

MARINE PROPULSION, INC.

1505 Corbin Ave • Hammond, LA 70403

TEL. 985-542-5344 • FAX 985-542-5347

www.marinepropulsion.net

e-mail: marprop@bellsouth.net



December 20, 2004

Mr. Steve Cochrane
Canadian Coast Guard - Vessel Support Services
P. O. Box 6000, 9860 W. Saanich Road
Sidney, BC
V8L 4B2

SUBJECT: HEIMDAL MANUAL

Dear Mr. Cochrane:

Please find enclosed two (2) copies of the requested manual for Gear Model
HG342SSF - Build No. 0291.

Please advise if we can be of further assistance.

Regards,

MARINE PROPULSION INC.

Ken Robbins (PR)

Ken Robbins

KR/pd

MARPROP
THRUSTERS



HEIMDAL PROPULSION NORWAY AS

Årøsetervn. 14
Post-box 2091
N-6401 Molde
Norway

Tel.: + 47 71 25 21 55
Fax.: + 47 71 25 17 78
E-Mail Tande@heimdal.com
Home page www.heimdal.com

CP PROPELLER

&

MARINE GEAR

SERVICE

&

PARTS

MANUAL

HEIMDAL PROPULSION NORWAY AS

FOREWORD

This service and parts manual relates to a complete cp-propeller with marine reduction gear, or shaftline servo unit manufactured by
HEIMDAL PROPULSION NORWAY AS.

However, where a HEIMDAL product is part of a propulsion system that incorporates products of other manufacture, this manual is only valid for such equipment as is manufactured or supplied by
HEIMDAL PROPULSION NORWAY AS.

Torsion data for equipment of HEIMDAL supply is provided to the Engine Supplier or Shipyard prior to delivery of the cp-propeller plant to enable a torsional vibration analysis to be carried out.

It is a condition of the HEIMDAL warranty that the responsible party prior to the vessel entering service gives torsional approval of the complete driveline.

Such approval is to include ancillary equipment driven from the engine and/or gear, and is to be without barred speed ranges.

When ordering replacement parts, please give the reduction gear serial number, and the specific drawing number, position number and part description, in addition to the part number.

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EXAMPLE

Gear serial number 36101, drawing 106-065, position 42, roller bearing, and part number 3G0014.

This example correctly identifies the main thrust bearing for the HG300 series reduction gear.

Should you require further information or advice regarding the operation and/or maintenance of your HEIMDAL equipment, please do not hesitate to contact us.

Molde, August 1997

HEIMDAL PROPULSION NORWAY AS

RECOMMENDED LUBRICANTS

Marine Gear and HPC-unit

CASTROL	Alpha	SP150
BP	Energol	GR/XP-150
ESSO	Spartan	EP150
MOBIL	Mobilgear	629
SHELL	Omala	100
SHELL	Omala	150
TEXACO	Meropa 100	
STATOIL	Loadway	EP100/EP150
TOTAL	Carter	EP150

First oil change at 200 hours, regular oil change at 1000 to 2000 hours, dependent on operating conditions.

Oil capacity (dry):

HG200 Gear	35 litre	HG300 Gear	60 litre	HPC-500	55 litre
HG400 Gear	130 litre	HG500 Gear	180 litre	HPC-550	70 litre

Propeller Hub (except K600)

BP	Energrease	MM-EP2
ESSO	Beacon	No. 2
MOBIL	Grease	No. 2
SHELL	Alvania	EP2/3
CASTROL	CL Grease	1616
TEXACO	Novatex	EP2
TEXACO	Multifak	EP2
STATOIL	Uniway	Li62
TOTAL	Multis	EP2/3

The propeller hub must be greased with the blades set in the full ASTERN position to avoid over-filling and possible hub damage.

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STERNTUBE (and K600 Hub)

GOL SEAL FITTED

ESSO	Stermar220	
SHELL	Talona	30
FINA	Neptun	53
CHEVRON	Marine oil	38X
STATOIL	Sternway	220
MOBIL	Voco Engine Oil No. 1	

DEEP SEA SEAL FITTED

CASTROL	Perfecto	T68 & T100
ESSO	Tromar	T77 & T78 EP
SHELL	Turbo	T78
BP	Egergol	THB77
MOBIL	Mobilguard	312
TEXACO	Regal Marine	100
TEXACO	Taro	XD30
TOTAL	Preslia	68 & 100
VICKERS	Hydrox	550
GOLDEN FLEECE	Circol	300 XT

SIMPLEX SEAL FITTED

VICKERS	Hydrox	550
CASTROL	Perfecto	T68
ESSO	Tromar	T66
MOBIL	Mobilguard	312
TEXACO	Taro	XD30

Oil capacity of the gravity supply tank is approx 30 litres.

The recommended oils for Gol Seals are NOT compatible with those recommended for Simplex or Deep Sea Seals and use of incorrect oil may lead to seal failure.

For operation in tropical regions, it may be necessary to use a higher viscosity oil of the same type. Please consult your local oil-company representative for confirmation of the correct grade.

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DESCRIPTION OF CP-PROPELLER

The Heimdal K-Series propeller is of three or four bladed design, with the hub and blades manufactured in NiAl bronze.

On the three-bladed type, the hub is split radially at the blade centre-line, and the propeller blade journals each have a rubber seal ring fitted. The hub is grease packed and movement of the pitch control rod forces grease to the blade journals.

On the four-bladed, the hub is manufactured as a single part and fitted with an end cover. The propeller blades are bolted to a carrier and each have a rubber seal ring fitted. The hub is oil lubricated from the sterntube gravity tank through borings in the propeller shaft.

The pitch control rod is manufactured in stainless steel and is supported in the hollow-bored propeller shaft by two bearings. Linear movement of the control rod is converted to a circular motion by a positioner slide and slide blocks that engage gudgeon pins fitted to the propeller blades.

The propeller shaft is manufactured in high-tensile steel and is secured at the hub (3-bladed models) by a key, taper and lock nut arrangement. The K600 (4-bladed model) hub is a shrink-fit on the propeller shaft. All models are mounted to the gear output flange by a split-type coupling.

The sterntube is manufactured in seamless steel tubing and is mounted to the hull in a way that allows for axial movement at the inboard end. Propeller shaft bearings are of iron-backed white metal and are oil-lubricated from a gravity supply tank mounted 2-3 meters above the waterline. The types of sterntube seals fitted are given in the equipment specification.

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CP-PROPELLER DESIGN.

The hull design and type of operation determine the blade shape while the propeller speed dictates the optimum diameter for the horsepower used. The prop shaft and hub diameter are determined by the maximum torque to be transmitted.

The design pitch of a cp-propeller is identical to that which would be used for a fixed-pitch propeller operating in a vessel of the same specifications.

However the advantage with a cp-propeller is that the blades may be rotated to compensate for variations in operating conditions that are outside the original design concept.

With minor changes to the blade setting, it is possible to keep the engine at its most effective operating speed irrespective of vessel speed. Engine driven alternators and hydraulic pumps can run at the rpm consistent with best performance.

Manoeuvrability is greatly improved, and in an emergency the propeller can be moved to the astern position while the vessel is running ahead for a much-reduced stopping time.

PROPELLER OPERATION

The propeller should be in the neutral position with the engine set at idle when the clutch is engaged.

Increase the engine speed to high idle after engaging the clutch and apply a few degrees of pitch to bring the vessel under way.

Then while moving the engine to maximum speed, progressively increase the pitch to obtain the required speed.

AVOID OVERLOAD - USE FULL PITCH ONLY WHEN THE VESSEL IS MOVING.

Maximum performance is obtained when the blade setting is such that it absorbs the power for which the propeller is specified.

HEIMDAL PROPULSION NORWAY AS

MANOEUVRING AT LOW SPEED.

Set the engine speed to approximately 70% of maximum rpm and use just the pitch control to manoeuvre the vessel ahead and astern. The propeller will travel from the full ahead to the full astern position in 10-15 seconds at this engine speed, depending on the oil-pump capacity and size of equipment installed.

THE PITCH CONTROL LEVER WILL ALWAYS FOLLOW THE MOVEMENT OF THE SERVO PISTON AND FORCING IT WILL HAVE NO EFFECT ON THE SPEED OF PITCH LEVER AS IS NECESSARY TO OVERCOME FRICTION IN THE CONTROL SYSTEM.

EMERGENCY STOPPING.

In an emergency, the propeller pitch can be moved from the full ahead to the full astern position while the vessel is running ahead at maximum speed, although this may severely overload the engine.

For the quickest possible stopping time, it is best to reduce the engine speed at the propeller is reversed and then increase the engine speed at the propeller begins to bite in astern. This reduces propeller cavitations (which can limit the braking effect) and vibration.

ECONOMICAL OPERATION.

For the most economical operation, bring the engine up to full power and the vessel to full speed, then leaving the pitch lever as set, gradually reduce the engine rpm (8-10%) until the vessel speed is marginally affected.

At this setting the minimum horsepower necessary is being used to maintain the vessel speed and both fuel consumption and engine wear will be reduced.

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DESCRIPTION OF MARINE GEAR.

The HG-Series Marine Gears are of vertical-offset, single-stage design offered as a free-standing unit or with an SAE bell housing for direct mounting to the engine.

Power is transmitted through a flexible coupling connected to the flywheel. The primary shaft has a hydraulic multi-disc clutch and a gear-type oil pump, which is driven directly from the engine flywheel to provide oil-pressure immediately on starting-up.

The gear pinion is integral with the primary shaft and supported by one spherical and one cylindrical roller bearing. The secondary shaft is supported at the forward end by an iron-backed white metal bearing and at the aft end by a spherical roller bearing. The pitch servo cylinder and piston are mounted in the centre of the gear wheel and output shaft. The servo piston is connected to the pitch setting mechanism in the propeller hub by a control rod.

Movement of the servo piston is controlled by oil fed to either side of the piston through oil-ways drilled in the piston shaft, via the servo slide valve. A control lever operates the servo slide valve and the position of the valve determines the pitch setting.

HEIMDAL PROPULSION NORWAY AS

GEAR LUBRICATION SYSTEM.

Oil is drawn by a pump from the gear sump via a filter element fitted with magnets to trap any steel particles and delivered through an oil-cooler to the oil distribution valve block. While the clutch is disengaged the oil is diverted to the propeller shaft-brake. When the clutch is engaged oil is directed to the clutch. When correct clutch working pressure has been reached a valve opens and oil is fed to the valve block provides oil to the slide bearing should there be insufficient oil-pressure to open the valve.

The valve block has a safety valve and oil-feed outlets for the lubrication of bearings and gear wheels.

Oil flow from the distribution block to the clutch is adjustable and should clutch engagement be too sharp, then the regulator may be turned clockwise to reduce the flow and extend the engagement time. Correctly set, the clutch will fully engage in 2--5 seconds.

Should oil-pump failure or leakage in the oil system prevent the clutch engaging, it can be engaged mechanically by finding the emergency bolts that are mounted on the gear top-cover. These are screwed into the clutch housing to lock the discs. The propeller must be wedged in ahead position by using a bar through the slots in the shaft coupling, and locked in this position to prevent the propeller going astern.

SERVO LUBRICATION SYSTEM

Oil is drawn by a pump from the servo sump via a filter element and delivered through an oil-cooler and safety valve to the oil distribution valve, and further to the oil inlet ring and servo cylinder.

Pipelines fitted to the main feed line between the cooler and the safety valve provides lubrication to bearings.

Should an oil-pump or drive-chain failure prevent the pitch servo operating, the electric standby lubrication system (where fitted) may be brought into use. (AFTER first checking that no mechanical damage will result from the failure. E.g. A broken chain damaging the sprockets of shaft.)

Where there is no electric standby lubrication system fitted, and no spare parts are held onboard, the propeller must be wedged in the ahead position by using a bar through the slots in the shaft coupling, and locked in this position to prevent the propeller going astern.

HEIMDAL PROPULSION NORWAY AS

INSTALLATION OF STERN TUBE.

Wooden Vessel.

The stern tube for a wooden vessel is installed from the engine room in seats bored in the stern boss and inner bulkhead. First bolt the stern tube to the inner bulkhead, ensuring that the mounting flange lies absolutely flat against it. Next, ensuring that the outer flange is absolutely flat against the sternpost fit the stern nut with attached o-ring. Check that the o-ring is well seated in the groove, before tightening the nut. Finally countersink the two setscrews into the stern tube and securely fasten.

Please refer to the installation drawing, and the data sheet for the stern tube seals included with this service manual.

Steel Vessel.

The Stern tube for steel vessel is installed from astern after the stern boss has been bored to in accordance with the dimensions shown on the installation drawing. This will give a press fit and will ensure a secure mounting in the stern. Next the stern tube-mounting flange with attached o-ring is fitted.

The stern tube is supported radial at the inner bulkhead flange to allow for axial expansion. Two o-rings fitted to the oil inlet ring provide a seal between the flange and the stern tube.

Please refer to the installation drawing, and the attached data sheet for the stern tube seals.

HEIMDAL PROPULSION NORWAY AS

PROPELLER SHAFT INSTALLATION.

It is essential that the sterntube and propeller shaft are free of burrs and well cleaned and lubricated before fitting.

The propeller shaft, with the outer seals fitted, is carefully pushed into the sterntube. Next the inner seal assembly is fitted loosely on the shaft and then the thrust-ring and shaft coupling are mounted on the forward end. The distance between the faces of the propeller coupling flange and gear output flange is measured and the gear and propeller shaft aligned.

The distance between the flanges must correspond to the preload specified by the manufacturer for the outer stern tub seal. Refer to propeller arrangement drawing. Failure to observe the correct clearance could lead to water entering the sterntube or may causes overheating of the seal, leading to premature failure.

If it is not possible to position the engine and marine gear at the specified distance then a shim should be inserted behind the outer seal seat or between the flange faces to obtain the correct clearance.

HEIMDAL PROPULSION NORWAY AS

INSTALLATION OF MARINE GEAR.

Holset Coupling Fitted.

Where the marine gear is to be directly coupled to the engine and a Holset Coupling is fitted, it is necessary to drill a 14mm hole in the engine flywheel housing. This hole must match the pre-drilled hole in the marine gear housing; which is designed to allow oil-spray from the gear to drain back to the gear sump.

THE ENGINE FLYWHEEL HOUSING MUST BE COMPLETELY SEALED WHEN THE MARINE GEAR HAS BEEN DELIVERED WITH A HOLSET FLEXIBLE COUPLING.

Vulkan Coupling Fitted.

Where the marine gear is to be directly coupled to the engine and a Vulkan Coupling is fitted, it is essential that the air vents in the marine gear housing are not obstructed.

THE ENGINE FLYWHEEL HOUSING MUST BE VENTILATED WHEN THE MARINE GEAR HAS BEEN DELIVERED WITH A VULKAN FLEXIBLE COUPLING.

Both the HOLSET and VULKAN Couplings are mounted as a complete assembly, and access is gained through the marine gear top and side covers. Mounting bolts to be secured with spring-washers.

A dial gauge must be used to check that the coupling runs true.

The marine gear is bolted to the flywheel housing using Permatex or a similar sealant between the flange faces. Mounting bolts to be secured with spring washers.

HEIMDAL PROPULSION NORWAY AS

GEAR OIL-COOLER.

