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PROTOTYPE INTERNAL RESCUE HOIST FOR UH-ID, SERIES V22.228.400, --ETC(U)
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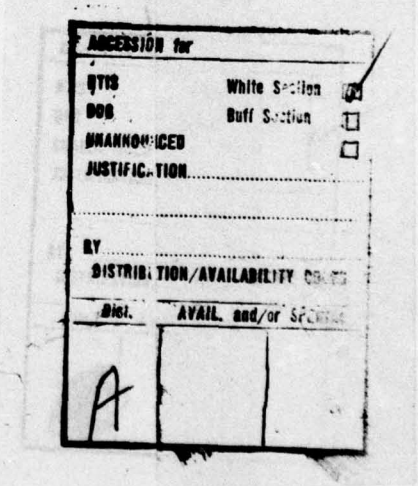
PROVISIONAL TECHNICAL DESCRIPTION

PROTOTYPE INTERNAL RESCUE HOIST

FOR UH-1D

Series: V22.228.400



ALLGEMEINE ELEKTRICITAETS-GESELLSCHAFT

AEG - TELEFUNKEN

TECHNICAL AREA FOR SHIP CONSTRUCTION -
AVIATION - SPECIAL TECHNOLOGY

AEG 100

1 DECEMBER 1972

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FOREWORD

An internal hoist for helicopter was developed by AEG-Telefunken to be used for rescue and recovery operations as well as for transporting loads. These hoists are installed in the lightweight helicopter Bell UH-1D and are applied for rescue maneuvers above the sea and in the mountains for the purposes of SAR service.

The hoist is assembled from integrated functional groups. Therefore, it can be modified easily to match the requirements of any other type of helicopter.

At disasters in terrain difficult of access and to be reached by rescue parties on foot often not until after hours and under great dangers, helicopters equipped with rescue hoists will render quick aid, riskless for the rescue team.

The AEG rescue hoist operates reliably and safely without capacity reductions also in great altitude and at extreme low temperatures.

1. INSTRUCTION MANUAL /1

1.1 GENERAL DATA

The internal rescue hoist is intended for installation in the light transport helicopter Bell UH-1D.

The following is a description for the internal rescue hoist for prototypes of the Series 400.

1.1.1 Designation

Designation:	Internal rescue hoist for UH-1D
Type number:	V22.228
Series number:	400-xx
Manufacturer:	AEG-Telefunken

1.1.2 Applicability

The device is suitable for receiving, setting down and transportation of persons and loads under special conditions:

Over land and sea when landing ashore or on water is not possible,

During search and rescue operations,

Transportation of wounded and sick persons,

Use in disasters.

1.1.3 General Description

The equipment is for installation on four prescribed positions in the helicopter.

It consists of a number of easily separable functional groups:

One mast with bottom-attached slewing gear which is connected closely to the air frame between an upper and lower clamping point, /2

One jib which contains the characteristic hoisting gear and which can be slewed out by the slewing gear through the air frame profile of the helicopter,

One electronics equipment box attached to the mast with mounted control device and 28 V aircraft electrical system feed through a pluggable connection, as well as

One manual control unit connected with the equipment box through a flexible cable.

Essential for running the equipment in the case of special operations (for example, transport of wounded) is a load-independent, stepless speed adjustment of the hoisting gear with operation of the manual control unit by the hoist operator. Slewing in and out takes place at only one speed. It is possible for the pilot, for purposes of correction, to use the equipment in all functions with priority by means of a stick switch already installed in the helicopter. Herewith, the hoisting gear always operates with maximum hoisting or lowering speed.

In case of emergency, the safety component "cable cut switch" can be actuated independently both by the pilot as well as by the hoist operator.

The hoist operator can be switched into the intercom system by means of a button installed in the manual control unit.

1.1.4 Visual Display /3

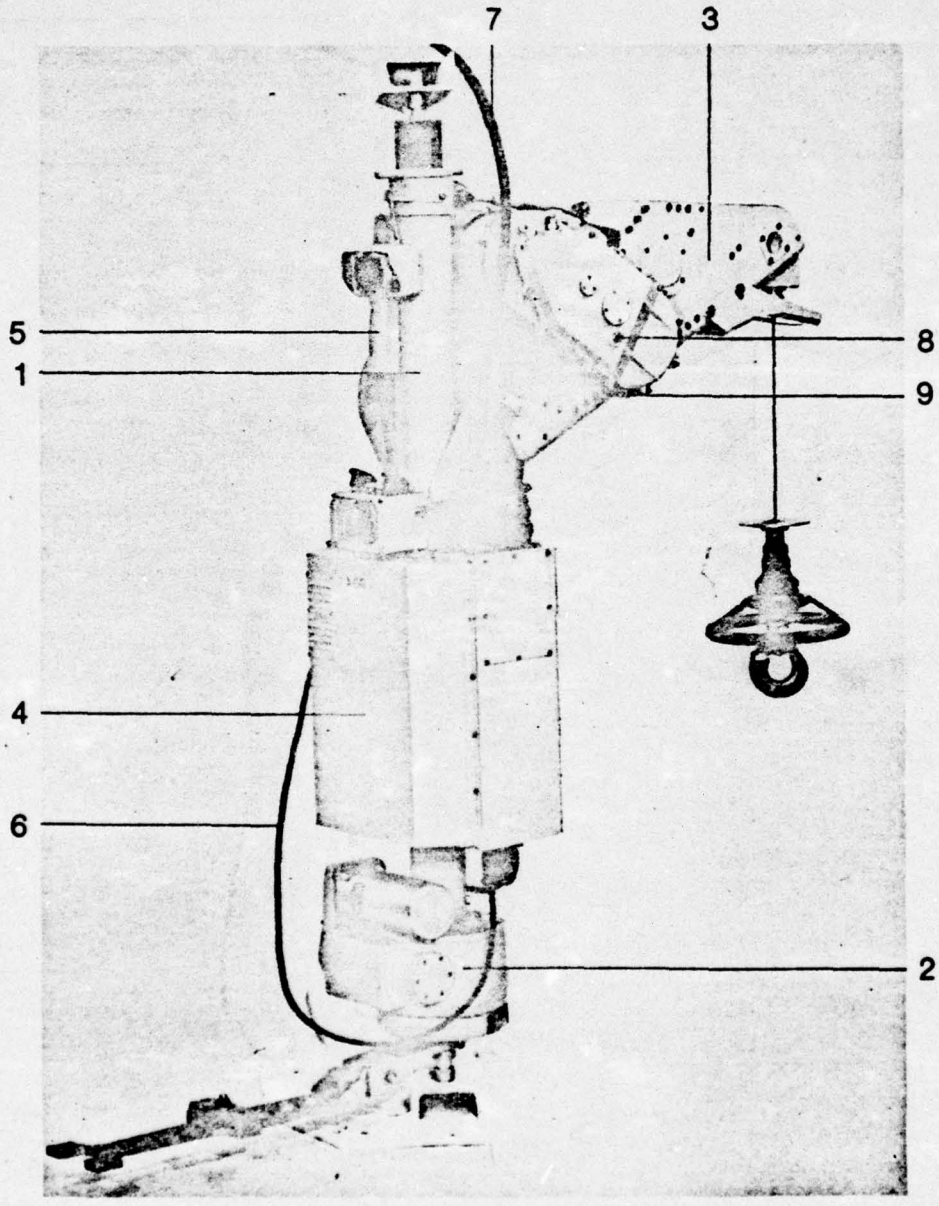


Figure 1.1. Internal rescue hoist for UH-1D Series V22.228.400.

1	Mast	6	Connection for manual control unit
2	Slewing gear	7	Connection for power supply
3	Jib	8	Oil level check plug
4	Electronic equipment box	9	Oil drainage plug
5	Manual control unit		

1.1.5 Service Record /4

A service record similar to the flight log is attached to each equipment.

This record will document all operations carried out with the equipment as well as all modifications undertaken on the equipment such as, for example, exchange of functional groups, cable replacement, etc.

The record is located in a protective plastic pocket and stays with the equipment.

While the equipment is in an operational status in the helicopter, the record is to be enclosed with the flight log.

1.2 TECHNICAL DATA

1.2.1 Performance Characteristics for Hoisting Gear

	Values
Permissible rated load	Max. 275 kp (max. 600 lbs)
Cable length	45 m (150 ft)
Cable speed V_{cable} = continuously adjustable (stepless)	0.075 ... 0.75 m/sec
Load hook horizontally rotatable by	>360°
Load capacity with shutdown of equipment by blocking brake, corresponds to safe load = 2.5 x permissible rated load	Max. 680 kp
Ultimate load of equipment	>1020 kp

1.2.2 Performance Characteristics for Slewing Gear

Slewing angle	ca. 100°
Limit switch for slewing angle control, switchable for all installed positions	
Slewing time for a 100° slewing angle depending on rated load and diagonal pull	5.5 ... 7.5 sec
Permissible diagonal pull from the central position towards all sides during slewing with permissible rated load	15°
Installed blocking brake in the drive motor	

1.2.3 Operating Data

Ambient temperature	-55° ... +70° C
Hoist speed in stationary hover flight with hoist actuation	Max. 60 Kts

Flight speed with hoist actuation	Max. 60 Kts IAS	
Permissible number of stress repetitions per operation under the following conditions:	11	/6
Rated load	$\leq$275 kp	
Lowering	$\leq$45 m	
Stop	$\geq$60 sec	
Hoisting	$\leq$45 m	
Stop	$\geq$60 sec	
Shortest stop after 11 load cycles before renewed hoist operation	20 min	

1.2.4 Electrical Data

Direct current

Nominal value	28 V
Range	24.5 ... 30.5 V

Current consumption

Control circuit	10 A
Power circuit	Max. 145 A

1.2.5 Safety Equipment

Cable cut switch with electrically ignitable explosive charge.

Automatic limit switching for hoisting and lowering. Monitoring switches for current, rotation speed and break of conductor.

Overtemperature fusing for hoisting gear motor, power amplifier and brake resistance.

Automatic slewing angle limit by limit switch.

Identification of cable ends by 5 m long color markings.

1.2.6 Fuels and Filling Capacities

	Values	/7
Gear case lubricating oil, NATO Symbol O-147 (exchangeable for oil O-148 or O-156)		
Hoisting gears	0.33 l	
Slewing gears	0.10 l	

1.2.7 Weights

Mast with slewing gear	20.80 kp
Jib	44.00 kp

Electronic equipment box	21.80 kp
Power supply connection	1.45 kp
Manual control unit	0.68 kp
Connection	0.24 kp
Total weight	88.97 kp

1.2.8 Center of Gravity and Load Lever

Separation of the center of gravity from the axis of rotation of the mast in the case of a jib which has been slewed out by 90° to the aircraft longitudinal axis	100 mm toward outside
Separation of the cable runout (load distribution line) from the axis of rotation of the mast	645 mm

2. OPERATING INSTRUCTION /9

2.1 INSTALLATION

2.1.1 General

Installation includes a complete equipment (Figure 1.1) consisting of:

1. Mast with slewing gear
2. Jib
3. Electronic equipment box
4. Manual control unit
5. Connecting cable for control unit
6. Power supply cable

The functional groups, items 1-5, shown in Figure 1.1, are identified by nameplates.

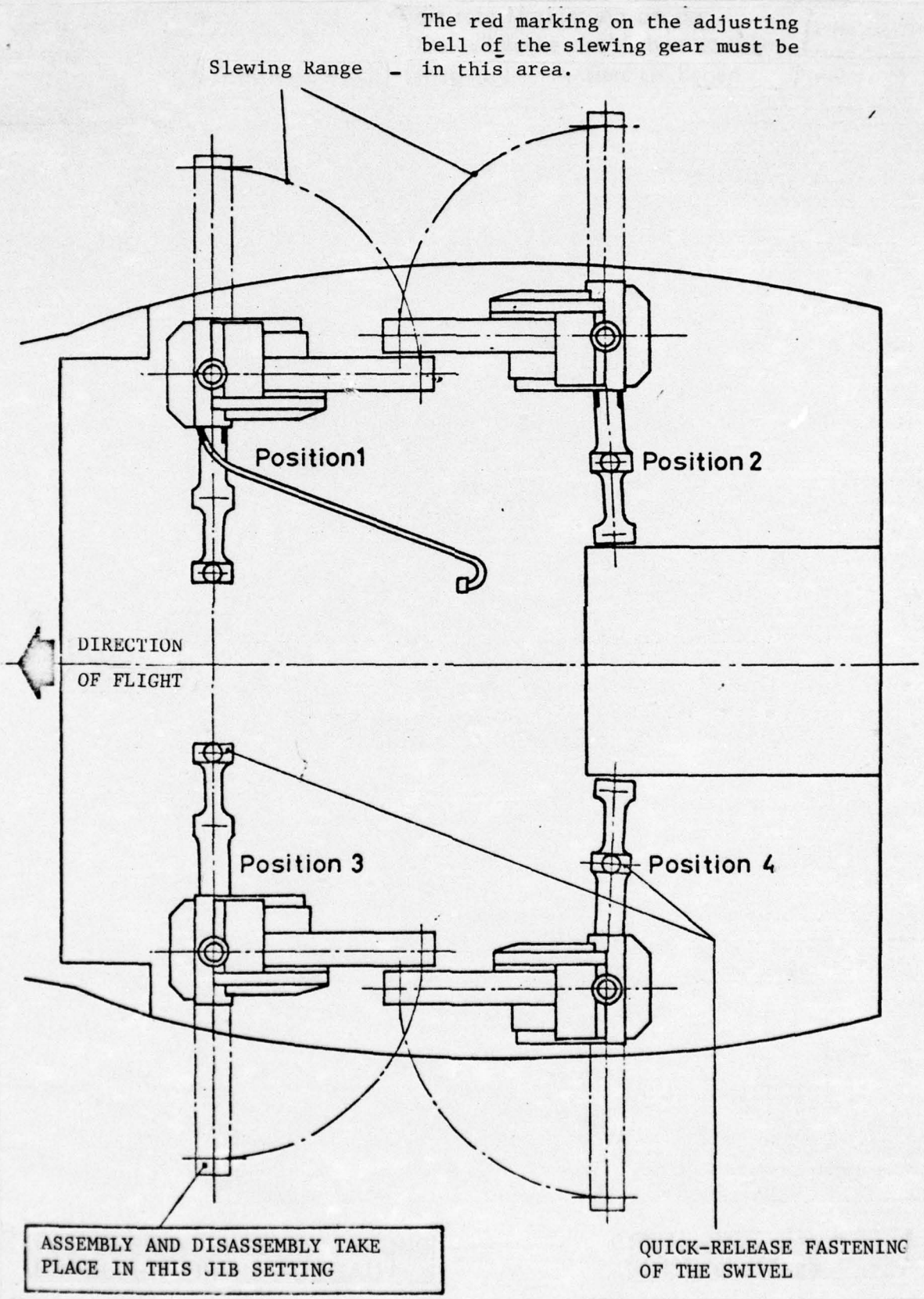
The equipment can be placed in the helicopter at four different points (cf. Figure 2.1).

For installation in position 1 and position 3 according to Figure 2.1, the quick-release fastener is to be installed at the outer end of the swivel or for installation in position 2 or position 4 according to Figure 2.1 in the center of the swivel.

2.1.2 Installation Tools

1. Modification of the swivel (cf. Section 2.1.1):
   Hexagonal-socket screw wrench s = 5 mm (EGA*Item 23).

*EGA, Basic Allowance of Spare Parts



/10

Figure 2.1. Installation positions of the equipment in the helicopter.

2. Attachment of the quick-release fastener of the swivel (cf. Section 2.1.3):
Open-end or box-end wrench s = 11/16".

3. Installation of the electronic equipment box and adjustment of the jib height (cf. Section 2.1.3):

Screwdriver (EGA Item 24)
Piercing diameter 2 mm.

2.1.3 Installation in Helicopters /11

The hoist is completely assembled for installation and made available with the exception of the electronic equipment box.

Care must be taken that the jib is located exactly opposite the swivel (cf. Figure 2.1).

Installation in helicopters takes place in the following sequence:

1. Opening of both quick-release fasteners on the hoisting mast (1, Figure 2.2, and 3, Figure 2.6).

2. Insert screw thread completely (2, Figure 2.2).

3. Expose mounting elements in the helicopter.

4. Insert equipment with the slewing gear forward in the helicopter and set the quick-release fastener opened from the bottom over the fastening bolts on the floor of the cabin.

5. Straighten the hoist and lock on the mast.

6. Elevate the thread insert at the upper end of the hoist mast, press against the upper mounting bolts on the cabin roof, close quick-release fastener and release hoist (Figure 2.2).

7. Screw down ring nut (3, Figure 2.2) lightly with the two handgrips against the bullring (6, Figure 2.2).

8. Check proper seat on lower fastening bolt and close lower quick-release fastener (Figure 2.7).

9. Check proper seat of hoist between the fixed points by shaking the mast and screw on the ring nut from one-half to a full turn so that the mast is held solid with stress (Figure 2.2).

10. Check height adjustment of the jib by slewing in and out manually(swivel 2, Figure 2.7 not yet fastened on the cabin floor). The upper rubber strip of the door opening can be lightly contacted with proper adjustment.

For adjustment, take out locking spring with screwdriver and turn tightening nut with piercing diameter 2 mm. Following this, again insert locking spring (Figures 2.3, 2.4 and 2.5).

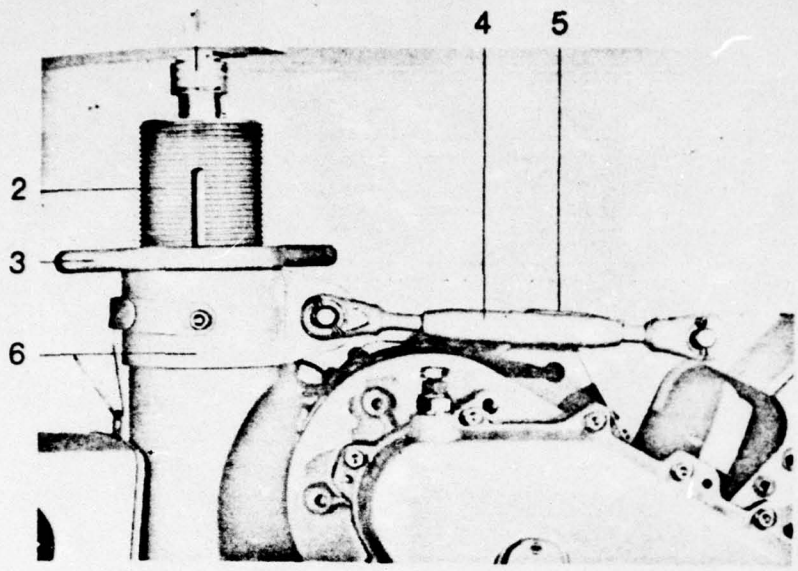


Figure 2.2
Upper hoist attachment

1 Quick-release fastener
2 Thread insert
3 Ring nut
4 Tightening nut of the forked turnbuckle
5 Locking spring
6 Bullring

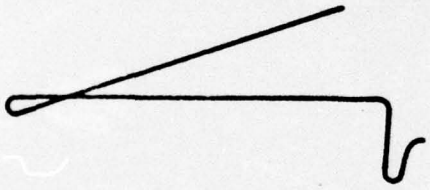
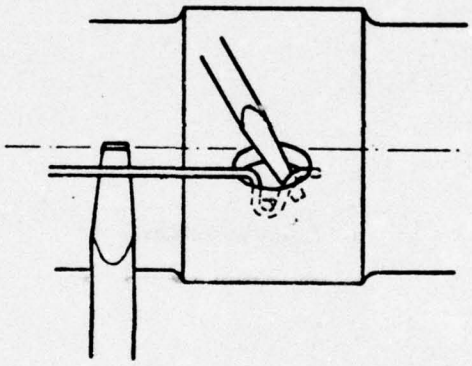


Figure 2.3 1 Locking spring



2 Disassembly of locking spring

/12

Figure 2.4
Adjustment of tightening nut

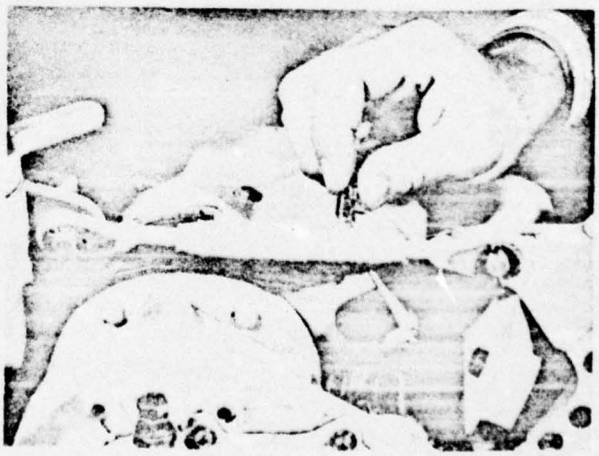


Figure 2.5
Insert of locking spring

11. Before fastening down the swivel, the tension piece (5, Figure 2.7) is to be installed in accordance with the selected installation position after unscrewing two countersunk screws M8 x 30 DIN 7991 using a hexagonal socket screw wrench s = 5 mm on one of the two possible places on the swivel. Figure 2.7 shows the tension piece for the rear installation positions 2, Figure 2.1 and 4, Figure 2.1. Installation is to be made at the end of the swivel (cf. Section 2.1.1) for installation positions 1, Figure 2.1 and 3, Figure 2.1. /13

12. The quick-release fastener on the swivel is unscrewed and after raising the swivel is attached to the mounting element in the cabin floor.

