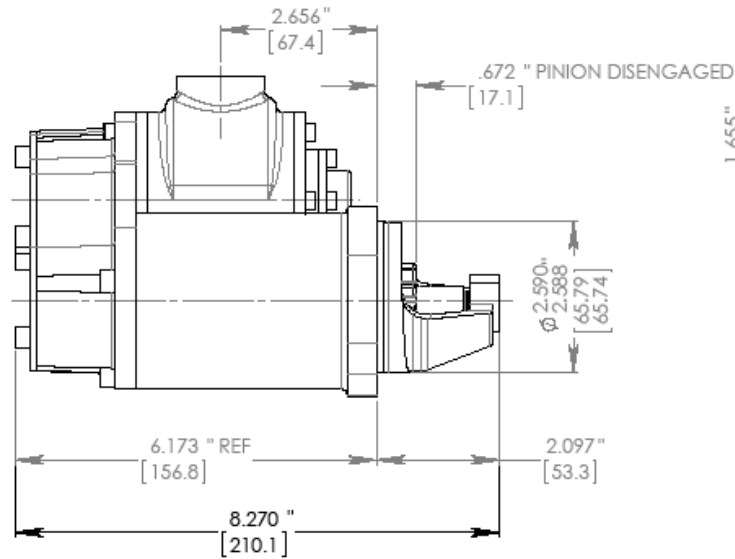
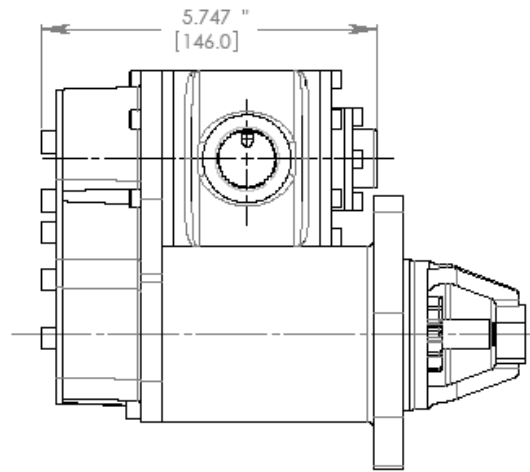
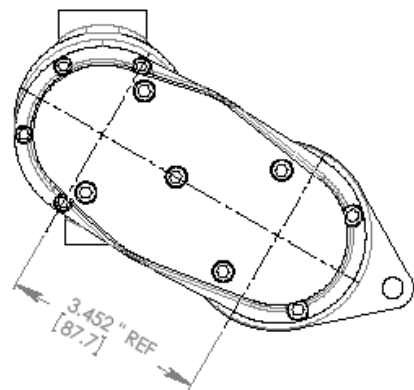
DO NOT SCALE
DRAWING