The oil-cooler fitted to the marine gear is suitable for use with freshwater or seawater cooled engines. It is designed to provide adequate cooling for the gear under normal working conditions, in any climate.

The inlet water flow, maximum heat dissipation, piping dimensions and fittings are shown on the relevant installation drawing.

Maximum inlet water temperature must be held to approximately 25 degrees Celsius to ensure that the gear working temperature stays between 40 and 55 degrees Celsius (measured at the filter cover).

It is suggested that a gate valve be fitted in the cooling water line, so that the flow may be regulated on sea trials to obtain the correct gear working temperature. In colder climates, this is essential to allow the gear to achieve the required temperature.

Operating the gear outside the specified temperature range could result in propeller pitch fluctuation, poor clutch engagement, or damage to the bearings and seals.

HEIMDAL PROPULSION NORWAY AS

BRIDGE CONTROLS

The propeller pitch system is operated from the bridge position by mechanical, hydraulic or electric controls. Pneumatic control system is NOT recommended for the propeller pitch actuation.

Mechanical control system are NOT recommended for use where the cable run would exceed 10 meters or include more than four bends.

Electric controls will normally provide the best overall solution and we can recommend a Newbury (NDC) system or the Heimdal Remote Controls. (Where Heimdal controls are part of the scope of supply please refer to page 24 for a Description/Setting-up procedure.

For correct pitch operation, the control system must have a total stroke of 10cms (4 inches) through a 55-degree travel arc, and it should be possible to limit the astern stroke to 65% of the ahead travel that is actually determined during the sea-trials.

A minimum operating torque of 10Nm is necessary to overcome the friction in the servo system linkage. Maximum torque should not exceed 50Nm, or mechanical damage to the gear will result.

As the response time of the servo is determined by engine speed any bridge control system that gives a torque in excess of 50Nm MUST incorporate a telescopic link that is capable of absorbing the full 10cms travel either direction.

It is ESSENTIAL that there is no backlash in the control system as this will allow movement of the pitch operating lever, which will give fluctuations in the pitch setting.

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PITCH INDICATOR

The PT1 Bridge Panel offered as an option with the Gear or Servo unit includes two gauges for monitoring the oil temperature and pressure, clutch buttons (with gear only) and a pitch indicator.

Please refer to the drawing/wiring diagram at the back of this manual for installation data. All the connections must be checked before electrical current is applied, as a voltage will damage the potentiometer/circuit board across the wrong terminals.

When the unit is installed, the vessel is run at high idle and with the shaft rotating, the true zero pitch is established by moving the pitch lever around the zero point until the vessel remains stationary. (No "creep" in either direction.)

The potentiometer should then be centralised on its mounting to obtain a zero reading on the pitch meter, there is a pre-set for fine adjustment. After the propeller travel has been correctly set on trials (see next page), the pre-set for scale deflection should be adjusted to give reading of 100% load at the maximum travel in the ahead position.

HEIMDAL PROPULSION NORWAY AS

SETTING TO WORK.

It is **ESSENTIAL** that the shaft alignment is re-checked within two to three days of the vessel being launched, and before the vessel is taken to sea for trials.

Heimdal will not consider any claim for damage to the equipment where this is caused by miss-alignment.

The Marine Gear/HPC servo unit is fitted with mechanical stops on the pitch lever to limit the maximum travel in both ahead and astern, the following procedure should be adopted to set the pitch correctly.

1. Check that the clearance between the propeller push-pull rod and the gear/servo shaft rod at the connector in the coupling flange is in accordance with the installation drawing.
2. **Marine Gear Fitted.**
With the engine set at high idle and the clutch **DISENGAGED** operate the pitch from full ahead to full astern. Should the servo pressure gauge give a sudden increased reading in the full ahead or full astern positions, then the servo piston is butting against the cylinder end cover and the travel must be reduced by adjusting the mechanical stop.

HPC Servo Unit Fitted.

The same test is carried out with the engine switched off and the electric standby lubrication pump operating.

3. The engine is set at high idle and the propeller rotated with the pitch lever set in the zero position. The true neutral is established by moving the pitch lever round the zero position until the vessel does not "creep" ahead or astern.
4. The bridge control handle should now be reset to indicate the zero pitch position, and where the gear/servo is fitted with a pointer on the pitch lever, this may also be reset by using the allen key adjustment at its base.
5. The vessel should be taken out to sea in its normal departure condition and the engine run up to maximum "no Load" rpm. The propeller pitch is progressively increased until the engine speed sinks to the rpm consistent with specified power output.

The mechanical stop for maximum ahead pitch should be locked up at the point where the propeller loads the engine to the rpm/temperature/boost pressure specified by the manufacturer for maximum output.

(Refer to the engine test-bed report).

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6. The mechanical stop for maximum astern pitch should be set at 60-65% of the maximum ahead pitch setting by reading from the scale on the side of the gear/servo unit.

PROPELLER MAINTENANCE.

Daily Inspection.

1. Check the oil level in the sterntube supply tank.
2. Check the sterntube for excessive heat and leakage through the inner sterntube seal. (Check shaft alignment and preload on inner seal if heat or leakage evident).

Vessel Slipped

1. Check propeller blades and hub for wear or damage and with the rope guard removed inspect condition of the outer seal.
2. Try to twist and rock each blade, and if there is discernible movement contact Heimdal for advice.

(The following ONLY applies to three-bladed propellers)

3. Remove the seal plug in the hub nosepiece and the drain plug below and behind No.1 blade. With the propeller in FULL ASTERN POSITION ONLY, pack with grease until all the original grease/water mixture has been expelled.

IF THE HUB IS GREASED WITH THE PROPELLER BLADES IN OTHER THAN IN THE FULL ASTERN POSITION A HYDRAULIC LOCK CAN OCCUR AND THIS MAY DAMAGE THE HUB AND PREVENT THE VESSEL GOING ASTERN!

Regular greasing of the propeller hub is a major factor in the service life of the propeller and should be carried out at least once each year.

Five-Year Inspection.

1. Remove and check the propeller shaft and bearing surfaces for corrosion.
2. Inspect all sliding surfaces on the inner and outer sterntube seals for corrosion.
3. Check for excessive clearance in the inner/outer white-metal sterntube bearings.

HEIMDAL PROPULSION NORWAY AS

GEAR MAINTENANCE.

Daily Inspection.

1. Run engine and check clutch pressure and gear temperature are as specified in the front of the Service Manual.
2. Check oil level, engine running with marine gear warm and clutch disengaged.
3. Inspect gear and pipe work for oil or water leaks.

After 200 hours then at 1000-1500 hour intervals.

1. Oil change (more frequently in severe operating conditions).
2. Check the old oil for water or abnormal metal particles.
3. Clean the oil filter and magnetic strips.
4. Check the condition of the zinc anodes in the oil-cooler.

Annual Inspection.

1. Remove top cover and check gearwheel and pinion for damage or uneven tooth contact.
2. Check the condition of the flexible coupling and replace worn or damaged rubber elements.
3. Remove the oil-cooler end cover and check the tube-stack for leaks or excessive silt and replace eroded zinc anodes.
4. Remove oil pump and drive shaft and check spines for wear or damage.
5. Lubricated the output shaft seals through the grease nipple on the top of the gear end cover.
6. Check the propeller pitch control lever for smooth operation and absence of backlash.

It is recommended that the rubber elements in the coupling be replaced after 10 years service, as they tend to harden in use.

HEIMDAL PROPULSION NORWAY AS

TROUBLE-SHOOTING GUIDE PROPELLER

Symptoms.	Possible Cause
Abnormal hull vibration	Propeller or shaft is misaligned bent or badly worn. The sterntube or shaft coupling flange bolts is loose. Outer bearing damaged.
Sterntube temperature high.	Sterntube oil level is too low or wrong oil grade is in use. Sterntube bearings are damaged or propeller shaft is misaligned.
High oil consumption.	An incorrect oil grade is in use. Leakage from the inner or outer seals due to damage wear or dirt on sliding surfaces. Excessive throw in propeller shaft. (Max 0.05mm).

HEIMDAL PROPULSION NORWAY AS

TROUBLE-SHOOTING GUIDE MARINE GEAR.

Symptoms	Possible Cause
Water in the gear oil.	Leak in the oil cooler tubes. Water entry from bilge through the gear output flange seals.
Abnormal oil consumption.	Leak in the oil cooler tubes or at the gear output flange seals.
Noise in the gear at all rpm.	Damage or wear in the gearwheels flexible coupling or bearings.
Noise in the gear at one rpm.	Idle rpm set too low causes gear hammering or critical speed range in the driveline - AVOID THIS RPM!
No clutch pressure.	Oil pump defective or pump drive shaft broken.
Low clutch pressure. (Clutch engaged)	Incorrect oil level or wrong oil type in use. Leakage at the inlet ring on the primary shaft. Broken or weak spring or sticking piston in the main valve block. Leak in the suction line between the sump and the oil-pump or worn oil-pump. Flow regulator screw in the valve block or pressure regulator valve incorrectly set or leakage at the clutch piston.
High servo pressure reading.	Servo piston sticking or butting against the cylinder end cover. Propeller is damaged or hub and blades are worn. Water in the hub.
Sluggish or movement of the propeller.	Wrong oil type. Worn servo slide. Wear in the white metal bearing (oil inlet for servo cylinder) or leakage in the pipes/ Hoses from the main valve block or sticking safety valve.
Gear temperature to high	Oil level low. Slipping clutch. Oil cooler blockage or cooling water flow restricted. Damaged bearings.
Propeller Pitch unstable	Backlash in the control cables or the pitch lever mechanism.
Oil Leakage from the gear output flange	Seal has been over greased-remove grease nipple to evacuate excess.

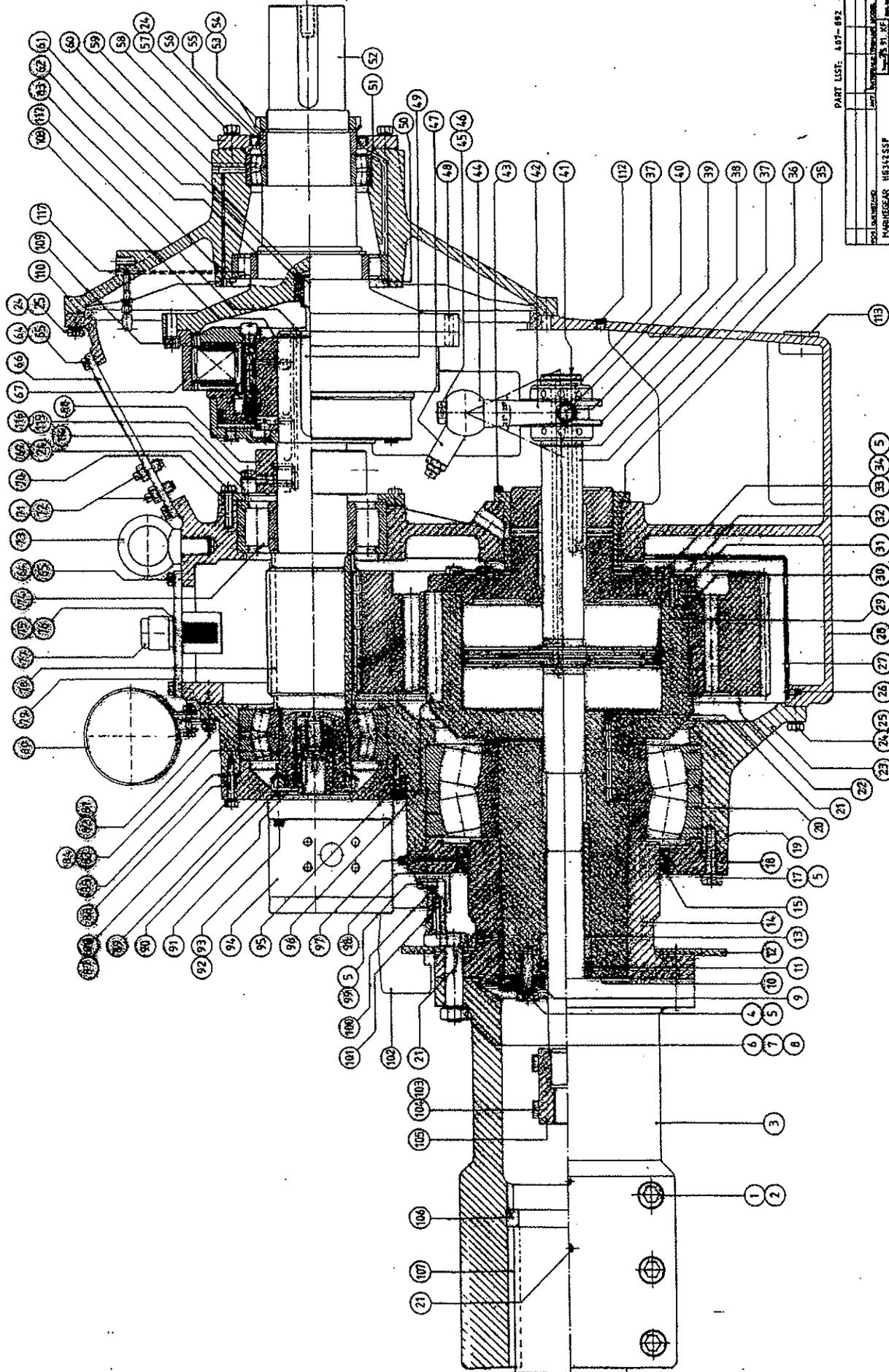
HEIMDAL PROPULSION NORWAY AS

MOUNTING THE PROPELLER BLADE.

Drawing 408-013 refers.

The CP-propeller is normally supplied with the blades dismounted to reduce the possibility of damage in transit. Mounting of the propeller blades is carried out in accordance with the following step-by-step procedure:

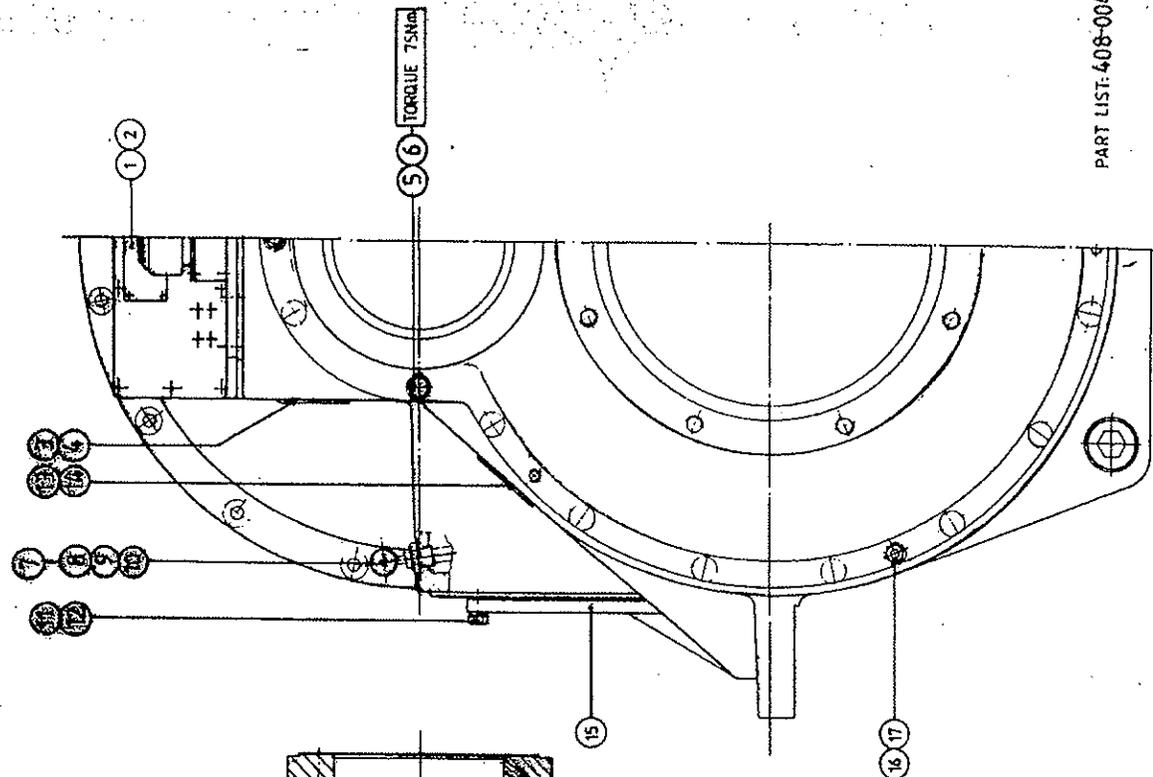
1. Support the propeller hub and shaft so that it may be rotated after each blade is fitted in place. (Blade installation may be carried out after the shaft is fitted in the hull).
2. Remove the rear half of the propeller hub (Item 1.) by undoing 6 Allen-headed lock screw (Item 2.) and then by unscrewing the 5/8-inch "square-headed" bolts (Item 3.)