Thereupon, the swivel is folded over and the quick-release fastener (4, Figure 2.7) is again screwed tight using an open-end wrench or box-end wrench -- s = 11/16".

2.1.4 Adjustment of the Slewing Range

By actuating slewing switch on control unit to ON (for "slewing in"), so that the unit slews in installation positions 1, Figure 2.1 and 4, Figure 2.1, turning clockwise and in installation positions 2, Figure 2.1 and 3, Figure 2.1, turning counterclockwise, the direction of turn of drive can be switched by twisting the adjusting bell (1, Figure 2.6).

(Accordingly, switching to OFF corresponds to "slewing out".)

One hand is used to extract the flexible captive bolt (2, Figure 2.6) and the other hand is used to turn the adjusting bell to the stop so that its red marking shows the proper slewing range for the selected installation position.

Subsequently, the captive bolt is released and the adjusting bell is moved slightly back and forth until the captive bolt engages.

CAUTION /15

The adjusting bell must be ensured against turning by the captive bolt since otherwise it is possible to have an excessive slewing of the jib.

2.1.5 Connection to the Aircraft Electrical System

1. The electronic equipment box is set on the mast using two catches (3, Figure 2.8) on the lower side slanting from the top inwards in such a way that the catches grasp the supporting pins (6, Figure 2.9) extending out transversely on both sides of the mast.

At this point, the electronic equipment box is pressed against the mast, the clamping strap (2, Figure 2.8) slewed around the mast on the upper side and the captive pin (1, Figure 2.8) locked using a screwdriver by means of a 90° turn in the shim.

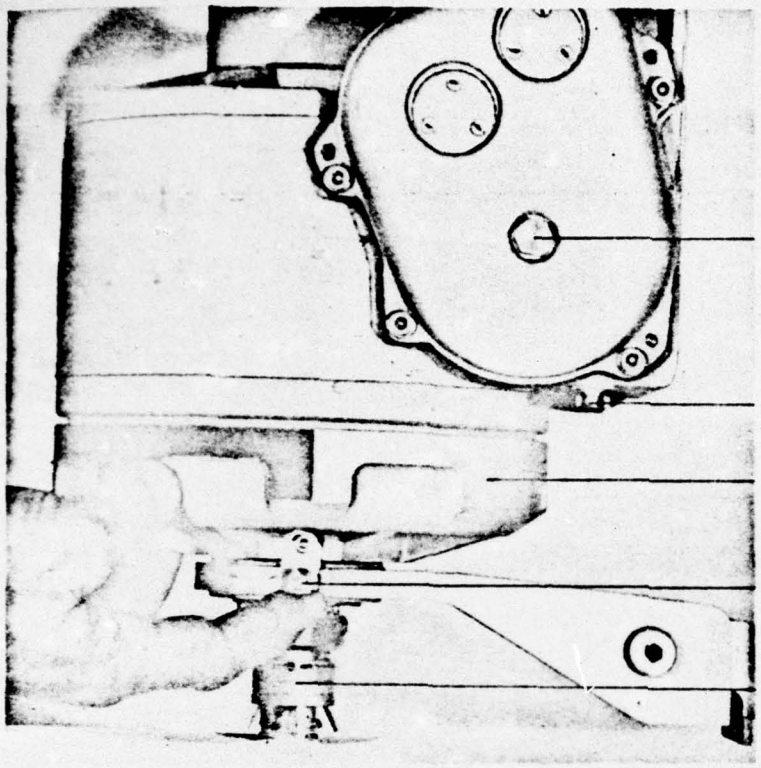


Figure 2.6
Adjustment of slewing range

1 Adjustment bell with red marking
2 Captive bolt
3 Lower quick-release fastener
4 Oil level check plug
5 Oil drainage plug

/14

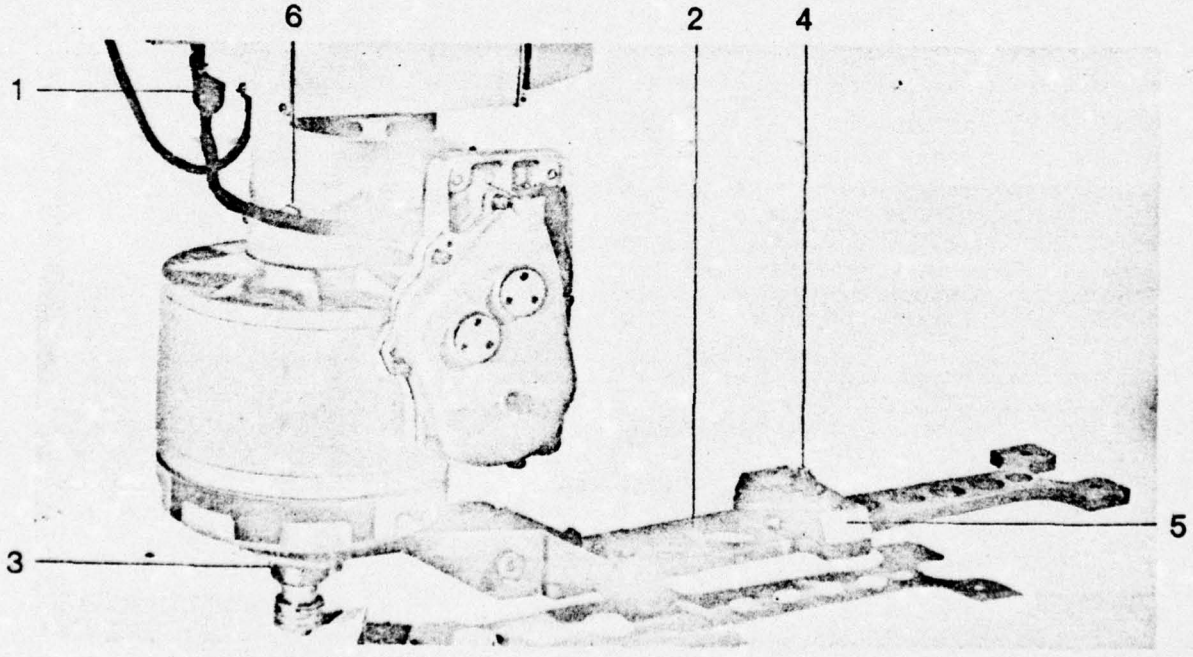


Figure 2.7
Slewing gear with swivel

1 Connecting cable for slewing gear
2 Swivel
3 Locking pin
4 Quick-release fastener with locking nut and plate
5 Tension piece
6 Hexagonal bolt

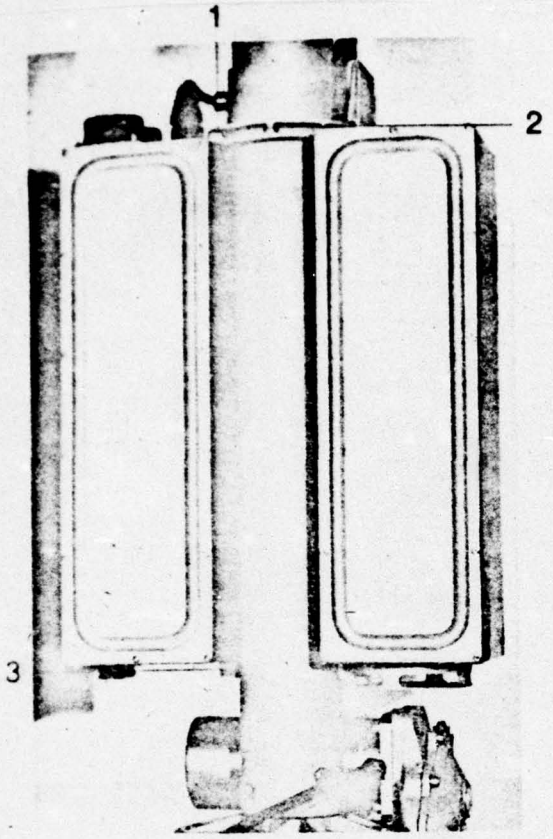


Figure 2.8
Electronic equipment box attached

1 Captive pin
2 Clamping strap
3 Catch

/16

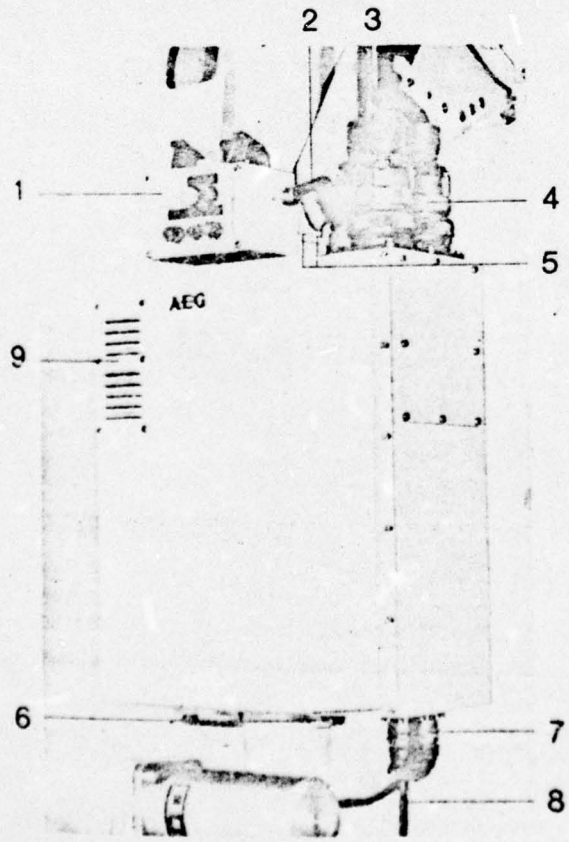


Figure 2.9
Electronic equipment box closed

1 Control device
2 Connecting cable
3 Connecting line to power supply
4 Connecting cable to jib
5 Cheesehead screw
6 Catch on supporting pin
7 Connecting cable to slewing gear
8 Connecting cable to manual control unit
9 Blower outlet

2. False caps are to be removed from all plugs and receptacles and placed in the packing case of the equipment.

3. The connecting cable (1, Figure 2.7 and 7, Figure 2.9) solidly attached to the slewing gear is to be plugged into the electronic equipment box and screwed tight.

4. The connecting cable (4, Figure 2.9) well attached to the jib is to be plugged into the electronic equipment box and screwed down.

5. The manual control unit (5, Figure 1.1) is to be connected with the electronic equipment box using the 1.5 m long connecting cable (6, Figure 1.1 and 8, Figure 2.9).

6. The 2 m long connecting cable for power supply connection (7, Figure 1.1 and 3, Figure 2.9) is to be plugged into the electronic equipment box and screwed down.

7. Expose the power outlet in the cabin roof by raising the roof /17
fairing and insert the connecting cable and screw in.

8. Again fasten down the roof fairing at the points provided for this purpose and fasten the connecting cable with the stowing loop available on the roof.

9. The screw plugs mentioned under points 4, 6 and 7 are to be ensured against turning by means of thin copper wire.

2.2 PERFORMANCE TEST IN THE HELICOPTER /18

2.2.1 Switching in the Equipment

CAUTION

The switch (1, Figure 2.10 and 2, Figure 2.10) located on the control unit for CABLE CUT and TEST as well as the CABLE CUT switch located on the HYDRAULIC CONTROL PANEL for the pilot must be closed and secured with thin copper wire before the equipment is switched in; otherwise, there is the danger of cable cut. For performance testing, the three safety switches located in the helicopter are first to be switched in and through which the 28 V-GS power supply is switched through to the socket.

The safety switches involved are

RESCUE HOIST CABLE CUTTER
RESCUE HOIST CONT and
RESCUE HOIST POWER,

which are arranged in the pilot's compartment on the cabin roof of the helicopter. The sequence of switching in is as necessary in this case.

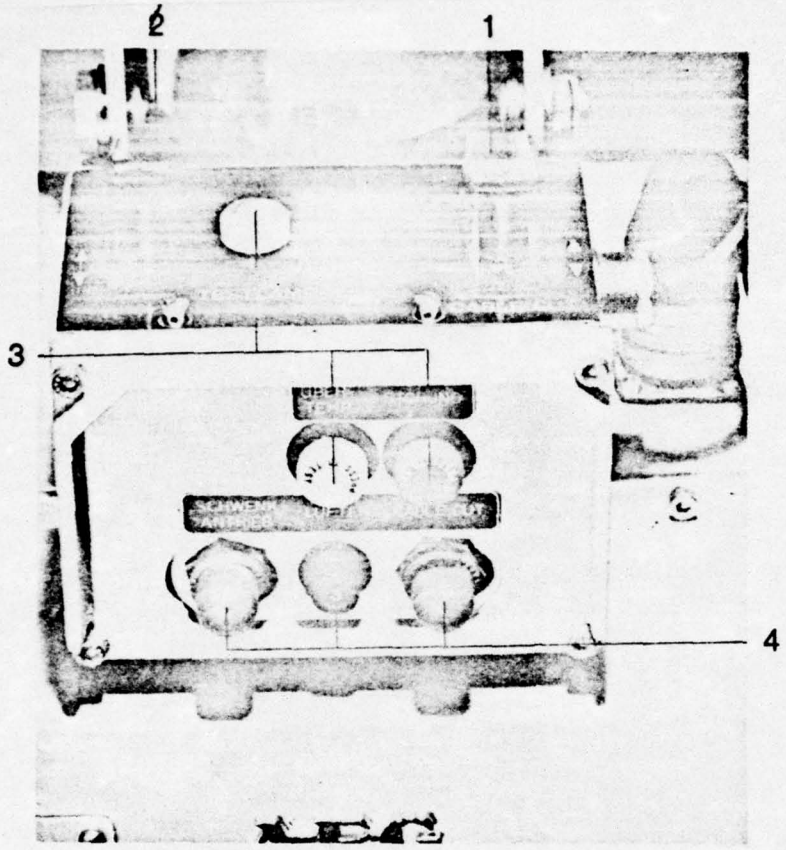


Figure 2.10
Control unit

1 Switch tab red
2 Switch tab black
3 Indicator lights
4 Safety switches

/19

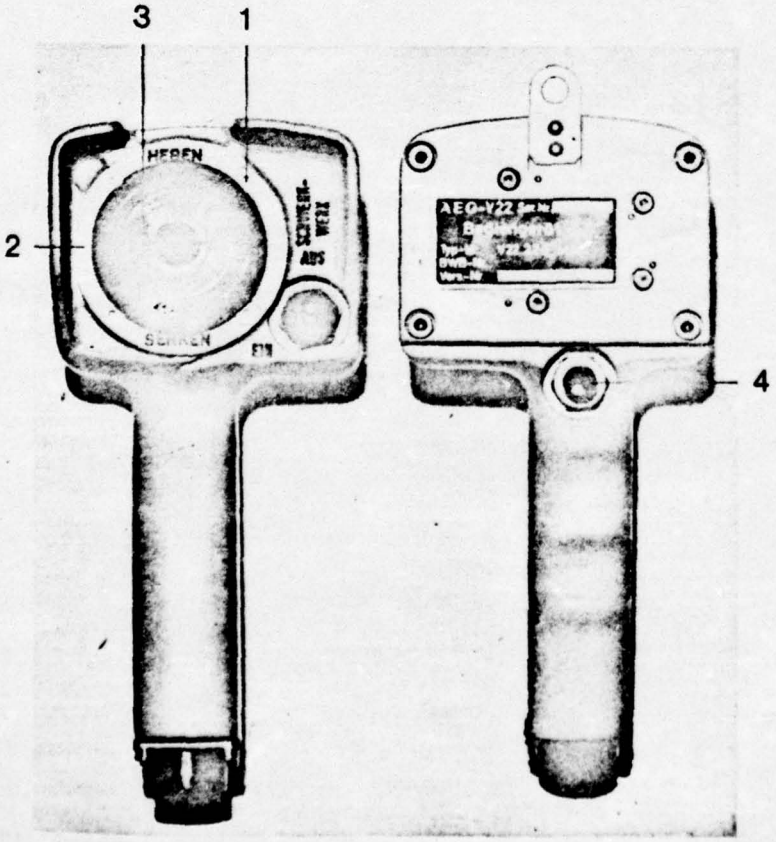


Figure 2.11
Manual control unit

1 Countersunk screw
2 Fastening ring
3 Bellows-type lever
4 Microphone pushbutton

Following this, the switch setting of the safety switches arranged on the side of the hoist as follows:

SLEW DRIVE

FAN and

CABLE CUT

are to be checked. These are arranged in the control unit on the top side of the electronic equipment box. They are switched in by pressing knobs.

If all itemized safety switches are activated, then the fan motors on the hoisting gear and on the electronic equipment box commence operation which can be acoustically checked. A perceptible flow of air comes out of both exhaust vents at the motor (Figure 2.5) and on the electronic equipment box (9, Figure 2.9). When operating normally, no one of the three indicator lights (3, Figure 2.10) installed on the control unit should light up. The equipment is now ready for operation. /20

2.2.2 Slewing Gear

The slewing gear is operated by actuation of the right-hand switch on the manual control unit (Figure 2.11) ON-OFF (corresponding to "slewing in" and "slewing out") and which is designed as a pushbutton switch. It must shut off by itself when the final position is reached.

2.2.3 Hoisting Gear

The hoisting gear is operated with the actuation lever HOISTING-LOWERING in the middle of the control unit. The control lever is designed as a feeler lever and returns to the zero position independently when released whereby the slewing gear is switched off and arrested by a motor brake. The slewing gear is switched in by any slight deflection from zero position and is switched in for raising or lowering depending on the actuation direction selected whereby the slewing gear runs at the lowest possible speed amounting to ca. 10% of maximum speed. The speed can be steplessly adjusted up to maximum speed of 0.75 m/sec in both directions by a further deflection of the lever from the zero position.

2.2.4 Pilot's Control

The pilot's control is accomplished using a four-way toggle switch on the CYCLIC CONTROL STICK as well as the following switch positions:

(Seen from the pilot's seat)

1.	Switch forward	-	Hoisting operation	/21
2.	Switch to rear	-	Lowering operation	
3.	Switch to right	-	Slewing out	
4.	Switch to left	-	Slewing in	

Functions are to be briefly tested with an operationally ready equipment (cf. Section 2.2.1).

2.2.5 Cable Cutting Device (CABLE CUTTER)

The cable cutter provided with an electrically ignitable explosive charge can be actuated by two switches both provided with a red switch tab. The pilot's switch is located on the HYDRAULIC CONTROL PANEL whereas the hoist operator's switch is located above on the control unit of the electronic equipment box. The test elements are also arranged at the same point (Figure 2.10).

The operability check should take place on the operationally ready equipment (cf. Section 2.2.1) in the prescribed sequence:

CAUTION

There is danger of cable cutting when this sequence is not maintained.

/22

	Test Step	Function
1.	Press illuminated pushbutton TESTLAMP	TESTLAMP must light up
2.	Lift up black protector flap of the TEST switch and tip switch into TEST position	The ignition function is interrupted for both CABLE CUT switches
3.	Lift up red protector flap of the CABLE CUT switch on the control unit and tip switch into FIRE position	TESTLAMP must light up, then test positive
4.	Tip CABLE CUT switch again into position zero and close red protector flap	TESTLAMP must go out
5.	Lift up red protector flap of the CABLE CUT switch on the HYDRAULIC CONTROL PANEL and tip switch into position FIRE	TESTLAMP must light up, then test positive
6.	Tip back again CABLE CUT switch and close red protector flap	TESTLAMP must go out
7.	Tip TEST switch into position FIRE and close black protector flap	The ignition function for both CABLE CUT switches is again established

After the check, the three switch flaps are to be secured with thin copper wire.