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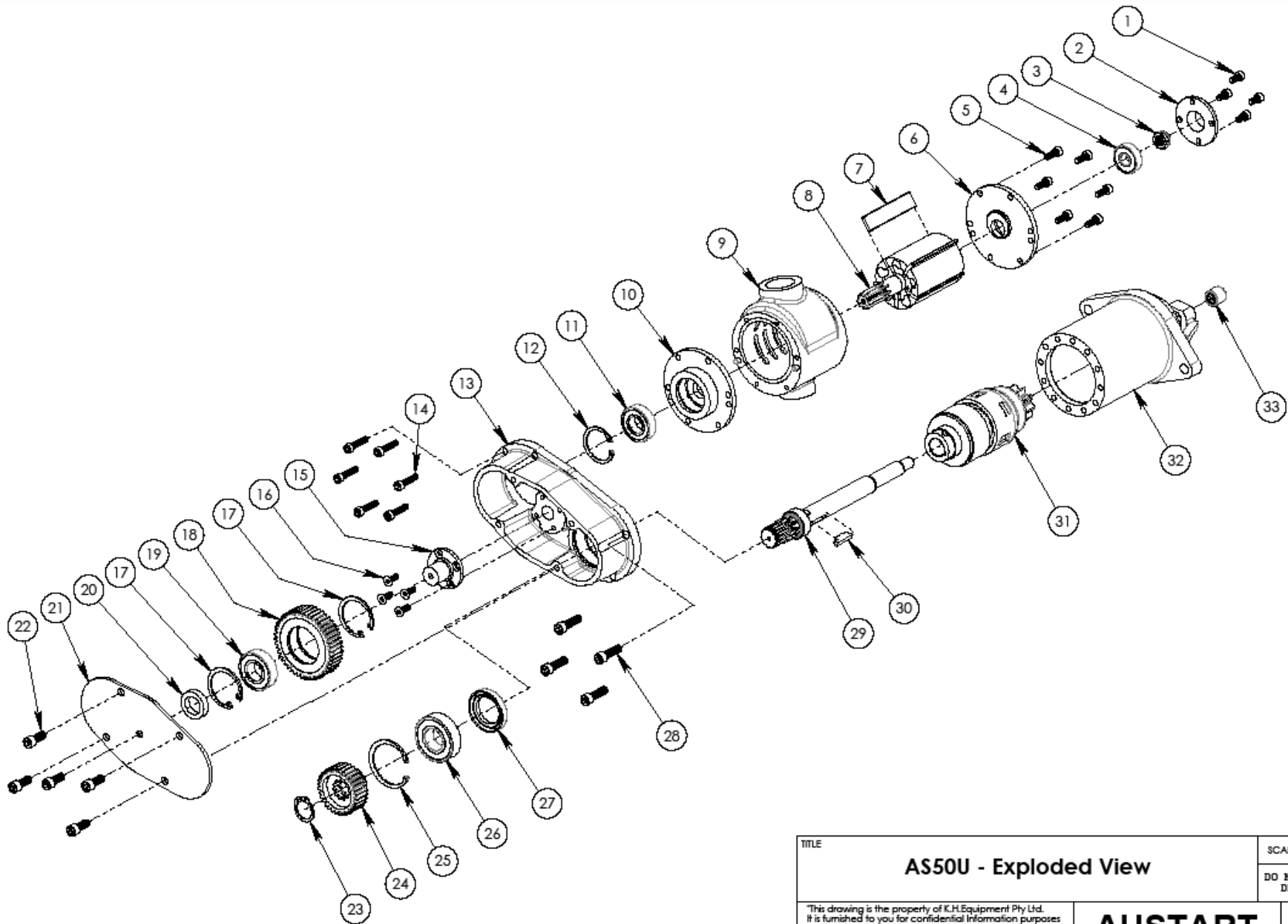
AUSTART

A3

-2-



TITLE		SCALE: 1:2
AS50U - General Arrangement		DO NOT SCALE DRAWING
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		A3



TITLE	AS50U - Exploded View	SCALE: 1:3
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AUSTART		A3