PART LIST: 497-892

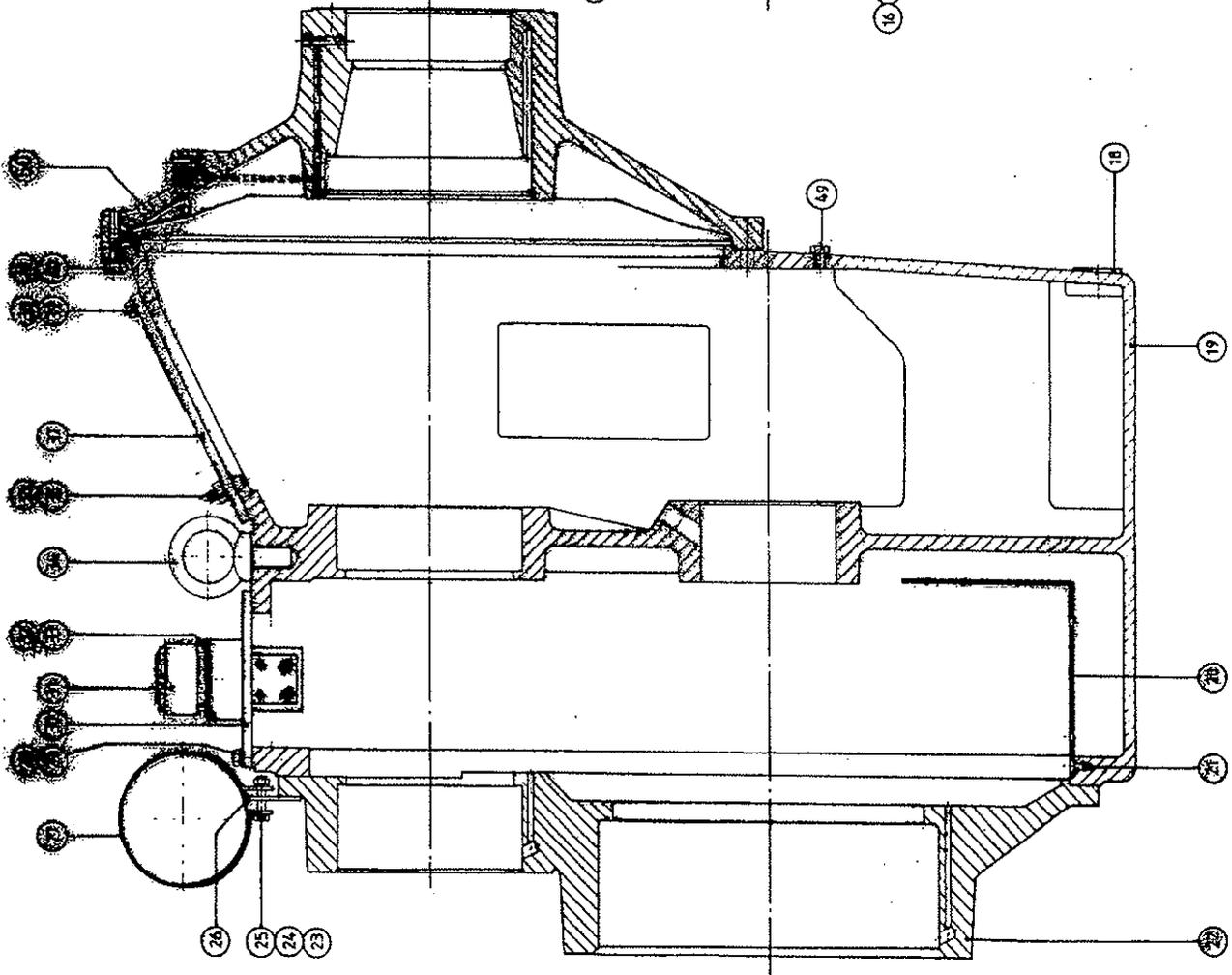
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PART LIST: 497-892	

A3:305-054



PART LIST: 408-004
 FOR PROD. 408-003

305-051	
REV.	DATE
1	11/11/11
HG355 F GROUP 8 GEAR HOUSING	



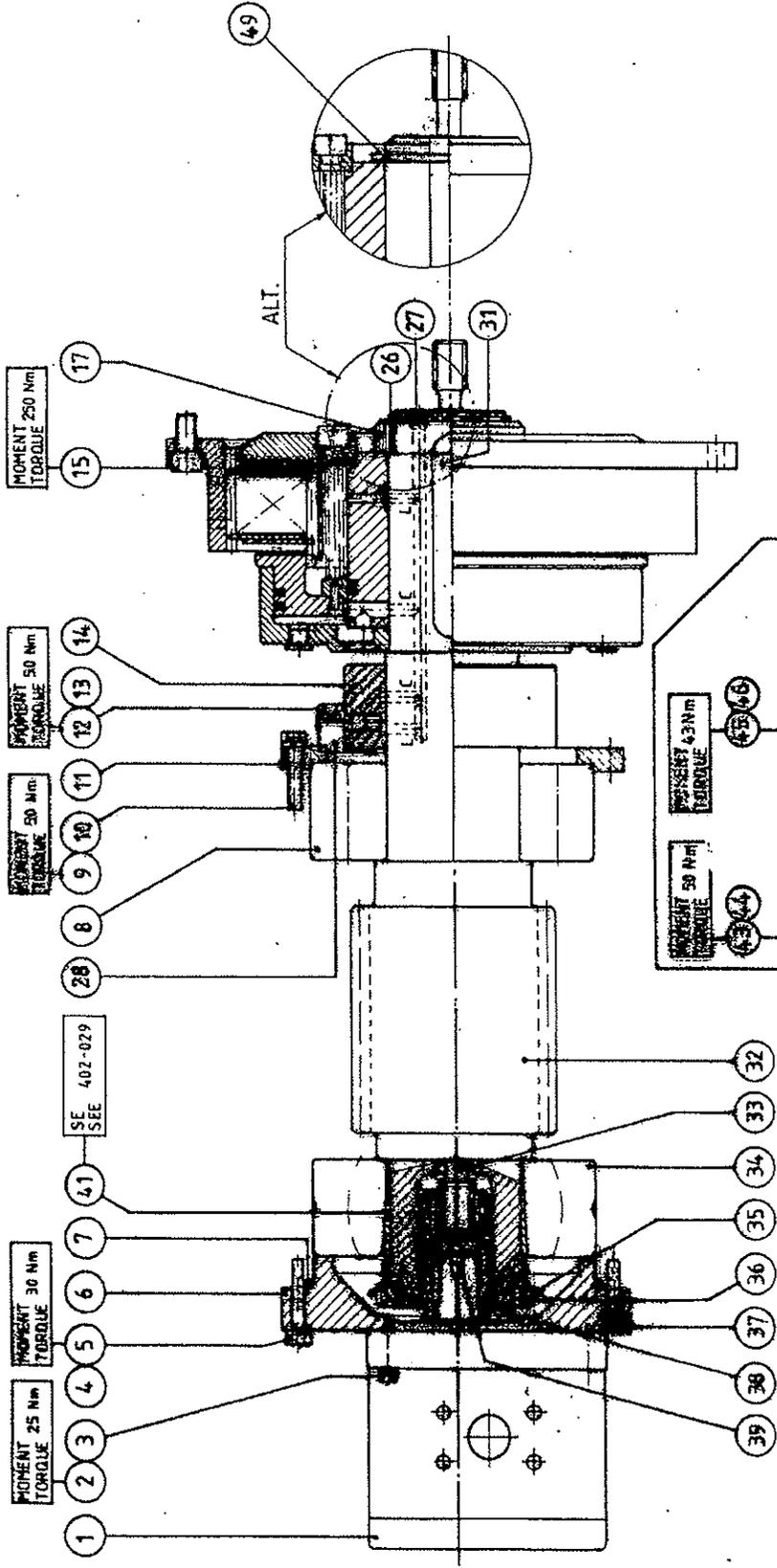
HEDMOAL**PROPULSION A-S**

Post Box 2081 Moldegård - 6401 Molde, Norway

408-004

GRUPPE B PARTLIST 408-003 DRAWING 305-051 PRODUCT HG300SSF

POS	BESKRIVELSE	DESCRIPTION	QTY	PARTNO
1	TYPESKILT	IDENTIFICATION PLATE	1	4G0076
2	RIFLENAGLE	GROOVED RIVET	4	5S0212
3	SKILT "ROTATION"	NAMEPLATE "ROTATION"	1	4G0077
4	RIFLENAGLE	GROOVED RIVET	4	5S0184
5	SKRUE	BOLT	18	5S0228
6	SPRENGSKIVE	LOCKWASHER	18	5S0141
7	PEILESTAV OG RØR KOMPLETT	DIPSTICK & PIPE COMPLETE	1	2G0259
8	GRIPEKULE	BALL FOR DIPSTICK	1	7S0003
9	PEILESTAV	DIPSTICK	1	2G0256
10	RØR	DIPSTICK PIPE	1	6S0077
11	SKRUE	BOLT	10	5S0214
12	SPRENGSKIVE	LOCKWASHER	10	5S0140
13	SKILT "ROTATION"	NAMEPLATE "ROTATION"	1	4G0077
14	RIFLENAGLE	GROOVED RIVET	4	5S0184
15	SIDELUKE	SIDE COVER	1	2G0141
16	KONISK PINNE-GJENGET	TAPER PIN-THREADED	3	7S0053
17	MUTTER	NUT	3	5S0110
18	PLUGG	PLUG	1	6S0099
19	GEARKASSE	GEARCASE	1	1G0265
20	OLJESKJERM	OIL SHIELD	1	4G0058
21	UNBRAKO SENSKRUE	UNBRAKO BOLT COUNTERSUNK	5	5S0177
22	BAKLOKK GEARKASSE	REAR COVER FOR GEARCASE	1	1G0283
23	SKRUE	BOLT	1	5S0188
24	SPRENGSKIVE	LOCKWASHER	1	5S0139
25	MUTTER	NUT	1	5S0110
26	BRAKETT FOR KJØLER	BRACKET FOR COOLER	1	2G0146
27	BØYLE FOR KJØLER BRAKETT	CLAMP FOR COOLER BRACKET	1	2G0105
28	SKRUE	BOLT	8	5S0108
29	SPRENGSKIVE	LOCKWASHER	8	5S0140
30	BAKRE TOPPLUKE	REAR TOP COVER	1	2G0122
31	LUFTE FYLLEHETTE	BREATHER	1	3G0138
32	SKRUE	BOLT	6	5S0265
33	SPRENGSKIVE	LOCKWASHER	6	5S0294
34	ØYEBOLT	EYEBOLT	1	5S0171
35	NØDSKRUE ORTLINGHAUS	EMERGENCY BOLT ORTLINGH.	4	2G0194
35	NØDSKRUE PRODAN	EMERGENCY BOLT PRODAN	8	5S0305
36	MUTTER FOR NØDSKRUE	NUT FOR EMERGENCY BOLT	4	5S0178
37	FREMRE TOPPLUKE	FRONT TOP COVER	1	2G0127
38	SKRUE	BOLT	10	5S0108
39	SPRENGSKIVE	LOCKWASHER	10	5S0140
40	SKRUE	BOLT	16	5S0271
41	SPRENGSKIVE	LOCKWASHER	16	5S0141
49	SKRUE	BOLT	1	5S0268
50	FRONTLOKK	FRONT COVER	1	1G0195



ONLY APPLIES TO GEARS THAT HAVE
SPLIT-TYPE OIL INLET RING FITTED
TO PRIMARY SHAFT.

PART LIST 405-071
FOR PROD. 405-072

POBLIENSTAND	ANT. MATERIAL	TECHN. MODEL. NR.	MEHRK.
MESSF. GROUP C	From 2404/02		
PRIMÄRSSEL NED. OLEUMITE			
PRIMARY SHAFT WITH OIL PUMP			
304-010			

Propeller blade
(rotating part)

$\phi 312 \pm 0.25$

4 ± 0.1

$\phi 348 \pm 0.5$

$\phi 346 \pm 0.5$

Wear ring
(stationary part)

$\phi 321$

$\phi 336$

Propeller hub

A

6
B

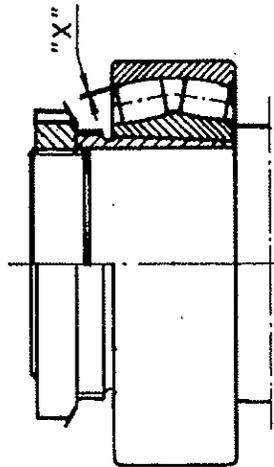
Resulting dimensions:

$A = 7.5 \pm 0.1$

$B = 10 \pm 0.15$

BYRKNOR OG KOLBERG
 Maskintekniske konsulenter A/S
 Tegn.nr. P28-35

Navn, type, dimensjon			Tegning Produktsted	Materiale	Vekt	Anmerking
Date:	Konstr./Tegnet	Godkjent	Målestokk			
24.05.88	MAH		2:1			
Propeller blade seal arrangement				Erstattning for:	Erstattet av:	
				404-006	406-017	
				404-071		
Henvisning:		Beregning		Prosjekt.nr.		
		AD				



1. Aksel-, hylse- og lagerflater skal være velsmurt.
Shaft, sleeve and bearing surfaces to be well oiled.
2. Skyv lager og hylse på plass.
Slide the bearing and sleeve in place.
3. Mål lagerglappet "X".
Measure the bearing gap "X".
4. Med et passende verktøy, f.eks. hydraulisk mutter, presses hylsen inn i lageret til den foreskrevne glappminskning er oppnådd.
With a proper tool, e.g. hydraulic nut, the sleeve is forced into the bearing until the recommended gap reduction is obtained.
5. Kontroller at restglappet ikke er mindre enn foreskrevet.
Check that the rest-gap is not less than recommended.
6. Hylsen sikres ved hjelp av låsbrikke og mutter.
The sleeve is secured by means of lock-ring and nut.