2.2.6 Failure Indicator /23

If the red lamp DISTURBANCE lights up on the control unit (Figure 2.10) during performance testing, it follows that the slewing gear drive is

disturbed and the control blocked although not the control of the slewing drive. In this case, pull the aircraft electrical system switch CONTROL in the cabin roof and again press. If the red lamp lights up immediately or with renewed drive, it follows that the equipment is not ready for operation and must be subjected to an inspection.

2.2.7 Switching Out the Equipment

For this purpose, there are three safety switches located on the cabin roof in the pilot's compartment:

RESCUE HOIST CABLE CUTTER

RESCUE HOIST CONT and

RESCUE HOIST POWER

which are to be switched out by pulling. The sequence in this case is as desired. The safety switches on the control unit of the equipment remain switched in.

2.3 CONTROL IN OPERATION /24

The control of equipment by hoist operator or by pilot takes place exactly as in the performance testing in Section 2.2. Special care should be given:

2.3.1 Switch in the following safety switches in the pilot's compartment on the cabin roof:

RESCUE HOIST CABLE CUTTER

RESCUE HOIST CONT

RESCUE HOIST POWER

Check the following safety switches on the control equipment of the hoist and if necessary press:

SLEWING DRIVE

FAN

CABLE CUT

2.3.2 The actuation by the pilot has priority over actuation by the hoist operator, i.e., the pilot controls with his hoist switch the equipment for hoisting, lowering, slewing in or out. In this way, the equipment follows these commands independently from a command given by the hoist operator.

2.3.3 The cable is marked at the beginning with a 5 m long yellow colored marking and at the end with a 5 m long red colored marking so that the hoist operator can early recognize the coming cable end of a paying in or paying out cable without having to lean out of the helicopter and hazard his person.

CAUTION

Owing to a possible electrostatic charge of helicopter and equipment in flight, it is advisable when paying out the cable to supply a potential compensation by ground contact of load hook or cable before the cable, load hook or equipment is touched.

2.3.4 The slewing gear actuation takes place before and after each recovery operation and is to be speedily carried out.

CAUTION

The slewing motor is only designed for short-term operation and therefore unnecessary activity on its part is to be avoided. If this precaution is not observed, it is possible for the safety switch SLEWING DRIVE to be triggered in the control equipment (Figure 2.10). It can be pressed in again after a short cooling period. The slewing gear is then again ready for operation.

2.3.5 Since the embarked electrical system of the helicopter has available no power reserve for a hoisting operating with overload, the hoist drive is automatically shut down in such a case, and this is indicated on the control equipment by the lighting up of the red lamp DISTURBANCE. An overload of the equipment in operation occurs:

1. In case of a static load greater than 315 kp corresponding to the nominal load of 275 kp with the addition of a power reserve amounting to ca. 15% or

2. In the case of a combined hook strength from static load and dynamic additional strength which exceeds the value mentioned under 1. In this event, over ca. 200 kp can only be counted on in the case of special flight conditions and loads since then, for example, with curving flight /26
the centrifugal force can achieve a corresponding quantity as dynamic additional force.

The equipment is ready again for operation when the indicated DISTURBANCE goes out owing to pulling out and renewed pressure of the safety switch CONTROL in the cabin roof.

CAUTION

For soft starting and braking, the hoist should always be operated at low speed. Passing through of long cable lengths always occurs when the operating lever is fully deflected, i.e., with maximum cable speed.

2.3.6 If this regulation is not observed, the drive becomes additionally

loaded and the number of stress repetitions is restricted by the consequent heating of the motor.

2.3.7 The hoist drive is designed such that, in accordance with Section 1.2.3, 11 load cycles can be carried out with the full cable length of 45 m and maximum load of 275 kp.

After a rest of at least 20 minutes, this cycle can be repeated without limitation. If point 5 is not taken into consideration or special disturbances appear in the equipment (for example, fan failure), overtemperatures occur. The yellow lamp OVERTEMPERATURE then lights up and the hoisting gear is shut down. As soon as the equipment has cooled down, the yellow lamp OVERTEMPERATURE goes out and the hoisting gear is again ready for operation.

2.3.8 If a new operation is planned for 20 minutes later, the fan should not be shut off. The safety switches CONTROL and POWER in the cabin roof must remain connected for this purpose. The safety switch CABLE CUTTER is switched out for safety reasons. /27

2.3.9 The hoist operator can switch when needed into the aircraft intercom. For this purpose, he must have connected to the INTERCOM using the protective helmet with builtin headset and lip microphone belonging to the general equipment. Using the pushbutton located on the back side of the manual control unit, he can switch in his lip microphone to "talk" on the INTERCOM without adversely affecting further operation of the equipment.

2.3.10 The cable cutting device is only to be actuated in case of danger. The actuation switch for the hoist operator is directly above on the control unit under a red cover flap and designated by CABLE CUT (Figure 2.10).

For release, switch from setting ZERO to setting FIRE. After a successful cable cut, switch back again to ZERO position.

The pilot's control accordingly results.

NOTE

If the safety switch POWER or safety switch CONTROL have been triggered by a disturbance either individually or together, it is only possible to carry out an actuation of the CABLE CUT device from the switch of the pilot.

2.3.11 The procedure described in Section 2.2.7 is to be carried out for switching out the unit.

2.4 TROUBLESHOOTING TABLE

/28

TROUBLE	POSSIBLE CAUSE	REMOVAL
Hoisting gear and slewing gear do not operate No lamp lights	Electrical system breakdown Improperly connected connection cables Safety switches triggered in cabin roof or in control unit	Check electrical system Check all plugs to connecting cables for solid seat Check or press safety switches CONTROL and POWER in cabin roof Check or press both safety switches SLEWING DRIVE and fan on the control unit
Slewing gear does not operate or is blocked after a number of actuations	Safety switch SLEWING DRIVE has triggered as a result of thermal overload	Press safety switch SLEWING DRIVE on control unit after ca. 2 minutes
Hoisting gear does not operate, no lamp lights	Safety switch FAN has triggered Electrical system voltage too low	Press safety switch FAN on control unit Check electrical system
Hoisting gear does not run, yellow lamp OVER-TEMPERATURE lights	Overload of hoist or fan breakdown on the motor or on the electronic equipment box	Wait sufficient time for cooling down until yellow lamp goes out by itself
Hoisting gear does not operate and Red control lamp DISTURBANCE lights	Hoisting gear considerably overloaded Short circuit safety has been actuated Overspeed release Connection break is present, electronics broken down	Pull out safety switch CONTROL in the cabin roof and again press Disassemble equipment with repeated disturbance signals and repair
Control lamp TEST LAMP does not light up in CABLE CUT test	Safety switch CABLE CUT not switched in Defective electric bulb Defective ignition cartridge	Press safety switch CABLE CUT on the control unit Check lamp (press to test) Change ignition cartridge of the cutting device in the jib

2.5 DISASSEMBLY /29

The following procedures are to be carried out:

1. Start hoist and slew out jib to end position (Figure 2.1).

2. Switch out safety switches CABLE CUT, CONTROL and POWER in the pilot's compartment of the helicopter.

3. Remove connecting cable for electronic equipment box.

4. Close power outlet in the helicopter.

5. Remove manual control unit with connection from electronic equipment box.

6. Remove connection for slewing drive and jib from the electronic equipment box.

7. Protect all plugs and receptacles by placement of false caps.

8. Remove electronic equipment box.

9. Dismount the quick-release fastener of the swivel and hinge up swivel. Remove quick-release fastener from the fastening bolt in the helicopter floor and install again on the swivel.

10. Open upper and lower quick-release fastener on the mast.

11. Rotate thread insert with the ring nut in the mast and take equipment from the helicopter. Avoid tilting.

12. Close quick-release fasteners.

CAUTION

Avoid abrupt placement of equipment on quick-release fastener: Danger of destruction!

2.6 STORAGE /30

Storage is appropriately accomplished in the operating position in the case of the removed electronic equipment box and the manual control unit. However, the jib can be stored with the slewing gear separate from the mast.

The protective bellows over the load hook should not be stressed at this time and a kink in the free cable is to be avoided.

Admissible storage temperatures range from -55° to +70° C.

3. MAINTENANCE AND REPAIR REGULATION /31

3.1 REPAIR LEVELS FOR MAINTENANCE AND REPAIR

3.1.1 General

The following describes operations which are carried out in repair levels 1 and 2 in the field and are required for maintaining equipment and exchanging repair parts and defective functional groups.

These operations are to be carried out by the manufacturer in the case of repair of equipment or individual functional groups owing to disturbances or breakdown of operating functions or severe external damages in a level higher than repair level 2.

A basic overhaul of equipment takes place after 1500 load cycles or two years and is accomplished by the manufacturer. The value first reached is determinative and its documentation is recorded in the service records (cf. Sections 1.1.5 and 3.7).

A continuous check of the cable is essential for the safety of equipment. For this reason, the result of each cable check is recorded and available in the service records.

The reserve charges for CABLE CUTTER (EGA Item 18) are to be always forwarded after two years storage time to the manufacturer for renovating ignition insert.

3.1.2 Summary of Maintenance and Repair Work /32

Work on Internal Rescue Hoist for UH-1D	Repair Level 1	2	3/4	Cf. Section
Overall equipment				
Clean	x			3.3.2
Check for:				3.3.3
Completeness	x			
External damage	x			
Freedom of moving parts	x			
Attachments solidly seated	x			
Electrical plugs and sockets	x			
Function	x			
Touchup painting		x		3.6.13
Repaint			x	
Maintain (basic overhaul)			x	
Functional group mast				
Exchange:				
Functional group	x			3.3.1
Quick-release fastener		x		3.6.1

Work on Internal Rescue Hoist for UH-1D	Repair Level 1	2	3/4	Cf. Section
Functional group jib				
Clean		x		3.6.9
Check:				
Oil level gear unit	x			3.3.3
Cable	x			3.3.4
Limit switch LOWER	x			3.3.5
Limit switch HOIST	x			3.3.6
Pressure roller	x			3.3.7
Carbon brushes of hoisting gear motor		x		3.6.8
Check and adjust:				
Torque overload release clutch of storage drum		x		3.6.3
Limit switch for LOWER		x		3.6.3
Limit switch for HOIST		x		3.6.7
Exchange:				
Functional group	x			3.3.1
Load hook		x		3.6.2
Cable		x		3.6.3
Explosive charge for cable cut device		x		3.6.4
Pressure roller		x		3.6.5
Intake funnel		x		3.6.6
Repair			x	
Functional group slewing gear				
Check oil level of gear unit	x			3.3.3
Exchange:				
Functional group	x			3.3.1
Quick-release fasteners		x		3.6.1
Repair			x	
Functional group electronic equipment box				
Clean filter insert		x		3.6.11
Check and exchange:				
Control unit		x		3.6.10
Electric bulbs	x			3.3.3
Repair			x	
Functional group manual control unit				
Exchange bellows type lever		x		3.6.12
Repair			x	

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3.2 MAINTENANCE REPAIR LEVEL 1 /34

3.2.1 General

Maintenance includes:

Cleaning of the equipment

Determination and reporting of damages and disturbances

Performance testing

Checking cable

Supervision of repair periods

3.2.2 Special Tool

A set of hexagonal socket screw wrenches (EGA Item 23) is required.

3.3 GUIDANCE FOR MAINTENANCE WORK /35

3.3.1 Assembly of the Equipment

The equipment consists of five functional groups with two connecting cables, each provided with an identification plate:

1. Mast
2. Slewing gear
3. Jib
4. Electronic equipment box with connecting cable to power supply
5. Manual control unit with connecting cable

The slewing gear is installed below on the mast (Figure 2.7):

1. Keep slewing gear upright
2. Set up mast and align
3. Insert two hexagonal bolts M8 x 90 DIN 931 (6, Figure 2.7) from the outside
4. Install on each of the bolts a washer 8.4 DIN 125 and lock nut M8 and tighten nut.

Install jib on the mast with slewing gear (Figure 3.3):

5. Set up mast with slewing gear
6. Set jib on forward side against mast
7. Insert two liners V22.228.400 - 1 EZ 4 (EGA Item 1) into the fitted boreholes of the jib (12, Figure 3.3)
8. Pass through bolts V22.228.400 - 2 EZ 4 (EGA Item 2) (13, Figure 3.3)
9. Install lock nut M8 and tighten
10. Tilt jib and hinge forked turnbuckle (7, Figure 3.3) over the cover plate on the bullring
11. Insert bolt SKL 60 (EGA Item 4) (4, Figure 3.3)
12. Place washer AN 960 - C 716 (EGA Item 5) and lock with cotter 3 x 18 LN 94 (EGA Item 6).

13. Remove lock nut M6 and washer 6.4 DIN 125 from the cheesehead screw M6 x 100 DIN 912 (3, Figure 3.3). /36

14. Mount lug of grounding strap and washer (2, Figure 3.3).

15. Install nut and tighten (3, Figure 3.3).

Attachment of electronic equipment box and manual control unit as described in Section 2.1.5, Items 1-6.

3.3.2 Cleaning the Equipment

Cleaning of the equipment can be carried out on the ground using a cleaning rag and customary means including water with detergents and depending on the type of contamination. Care should be taken to set the equipment up as close as possible to the operating position in order that no cleansing material can penetrate through the fan openings. After operations over the ocean, the equipment should be sprayed with fresh water in order to completely free the equipment from adhering salt residues by rinsing using water and sponge. Spraying with a hose is not allowed. It is allowed to blast out the water residues or dust with compressed air.

Rubber parts are to be protected from embrittlement by rubbing with glycerine.

3.3.3 Inspection of the Equipment

For this purpose, the equipment as described in Section 2.1 is to be installed in the helicopter and checked for:

1. Completeness.

2. External damages.

3. Freedom of the three quick-release fasteners and the thread insert.

4. Solid seating of the bolt connections of mast and slewing gear, jib and mast as well as on the swivel.

5. Easy rotatability of the load hook without chattering and operation of the retaining bolt.

6. Damage of the cable intake funnel. Abrasion owing to the cable can be as much as 1.5 mm deep with the funnel to be exchanged when a max. 2 mm depth is reached (cf. Section 3.6.6). /37

7. Tightness and oil level of hoisting gear and slewing gear drives. For checking oil level, unscrew check plugs (8, Figure 1.1 and 4, Figure 2.6). In the operating posture of the equipment, the oil level must reach the lower edge of the threaded borehole.

NOTE

If the oil level is insufficient, the oil is to be drained and replaced with oil types O-147, O-148 or O-156 and at the same

time a mixture of the abovementioned oil types is out of the question.

8. Adjustability of adjusting bell for slewing range.

9. Damage of electrical plug connections and visible electrical lines as well as panel on manual control unit.

10. Freedom of attachment of electronic equipment box. Deficiencies determined are to be logged in the service records. The equipment is to be placed in maintenance.

In the case of a positive result in the above-described inspection steps, further procedures are as described in Section 2.2.

Check for operation:

11. Safety switches.

12. Fans.

13. Lamps on the control unit.

Press to test lamps for this purpose. If a lamp does not light up, it is to be exchanged. This is done by removing protector flap by rotating counterclockwise. Electric bulbs are to be exchanged, protector flaps to be replaced and inspection repeated.

14. Limit switch of slewing gear. /38

15. Hoisting gear.

16. Pilot's control.

17. Cable cut device.

Deficiencies determined are to be logged in the service records. The equipment is to be passed on to maintenance (Section 3.6).

In the case of a positive result of the abovementioned inspection steps, an inspection is to be carried out with the apparatus switched in of the cable, limit switches and pressure roller.

3.3.4 Visual Inspection of Cable

The cable is to be paid out to its full length such that the subsequent paying in can take place without twisting. During this process, the cable is to be checked for individual wire breaks and for a loosening of external cable braids with respect to core of the cable.

Whenever either one of the two types of damage is ascertained, the cable is to be exchanged immediately (Section 3.6.3).

3.3.5 Inspection of Cable Limit Switch LOWER

In the case of the abovementioned cable inspection, the function of the switch for cable limit LOWER is to be checked at the same time.

Therewith, the switch should be cut off with maximum lowering speed. With a proper adjustment, the cable must have run until ca. 4 to 6 cable windings from the storage drum (Figure 3.4).

If this is not the case, the equipment is to be passed on to maintenance (Section 3.6.3).

3.3.6 Inspection of the Cable Limit Switch HOIST (Figure 3.20)

In order to completely exploit the maximum height and to avoid a difficult running into the mechanical final position utilizing a full cable speed, two limit switches are installed (1, Figure 3.20 and 2, Figure 3.20).

They are to be checked as follows: /39

1. Pay out the cable to the point where ca. 0.5 m of cable is free between load hook and jib.

2. Run in cable using about half speed.

3. The load hook travels with the flange (2, Figure 3.2) attached above on the protective bellows (1, Figure 3.2) against the switch lever (4, Figure 3.20) and in this way actuates the first limit switch (1, Figure 3.20).

4. The hoisting gear must now be shut down when the actuation lever on the manual control unit is deflected from HOIST.

5. The actuation lever is released and again deflected to HOIST.

6. The hoisting gear must now raise the load hook at low speed whereby the protective bellows is considerably compressed.

7. Shortly before reaching the mechanical limiting position, the second limit switch (2, Figure 3.20) must reply and eventually switch off the operating mode HOIST.

8. The flange must now be manually moved ca. 10-20 mm from the limiting stop against the spring pressure of the protective bellows.

If no satisfactory switchoff is ascertained or the play provided in point 8 is not present, the equipment should be sent for maintenance in accordance with Section 3.6.7.

3.3.7 Inspection of Pressure Roller (Figure 3.12)

1. Extend the cable out so far that there is ca. 0.5 m cable open between load hook and jib.

2. At the same time, check parallel running of pressure roller.

3. Lightly raise load hook manually for cable relief.

4. Check to see that the unloaded cable is paid out satisfactorily.

In the case of a negative result of the inspection under points 2 and 4, the equipment is to be sent to maintenance in accordance with Section 3.6.5.

3.4 SUPERVISION OF MAINTENANCE PERIODS /40

The following work is to be carried out at regular intervals and its timely performance is to be supervised:

Scheduled Work	When Scheduled
1. Performance testing in helicopter in accordance with Section 2.2	Before every operation
2. Maintenance work in accordance with Sections 3.3.2 to 3.3.7	After every operation
3. Inspection and adjustment of torque overload release clutch-storage drum in accordance with Section 3.6.3	After 100 load cycles After 300 load cycles After 600 load cycles and After 1000 load cycles
4. Clean jib and filter insert and check carbon brushes in accordance with Sections 3.6.9, 3.6.11 and 3.6.8	After 300 load cycles
5. Cable change in accordance with Section 3.6.3	After 600 (+10) load cycles according to data sheet for ac/dc wire cable MBL 4010-009 Edition 1, July 1972
6. Basic overhaul in accordance with Section 3.1.1	After 1500 load cycles or two years
7. Exchange of ignition insert of EGA Item 18 in accordance with Section 3.1.1	After every two years storage time

3.5 MAINTENANCE - REPAIR LEVEL 2 /41

3.5.1 General

The maintenance work to be carried out in accordance with Sections 3.1.2 and 3.4 are described in Section 3.6.

Defective functional groups which cannot be maintained in this repair level 2 are to be forwarded to the manufacturer and exchanged for spare functional groups.

In addition to the special tool contained in the basic allowance of spare parts (EGA) (Section 3.8), a torque wrench with a socket diameter s = 14 mm and a measuring range of 0-150 cmkp is always required for adjusting the torque of the torque overload release clutch in the storage drum (Sections 3.4 and 3.6.3).

3.6 INSTRUCTION FOR MAINTENANCE WORK /42

3.6.1 Exchange of Quick-Release Fasteners

Upper quick-release fastener on mast (Figure 3.1):

1. Screw out countersunk cheesehead screw M6 x 45 DIN 912 (1).
2. Exchange quick-release fastener (2) - EGA Item 7.
3. Reinstall screw.

Lower quick-release fastener on the slewing gear (Figures 2.6 and 2.7):

1. Knock out dowel pin 6 x 40 DIN 1481 (3, Figure 2.7) with piercing diameter 5 mm.
2. Exchange quick-release fastener (3, Figure 2.6), EGA Item 7.
3. Again insert dowel pin and be careful to maintain uniform overhang.

Exchange quick-release fastener on the swivel after removing nut and washer (4, Figure 2.7), EGA Items 8 and 9.