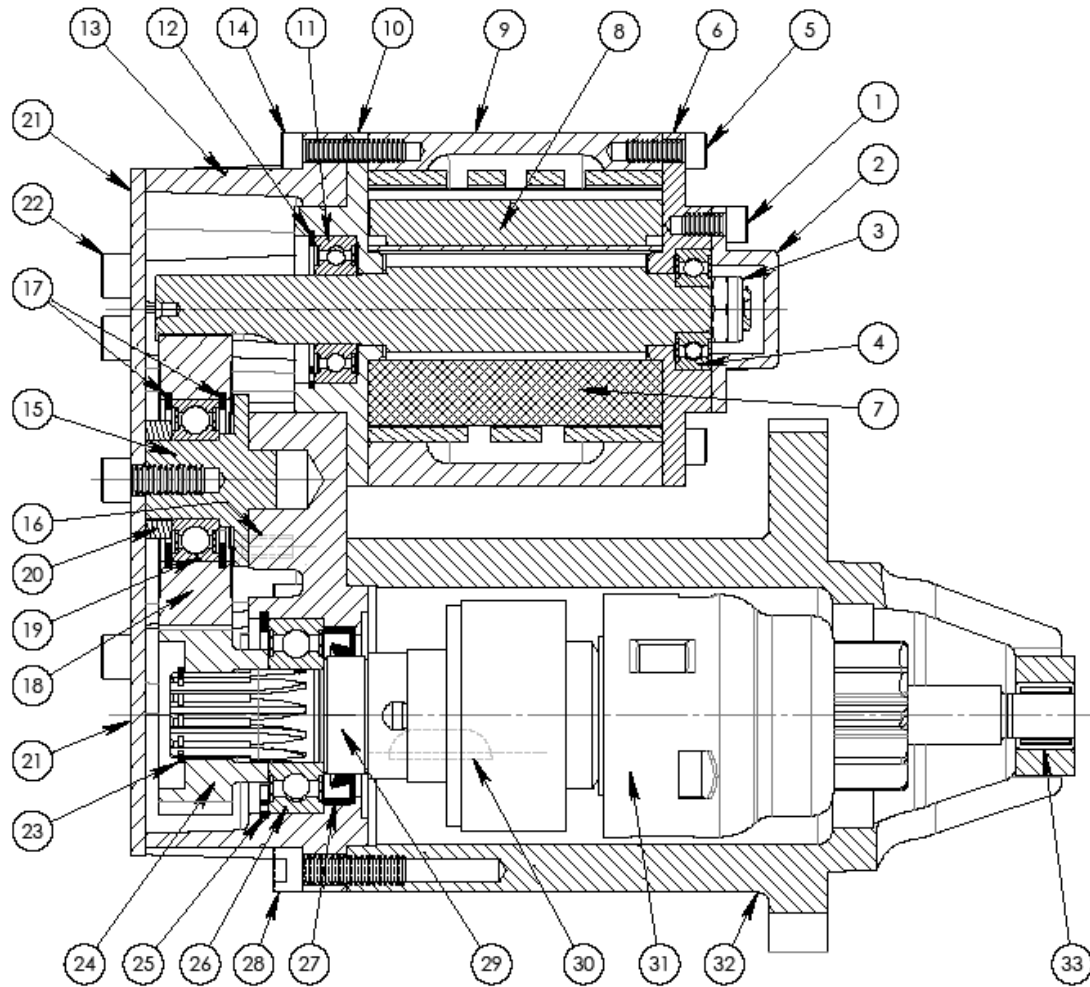
AUSTART AS50U

PARTS BREAKDOWN

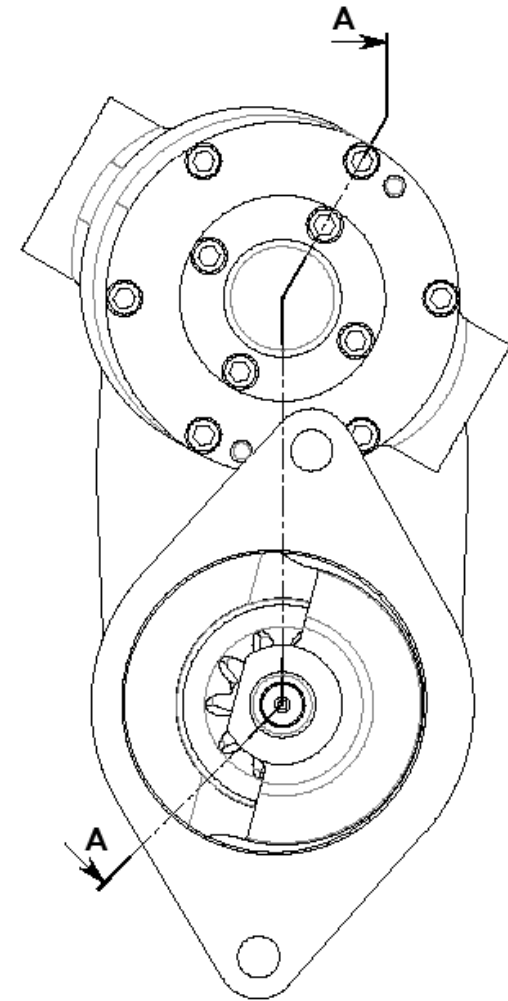
ITEM	PART NO.	EXT.	DESCRIPTION	QTY	ITEM	PART NO.	EXT.	DESCRIPTION	QTY
1	6001	-000	SCREW	4	31	6016	-XXX	DRIVE ASSEMBLY	1
2	5002	-100	END CAP	1	32	5018	-XXX	NOSE HOUSING	1
3	5301	-000	SPECIAL NUT	1	33	5001	-000	BEARING	+
4	5026	-000	BEARING	+					
5	5006	-000	SCREW	6					
6	5004	-100	END COVER	1		5040	-920	SERVICE KIT CONSISTS AS MARKED +	A.R.
7	5008	-900	BLADE SET	+					
8	5009	-100	ROTOR	1					
9	5007	-910	MOTOR HOUSING ASSY	1					
10	5010	-100	END COVER	1					
11	6310	-000	BEARING	+					
12	6308	-000	CIRCLIP	+					
13	5111	-200	GEAR COVER	1					
14	5021	-000	SCREW	6					
15	6767	-100	IDLER PIN	1					
16	6115	-000	SCREW	4					
17	6612	-000	CIRCLIP	+					
18	5113	-100	IDLER GEAR	1					
19	6611	-000	BEARING	+					
20	6771	-100	SPACER	1					
21	5112	-100	COVER PLATE	1					
22	6005	-000	SCREW	5					
23	6617	-000	CIRCLIP	+					
24	5017	-100	DRIVE GEAR	1					
25	6619	-000	CIRCLIP - FITTED	+					
26	6012	-000	BEARING	+					
27	6621	-000	SEAL	+					
28	6729	-000	SCREW	4					
29	5019	-110	DRIVE SHAFT	1					
30	6624	-100	WOODRUFF KEY (MODIFIED)	1					