Gear type	Glappminskning	Restglapp
Gear type	Gap reduction	Rest-gap
HG 2..	45-60 µm	35 µm
HG 3..	45-60 µm	35 µm

POS.	GJENSTAND	ANT.	MATERIALE	TEGN.NR	MODEL NR.	MERK.
	HG LAGER MED KONISK HYLSE HG BEARING WITH TAPERED SLEEVE			Tegn. 20.02.87.2	Erst. for:	
				Trac:	402-029	
				Kfr:		
				Målestokk:	Erst. av:	

MOMENT TORQUE 90Nm

Locktite 242e

MOMENT TORQUE 250 Nm

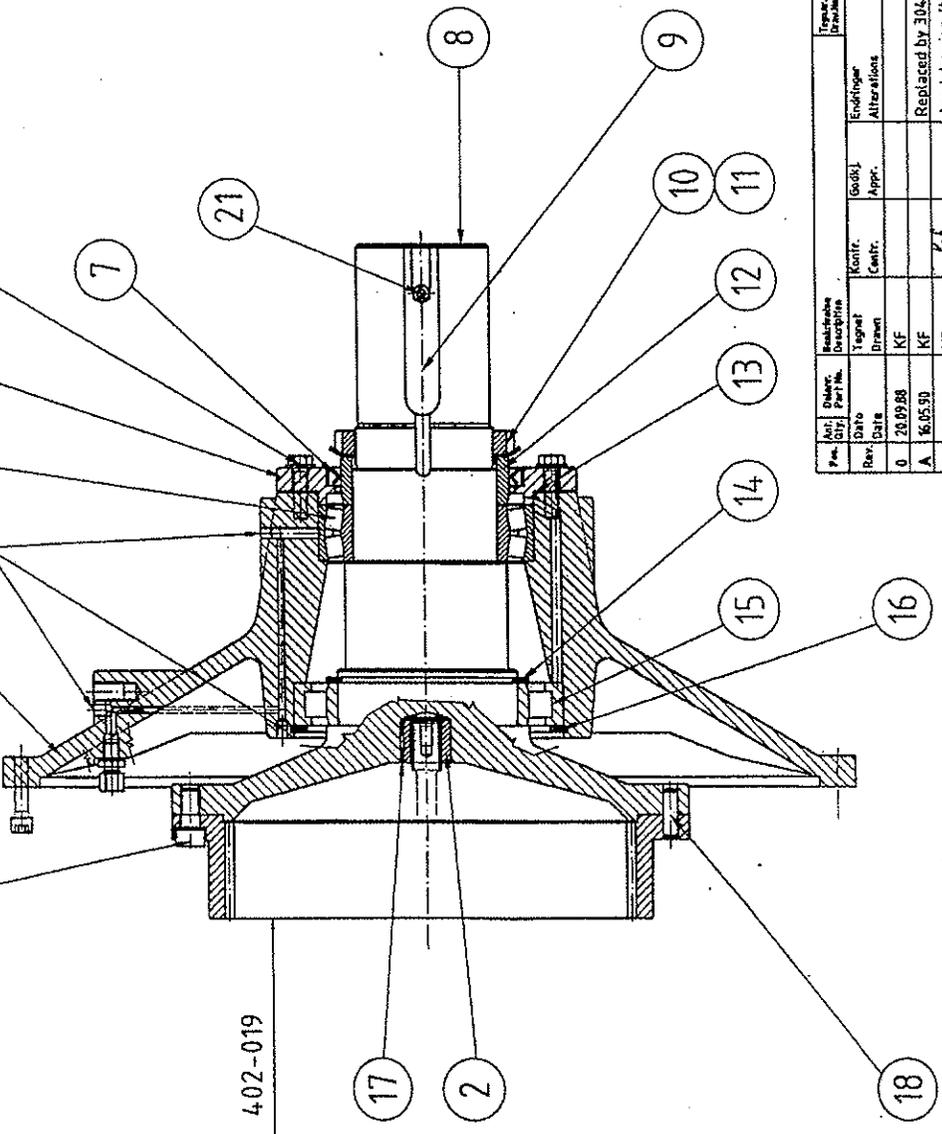
Locktite 242e

CLUTCH
Ortlinghaus
0-002-331-69-000

402-019

MOMENT TORQUE 250 Nm

Locktite 242e



PART LIST: 406-095
PROD.: 406-094

Rev.	Date	By	Descr.	Part No.	Material	Quantity	Unit	Remarks
0	20.09.88	KF	Original					
A	16.05.90	KF	Revised					Replaced by 304-087
B	18.09.01	KF	Revised					Acad drawing, item 20 and 21 added.

<p>MARINEGEAR HG3SF GROUP C PRIMARY SHAFT EXTENSION</p>	<p>HEIMDAL PROPULSION NORWAY AS Post Box 188, Halden 1704, Halden, Norway</p>	<p>304</p>	<p>304-087</p>	<p>205-082</p>	<p>309-003</p>
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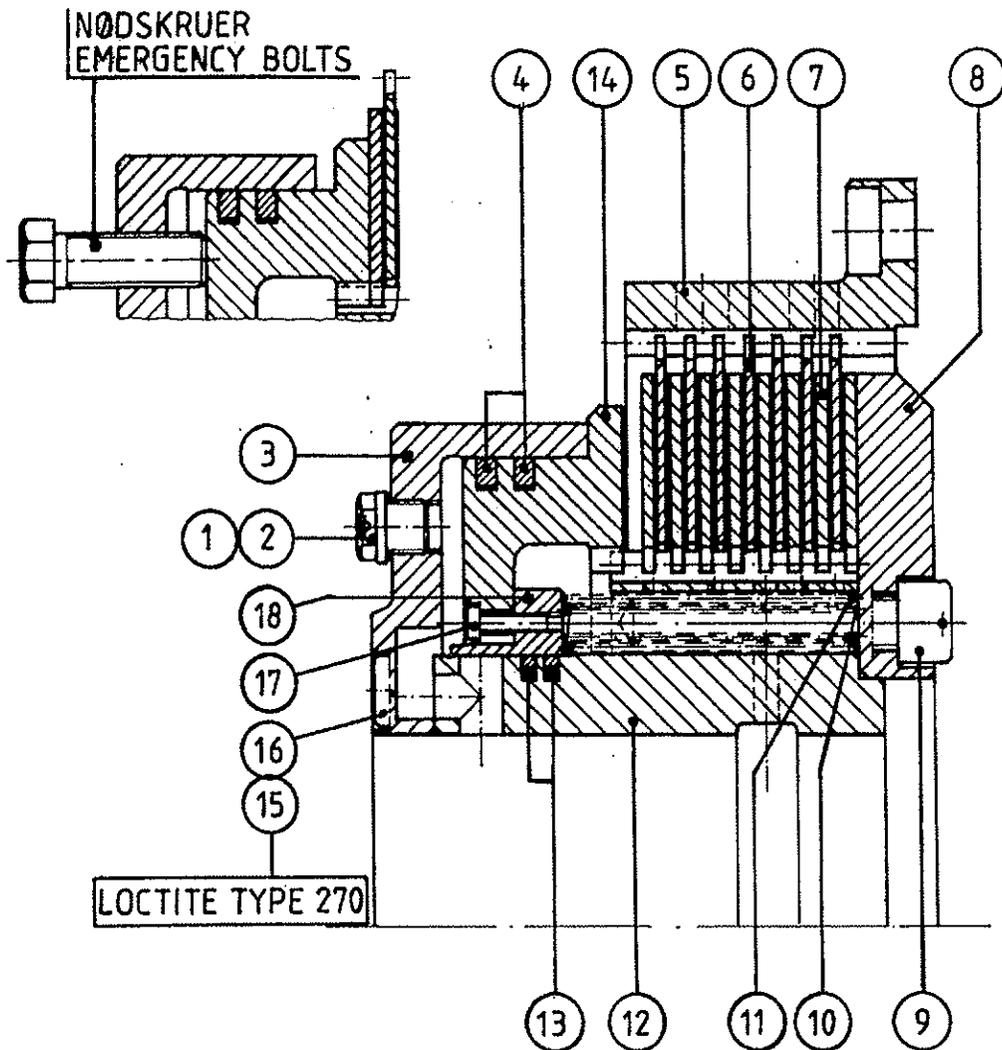
HEIMDAL**PROPULSION AS**

Post Box 2081 Moldegård - 8401 Molde, Norway

406-095

GRUPPE C PARTLIST 406-094 DRAWING 304-087 PRODUCT HG300SF

POS	BESKRIVELSE	DESCRIPTION	QTY	PARTNO
1	UNBRAKOSKRUE	UNBRAKO BOLT	6	5S0281
2	SPLINEMUFFE	SPLINED SLEEVE	1	4G0084
3	FRONTLOKK	FRONT COVER	1	1G0195
4	RULLELAGER	ROLLER-BEARING	1	3G0271
5	ENDELOKK	END COVER	1	1G0196
6	SKRUE	BOLT	6	5S0207
7	TETNINGSRING	SEALING RING	1	8S0036
8	AKSEL	SHAFT	1	1G0244
9	KILE	KEY	1	4G0073
10	LASEMUTTER	LOCKNUT	1	3G0058
11	LASESKIVE	LOCK PLATE	1	3G0285
12	DISTANSERING	SPACER	1	2G0243
13	O-RING	O-RING	1	8S0032
14	LASERING	SNAP-RING	1	7S0020
15	RULLELAGER	ROLLER-BEARING	1	3G0286
16	LASERING	SNAP-RING	1	7S0023
17	SPENNYLSE	SPLIT SLEEVE	2	7S0030
18	SYLINDRISK PINNE	PARALLEL PIN	3	7S0039
19	UNBRAKOPLUGG	UNBRAKO PLUG	3	6S0065



DELELISTE 402-020
PART LIST 402-020

FOR PROD. 402-064

POS.	GJENSTAND	ANT.	MATERIALE	TEGN.NR	MODEL NR.	MERK.
	HG4L / HG5L			Tegn. 21.01.87. 30	Erst. for:	
	HG3S GRUPPE D CLUTCH			Trac:		402-019
	HG3S GRUPPE D CLUTCH			Kfr:		
	HEMDAL PROPULSION A/S Post Box 291 6401 Molde Norway			Målestokk:		Erst. av:

HEMDAL**PROPULSION A/S**

Post Box 2091 Moldegård - 6401 Molde, Norway

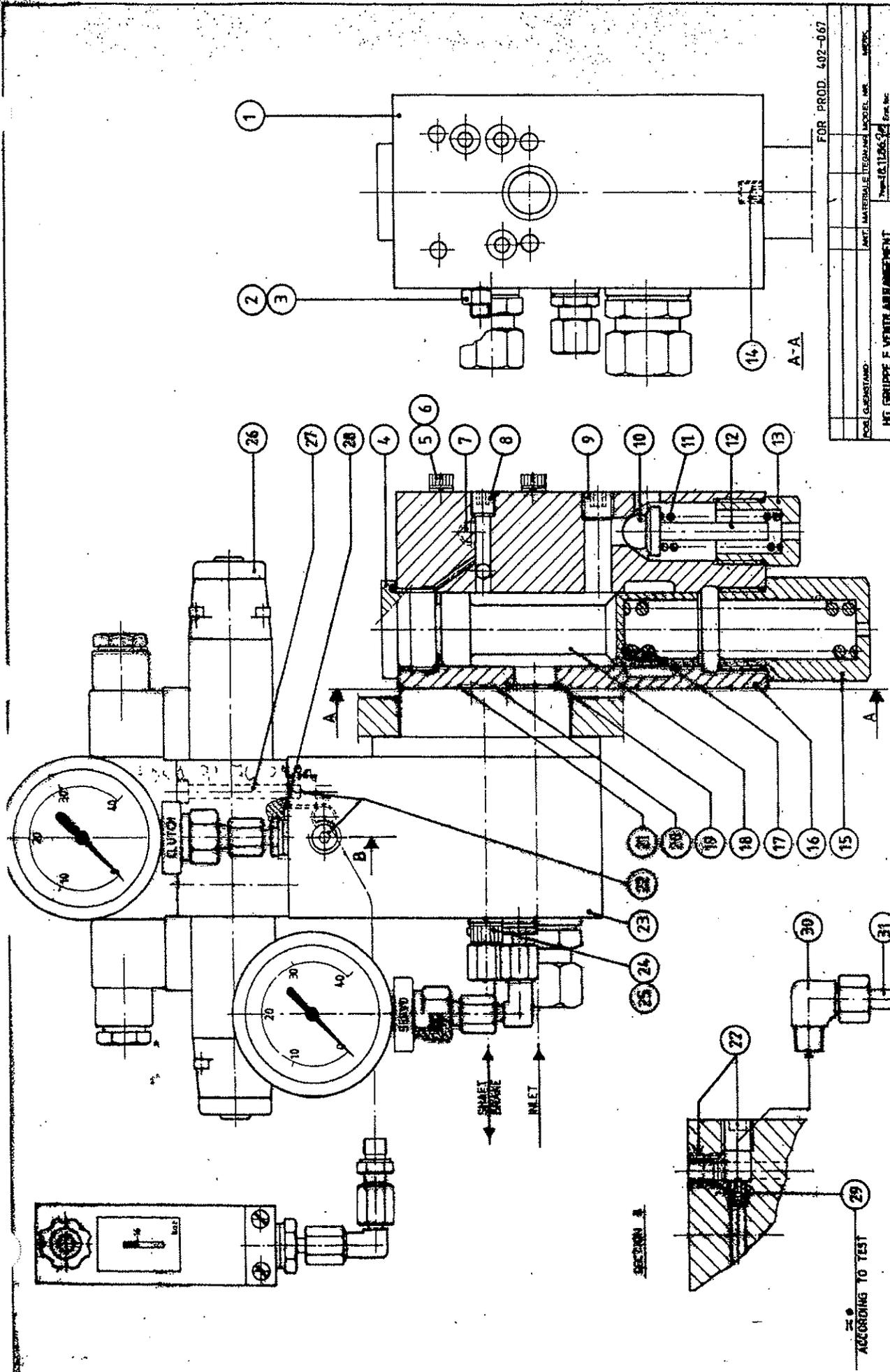
402-020

GRUPPE D PARTLIST 402-064 DRAWING 402-019 PRODUCT HG300S

POS	BESKRIVELSE	DESCRIPTION	QTY	PARTNO
1	PLUGG FOR NØDSKRUE	PLUG FOR EMERGENCY BOLT	4	3G0114
2	TETTINGSRING	SEALING RING	4	3G0115
3	SYLINDER	CYLINDER	1	3G0113
4	YTRE STEMPOLFJØR	OUTER PISTON RING	2	3G0122
5	MEDBRINGERRING	TRANSFER RING	1	3G0073
6	YTRE LAMELL	OUTER CLUTCH PLATE	7	3G0110
7	INDRE LAMELL	INNER CLUTCH PLATE	8	3G0111
8	ANSLAGSSKIVE	RETAINING DISC	1	3G0123
9	UNBRAKOSKRUE	UNBRAKO BOLT	6	3G0119
10	FJØR	SPRING	15	3G0117
11	FJØR	SPRING	15	3G0116
12	BØRER	CARRIER	1	3G0125
13	INDRE STEMPOLFJØR	INNER PISTON RING	2	3G0121
14	STEMPEL	PISTON	1	3G0124
15	UNBRAKOSKRUE	UNBRAKO BOLT	8	3G0118
16	SYLINDRISK PINNE	PARALLEL PIN	2	3G0126
17	UNBRAKOSKRUE	UNBRAKO BOLT	6	3G0109
18	OVERGANGSHYLSE	TRANSITION SLEEVE	1	3G0120
19	CLUTCH KOMPLETT	CLUTCH ASSEMBLY	1	3G0019