3.6.2 Exchanging the Load Hook (Figure 3.2), EGA Item 12

1. Remove protective bellows (1) with flange (2) and volute spiral spring (3) by hand against the pressure of the spring washer (4) from the bearing bush (5).
2. Knock out dowel pin 2.5 x 14 DIN 148 with piercing diameter 2 mm from the inside (6).
3. Screw out conical nipple (7) with open-end wrench s = 24 mm
4. Release spring washer (8) from both ball sockets (9), remove from cable shoe (10) extract cable.
5. Installation in the reverse sequence as described under 4, 3, 2 for disassembly.
6. Insert spring washer (4) into the annular tee slot of the protective bellows (1) by hand.
7. At this point, lever the protective bellows as shown in (11) into the annular tee slot of the bearing bush (5) using a screwdriver.

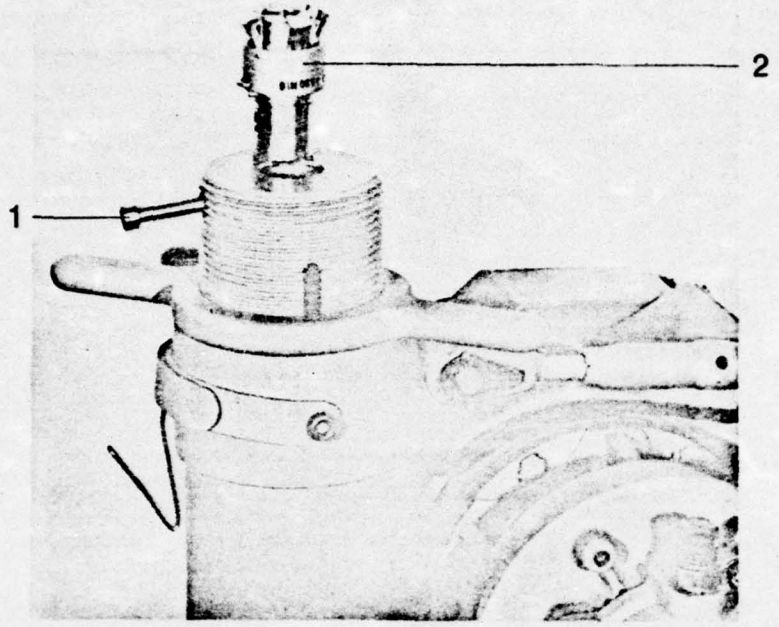


Figure 3.1

Upper quick-release fastener

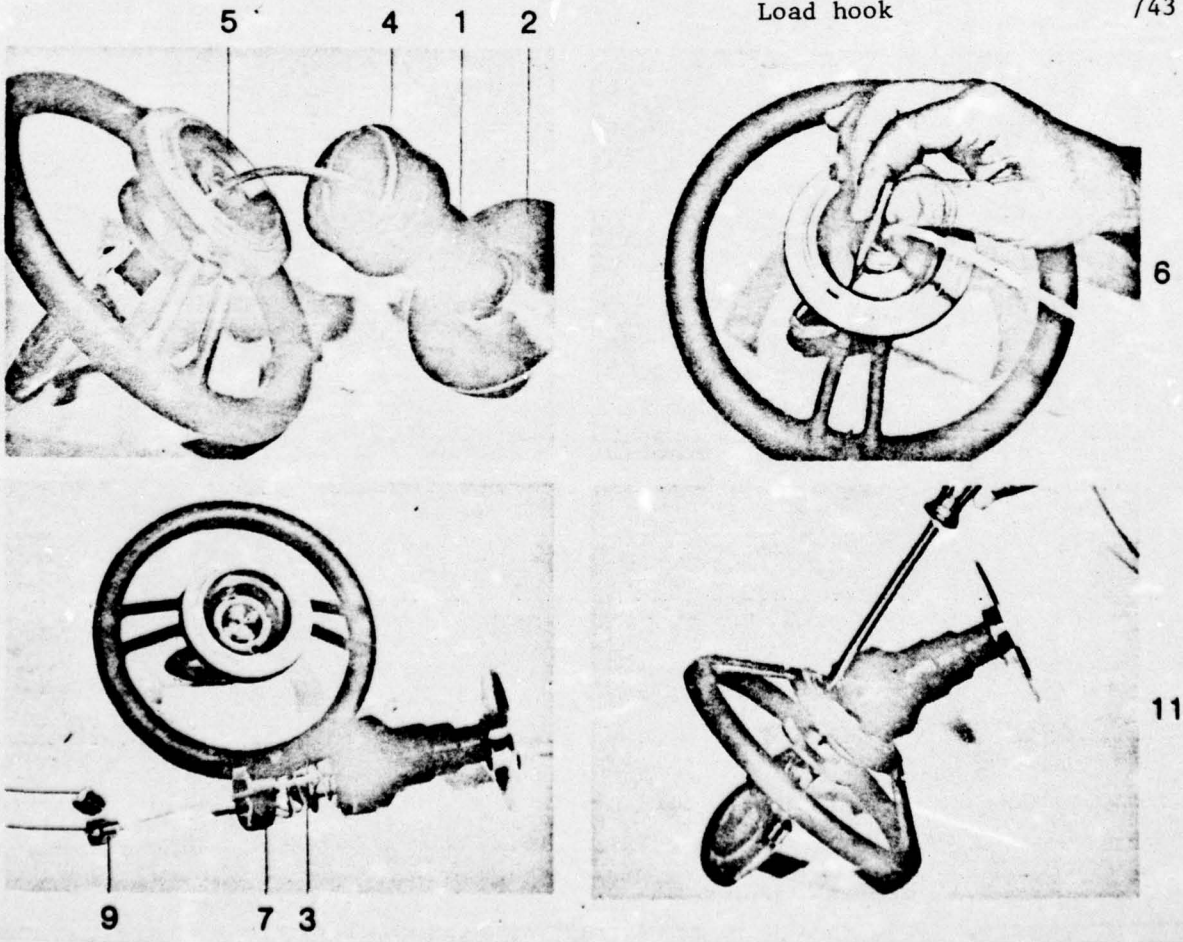


Figure 3.2
Load hook /43

In order to facilitate this operation, wet down rubber with water.

3.6.3 Changing Cable and Limit Switch Adjustment for LOWERING /44

1. For changing the cable, the equipment is first to be installed in the helicopter and placed in operation (as found in Sections 2.1.3, 2.1.5 and 2.2.1).

2. The cable is to be run completely and at minimum speed to the limit switch. It must be possible to see five cable windings on the storage drum (1, Figure 3.4) through the window of the access cover (2, Figure 3.23). Since the adjustment tolerance can amount to four to six residual windings, bring in some more cable if too few windings are to be seen or after bringing in ca. 2 m of cable, pay out using maximum speed up to the limit switch.

3. Pull safety switch in the helicopter and remove power supply plug and plug of the connecting cable to the jib from the electronic equipment box.

4. Access plate (1, Figure 3.23) to be removed. For this purpose, take out four countersunk screws M4 x 12 DIN 7991 (1, Figure 3.3) and (1, Figure 3.5) as well as one cheesehead screw M4 x 12 DIN 912 with plate 4.3 DIN 125 (2, Figure 3.5) and lift up cover plate forward and push it to front.

5. Access cover (2, Figure 3.23) to be removed. For this purpose, take out seven cheesehead screws M4 x 12 DIN 912 (3, Figure 3.23).

6. Pressure roller to be dismounted (Section 3.6.5).

7. Storage drum (1) rotated manually to such an extent that drillholes (2) of baseplate (3), storage drum and jib are in alignment (Figure 3.4).

CAUTION

The torque of the torque overload release clutch must be overcome in the direction of cable winding. For this reason, the storage drum must be carefully rotated with both hands.

8. Catch pin (EGA Item 21) (4, Figure 3.4) to be inserted to stop. /46

CAUTION

The catch pin must be inserted in order to preserve the arrangement of the remaining cable windings with the limiting switch adjustment LOWER. It may not be removed during cable exchange.

Figure 3.3
Jib without cover

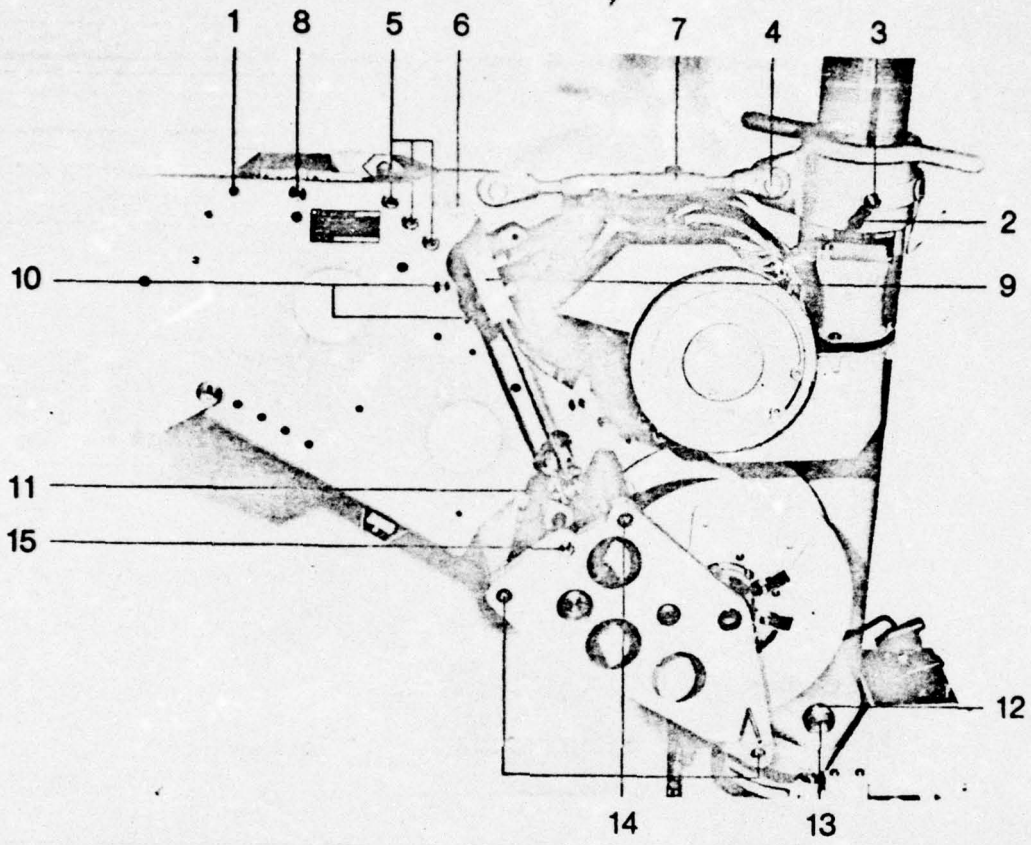
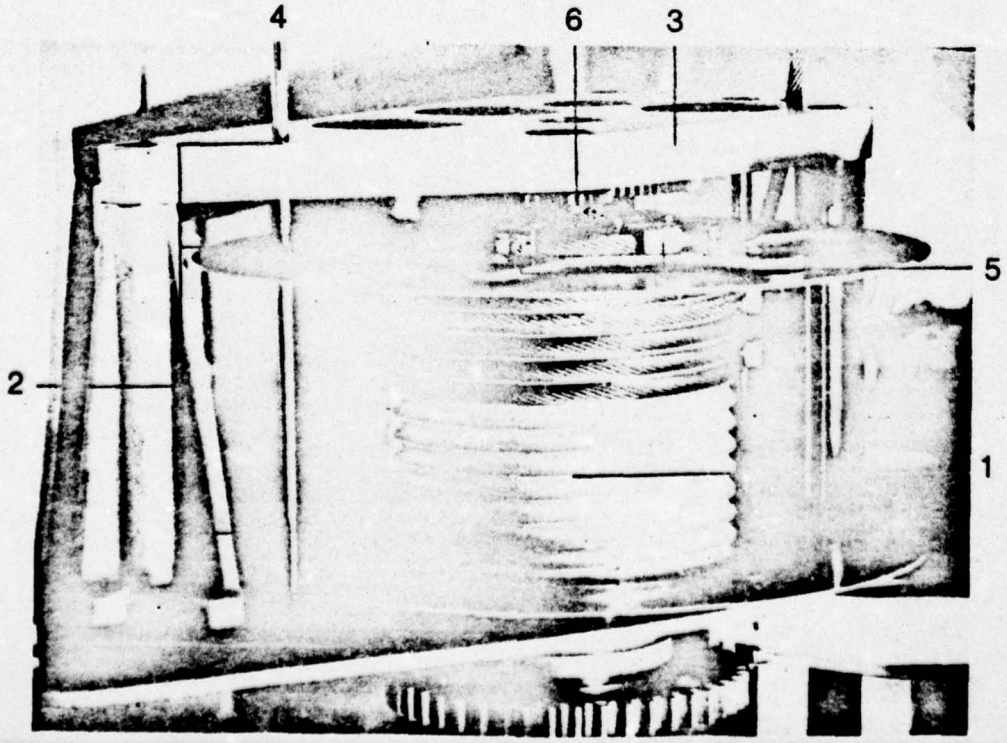


Figure 3.4
Storage drum

/45



9. Grounding cable (2, Figure 3.3) to be loosened. For this purpose, remove lock nut M6 with plate 6.4 DIN 125 (3, Figure 3.3) and take off grounding cable.

10. Disassemble cotter 3 x 18 LN 94 (EGA Item 6), plate AN 960-C 716 (EGA Item 5) and bolt SKL 60 (EGA Item 4) (4, Figure 3.3) and fold down jib (Figure 3.23)

11. Disassemble six cheesehead screws M6 x 18 DIN 912 with plate 6.4 DIN 125 (outside) and lock nut M6 (5, Figure 3.3) and take off support with turnbuckle (6/7, Figure 3.3).

12. Separator (1, Figure 3.7) to be removed. For this purpose, disassemble three countersunk screws M6 x 16 DIN 7991 (2, Figure 3.7) and one countersunk screw M6 x 50 DIN 7991 (8, Figure 3.3) with spacer tube (3, Figure 3.7). Then, using a shortened hexagonal socket screw wrench (EGA Item 22), remove from the inside two cheesehead screws M6 x 16 DIN 912 along with plate 6.4 DIN 125 (4, Figure 3.7).

13. Cable roll container (9, Figure 3.3) to be loosened. For this purpose, take out two countersunk screws M6 x 50 DIN 7991 (10, Figure 3.3).

14. Spacer (1, Figure 3.8) to be taken out after removing three countersunk screws M6 x 16 DIN 7991 (2, Figure 3.8).

15. Access plate (1, Figure 3.9) to be removed after taking out one cheesehead screw M5 x 25 DIN 912 with plate 5.3 DIN 125 (2, Figure 3.9) and one cheesehead screw M5 x 16 DIN 84 with plate 5.3 DIN 125 (3, Figure 3.9). /48

16. Capstan drums to be exposed after removal of the locking wire (5, Figure 3.9) through hinging back the cover plate (4, Figure 3.9 and 1, Figure 3.10).

One retaining bolt between the capstan barrels is disassembled for a better view into the cable run in Figure 3.10 but, however, can remain installed for cable change.

CAUTION

Cover plates for capstan barrels are not to be bent.

17. Two cable clamps (5, Figure 3.4) to be lifted out after removing two cheesehead screws M5 x 10 DIN 6912 by a slight back and forth movement with the firmly compressed straight pins.

18. Cable to be taken from the capstan drum (1, Figure 3.4) and roller support (1, Figure 3.11) to be taken out. Further,

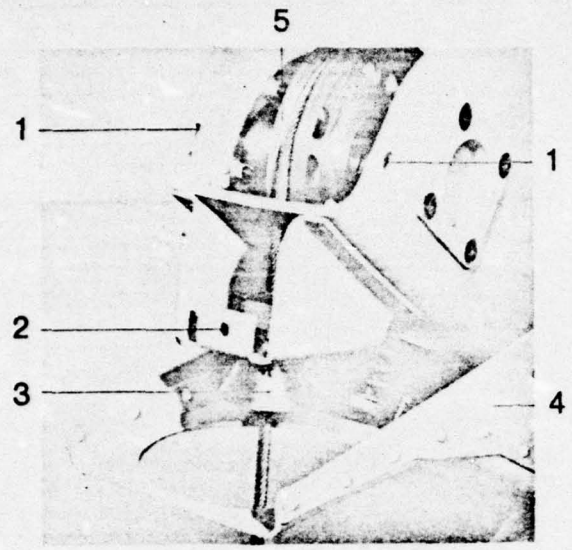


Figure 3.5
Cable intake

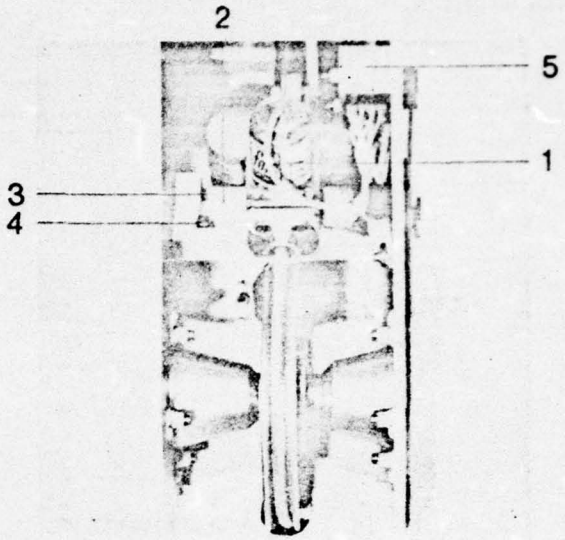


Figure 3.6
Guide roller and cable cut device

/47

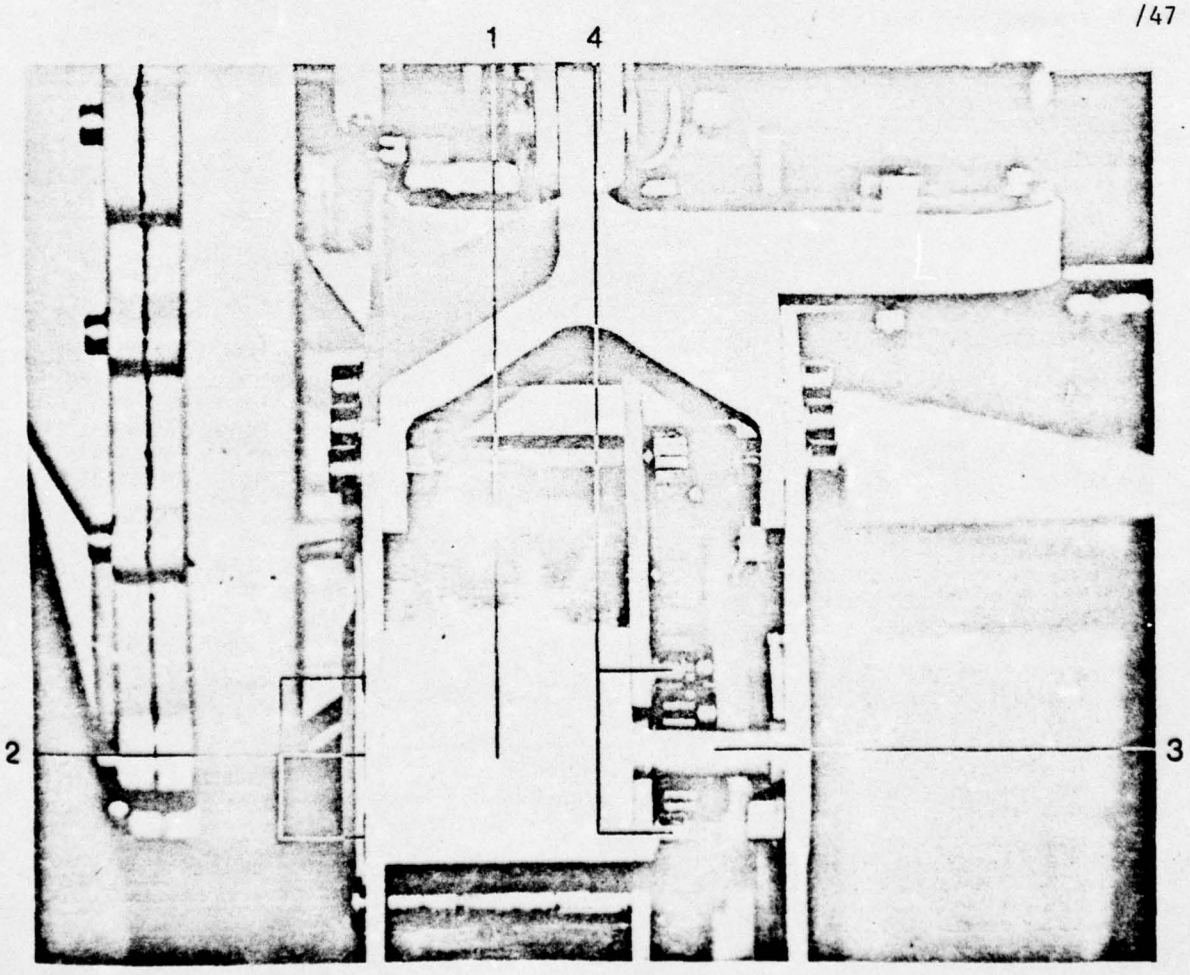


Figure 3.7. Hoisting gear

the cable is to be removed layer for layer from the capstan system (Figure 3.10) and the cable intake (Figures 3.5 and 3.6) is to be taken out.