- XXX DENOTES OPTIONS AVAILABLE

PARTS BREAKDOWN



SECTION A-A



TITLE	AS50U - Section	SCALE: 1:1
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AUSTART		A3

MAINTENANCE



DISASSEMBLY

Refer to the Exploded View drawing on page 8

Begin by separating the motor sub assy (9) from the gear cover assy (13).

1. Remove screws (22) and cover plate (21).
2. Remove spacer (20), idler gear (18) and the six screws (14).
3. Remove motor sub assy (9) from gear cover (13).

The Sub-Assemblies may now be dismantled separately. Disassembly of any of these two Sub-Assemblies is detailed in the exploded view on page 8 and is basically in the order shown. Refer also to the following instructions:

Gear Cover Assembly

1. Remove screws (28) and remove nose (32) from gear cover (13). Loosen drive retaining screw from drive and remove drive assy (31) from drive shaft (29).
2. Invert and support gear cover (13) with drive shaft in the downward position.
3. Remove circlip (23) with circlip pliers and gently press out drive shaft (29) from gear (24) and bearing (26).
4. Remove circlip (25) using circlip pliers. Place gear cover (13) on bench. Using a pressing tool, press out bearing (26) and seal (27).
5. Remove nose bearing (33) from nose (32).

Motor Assembly

1. Remove the four screws (1) and cap (2).
2. Invert motor assy and hold shaft of rotor (8) in a vice using soft jaws.
3. Remove nut (3) and place motor assy on bench.
4. Support motor housing (9) and lightly tap threaded end of rotor (8) which will remove end cover (10) and rotor (8) as an assembly.
5. Support end cover (10) and press rotor (8) out through bearing (11).
6. Remove circlip (12) using circlip pliers and press out bearing (11).
7. Remove six screws (5) support motor housing (9) using a soft drift, tap end cover (6) away from motor housing (9).
8. Support end cover (6) and press out bearing (4).

INSPECTION

Refer to the Exploded View drawing on page 8

1. Visually inspect all parts removed during disassembly for excessive wear or damage. Replace any damaged or questionable parts.
2. Pay particular attention to the slots in rotor (8) for excessive wear, also the condition of motor housing liner for excessive wear and scoring. If excessive scoring has occurred or the liner has irregular wear patterns honing of the motor housing liner is required. Serviceable limits as follows:
 - 2.125 – 2.130 inch
 - 53.98 – 54.102 metric
3. Also pay particular attention to all gear teeth looking for cracked or broken teeth and excessive wear. Check the pinion on the Drive Assembly (31) for evidence of unusual contact patterns resulting from misalignment or improper engagement. Remove any burrs or replace if questionable.
4. Check all bearings are free to rotate and do not have excessive play between races. If in doubt replace questionable bearings.

CAUTION

Do not wash shielded bearings that are to be reused in solvent or blow with compressed air as it may remove internal lubrication. Bearings that are to be reused should be cleaned by wiping the end shields with a clean cloth.

5. Clean all other parts that are going to be reused with commercially approved solvents.

WARNING

Ensure cleaning operations are carried out in a properly vented area away from open flames.

6. It is recommended that when servicing your Austart Air Starter always replace complete repair kit contents.

REASSEMBLY

Refer to the Exploded View drawing on page 8

Reassembly of any of the two Sub-Assemblies detailed in the exploded view on *page 8* is basically in the reverse order shown. Refer also to the following instructions:

Gear Cover Assembly

1. Begin by pressing the Bearing (33) into Nose Housing (32) using a press with an appropriate pressing tool.
2. Drive home the Seal (27) into the Gear Cover (13) until it bottoms.