GRUPPE E PARTLIST 408-001 DRAWING 305-050 PRODUCT HG300SS

POS	BESKRIVELSE	DESCRIPTION	QTY	PARTNO
1	AKSELKOPLING	SHAFT COUPLING	1	PAGE 3
2	UNBRAKOSKRUE	UNBRAKO BOLT	6	5S0074
3	SPRENGSKIVE	LOCKWASHER	6	5S0233
4	UNBRAKOSKRUE	UNBRAKO BOLT	4	5S0193
5	SPRENGSKIVE	LOCKWASHER	4	5S0241
6	KOPLINGSTYKKE	PUSH-PULL ROD CONNECTOR	1	2G0115
7	PASSBOLT	REAMED BOLT	8	2G0103
8	MUTTER	NUT	8	5S0113
9	SPRENGSKIVE	LOCKWASHER	8	5S0142
10	BREMSEKLAVE	BRAKE CALIPER	1	3G0029
11	BREMSEKLOSSER	BRAKE PAD SET	1	3G0034
12	PAKNINGSSETT	SEAL KIT	1	3G0160
13	BREMSESKIVE	BRAKE DISC	1	2G0246
14	UNBRAKO SENKSKRUE	UNBRAKO BOLT COUNTERSUNK	2	5S0191
15	UNBRAKOPLUGG	UNBRAKO PLUG	1	6S0066
16	BRAKETT FOR AKSELBREMSE	BRACKET FOR SHAFTBRAKE	1	2G0454
17	SKRUE	BOLT	2	5S0205
18	SPRENGSKIVE	LOCKWASHER	2	5S0144
19	SHIMSPAKKE	SHIM SET	1	2G0128
20	FETTNIPPEL	GREASE NIPPLE	1	6S0095
21	KILE FOR TANNHJUL	KEY FOR GEARWHEEL	1	4G0141
22	SKRUE	BOLT	12	5S0192
23	SPRENGSKIVE	LOCKWASHER	12	5S0144
24	LASETRAD	LOCK WIRE	1	5S0182
25	ENDELOKK FOR SERVOAKSEL	END COVER FOR SERVO SHAFT	1	1G0281
26	GLIDELAGER	WHITE METAL BEARING	1	2G0426
29	SKRUE	BOLT	2	5S0272
30	UNDERLAGSSKIVE	COARSE WASHER	2	5S0288
31	LASETRAD	LOCK WIRE	1	5S0182
32	LASERING	SNAP-RING	1	7S0019
33	SERVOSLEIDE	SERVO SLIDE	1	1G0154
34	LASERING	SNAP-RING	1	7S0019
35	UNBRAKOPLUGG	UNBRAKO PLUG	3	6S0067
36	SERVOSTEMPEL MED AKSEL	SERVO PISTON WITH SHAFT	1	2G0397
37	SYLINDRISK PINNE	PARALLEL PIN	1	7S0039
38	STEMPELFJER	PISTON-RING	2	3G0154
39	TANNHJUL OG PRIMÆRAKSEL	GEARWHEEL & PINION SET	1	PAGE 3
40	UNBRAKOPLUGG	UNBRAKO PLUG	1	6S0066
41	SERVOAKSEL	SERVO SHAFT	1	1G0280
42	RULLELAGER	ROLLER-BEARING	1	3G0396
43	O-RING	O-RING	1	8S0188
44	BAKRE BAKLOKK	REAR END COVER	1	1G0282
46	SKRUE	BOLT	6	5S0192
47	SPRENGSKIVE	LOCKWASHER	6	5S0144
48	TETNINGSRING	SEALING RING	2	8S0184
49	GLIDELAGER I SERVOAKSEL	BUSH FOR SERVO SHAFT	1	2G0271
50	TETNINGSRING	SEALING RING	1	8S0057
51	LASERING	SNAP-RING	1	7S0016
52	THRUSTSKIVE	THRUST DISC	1	2G0453
53	SKRUE	BOLT	8	5S0192
54	SPRENGSKIVE	LOCKWASHER	8	5S0144
55	GEARFLENS	GEAR FLANGE	1	2G0307



FOR PROD. 402-067

NO. QUANTUM	ART. MATERIALE	ITERAM	MODEL	MS	UNIT
HG GRUPE F VENTILARRANGEMENT			203-098		
HG GROUP F VALVE ARRANGEMENT					
HEMIVAL			PROPELLION AS		
HEMIVAL			PROPELLION AS		

DELESTE 402-007
PART LIST 402-007

A3: 302-049

ACCORDING TO TEST

HEIMDAL**PROPULSION A/S**

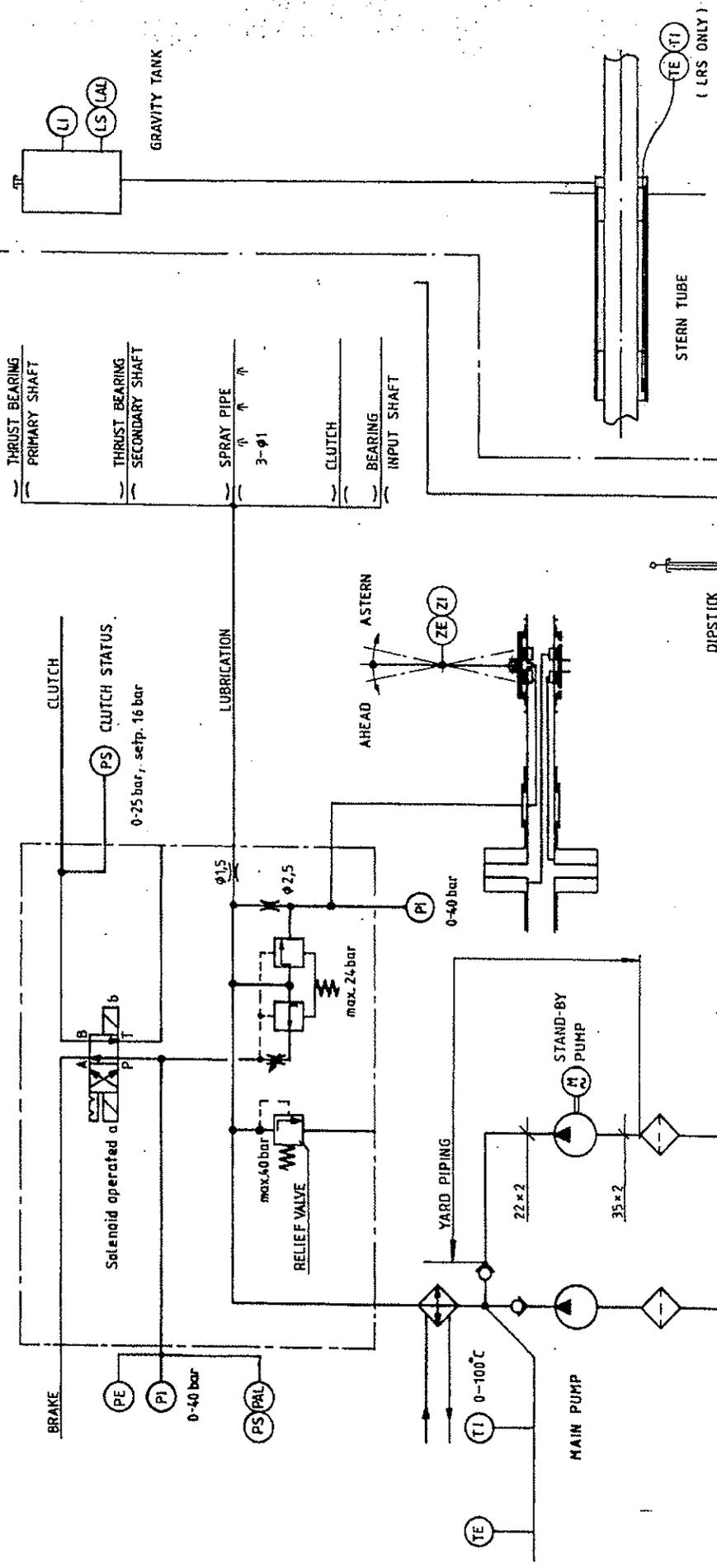
Post Box 2091 Moldegård - 6401 Molde, Norway

402-007

GRUPPE F PARTLIST 402-067 DRAWING 203-098 PRODUCT HG300

POS	BESKRIVELSE	DESCRIPTION	QTY	PARTNO
1	OLJEVENTIL KOMPLETT	OIL VALVE COMPLETE	1	0G0014
2	STRUPESKRUE	THROTTLE SCREW	1	5S0202
3	MUTTER	NUT	1	5S0109
4	PLUGG	PLUG	1	6S0100
5	UNBRAKOSKRUE	UNBRAKO BOLT	4	5S0211
6	SPRENGSKIVE	LOCKWASHER	4	5S0163
7	UNBRAKOPLUGG	UNBRAKO PLUG	1	6S0065
8	UNBRAKOPLUGG	UNBRAKO PLUG	1	6S0065
9	UNBRAKOPLUGG	UNBRAKO PLUG	1	6S0066
10	KULE	BALL	1	7S0002
11	FJÆR	SPRING FOR SAFETY VALVE	1	4G0090
12	FJÆR	SPRING GUIDE	1	2G0288
13	KAPSEL FOR SIKKERHETSVENT	CAP FOR SAFETY VALVE	1	2G0298
14	UNBRAKOPLUGG	UNBRAKO PLUG	1	6S0065
15	KAPSEL FOR KONTROLLVENTIL	CAP FOR CONTROL VALVE	1	2G0299
16	VENTILBLOKK	VALVE BLOCK	1	2G0294
17	FJÆR	SPRING FOR CONTROL VALVE	1	4G0089
18	STEMPEL I OLJEVENTIL	PISTON IN OIL-VALVE	1	2G0300
19	O-RING	O-RING	1	8S0093
20	O-RING	O-RING	2	8S0094
21	O-RING	O-RING	1	8S0094
22	UNBRAKOPLUGG	UNBRAKO PLUG	2	6S0066
23	MONTERINGSBLOKK	MOUNTING BLOCK	1	1G0256
24	UNBRAKOSKRUE	UNBRAKO BOLT	2	5S0197
25	SPRENGSKIVE	LOCKWASHER	2	5S0158
26	MAGNETVENTIL	SOLENOID VALVE	1	9S0028
27	UNBRAKOSKRUE	UNBRAKO BOLT	4	5S0196
28	O-RING	O-RING	4	8S0094
29	GJENGESTIFT *	SET SCREW *	1	5S0201
30	VINKELKOPLING	ELBOW COUPLING	1	6S0202
31	PRESISJONSTALRØR	STEEL PIPE	1	6S0203

Mechanically operated



THE EXTENT OF SUPPLY MAY NOT INCLUDE ALL THE ABOVE

ALARMS AND SAFETY ARRANGEMENTS FOR UNATTENDED ENGINE ROOMS. WITHOUT CLASS NOTATION.

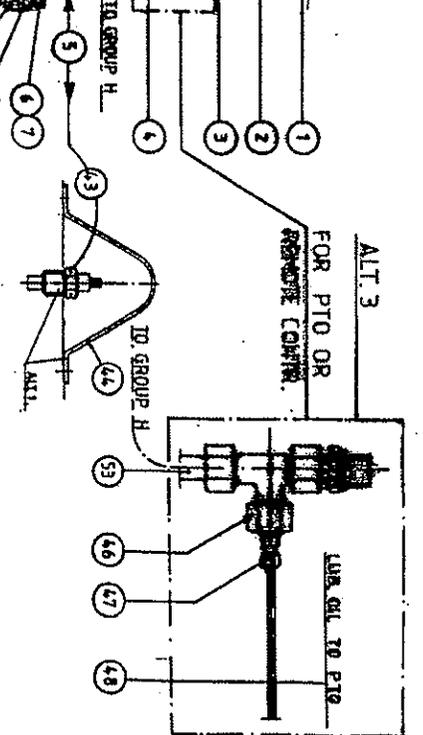
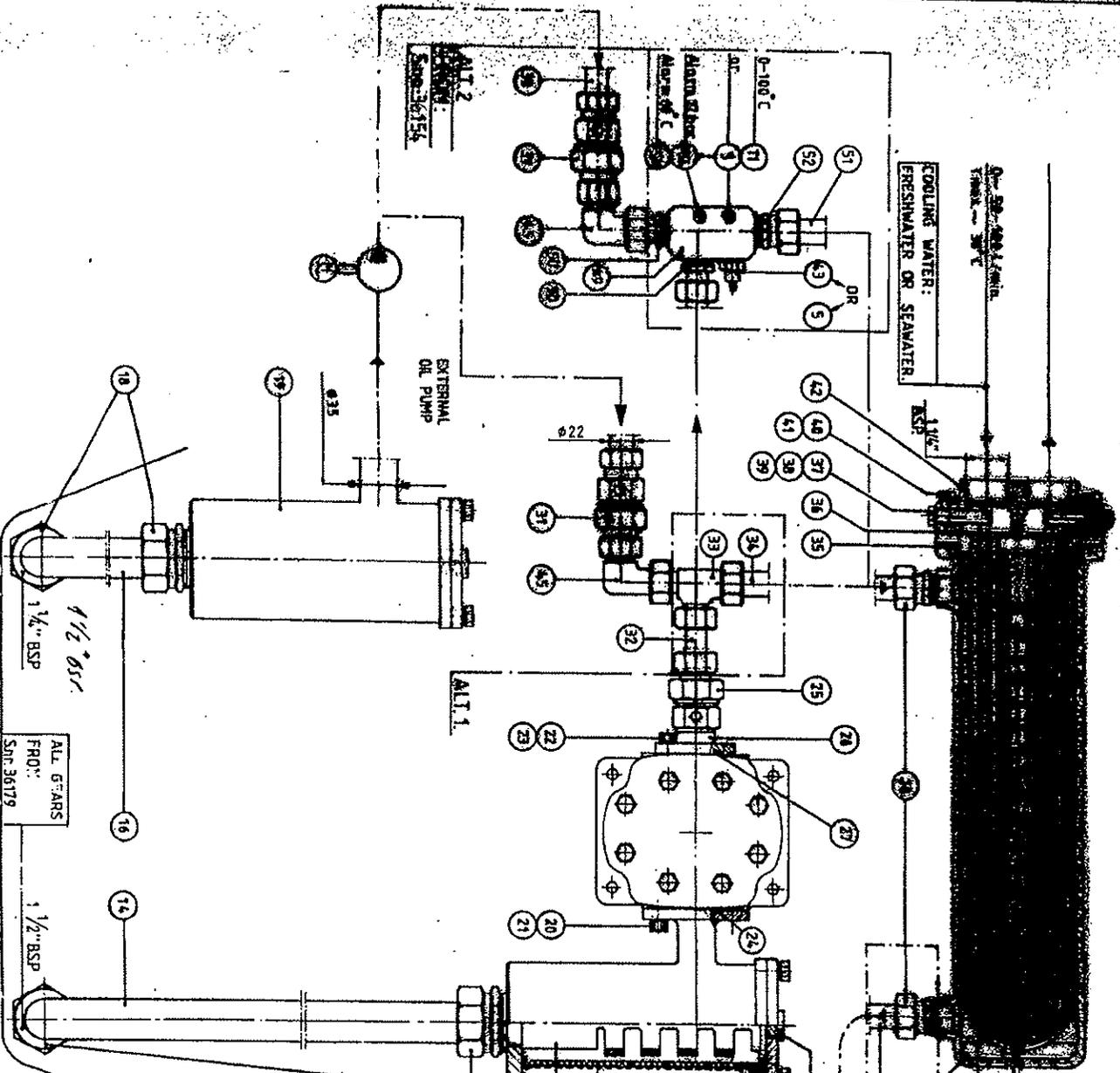
HG 2-HG 3-HG3S