19. Load hook to be removed from cable (Section 3.6.2).

20. Pay out ca. 7 m of kinkfree new cable (EGA Item 13) from the plastic spool and apply a marking (possibly by adhesive strips) 5.2 m from the unsoldered end.

21. Cable is to be introduced through the cable intake (Figures 3.5 and 3.6) -- clutch lever (4, Figure 3.5), cable intake funnel (3, Figure 3.5), guide roller (5, Figure 3.5) and cable cut device (1, Figure 3.6). The cable is to be introduced into the groove of the capstan barrel (2, Figure 3.10) at penetration into the jib plate for the pressure roller (Figure 3.12). Further, it is to be raised upward behind the drum until the 5.2 m mark is reached with the bottom edge of the cable intake funnel for cover. /49

The cable is to be coiled layer for layer in figure eight form around the two capstan barrels (Figure 3.10). At the same time, the cable end coming out upward between cover plate and capstan barrel is to be drawn straight through each time until it lies firmly in each groove.

CAUTION

Pull cable slowly through and keep the remaining cable in a loop so that it does not become kinked.

22. Cover plate (4, Figure 3.9) to be hinged back and secured with a safety wire (5, Figure 3.9). Following this,

    Second cover plate (1, Figure 3.9) is to be placed on and screwed down.

CAUTION

Take care to follow the sequence. Otherwise, the cable will become damaged.

23. Cable roller holder taken up (3, Figure 3.8) and installed with spacer (1, Figure 3.8).

24. Spacer (1, Figure 3.7) and spacer tube (3, Figure 3.7) as well as support with turnbuckle (6/7, Figure 3.3) to be installed.

25. Cable to be placed through the rollers of the cable intake (11, Figure 3.3) and five layers are to be laid on the storage drum (Figure 3.4). In this case, the cable is not

to be passed over catch pin (4, Figure 3.4) and absence of twist is preserved. The five layers are properly laid when the cable runs vertically from the rollers of the cable guide onto the storage drum.

26. The cable end is to be passed through to the outside and attached with two cable clamps (5, Figure 3.4) in such a way that it projects out about 5-10 mm from the last clamp. Excess cable is to be taken out manually between cable roller holder (9, Figure 3.3) and cable intake (11, Figure 3.3) in such a way that all windings lie firmly on the storage drum. /50

27. Catch pin to be taken out and the 5.2 m marking removed from cable.

28. Pressure roller to be installed (cf. Section 3.6.5), jib raised and attached to mast.

29. Plug of the connecting line to jib and power supply to be connected with electronic equipment box. The equipment is switched on and ca. 3 m of cable paid out.

NOTE

With cable under load, pay in and pay out and check whether the cable runs without trouble through the cable cut device (this is also valid for the next few points). If this is not the case, the cable cut device is to be adjusted (cf. Section 3.6.4, Point 6).

30. Cable to be paid out and the limit switch inspected (cf. point 2).

31. Cable to be paid in without kinking from the plastic spool to ca. 3 m by rolling off.

CAUTION

Do not lay spool flat before equipment and do not take off cable in loops.

32. Load hook to be installed (cf. Section 3.6.2) and pay in cable completely.

33. Separate equipment from aircraft power supply.

34. Adjust torque of the torque overload release clutch in the storage drum in accordance with Section 3.4, Points 3 and 5. If this is not necessary, the following Points 35-40 can be left out.

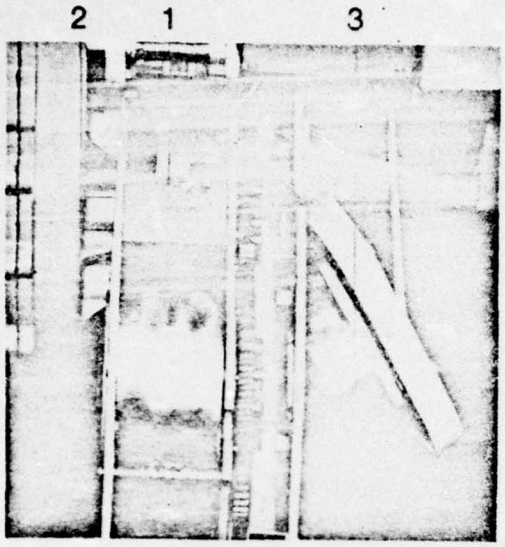


Figure 3.8
Capstan system

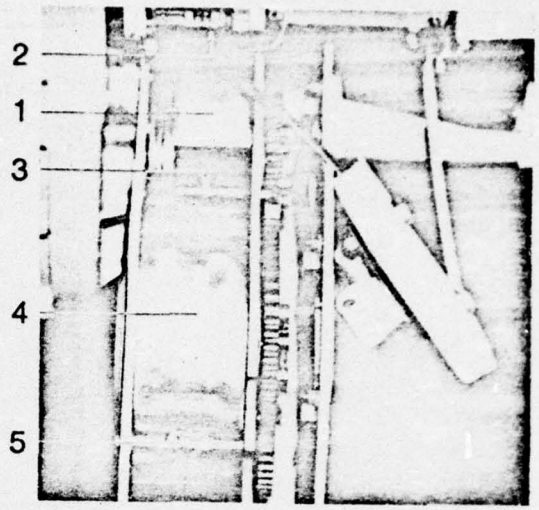
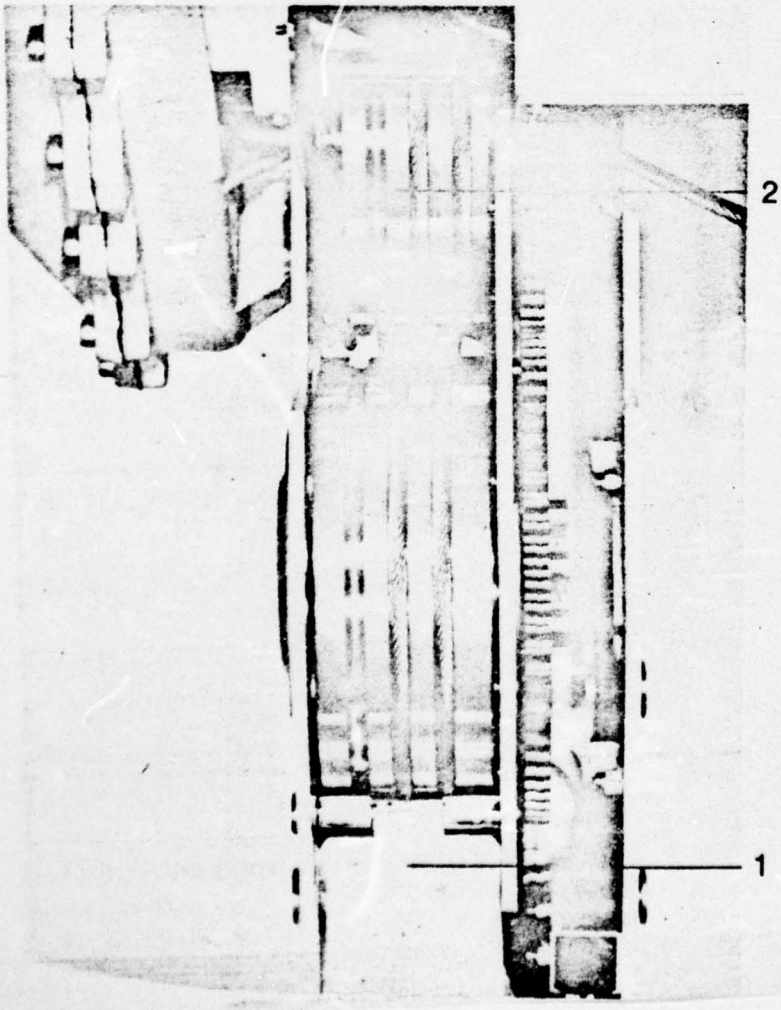


Figure 3.9
Cable cover



/51

Figure 3.10
Cable running in
the capstan system

35. Baseplate (3, Figure 3.4) to be removed after unscrewing three cheeesehead screws M5 x 16 DIN 912 with plates 5.3 DIN 125 (14, Figure 3.3) and taking out one guard ring 6 x 0.7 DIN 471 (EGA Item 15) (15, Figure 3.3). /52

36. Pinion (6, Figure 3.4) to be exchanged after unscrewing four cheesehead screws M3 x 8 DIN 912 for an adjusting flange (EGA Item 20).

CAUTION

Guide spindle (1, Figure 3.13) may not be turned during these works since otherwise the limit switch becomes maladjusted.

37. Torque wrench (measuring range 0-150 cmkp) with socket s = 14 mm to be attached and the torque read off during a half-turn in a clockwise direction (Figure 3.13).

During turning, the desired value should range between 70-90 cmkp. The initial breakaway torque must then be ca. 100 cmkp. After each half right turn, turn back until the cable is taut.

38. For adjustment, insert catch pin and loosen two cheesehead screws M5 DIN 912 (1, Figure 3.14). Then (as in Figure 3.14), insert two hexagonal socket screw wrenches and turn with screwdriver. Figure 3.14 shows the restoration of the coupling moment.

39. After adjustment, the catch pin is withdrawn and check carried out as in Point 37.

40. The tool is exchanged for a pinion. The baseplate is installed and the guard ring is renewed at the same time.

41. Install covers and attach grounding cable.

3.6.4 Exchanging the Explosive Charge for Cable Cut Device /54

1. For removing cable cut device (1, Figure 3.6) with holder (2, Figure 3.6) take out two countersunk screws M5 x 16 DIN 7991 (3, Figure 3.6) and two countersunk screws M5 x 20 DIN 7991 with lock nut M5 (4, Figure 3.6).

2. Remove both electrical leads on the sequence distributor (5, Figures 3.6 and 3.16). In addition, press each time one line into the groove of the white disassembly side of the tool (EGA Item 19, Figure 3.17) and slowly push vertically into the connection opening of the distributor. At the same time, the contact pin (10, Figure 3.15) is unlocked inside and is to be extracted.

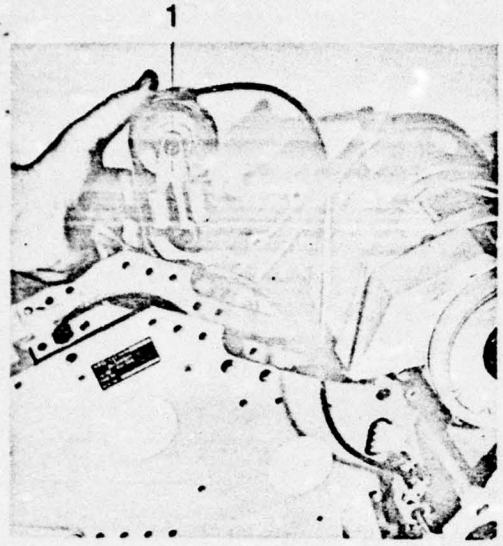


Figure 3.11
Cable roller holder

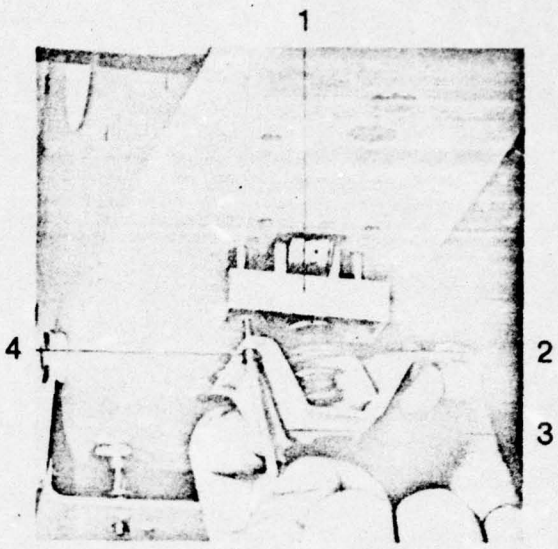


Figure 3.12
Installation of pressure roller

/53

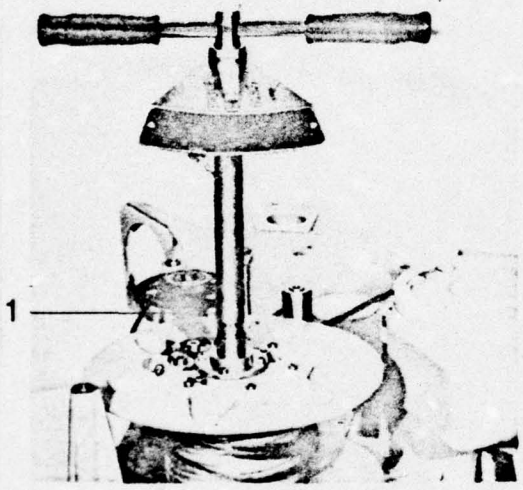


Figure 3.13
Measuring and adjusting torque moment of storage drum

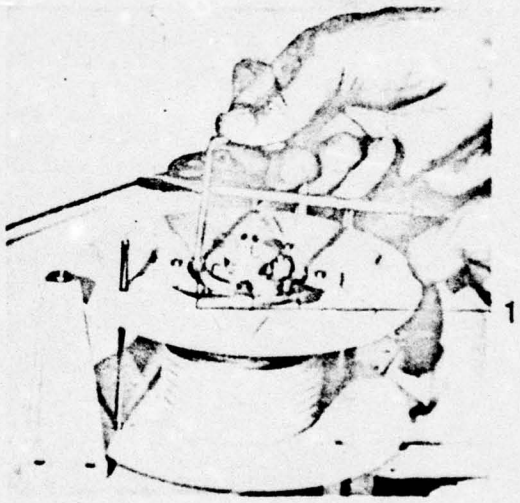


Figure 3.14

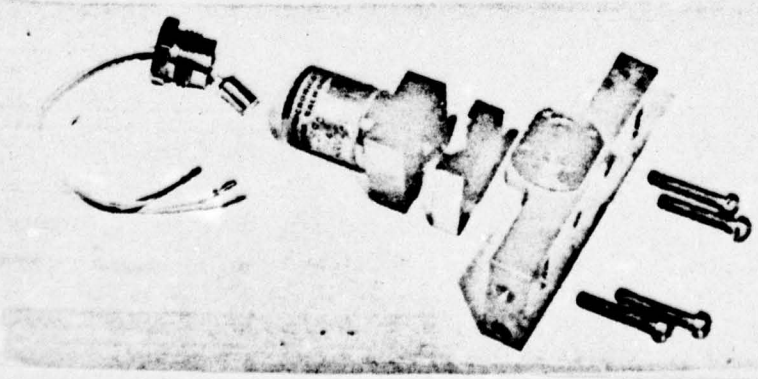


Figure 3.18
Cable cut device

CAUTION

If the tool is inserted at a slant, it is possible to damage the inside locking and, for this reason, it is absolutely necessary to keep the tool vertical!

3. Disassembly of the cable cut device (Figures 3.15 and 3.18). For this purpose, remove locking wire (9, Figure 3.15) and unscrew four cheesehead screws (8, Figure 3.15). Unscrew arm bracket (1, Figure 3.15) with ignition charge (2, Figure 3.15).

4. The old shear pin (4, Figure 3.15) in the case of a fired cable cut device is to be completely removed, the knife blade (3, Figure 3.15) is again raised and pin replaced (shear pin is contained in EGA Item 18). Care should be taken to allow freedom for the knife blade in the tube (5, Figure 3.15) before replacing the pin.

5. Ignition insert with arm bracket (EGA Item 18) to be unscrewed and cable cut device installed with new cheesehead screws (8, Figure 3.15) on the bracket (the cheesehead screws are contained in EGA Item 18) and screws are locked with wire 0.8 LN 9424 or MS 20995-C32.

6. Cable cut device to be installed in jib and arranged such that the cable can run freely through under load. /56

Slightly tighten the two set countersunk screws M5 x 16 DIN 7991 (3, Figure 3.6) for adjustment and insert the two countersunk screws M5 x 20 DIN 7991 with lock nut M5 (4, Figure 3.6). Following this, adjust holder by turning around the two countersunk screws (3, Figure 3.6) and tighten screws.

7. Insert both connecting lines with contact pin (10, Figure 3.15) as needed in contacts B1 and D1 (Figure 3.16) of the sequence distributor using tool (Figure 3.17).

8. Check cable cut device as described in Section 2.2.5.

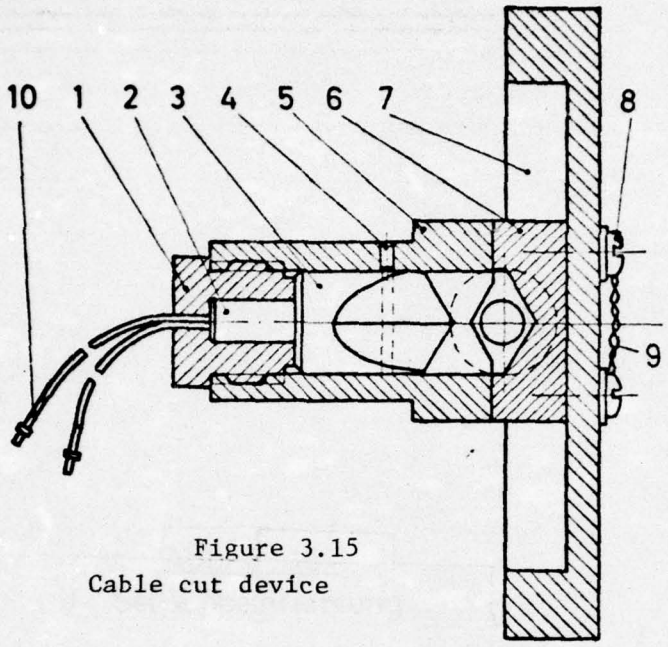
3.6.5 Installation of Pressure Roller (Figure 3.12), EGA Item 14

Roller holder (1), pressure spring (2) and cover plate (3) can be exchanged after loosening the four cheesehead screws M3 x 10 DIN 912 (4).

3.6.6 Exchange of Intake Funnel

1. Cover plate (1, Figure 3.23) loosened by taking out one cheesehead screw M4 x 12 DIN 912 along with plate 4.3 DIN 125 at the spot (1, Figure 3.19).

2. Holder (2, Figure 3.19) with separated intake funnel passed through the borehole of the clutch lever (4, Figure 3.19)



1 Arm bracket
2 Ignition insert
3 Knife blade
4 Shear pin
5 Tube
6 Primer anvil
7 Holder
8 Cheesehead screw
9 Locking wire
10 Contact pin

Figure 3.15
Cable cut device

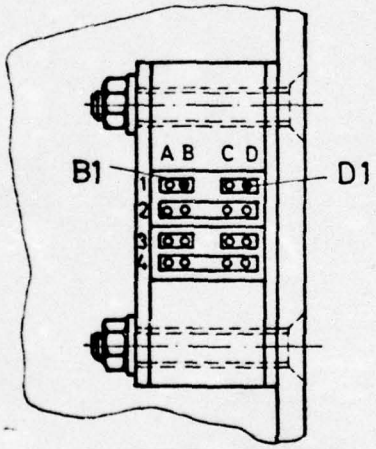
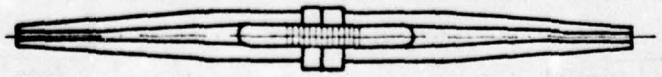


Figure 3.16
Connections for explosive charge on the sequence distributor

Assembly side (insert) Disassembly side (extract)



(red) (white)

Figure 3.17
Assembly and disassembly tool (EGA Item 19) for contact pins

after taking out four countersunk screws M4 x 12 DIN 7991 (3, Figure 3.19).

3. Place open-end wrench s = 24 mm at a slant from above on the nut (5, Figure 3.19) and take out intake funnel with open-end wrench s = 32 mm.

4. Assembly takes place in reverse sequence.

3.6.7 Limit Switch Adjustment HOIST (Figure 3.20)

The adjustment of limit switches (1) and (2) takes place with feeler gauge and screwdriver at the set screw (3) with terminal position of the clutch lever.