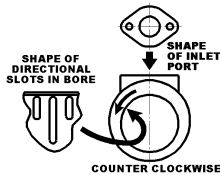
CAUTION

Ensure the Seal (27) is fitted the correct way, ie with the tapered leading edge engaged first. Liberally grease the exposed side of the Seal (27) with Lithium based grease such as Valvoline VALPLEX EP Grease or similar.

3. Using a press drive home the Bearing (26) into the Gear cover (13) until it bottoms. Then insert Shaft (29) into the Bearing (26) and press home. Ensure the Gear cover (13) and Bearing (26) are well supported during this operation. Finally fit Circlip (25) using circlip pliers.
4. Invert the Gear cover (13) and restrain in the vertical position. Slip on gear (24) onto Shaft (29) and fit Circlip (23) using circlip pliers.
5. Invert partial assembly again and slide drive assy (31) onto drive shaft (29) with woodruff key (30) in place.
6. Using Loctite 242 thread locker apply to drive assy locking screw and tighten.
7. Align nose housing (32) to the correct position and assemble on to gear cover (13) using four screws (28) and tighten.
8. The gear cover assy is now ready to except the motor assy.

Motor Assembly

1. Install bearing (4) into end cover (6) and bearing (11) into end cover (10).
2. Confirming direction of air starter. For counter clock-wise air starters refer diagram below. Start by placing motor housing (9) on a bench with the three intake directional slots facing to the left.
3. Apply a thin layer of liquid gasket such as Loctite 515 or similar to mating face of motor housing.
4. Knock on end cover (6) with a soft hammer and insert the six screws (5).
5. Invert the motor housing (9) and support bearing (4) and end cover (6).
6. Press rotor (8) into bearing (4) insert blades (7) into rotor (8) slots making sure blades are pushed out towards motor housing liner. Apply thin layer of liquid gasket such as Loctite 515 or similar to mating face of motor housing.
7. Insert end cover (10) and bearing (11) over rotor shaft with an appropriate tool. Press home end cover (10) and bearing (11).
8. Fit circlip (12) using circlip pliers.
9. Invert motor assy and hold gear teeth of rotor (8) in vice using soft jaws.
10. Apply oil to thread of rotor (8) and install nut (3) tighten nut to a torque of 20-25 ft lb (27-34Nm)
11. Apply a thin layer of liquid gasket to cap (2) and mount onto end cover (6) with the four screws (1).



12. Carefully align motor assembly to the correct position and install into gear cover assy (13), install screws (14) and tighten.
13. Install 1st circlip (17) into idler gear (18) using circlip pliers, carefully press bearing (19) and install 2nd circlip (17).
14. Invert gear cover assembly, align gears and assemble idler gear (18) and spacer (20) onto idler pin (15).
15. Liberally pack gear teeth with suitable grease such as Valvoline Valplex EP grease or similar.
16. Apply a thin layer of liquid gasket such as Loctite 515 to cover plate face of gear cover (13). Install cover plate (21) and screws (22).
17. Apply lubricating oil into inlet port of motor housing (9). Attach air line and test operation of air motor.
18. The Austart air starter is now assembled and ready for installation. Refer to installation and operation section of this manual.

WARRANTY POLICY

All Austart Products supplied by K.H. Equipment Pty. Ltd. (herein called “the Manufacturer”) is warranted to be free from any defect in workmanship and material under conditions of normal use and service for engine starting applications for a period of 12 months from the date of purchase by the first user. Normal wear and tear is excluded from the warranty cover.

The Manufacturer will replace or repair at their works, without cost, any Austart Starter or parts found to be defective or at their discretion choose to refund the purchase price less a reasonable allowance for depreciation in exchange for the starter or part should the item prove impossible to repair or replace.

This warranty shall not apply to any Austart Starter or parts which have been altered or repaired or purchased outside the Manufacturer and its assigned agents nor to equipment or parts that have been subject to misuse including overloading, neglect, accident or damage, nor to any part or parts improperly applied or installed.

This warranty is in lieu of all other warranties and conditions statutory or otherwise expressed or implied and of all other obligations or liabilities on the Manufacturer’s part. The Manufacturer’s maximum liability is limited to the purchase price of the starter and is not liable for any consequential damage, loss or expense.

Repeat engine starting attempts must be delayed for 15 seconds to allow all Austart Starter and engine components to stop rotating to avoid damage or adverse wear of components.