OIL SYSTEM SCHEMATIC

304-017

HEMIVAL
PROPULSION A/S
NORWAY

FOR. QUANTITY	AMT. MATERIALS (ECONOMY MODEL. NR. MARK)
TYPE: 160189-2	DATE: 1982
NO.:	REVISION:
DATE:	BY:



PUMP TYPE/SIZE	INST.	SAE 480LT CONNECTOR	PUMP PORTS
SEE PAGE 3	INST.	PRD.	INST.
TYRONE 25500-25770.		404-055/404-056	2 1/2"
TYRONE 25900-25450, 20400-20450.		406-064/406-065	2"
TYRONE 20250-20350		406-064/406-065	1 1/2"
DDWTY: 3PL 330-300		407-018/407-079	1 1/2"
DDWTY: 3PL 150-300			1"

ALL 6" ARS
FRONT: S/N. 36179
1 1/2" BSP
1 1/2" BSP
1 1/2" BSP

303-039

HEIMDAL

PROPULSION A/S

Post Box 2081 Moldegård - 8401 Molde, Norway

407-019

GRUPPE G PARTLIST 407-018 DRAWING 303-039 PRODUCT HG300

POS	BESKRIVELSE	DESCRIPTION	QTY	PARTNO
1	OLJEKJØLER KOMPLETT	OIL-COOLER COMPLETE	1	OG0005
2	RØR	TUBE STACK	1	2G0248
3	SKALL	COOLER BODY	1	2G0250
4	PRESISJONSTALRØR	STEEL PIPE	1	6S0082
5	PLUGG	PLUG	1	6S0101
6	SPRENGSKIVE	LOCKWASHER	4	5S0139
7	SKRUE	BOLT	4	5S0231
8	OLJEFILTER TOPPLUKE	OIL FILTER TOP COVER	1	2G0283
9	O-RING	O-RING	1	8S0044
10	FJÆR	SPRING	1	3G0139
11	FILTER	FILTER	1	3G0140
12	MAGNETINNSATS	MAGNETIC INSERT	1	3G0141
13	OLJEFILTERHUS	OIL FILTER BODY	1	2G0433
14	PRESISJONSTALRØR	STEEL PIPE	1	6S0072
15	RETT KOPLING	STRAIGHT COUPLING	2	6S0071
16	PRESISJONSTALRØR	STEEL PIPE	1	6S0084
18	RETT KOPLING	STRAIGHT COUPLING	2	6S0051
19	OLJEFILTER KOMPLETT	OIL FILTER COMPLETE	1	OG0011
20	UNBRAKOSKRUE	UNBRAKO BOLT	4	5S0232
21	SPRENGSKIVE	LOCKWASHER	4	5S0164
22	UNBRAKOSKRUE	UNBRAKO BOLT	4	5S0138
23	SPRENGSKIVE	LOCKWASHER	4	5S0164
24	O-RING	O-RING	1	8S0173
25	TILBAKESLAGSVENTIL	NON-RETURN VALVE	1	6S0031
26	PUMPE FLENS UTGAENDE 3/4"	PUMP FLANGE OUTLET 3/4"	1	2G0285
27	O-RING	O-RING	1	8S0043
28	RETT KOPLING	STRAIGHT COUPLING	2	6S0009
30	PRESISJONSTALRØR	STEEL PIPE	1	6S0085
31	TILBAKESLAGSVENTIL	NON-RETURN VALVE	1	6S0032
32	PRESISJONSTALRØR	STEEL PIPE	1	6S0124
33	T-KOPLING	T-COUPLING	1	6S0190
34	PRESISJONSTALRØR	STEEL PIPE	1	6S0125
35	O-RING	O-RING	1	8S0042
36	PAKNING	GASKET	1	8S0092
37	PLUGG	PLUG	2	6S0063
38	TETTESKIVE	BONDED SEAL	2	8S0072
39	SINK ANODE	ZINC ANODE	2	6S0094
40	SPRENGSKIVE	LOCKWASHER	10	5S0139
41	SKRUE	BOLT	10	5S0216
42	ENDELOKK	END COVER	1	1G0191
43	TEMPERATUR FØLER	TEMPERATURE SENSOR	1	9S0010
44	BØYLE OVER TEMP.FØLER	PROTECTOR FOR TEMP.SENSOR	1	2G0431
45	VINKELKOPLING	ELBOW COUPLING	1	6S0191
46	STILLBAR T-KOPLING	SWIVEL T-COUPLING	1	6S0199
47	REDUKSJONSKOPLING	REDUCTION COUPLING	1	6S0200
48	PRESISJONSTALRØR	STEEL PIPE	1	6S0201
49	MONTERINGSBLOKK	DISTRIBUTION BLOCK	1	2G0442
50	INSTILLINGSTAPP	SWIVEL TAP	2	6S0204
51	PRESISJONSTALRØR	STEEL PIPE	1	6S0207
52	RETT KOPLING	STRAIGHT COUPLING	1	6S0009
53	PRESISJONSTALRØR	STEEL PIPE	1	6S0213

HEIMDAL

PROPULSION A/S

Post Box 2091 Moldegård - 6401 Molde, Norway

406-046

GRUPPE H PARTLIST 406-047 DRAWING 304-065 PRODUCT HG3005

POS	BESKRIVELSE	DESCRIPTION	QTY	PARTNO
1	TETTESKIVE	BONDED SEAL	1	8S0068
2	STILLBAR VINKELKOPLING	SWIVEL ELBOW COUPLING	1	6S0022
3	TETTESKIVE	BONDED SEAL	1	8S0071
4	STILLBAR VINKELKOPLING	SWIVEL ELBOW COUPLING	1	6S0025
5	TETTESKIVE	BONDED SEAL	1	8S0072
6	RETT KOPLING	STRAIGHT COUPLING	1	6S0010
7	KOPPERSKIVE-TELEMECANIQUE	COPPER DISC-TELEMECANIQUE	1	
8	INNSTILLINGSTAPP	SWIVEL TAP	1	6S0088
9	PRESSOSTAT	PRESSURE SWITCH	1	9S0004
10	TETTESKIVE	BONDED SEAL	1	8S0070
11	STILLBAR VINKELKOPLING	SWIVEL ELBOW COUPLING	1	6S0091
12	MANOMETER 0-40 BAR	PRESSURE GAUGE 0-40 BAR	1	9S0003
13	SKILT "CLUTCH"	NAME PLATE "CLUTCH"	1	4G0078
14	OLJEFORDELINGSBLOKK	OIL DISTRIBUTION BLOCK	1	2G0228
15	RETT KOPLING	STRAIGHT COUPLING	2	6S0002
16	INNSTILLINGSTAPP	SWIVEL TAP	1	6S0195
17	RETT KOPLING	STRAIGHT COUPLING	1	6S0107
18	MANOMETER 0-40 BAR	PRESSURE GAUGE 0-40 BAR	1	9S0003
19	SKILT "SERVO"	NAMEPLATE "SERVO"	1	4G0079
20	MANOMETERKOPLING	GAUGE COUPLING	1	6S0086
21	MANOMETERPAKNING	GAUGE SEAL RING	1	6S0093
22	RETT KOPLING	STRAIGHT COUPLING	1	6S0002
23	TETTESKIVE	BONDED SEAL	1	8S0070
24	STILLBAR VINKELKOPLING	SWIVEL ELBOW COUPLING	1	6S0091
25	INNSTILLINGSTAPP	SWIVEL TAP	1	6S0090
26	TETTESKIVE	BONDED SEAL	1	8S0070
27	RETT KOPLING	STRAIGHT COUPLING	1	6S0009
28	TETTESKIVE	BONDED SEAL	1	8S0068
29	PRESISJONSTALRØR	STEEL PIPE	1	6S0126
30	RETT KOPLING	STRAIGHT COUPLING	1	6S0002
31	TETTESKIVE	BONDED SEAL	1	8S0070
32	STILLBAR VINKELKOPLING	SWIVEL ELBOW COUPLING	1	6S0022
33	TETTESKIVE	BONDED SEAL	1	8S0068
34	VINKELKOPLING	ELBOW COUPLING	1	6S0092
35	SLANGE KOMPLETT	HOSE ASSEMBLY	1	6S0041
36	SLANGE KOMPLETT	HOSE ASSEMBLY	1	6S0042
37	RETT KOPLING	STRAIGHT COUPLING	1	6S0001
38	TETTESKIVE	BONDED SEAL	2	8S0071
39	PRESISJONSTALRØR	STEEL PIPE	1	6S0127
40	T-KOPLING *	T-COUPLING *	1	6S0062
41	PRESISJONSTALRØR	STEEL PIPE	1	6S0128
42	SKOTTGJENOMGANG	BULKHEAD COUPLING	1	6S0019
43	PRESISJONSTALRØR	STEEL PIPE	1	6S0129
44	T-KOPLING	T-COUPLING	1	6S0062
45	PRESISJONSTALRØR	STEEL PIPE	1	6S0130
46	SKOTTGJENOMGANG	BULKHEAD COUPLING	1	6S0019
47	SPREDERØR	SPRAY PIPE	1	6S0050
51	SLANGE KOMPLETT	HOSE ASSEMBLY	1	6S0043
52	INNSTILLINGSTAPP	SWIVEL TAP	1	6S0089
53	TETTESKIVE	BONDED SEAL	1	8S0071
54	TRE-VEIS PRØVEKRAN	THREE-WAY TEST COCK	1	6S0159
55	PRESISJONSTALRØR	STEEL PIPE	1	6S0196
56	RETT KOPLING	STRAIGHT COUPLING	1	6S0002
57	TRYKK/TEMP. BRYTER	PRESSURE/TEMP. SWITCH	1	9S0023
58	SLANGE KOMPLETT	HOSE ASSEMBLY	1	6S0044
59	TERMOMETER	THERMOMETER	1	9S0022
60	PRESISJONSTALRØR	STEEL PIPE	1	6S0197
61	VINKELKOPLING	ELBOW COUPLING	1	6S0122

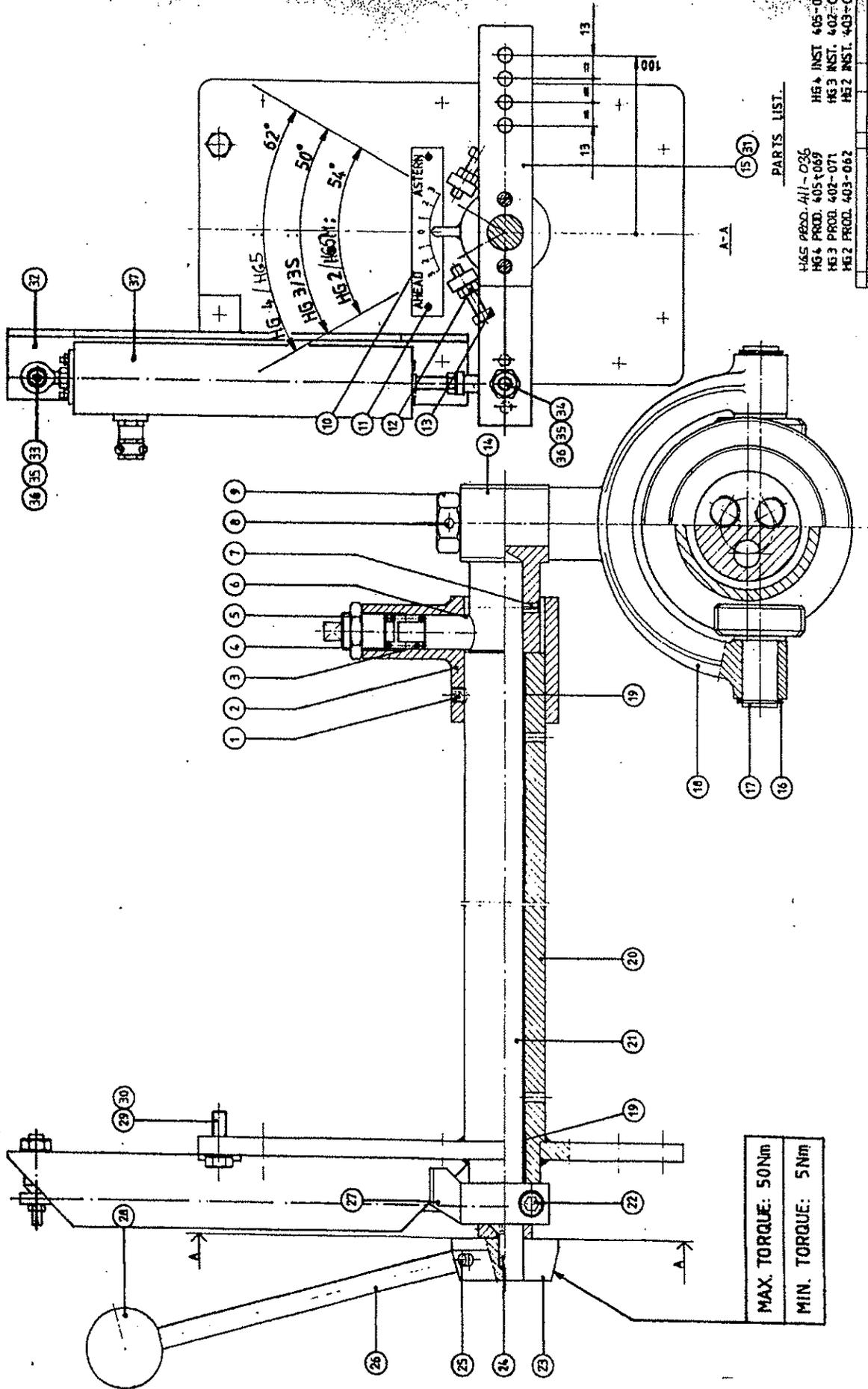
HEIMDAL**PROPULSION A/S**

Post Box 2091 Moldegård · 8401 Molde, Norway

406-046

GRUPPE H PARTLIST 406-047 DRAWING 304-065 PRODUCT HG3005

POS	BESKRIVELSE	DESCRIPTION	QTY	PARTNO
62	RETT KOPLING	STRAIGHT COUPLING	1	6S0001
63	SLANGE KOMPLETT	HOSE ASSEMBLY	1	6S0172
64	T-KOPLING *	T-COUPLING *	1	6S0198
65	T-KOPLING *	T-COUPLING *	1	6S0062
66	TETTESKIVE	BONDED SEAL	1	8S0071
67	TRYKK BRYTER	PRESSURE SWITCH	1	9S0024
68	PRESISJONSTALRØR	STEEL PIPE	1	6S0194