Play between set screw and push rod: Switch (1) : 0.1 mm /57

Play between set screw and push rod: Switch (2) : 0.9 mm

If an exchange of set screws -- EGA Item 11 -- becomes necessary owing to damage, then both guide screws (4) are taken out for this purpose and the clutch lever is pulled down.

3.6.8 Checking Carbon Brushes on the Hoisting Gear Motor

1. After loosening the two top cheesehead screws M4 x 25 DIN 912 (1, Figure 3.24), remove upper clamping collar (2, Figure 3.24) and lower clamping collar along with fan (3, Figure 3.24).

CAUTION

In this case, do not damage cable connection of fan.

2. Carbon brush (1, Figure 3.21) is to be carefully taken out after lifting retaining spring (2, Figure 3.21) and its length measured with a steel rule. The admissible minimum length amounts to 12 mm.

CAUTION

Do not use a caliper scale since edges of the running surface on the carbon brush are otherwise damaged.

3. The carbon brush is immediately reinserted with care taken that it is not inserted 180° out of phase.

4. Check the three further carbon brushes in the same way.

5. If the minimum length is reached before expiration of the maintenance period owing to extraordinary wear, it follows that the equipment is to be returned to the manufacturer for maintenance. /59

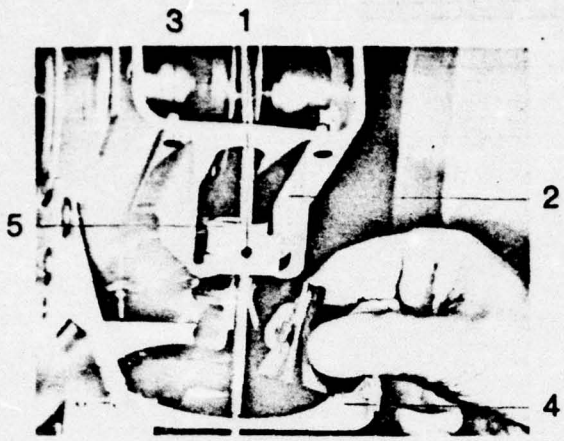
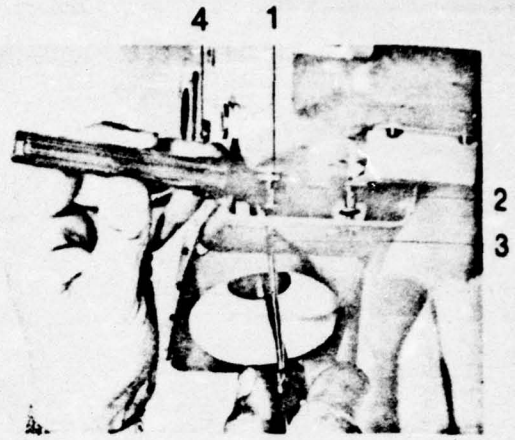


Figure 3.19
Intake funnel



/58

Figure 3.20
Limit switch adjustment HOIST

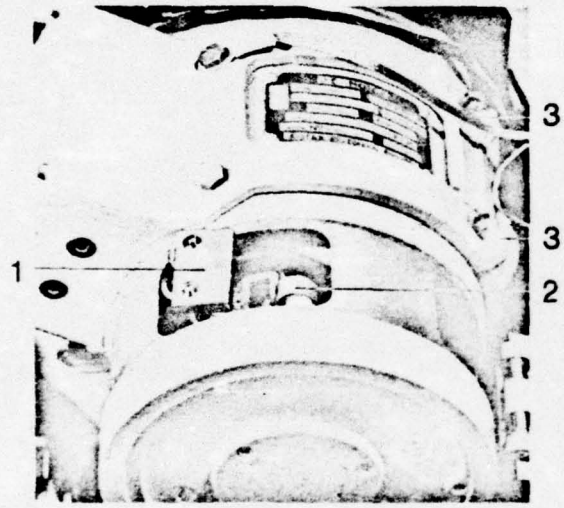


Figure 3.21
Hoisting gear motor

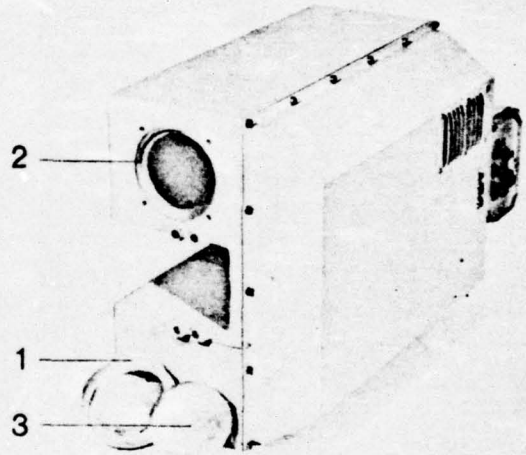


Figure 3.22
Electronic equipment box

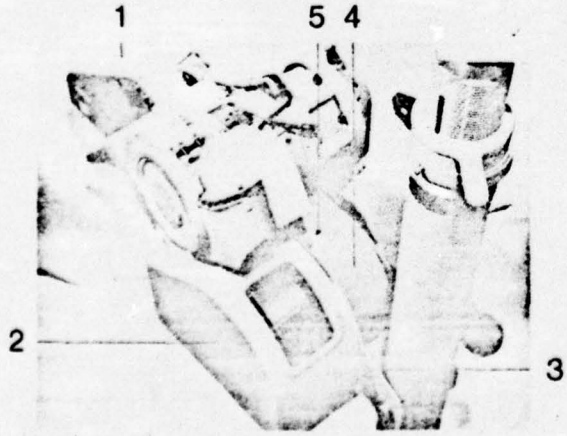


Figure 3.23
Jib

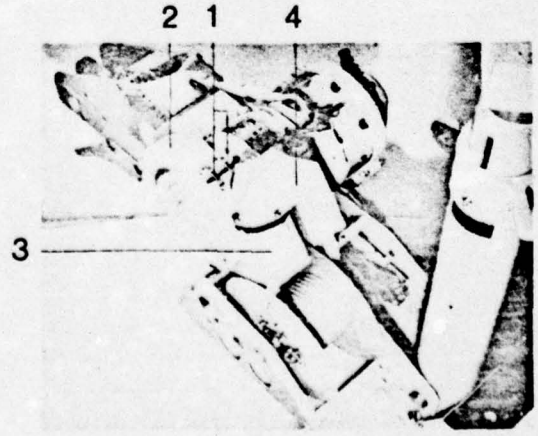


Figure 3.24
Jib, cover removed

6. Blast out the collector space, upper and lower clamping collar with compressed air and clean filter.

7. Insert upper and lower clamping collar into the guide groove and, after inserting two cheesehead screws (1, Figure 3.24), rotate counterclockwise until contact with the intake canal (4, Figure 3.24) against the lugs of the motor mount. In this position, the openings of the fan canals are located above the corresponding escapes of the hoisting gear motor.

CAUTION

If rotation is not made to the stop, the motor cooling will not be sufficient!

8. Tighten the two upper cheesehead screws (1, Figure 3.24).

3.6.9 Cleaning the Jib

1. Disassemble covers of the jib as described in Section 3.6.3.

2. Take jib from the mast after removing bolts, two liners and lock nut M8 (12/13, Figure 3.3).

3. Remove cover plate (4, Figure 3.23) after unscrewing one cheesehead screw M4 x 12 DIN 912 with plate 4.3 DIN 125 (5, Figure 3.23) and a similar screw with plate on the underside of the jib, removal taking place slanting upward.

4. Thoroughly blast out jib with compressed air.

5. Install covers.

3.6.10 Testing and Exchange of Control Unit /60

The control unit is to be exchanged and maintained by the manufacturer in the case of external damages or breakdown of switching functions. Remove for this purpose connecting cable (2, Figure 2.9), take out four cheesehead screws M4 x 12 DIN 912 (5, Figure 2.9) and remove control unit.

3.6.11 Cleaning the Filter Insert in the Electronic Equipment Box

The filter insert of the builtin fan is located on the underside of the control box and is shown in Figure 3.22. For this purpose, the cover ring (1, Figure 3.22) is screwed out from the filter lining (2, Figure 3.22) using a large screwdriver and turning counterclockwise. The insert which is stressed on both sides with filter gauze (3, Figure 3.22) is likewise removed. The filter gauze is lightly blasted with air and the insert is set inside the cover ring with the coarser filter gauze. Reset the cover ring and tighten well with screwdriver.

3.6.12 Exchange of Bellows-Type Lever on the Control Unit

1. Remove four countersunk screws M3 x 8 DIN 7991 (1, Figure 2.11) with bellows-type lever (3, Figure 2.11).

2. Insert new bellows-type lever (EGA Item 17), insert into the groove of the fastening ring and again screwed tight. At the same time, tighten the four countersunk screws uniformly over the slot so that the bellows-type lever does not slip out of the annular groove.

3.6.13 Touchup Painting

1. Remove grease from damaged places (for example, with clean washing gasoline).

2. Put a base coat using zinc chromate basic color according to MIL 8585.

3. Touch up with synthetic resin paint, silver-gray, RAL 7001, glossy, 20% ±5% according to Boller -- corresponds to MIL E5556.

3.7 KEEPING THE SERVICE RECORDS /62

Forms AFTO 781A and AFTO 781B are to be used for the service records of each individual hoist. They are filled out as in the sample shown as "hoist sheet" and accompany the flight log as soon as the hoist is placed in a helicopter or removed from a helicopter, as the case may be.

Inspection, maintenance and repair work as well as operations and load cycles carried out with the hoist are entered completely in the forms so that the operational readiness of the hoist is immediately obvious.

One load cycle is in this case the paying in and out of the cable for more than 5 m.

Load cycles are separated according to hoist load cycles (HL) and cable load cycles (CL), meaning that the HLs are continuously counted and the CLs begin again after every cable change.

The supervision of maintenance work as covered in Section 3.4, Points 1 and 2, is documented by entering in form AFTO 781A those of Points 3 to 7 in form AFTO 781B (cf. sample).

HOIST SHEET EQUIPMENT 00

DATE FROM 18.10.1 TO	CREW CHIEF	ORGANIZATION HTG-64	LOCATION Ahlhorn	~~ACFT TYPE~~ AEG Hoist	~~ACFT~~ SERIAL NO. 400-00

A. AIRCRAFT INSPECTION STATUS

NEXT PERIODIC INSPECTION DUE NUMBER

TYPE	FREQ	COMPL	NEXT DUE	COMPL	NEXT DUE
PE					
PO					
GÜ	24 Mo.	10.72	10 74		

B. ENGINE DATA

PSN	ENG SER NO.	ENG CHANGE DUE TIME	TYPE PSN	ENG SER NO.	ENG CHANGE DUE TIME
1			5		
2			6		
3			7		
4			8		

C. CALENDAR INSP STATUS | DATE OF LAST FLIGHT

TYPE	DATE DUE	TYPE	DATE DUE

D. STATUS OF DEPOT LEVEL INSP | TYPE ☐ IRAN ☐ PARC

LAST IRAN FACILITY		LAST PARC NO.	
DATE COMPL	ACFT TIME	DATE COMPL	ACFT TIME

E. OUTSTANDING IMMEDIATE ACTION AND URGENT ACTION TO'S AND SUMMARY OF DELAYED DISCREPANCIES

SYM	T. O. NUMBER AND PUBLICATION DATE OR DISCREPANCY	SYS	WHEN DISC'D OR ENTERED: DATE	ACFT TIME	CODE	DATE TO AF-TO 26C OR 781 A OR DATE C/W	TRANSFERRED BY OR COMP VERIFIED BY (SIGNATURE)

F. IMMEDIATE ACTION AND URGENT ACTION T.O.'S COMPLIED WITH IN 10 DAY PERIOD PRECEDING INITIATION OF THIS FORM

T. O. NUMBER AND PUBLICATION DATE	DATE C/W	T. O. NUMBER AND PUBLICATION DATE	DATE C/W

G. HIGHER AUTHORITY INSPECTIONS

DATE	SIGNATURE AND TITLE	DATE	SIGNATURE AND TITLE

AEG HOIST NO.-00

H. ~~AIRCRAFT AND ENGINE~~ OPERATING TIME RECORD

DATE	Hoist Load cyc.	Cable ld cyc.	~~OVER TEMP~~	Signature	~~OVER TEMP~~		OVER TEMP		OVER TEMP		OVER TEMP		OVER TEMP		OVER TEMP		OVER TEMP	
PREVIOUS																		
TOTAL																		
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CARRIED FWD																		

I. CALENDAR INSPECTION SCHEDULE

INSPECTION ITEM	FREQUENCY	NEXT DUE	NEXT DUE	NEXT DUE	NEXT DUE	NEXT DUE	NEXT DUE
Ck torque overld release clutch	—	100 HL	300 HL	600 HL	1000 HL		
Hoist inspection	300WL						
Cable change	600 + 10 CL						
Exchange ignition insert	24 months						

3.8 PARTS LIST FOR SPARE PARTS BASIC ALLOWANCE /65

The spare parts basic allowance V22.228.460000 - 0 ST 4 accompanying every equipment contains the following parts and tools:

Item	No.	Description	Stock Number
-	-	Attachment Components for Jib:	
1	4	Liner	V22.228.400000 - 1 EZ 4
2	2	Bolts	V22.228.400000 - 2 EZ 4
3	2	Locking spring for turnbuckle	MS 21256
4	2	Bolts for turnbuckle	SKL 60
5	2	Plate for turnbuckle	AN 960 - C 716
6	2	Cotter for turnbuckle	3 x 18 LN 94
7	2	Quick disconnect adapter	FDC 2650 M 18
8	1	Quick disconnect adapter	FDC 2650 M 19
9	1	Hexagonal nut	NAS 679 A 7
10	2	Cable intake funnel	V22.228.327000 - 3 EZ 4
11	4	Set screw	V22.228.327000 - 10 EZ 4
12	1	Load hook, complete	V22.228.328000 - 0 ST 4
13	2	Cable lines with ball end on plastic spool	V22.228.328000 - 28 St 4
14	2	Pressure roller, complete	V22.228.329000 - 0 ST 4
15	5	Guard ring	6 x 0.7 DIN 471
16	2	Electric bulb	Midget T- 1 3/4 /28 V/ No. 327
17	1	Bellows-type lever	V22.228.350000 - 3 ST 4
18	2	Spare charge for cable cutter	Part No. 278 C-01-10
-	-	Special Tools:	
19	2	Plastic assembly and disassembly tool for item 18	Gr. 20 - Part No. M15.570-20
20	1	Adjusting flange	V22.228.460000 - 1 EZ 4
21	1	Catch pin	V22.228.460000 - 2 EZ 4
22	1	Hexagonal socket screw wrench	V22.228.460000 - 3 EZ 4
23	1	Set of hexagonal screw wrenches	
24	1	Set of screwdrivers	

Technical data

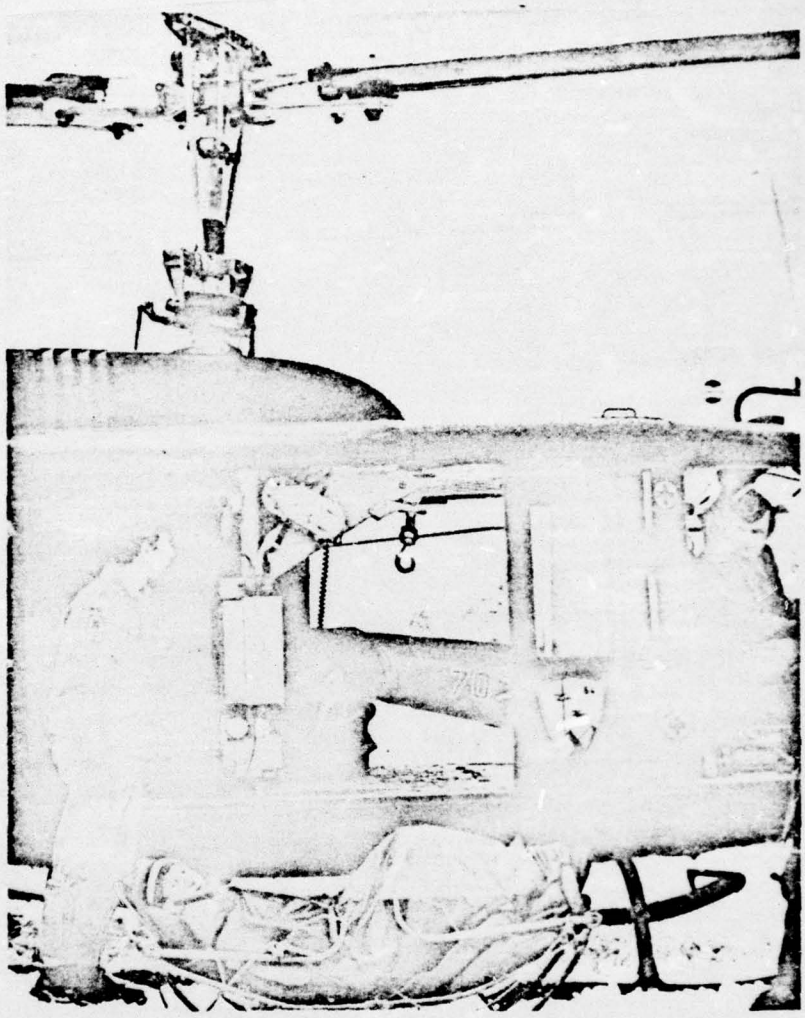
Hoisting gear	
Rated load, maximum	275 kg
Safe load	> 680 kg
Ultimate load	>1020 kg
Cable speed	0.075 . . . 0.75 m/sec steplessly adjustable
Extended cable length	45 m
Admissible cable deflection, maximum	25°
Slewing gear	
Slewing angle	approx. 100°
Slewing-in time at max. banking position of helicopter (15° pitch angle) and 275 kg load	approx. 7.5 sec for full slewing angle
Dead weight	
Complete with cable, load hook and connections	approx. 88 kg
Power supply	
Voltage	28 V DC
Power consumption:	
Control circuit	10 A
Power circuit	max. 145 A
Residual ripple of electrical system voltage	± 2 V

Safety equipment

- Blocking brake on drive motor
- electrically operated cable cut device,
- automatic limit switches for lifting and lowering,
- temperature switches in motor and power amplifier,
- electronic electrical system monitoring,
- short-circuit protection,
- overspeed protection,
- open-phase protection

Admissible operating conditions

Temperature between
−55 °C and +70 °C



Mechanical design

In consideration of international standards and regulations – such as STANAG, MIL, DIN und LN-Standards – the hoist is a lightweight construction made from parts and materials approved for aviation.

The hoist is carried on a mast with attached slewing drive and torque compensation bracket. The slewing drive consists of a d.c. motor with built-in blocking brake and with a multistage gear.

The slewing range can be set dependent on the hoist mounting position. Even at extreme banking position of the helicopter the hoist can be slewed in and out under full load within this range.

The jib houses the hoist drive system consisting of the lifting motor with fan and flanged-on blocking brake, a multistage gear, the capstan system, the cable guide and turn around devices as well as the cable drum driven throught a slipping clutch.

The stranded cable of moderate twist is made from austenitic chrome-nickel-steel. To avoid too high cable torsion the load hook is uncoupled from the cable by means of a ball bearing.

The electronic equipment box is fixed to the mast with a quick-action latch between slewing gear and jib. This box contains the entire electronics for power, regulation and control. The box is connected to the other electrical assemblies and to the helicopter mains via plug-in cables.
The transitorized power electronics are mounted on an air-cooled tower, the electronic regulation and monitoring components designed as printed circuit plug-in boards. Above the electronic equipment box the control box is arranged. It contains, aside from the fuses for fan and slewing drive, the test and release switches for the cable cut device.

Slewing in and out as well as stepless adjustment of the cable speed is controlled by the hoist operator via a manual control unit.

For correction reasons, however, the pilot can operate with priority all functions of the hoist by a switch on his control lever.

The hoist may be incorporated in four positions inside the light-weight transport helicopter Bell UH-1D. The mast can be inserted simply and quickly into receptacles existing in the ceiling and floor of the helicopter's cabin and locked by means of quick-action latches.