HAS PROD. A11-036
 HG 4 PROD. 405-069
 HG 3 PROD. 402-071
 HG 2 PROD. 403-062

PARTS LIST

HAS PROD. A11-036 HG 4 PROD. 405-069 HG 3 PROD. 402-071 HG 2 PROD. 403-062	HG 4 INST. 405-070 HG 3 INST. 402-003 HG 2 INST. 403-003	106-066
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MAX. TORQUE: 50Nm
 MIN. TORQUE: 5Nm

A3: 302-061

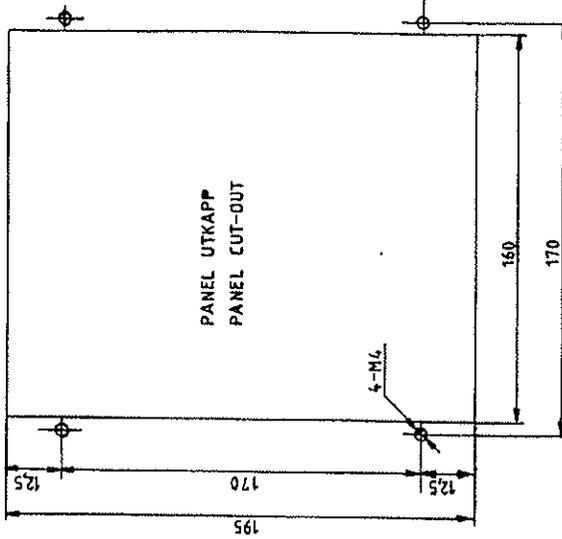
HEIMDAL**PROPULSION A-S**

Post Box 2091 Moldegård - 6401 Molde, Norway

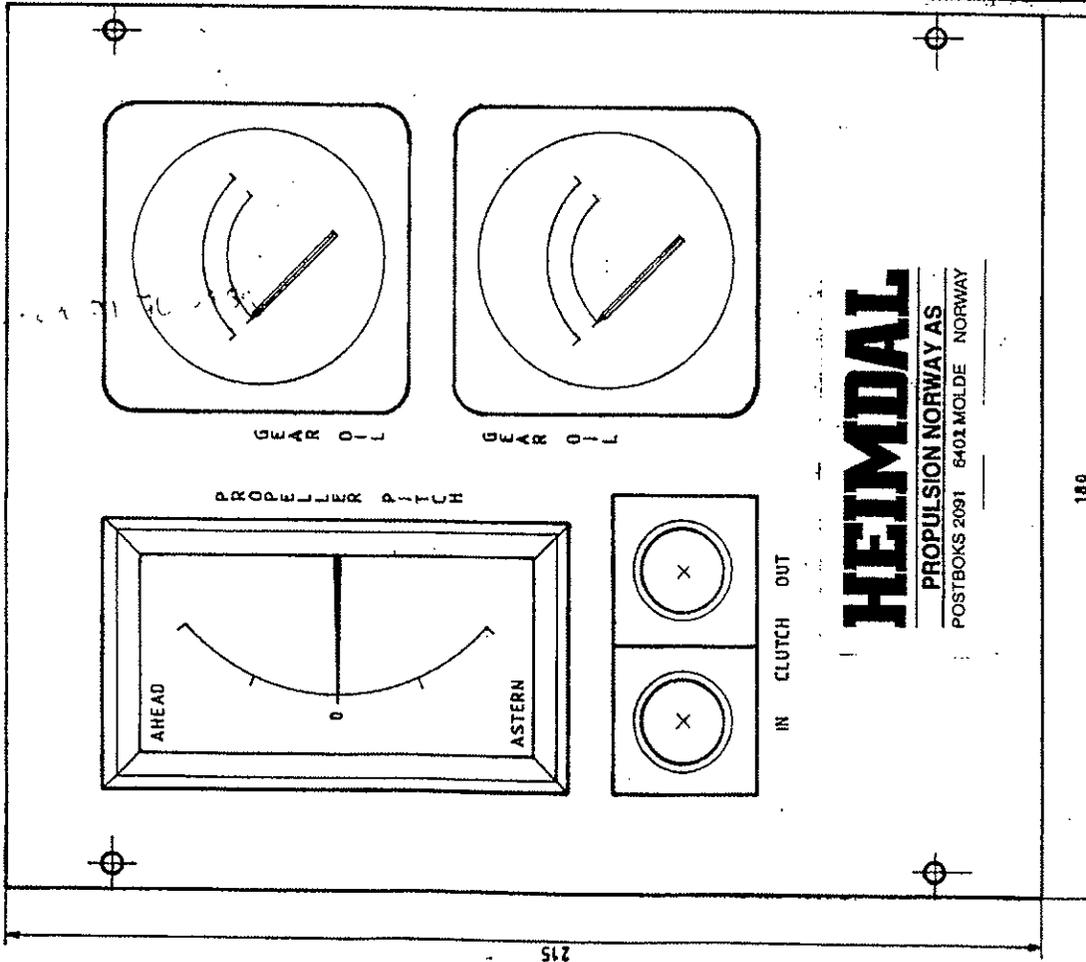
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GRUPPE I PARTLIST 402-071 DRAWING 106-066 PRODUCT HG300

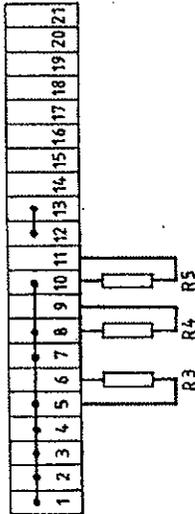
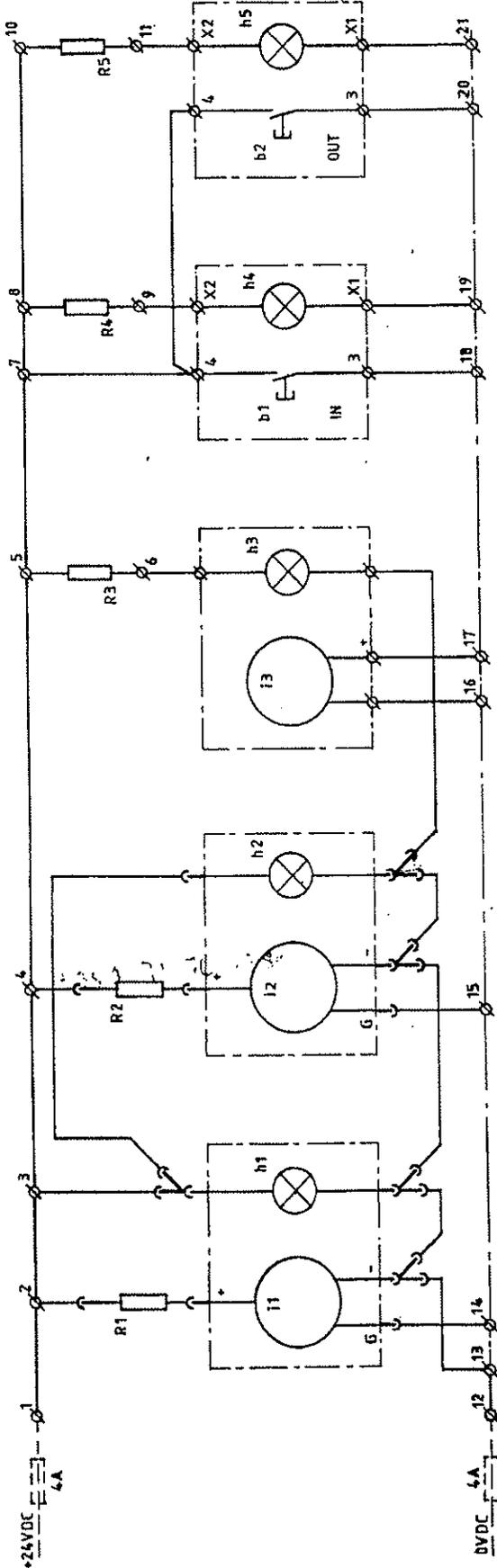
POS	BESKRIVELSE	DESCRIPTION	QTY	PARTNO
1	GJENGESTIFT	SET SCREW	2	5S0201
2	BREMSEHUS	BRAKE HOUSING	1	1G0255
3	FJER	SPRING	1	4G0098
4	STILLSKRUE	ADJUSTMENT SCREW	1	2G0253
5	LASEMUTTER	LOCKNUT	1	2G0289
6	FRIKSJONSTAPP	FRICTION PAD	1	2G0252
7	SPENNYLSE	SPLIT SLEEVE	1	7S0054
8	SPLINT	SPLIT-PIN	1	7S0038
9	FLENSMUTTER	FLANGE NUT	1	5S0183
10	SKILT "PITCH READING"	NAMEPLATE	1	4G0100
11	RIFLENAGLE	GROOVED RIVET	2	5S0212
12	MUTTER	NUT	2	5S0206
13	SKRUE	BOLT	2	5S0203
14	BOSS FOR GAFFEL	HUB FOR YOKE	1	2G0305
15	TELEFLEXARM	TELEFLEX ARM	1	2G0290
16	LASERING	SNAP-RING	2	7S0022
17	GLIDESTYKKE	SLIDING SLEEVE	2	2G0195
18	GAFFEL	YOKE	1	1G0184
19	GLIDELAGER	SLEEVE BEARING	1	3G0150
20	SIDELUKE MED BRAKETT	SIDE COVER WITH BRACKET	1	2G0136
21	MANØVERAKSEL	MANOEUVRE SHAFT	1	2G0211
22	UNBRAKOSKRUE	UNBRAKO BOLT	1	5S0200
23	BOSS FOR MANØVERAKSEL	BOSS FOR HANDLE	1	2G0306
24	UNBRAKO SENKSKRUE	UNBRAKO BOLT COUNTERSUNK	2	5S0177
25	KONISK PINNE	TAPER PIN	1	7S0052
26	MANØVERHENDEL	MANOEUVRE HANDLE	1	2G0292
27	SLAGBEGRENSER	STROKE LIMITER	1	2G0293
28	GRIPEKULE	BALL FOR HANDLE	1	7S0005
29	SKRUE	BOLT	10	5S0213
30	SPRENGSKIVE	LOCKWASHER	10	5S0140
31	TELEFLEX/PITCH METER ARM	TELEFLEX/PITCH METER ARM	1	2G0413
32	BRAKETT FOR POTENSIOMETER	BRACKET FOR POTENTIOMETER	1	2G0447
33	SKRUE FOR POTENSIOMETER	BOLT FOR POTENTIOMETER	1	2G0445
34	SKRUE FOR MANØVER ARM	BOLT FOR MANOEUVRING ARM	1	2G0446
35	MUTTER	NUT	2	5S0307
36	MUTTER	NUT	2	5S0109
37	POTENSIOMETER	POTENTIOMETER	1	PAGE 3



DYBDE:
DEPTHT:



POS. GJENSTAND	ANT. MATERIALE	TEGNAER	MODEL NR.	MERK.
BROPANEL		Tegn. 24.03.87		Erst. Nr.
BRIDGE PANEL		Nr.:		302-078
		Millestokk		Erst. Nr.
		HEIMDAL PROPULSION AS Post Boks 2091 8403 Molde Norway		

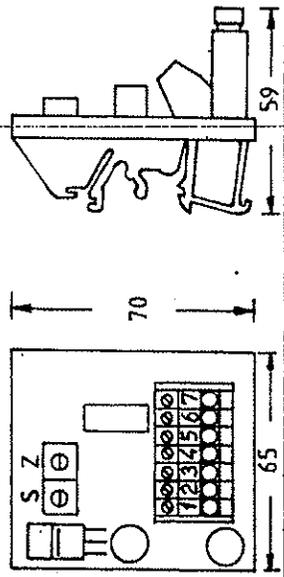
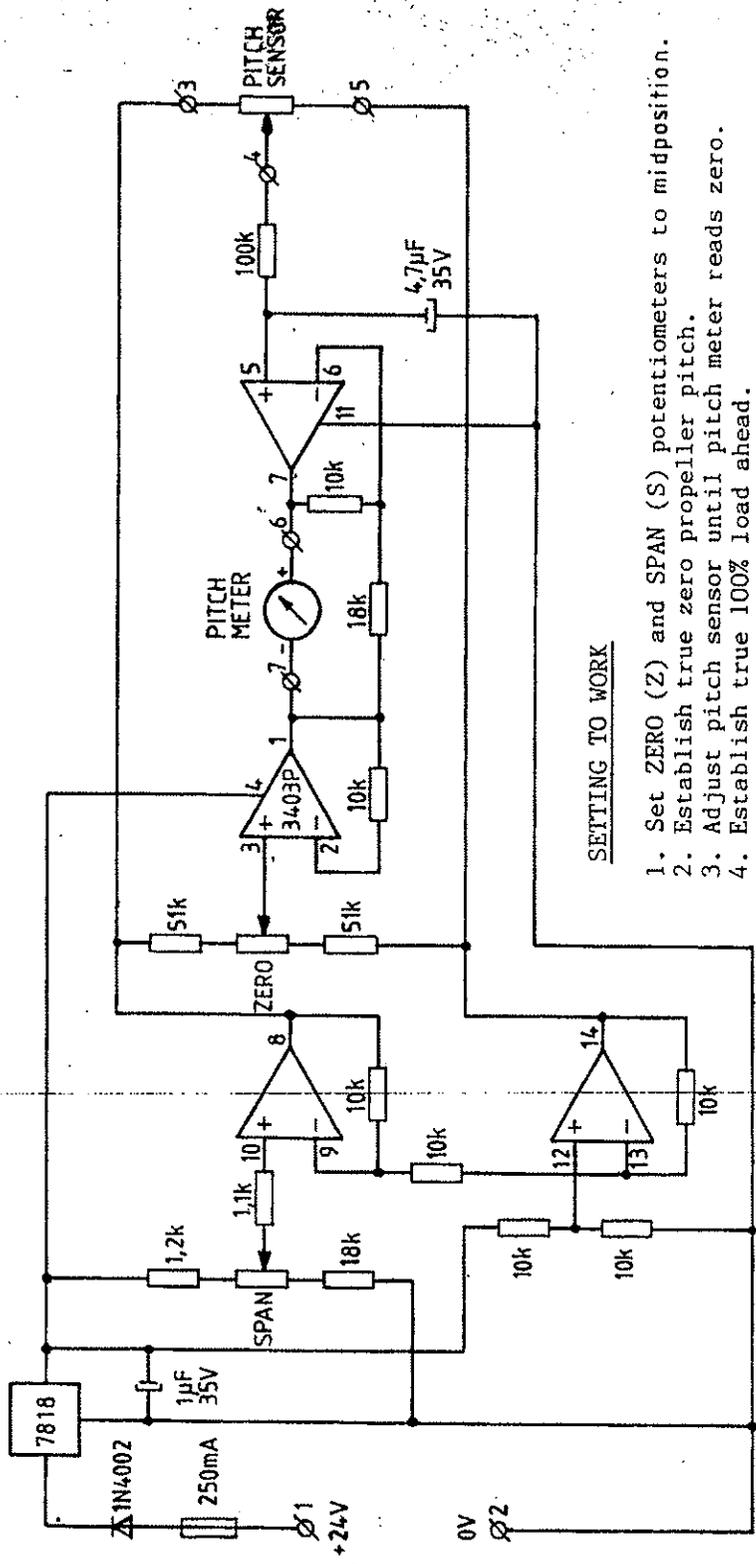


- b1 Pushbutton
- b2 Pushbutton
- h1, h2 Lamp
- h3 Lamp
- h4, h5 Lamp
- i1 Temp. indicator
- i2 Press. indicator
- i3 Pitch indicator
- R1, R2 Resistor
- R3, R4, R5 Resistor
- Izumi ALFW 29911G
- Izumi ALFW 29911E
- 24V, 3W
- 24V, 3W
- 24V, 3W
- Ba9s 24V, 1W
- 313/274/8/1
- 352/271/5/15
- 7-0-7
- V150 391.102/1/1
- 220 ohms, 2W

REF. DRAW. NO. 302-082 WIRING DIAGRAM GEAR

POS. GJENSTAND	ANT. MATERIALE	TEGN.NR.	MODEL NR.	MERK
KOBLINGSSKJEMA BROPANEL				Tegn. 09.04.87
WIRING DIAGRAM BRIDGE PANEL				Erst. for
				Trec
				Kffc
				Mllestoikk
				302-081
				Erst. nr.