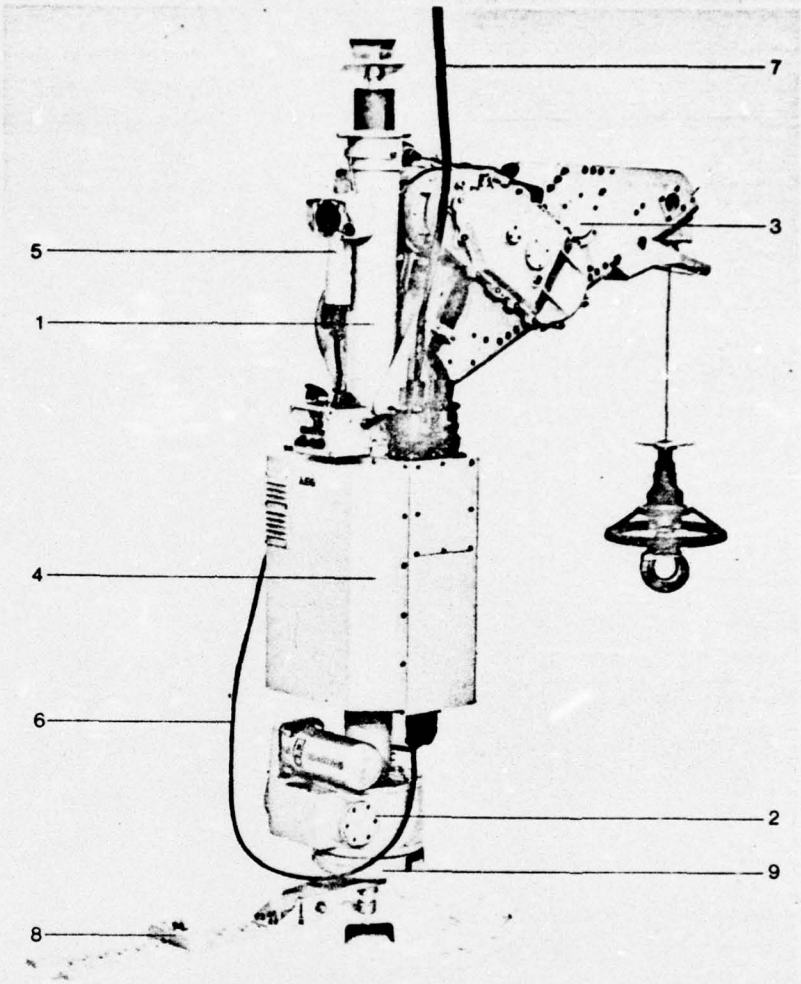
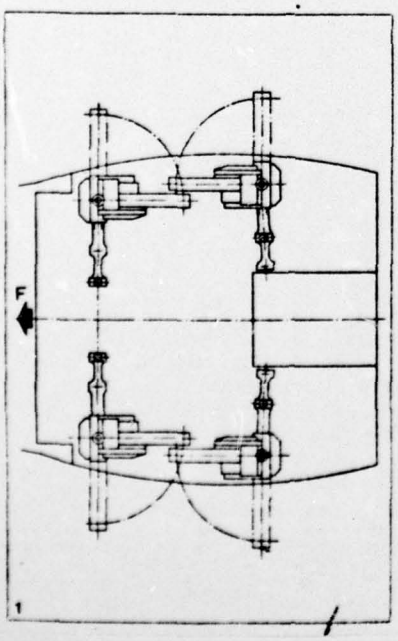


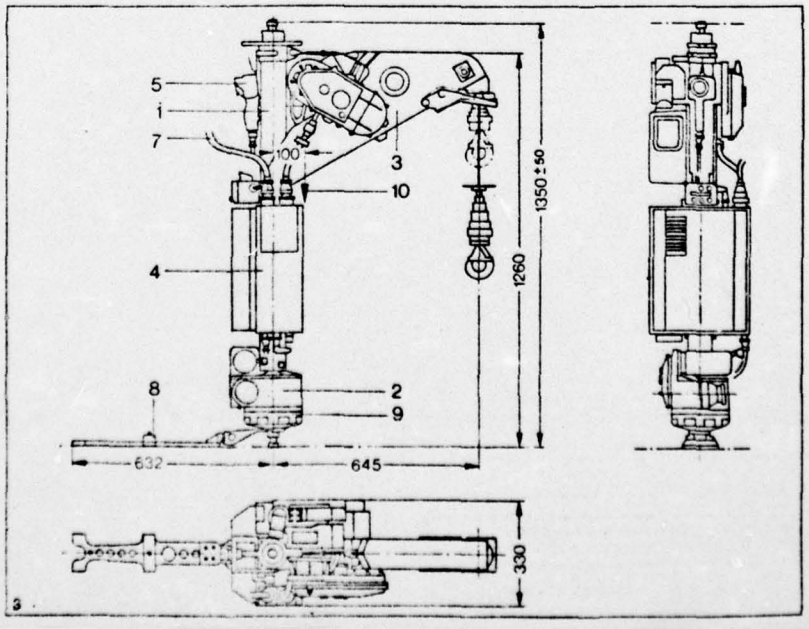
Fig 1 Mounting positions in the helicopter Bell UH-1D
F = Forward direction

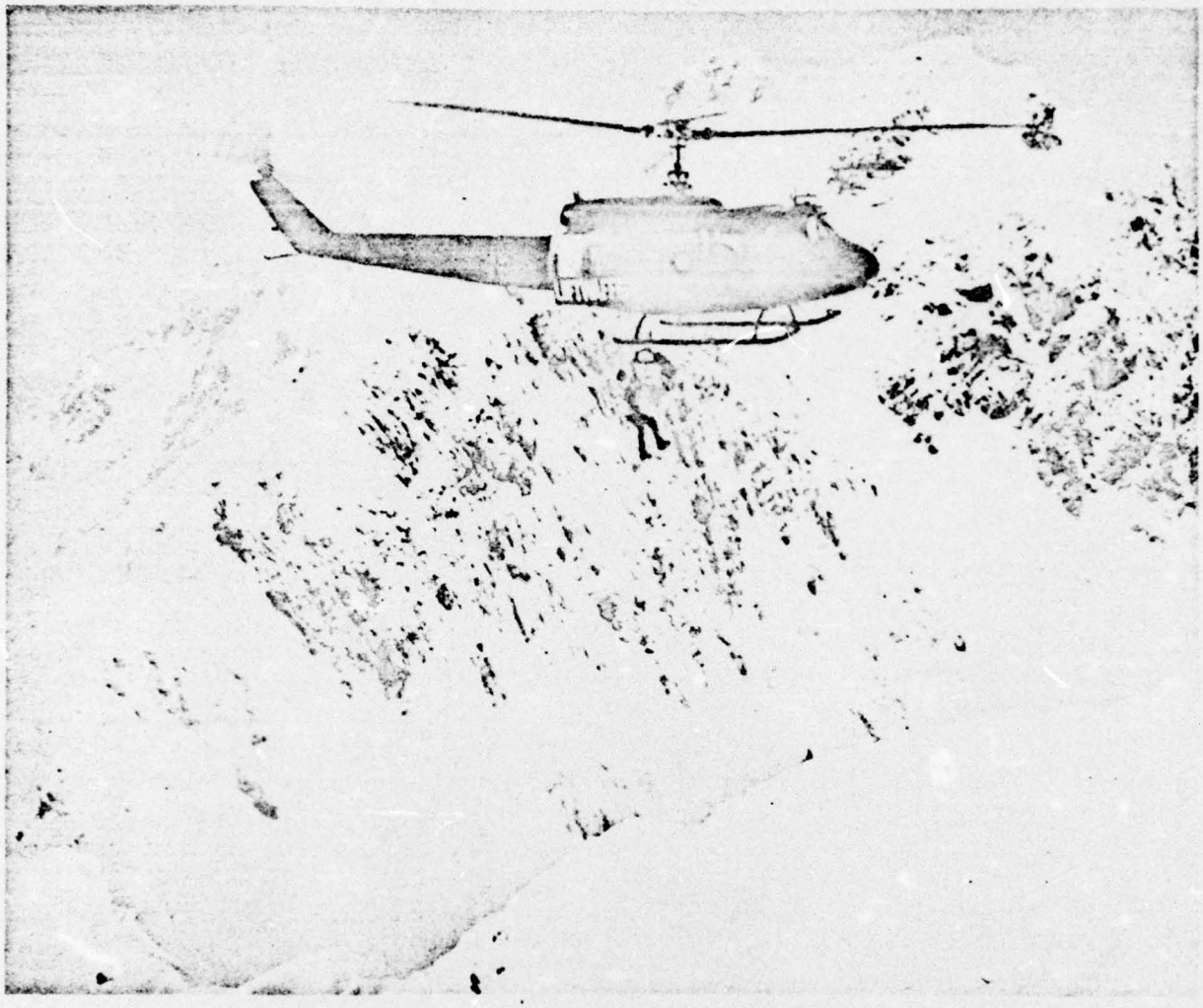
Fig 2 Total view

Fig 3 Dimensions

1 Mast
2 Slewing gear
3 Jib
4 Electronic equipment box
5 Manual control unit
6 Connection cable to control unit
7 Connection cable to power supply
8 Torque compensation bracket
9 Ring for the adjustment of slewing range
10 Line of center of gravity







Technical data

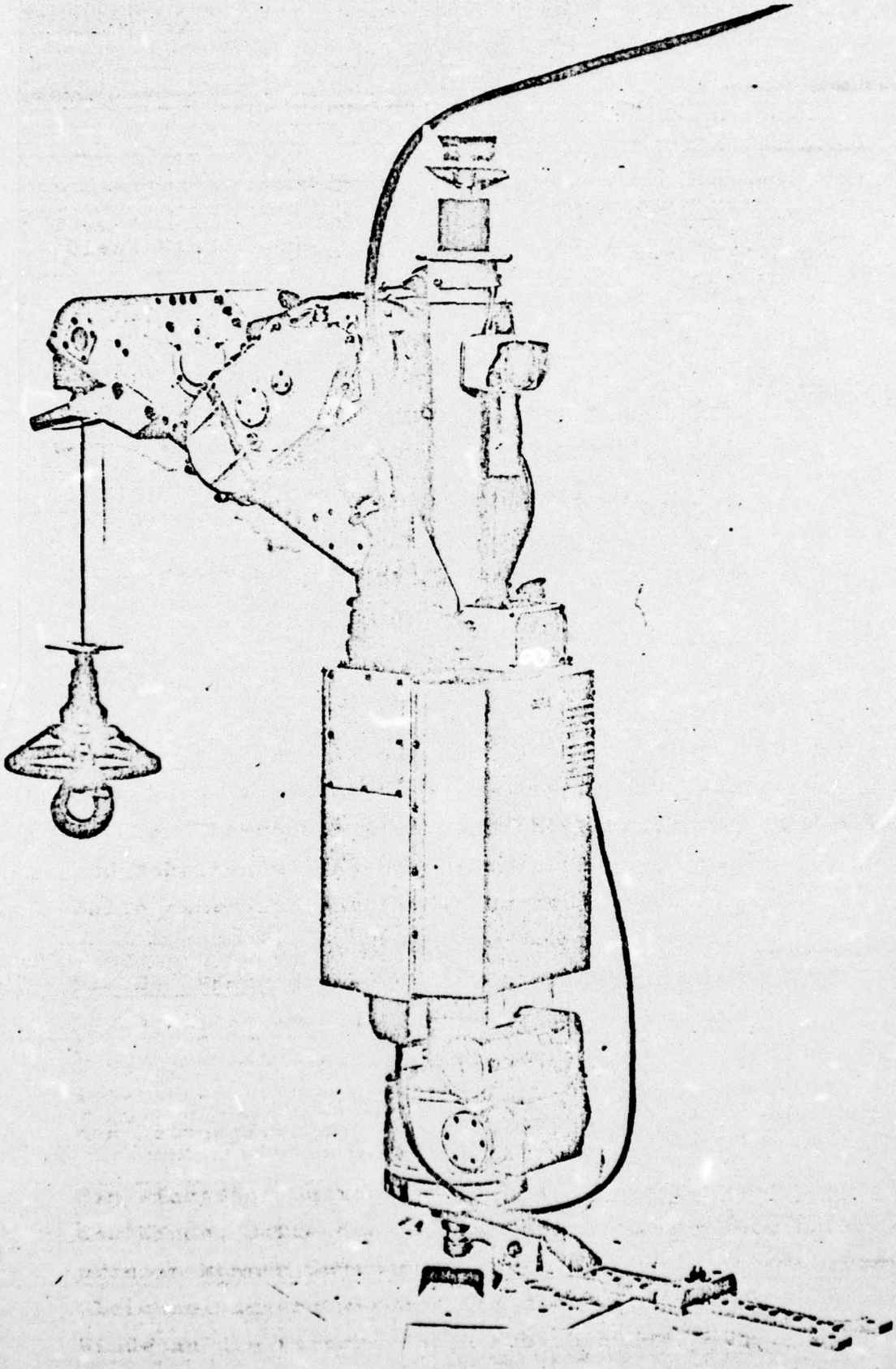
Hoisting gear	
Rated load, maximum	275 kg
Safe load	> 680 kg
Ultimate load	>1020 kg
Cable speed	0.075 . . . 0.75 m/sec steplessly adjustable
Extended cable length	45 m
Admissible cable deflection, maximum	25°
Slewing gear	
Slewing angle	approx. 100°
Slewing-in time at max. banking position of helicopter (15° pitch angle) and 275 kg load	approx. 7.5 sec for full slewing angle
Dead weight	
Complete with cable, load hook and connections	approx. 88 kg
Power supply	
Voltage	28 V DC
Power consumption:	
Control circuit	10 A
Power circuit	max. 145 A
Residual ripple of electrical system voltage	± 2 V

Safety equipment

- Blocking brake on drive motor
- electrically operated cable cut device,
- automatic limit switches for lifting and lowering,
- temperature switches in motor and power amplifier,
- electronic electrical system monitoring,
- short-circuit protection,
- overspeed protection,
- open-phase protection

Admissible operating conditions

Temperature between
−55 °C and +70 °C



ALLGEMEINE ELEKTRICITAETS-GESELLSCHAFT /1*
AEG-TELEFUNKEN

AEG INTERNAL HOIST FOR HELICOPTERS

This hoist was designed especially for search and rescue missions and should represent at this time the most modern and reliable equipment presently in operation.

Unlimited load cycles under the maximum load of 275 kg can be carried on continuously. This corresponds to a load of two men including rescue device and equipment.

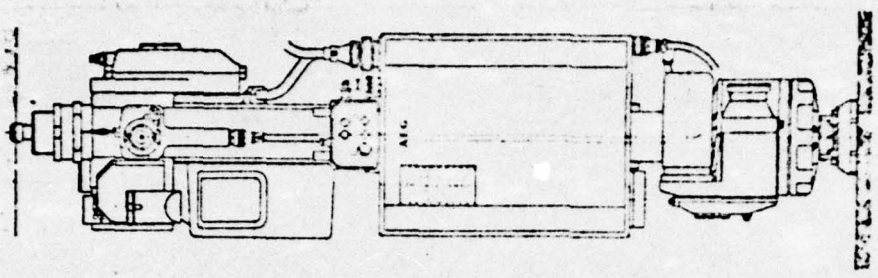
Under extreme temperature conditions ranging from -55° C to +70° C, it is possible to rescue persons by means of the continuously adjustable cable speed up to a maximum cable length of 45 m.

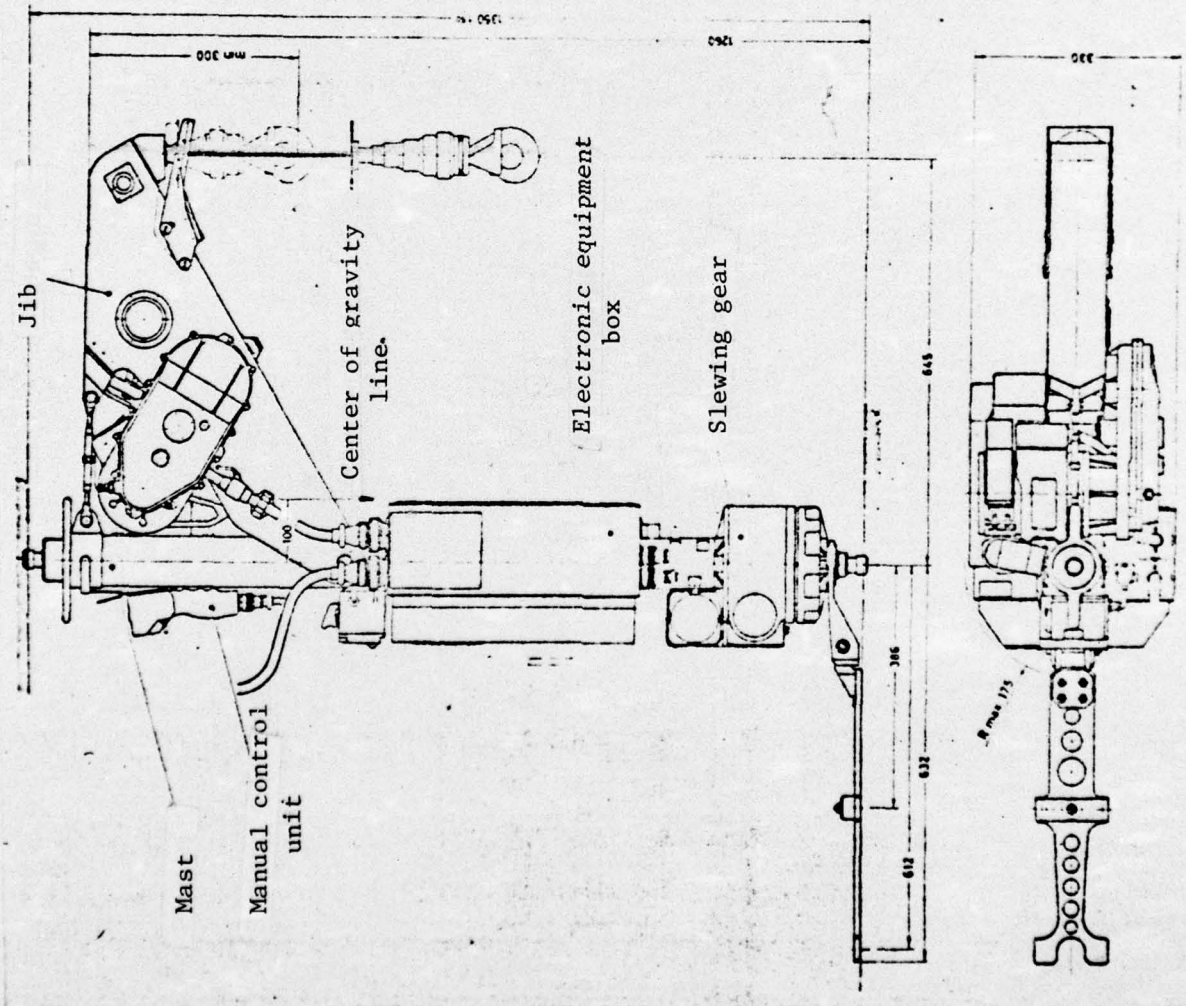
The drive is accomplished by an electric motor, and it is controlled by a transistorized electronics. During operation, electronic test circuits monitor the operation and switch in automatically the safety brake in the event of a disturbance (for example, short circuit or overload).

The operation of the hoist is simple and reliable. If the cable becomes caught, the operator can cut the cable using the cable cut. If the hoist operator is not there, a dead man switch ensures against improper operation. The pilot can continue the rescue process.

One important consideration is the maintenance and installation of the hoist. Owing to construction of the hoist according to principles of prefabrication, functional groups can be simply exchanged. At the same time, this makes possible a simple adaptation of the hoist to the various helicopter types. Installation and placement in operation can be carried out by two men in less than five minutes.

*Numbers in the right margin indicate pagination in the original text.

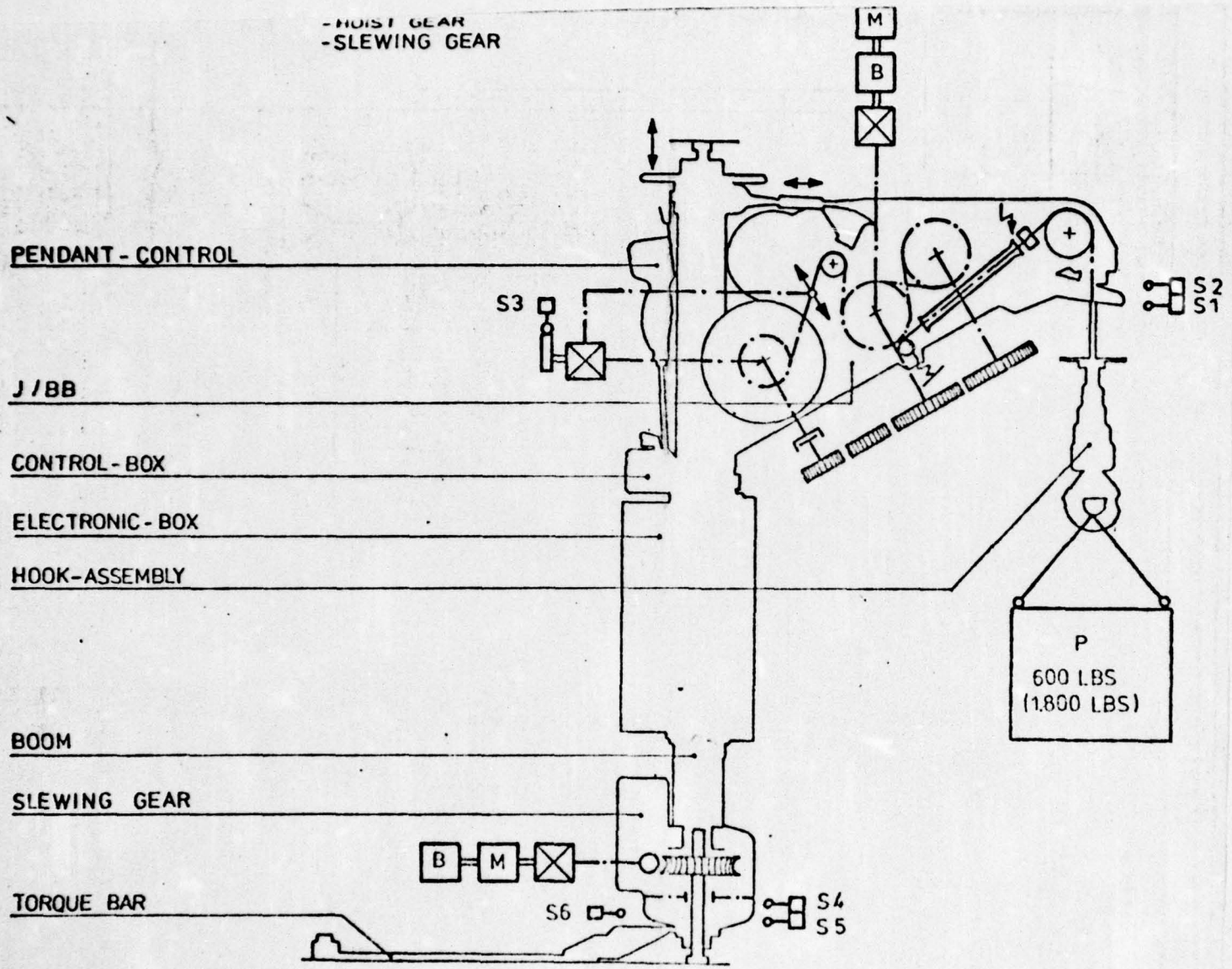


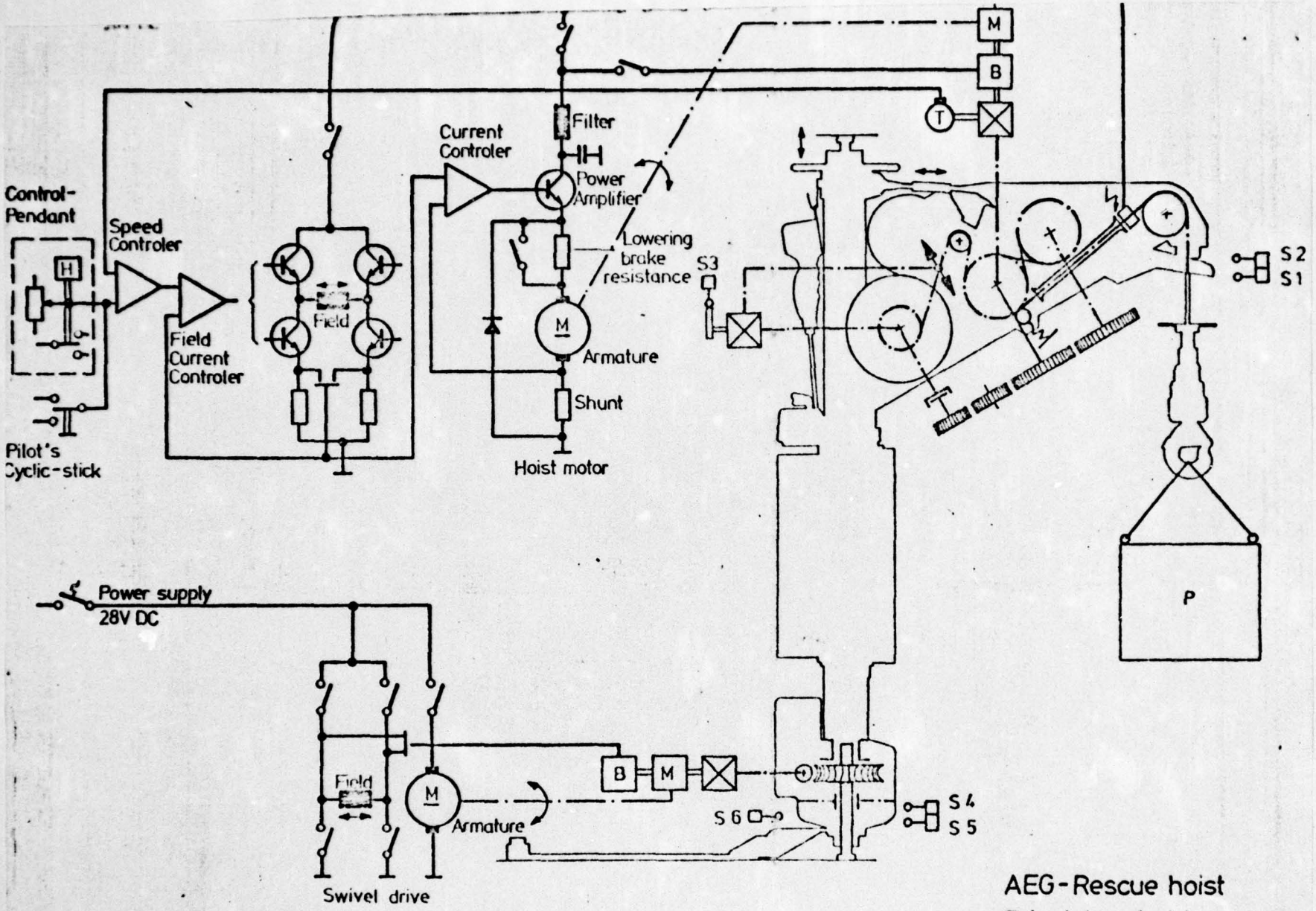


INTERNAL RESCUE HOIST

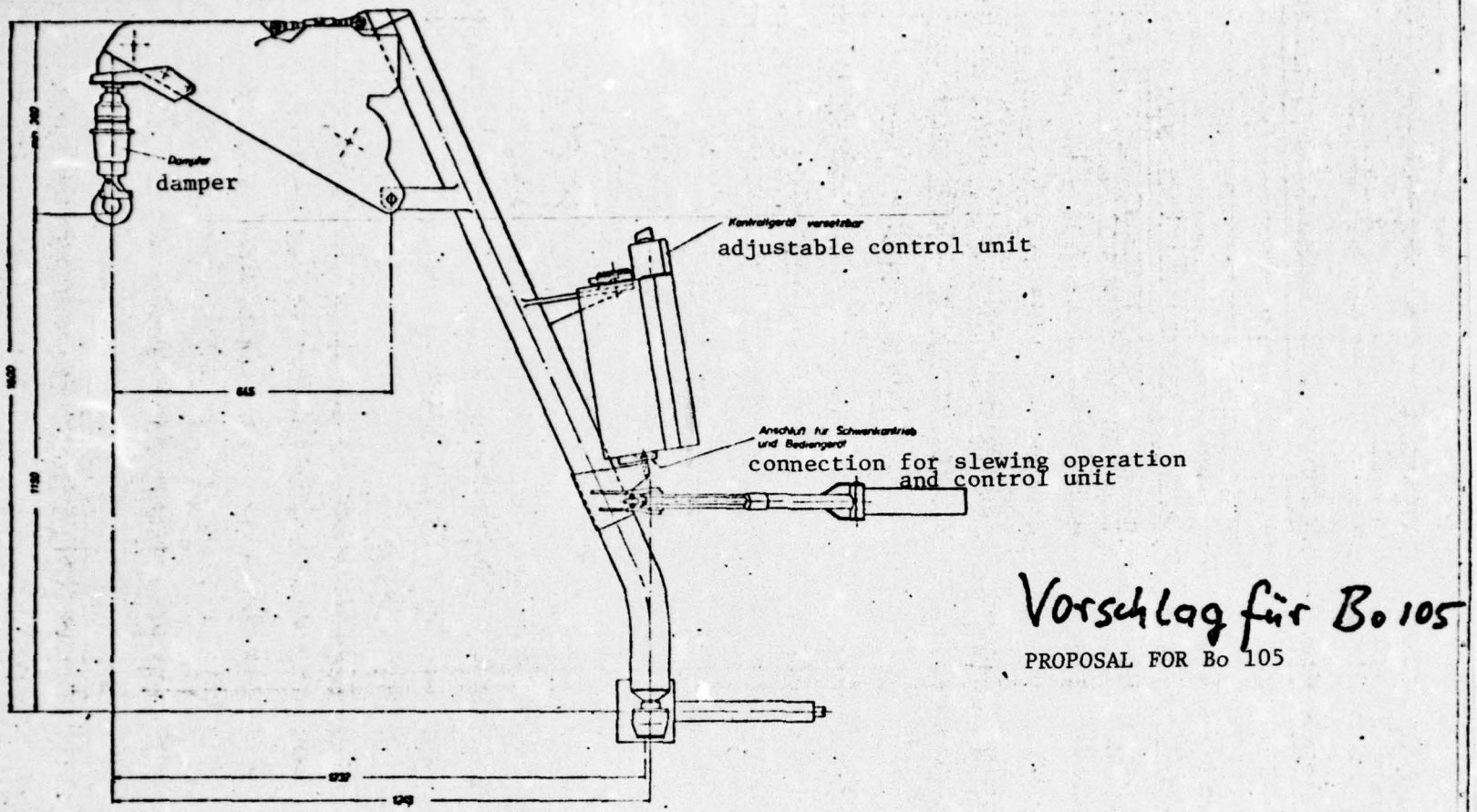
FOR UH - 1D

Type V22.228.400


-HOIST GEAR
-SLEWING GEAR
M
B
PENDANT - CONTROL
S3
S2
S1
J / BB
CONTROL - BOX
ELECTRONIC - BOX
HOOK - ASSEMBLY
P
600 LBS
(1.800 LBS)
BOOM
SLEWING GEAR
B
M
TORQUE BAR
S6
S4
S5

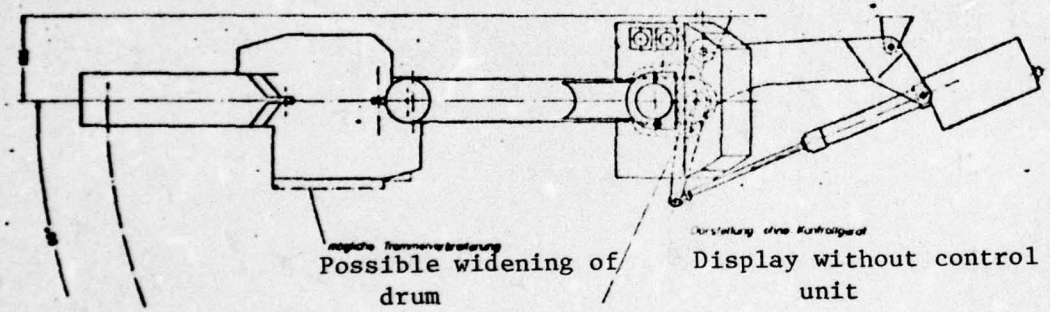


AEG-Rescue hoist
Principle of drive



Vorschlag für Bo 105

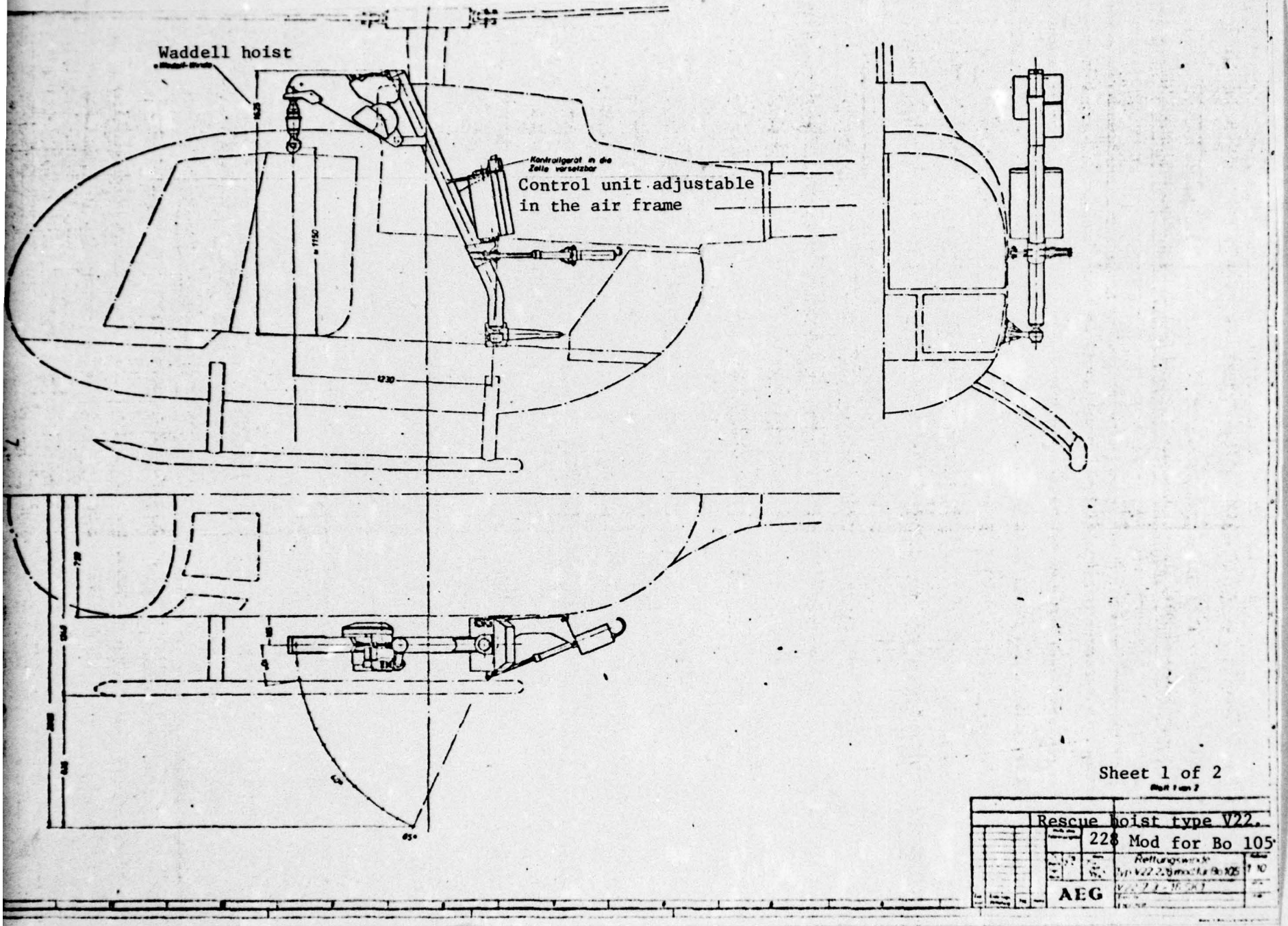
PROPOSAL FOR Bo 105



Sheet 2 of 2

Rescue hoist type V22.228 Mod. for Bo 105

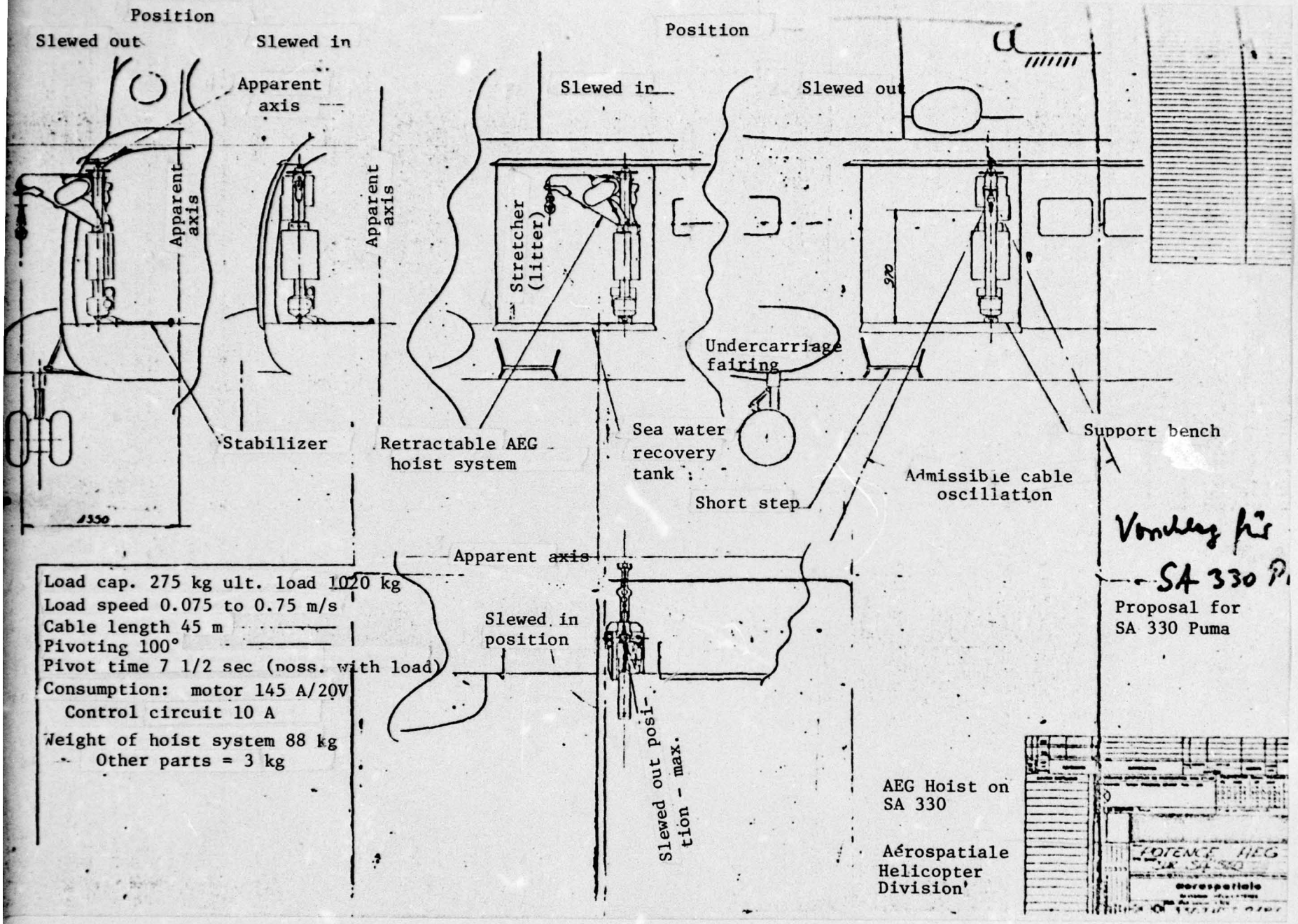
AEG



Sheet 1 of 2

Rescue hoist type V22.
228 Mod for Bo 105

AEG


Position
Slewed out
Slewed in
Apparent axis
Apparent axis
Apparent axis
Position
Slewed in
Slewed out
Stretcher (litter)
Undercarriage fairing
Stabilizer
Retractable AEG hoist system
Sea water recovery tank
Short step
Support bench
Admissible cable oscillation
Apparent axis
Slewed in position
Slewed out position - max.
Load cap. 275 kg ult. load 1020 kg
Load speed 0.075 to 0.75 m/s
Cable length 45 m
Pivoting 100°
Pivot time 7 1/2 sec (poss. with load)
Consumption: motor 145 A/20V
Control circuit 10 A
Weight of hoist system 88 kg
Other parts = 3 kg
Vorschlag für SA 330 P
Proposal for SA 330 Puma
AEG Hoist on SA 330
Aérospatiale Helicopter Division'