SETTING TO WORK

1. Set ZERO (Z) and SPAN (S) potentiometers to midposition.
2. Establish true zero propeller pitch.
3. Adjust pitch sensor until pitch meter reads zero.
4. Establish true 100% load ahead.
5. Adjust SPAN potentiometer until pitch meter reads 100% ahead.
6. Repeat above if necessary.

NOTE. The ZERO potentiometer is used for ZERO fine-adjustment only.

Dato	Konstr./Tegnet	Godkjent
24.12.87. <i>73</i>		

HEIMDAL

PROPULSION NORWAY AS

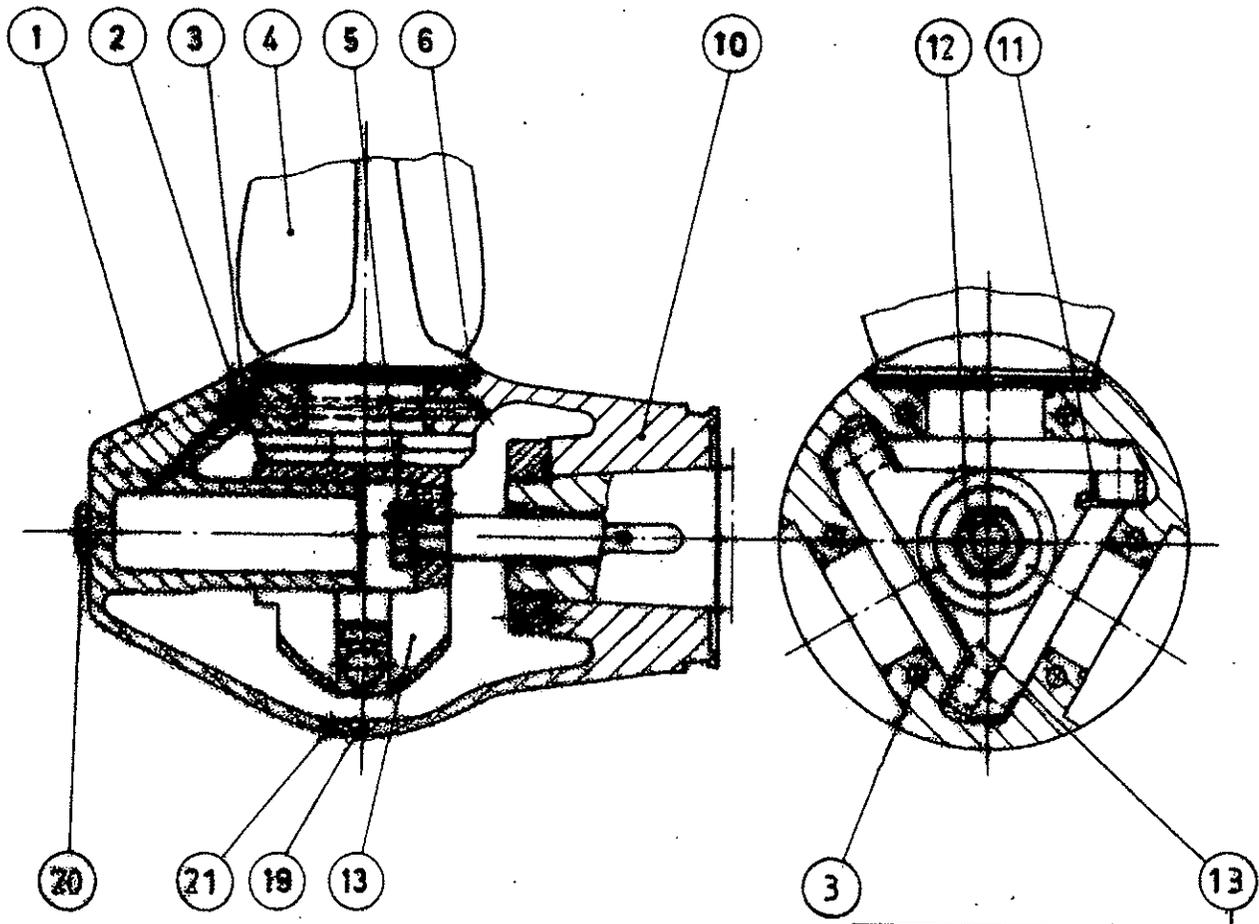
PITCH METER DRIVER

403-098

Henvising:	Beregning:
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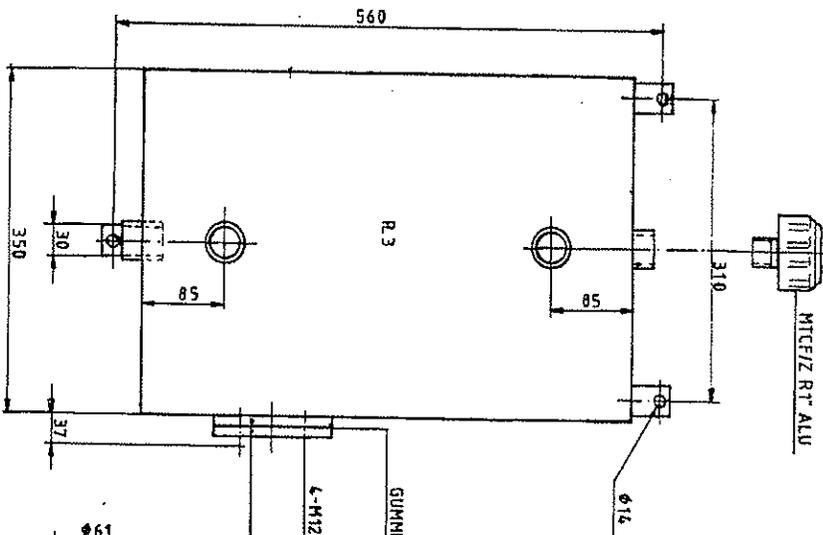
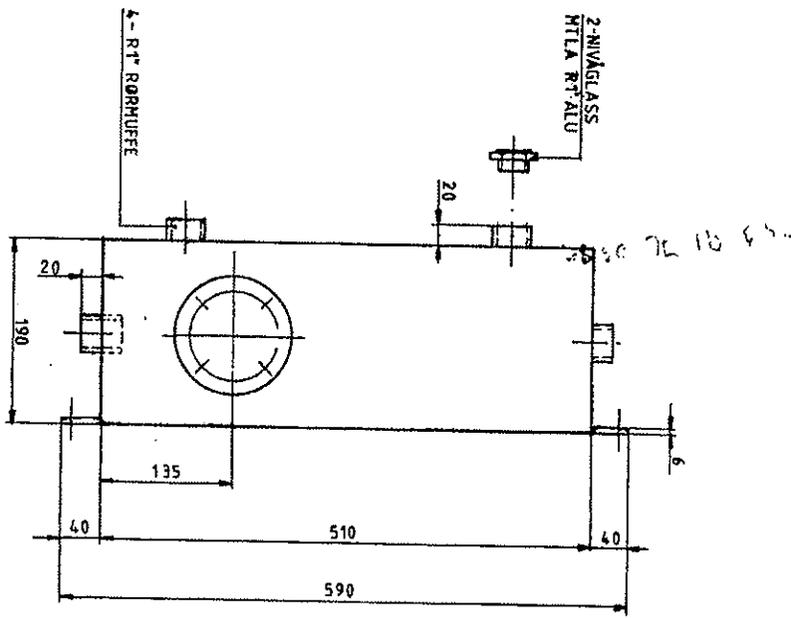
GRUPPE P PARTLIST 407-087 DRAWING 108-096 PRODUCT K500

POS	BESKRIVELSE	DESCRIPTION	QTY	PARTNO
1	PROPELLERBLAD	PROPELLER BLADE	3	PAGE 3
2	INDRE PROPELLERHODE	INNER PROPELLER HUB	1	1P0009
3	YTRE HODE (DEL AV 1P0009)	OUTER HUB(PART OF 1P0009)	1	-
4	SKYVESTYKKE	POSITIONER SLIDE	1	PAGE 3
5	GLIDEKLOSSER	SLIDE BLOCK	3	1P0715
6	MUTTER FOR PROPELLHODE	HUB NUT	1	1P0711
7	PROPELLERAKSEL	PROPELLER SHAFT	1	PAGE 3
8	TREKKSTANG	PUSH-PULL ROD	1	PAGE 3
9	INDRE GLIDELAGER	INNER PULL ROD BUSH	1	2P0017
10	YTRE GLIDELAGER	OUTER PULL ROD BUSH	1	2P0018
11	AKSELKOPLING-DEL AV GEAR	SHAFT COUPLING-WITH GEAR	1	-
12	THRUSTRING	THRUST RING	1	2P0056
13	KILE FOR AKSELKOPLING	KEY FOR SHAFT COUPLING	1	4P0019
14	KILE FOR HODE	KEY FOR HUB	1	4P0009
15	HYLSE	STERNTUBE	1	PAGE 3
16	SKJERM	ROPE GUARD	1	1P0119
18	OLJEINNFØRINGSRING	OIL INLET RING	1	2P0074
19	YTRE SETE (GML.NR 2P0082)	OUTER SEAT-OLD NO 2P0082	1	1P0729
20	YTRE HYLSEFORING	OUTER STERNTUBE BEARING	1	1P0713
21	INDRE HYLSEFORING	INNER STERNTUBE BEARING	2	1P0714
22	INDRE SETE	INNER SEAT	1	3P0250
23	INDRE HYLSETETNING	INNER STERNTUBE SEAL	1	3P0181
24	YTRE HYLSETETNING	OUTER STERNTUBE SEAL	1	3P0189
25	PAKNING	GASKET	1	8S0087
26	TETTESNOR	SEALING STRAP	3	8S0090
27	O-RING	O-RING	3	8S0026
28	O-RING	O-RING	1	8S0015
29	O-RING	O-RING	2	8S0028
30	O-RING	O-RING	1	8S0023
31	O-RING	O-RING	1	8S0024
33	TETTINGSRING	SEALING RING	1	8S0050
34	LASESKIVE	RETAINER	1	2P0331
35	LASERING	SNAP-RING	1	7S0028
36	HODE SKRUE	HUB BOLT	6	2P0036
37	GJENGESTIFT RUSTFRI	SET SCREW STAINLESS	6	5S0102
38	MUTTER FOR TREKKSTANG	NUT FOR PUSH-PULL ROD	1	PAGE 3
39	GJENGESTIFT RUSTFRI	SET SCREW STAINLESS	2	5S0102
40	UNBRAKOSKRUE RUSTFRI	UNBRAKO BOLT STAINLESS	4	5S0018
41	PLUGG RUSTFRI	PLUG STAINLESS	1	6S0109
43	GJENGESTIFT RUSTFRI	SET SCREW STAINLESS	1	5S0082
44	UNBRAKOSKRUE	UNBRAKO BOLT	2	5S0064
45	SKRUE RUSTFRI	BOLT STAINLESS	8	5S0104
46	UNBRAKOSKRUE RUSTFRI	UNBRAKO BOLT STAINLESS	12	5S0019
47	UNBRAKOSKRUE RUSTFRI	UNBRAKO BOLT STAINLESS	12	5S0221
48	GJENGESTIFT RUSTFRI	SET SCREW STAINLESS	4	5S0105
49	SKRUE	BOLT	6	5S0192
50	UNBRAKOSKRUE	UNBRAKO BOLT	8	5S0296
51	UNBRAKOSKRUE	UNBRAKO BOLT	2	5S0014
52	PLUGG	PLUG	1	6S0100
53	PLUGG	PLUG	1	6S0101
54	LUFTESKRUE	BLEED SCREW	1	5S0219
55	UNBRAKOPLUGG	UNBRAKO PLUG	1	6S0066
57	HYLSEOLJETANK	OIL SUPPLY TANK	1	4P0022
59	AKSELKLEMING	SPLIT CLAMP RING	1	3P0258
60	UNBRAKOPLUGG RUSTFRI	UNBRAKO PLUG STAINLESS	1	6S0110
61	GJENGESTIFT	SET SCREW STAINLESS	1	6S0252
62	O-RING	O-RING	1	9S0187
63	NIVABRYTER	LEVEL SWITCH	1	9S0006

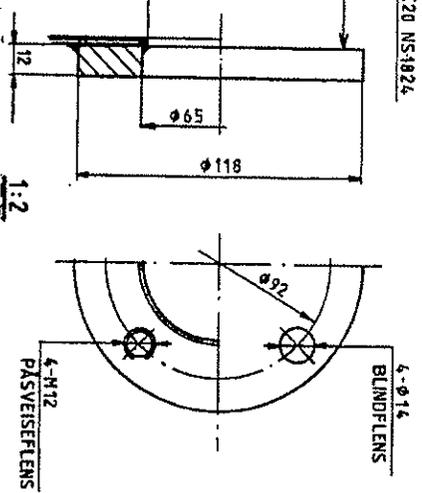


REFERS TO INSTRUCTION 402-028 PAGE 26.

POS.	GJENSTAND	ANT.	MATERIALE	TEGN.NR	MODEL NR.	MERK.
	PROPELLER-K-SERIES			Tegn: 13/9.91 KF		Erst. for:
	MOUNTING THE PROPELLER BLADES			Trac:		408-013
				Kfr:		
	HEIMDAL PROPULSION AS <small>Post Box 2091 Mottegård - 9401 Motte, Norway</small>			Målestokk:		Erst. av:



S. Aced → SW



DEL.NR. 490022

1:2

POS. GJENSTAND	ANT.	MATERIALE	TEGN.NR	MODEL	NR.	MERKE
HYLSEOLJETANK						
STERN TUBE GRAVITY TANK						
<small>Post Box 281 4001 Sletten Norway</small>						
Tegn. 03038784			Emk for:			
Ktr.:			302-068			
Målestokk			1:5			
Emk. nr.:			302-068			

