

EL 4000

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SERVICE NOTES

TODD-A0
70/35mm PROJECTOR
TYPE EL 4000

TODD-AO PROJECTOR EL 4000

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EL 4000

A. GENERAL

Type numbers of the projector

EL 4000/00	110-220 V	50 c/s
EL 4000/01	110-220 V	60 c/s

On delivery the projector is equipped for 70 mm. In order to be able to make it suitable for 35 mm. a case with reconstruction parts is supplied separately.
Code number of this case is C1 606 51.

The contents consist of:

Runner plate complete	35 mm
Pressure roller mag. sound head	35 mm
2 Pad rollers	35 mm
Aperture plate normal	35 mm
Aperture plate w.s. ratio	1 : 1.75
Aperture plate w.s. ratio	1 : 1.85
Aperture plate w.s. ratio	1 : 2
Aperture plate Cinemascope 35 mm	
Aperture plate CO	
Droopsnoot	

Set of pressure bands	35 mm
Set of pressure bands	35 mm with velvet
Set of pressure bands	70 mm
Set of pressure bands	70 mm with velvet

In order to be able to change the speed quickly the driving spindle has been provided with an adjustable coupling.
With 35 mm the projector should run 24 pictures/sec.
With 70 mm the projector should run 24 or 30 pictures/sec., depending on the film.

Type numbers of the tools:

EL 4814/00	without oil
EL 4814/01	with thin oil
EL 4814/02	with normal oil
EL 4814/03	with thick oil

Protections

The projector has been provided with the following safety devices:

1. Automatic film rupture device (fig.1)

In case of film rupture a lever "B" is pressed upwards and operates a micro switch. The motor stops and the dowser closes. See point 5.

2. Cooling plate (fig.10)

When lever "1" is pulled forward the micro switch fig.1 interrupts the motor circuit. Then the dowser closes. See point 5.

3. Shutter (fig.6)

A centrifugal device on the shutter shaft ensures that the cooling plate holder cannot be opened when the projector is operating.

4. Water pressure switch (fig.14)

When no cooling water flows, micro switch 13 interrupts the control current of the rectifier and the arc lamp will not ignite.

5. Centrifugal switch (fig.14)

A micro-switch ensures that the dowser opens only at a certain speed of the projector.

6. Safety fire trap (fig.15)

This prevents flames entering the spool box, should the film catch fire.

B. MOUNTING

The cases in which the various parts of the projector have been packed have the same type number as the complete projector. Moreover, they are numbered from I - X.

The order of numbering is the correct order for mounting. So first unpack case I, and then case II, and so on.

Case I	Projector base
II	Case of spool box
III	Seesaw
IV	Projection mechanism
V	Upper and lower spool box
VI	Motor unit
VII	Optical sound head
	Parts for rebuilding to 35 mm
	Head for objective holder
VIII	Projector door
IX	Magnetic sound head
X	Objective holder

The blank parts are greased. Remove this grease with carbon tetrachloride. Where necessary grease again with acid free grease.

In order to be able to turn the projector easily into the desired angle of inclination two strips of felt should be put between projector and base of spool box. For that purpose packing felt can be used.

Before fixing the base in position it should be examined to see whether the water supply lines and the electrical connections have been provided. The base has been provided with four set bolts with counter nuts so that the projector can be set up horizontally.

The steel plates fitted underneath these bolts should be 50 x 50 mm with a thickness of 5 mm. When mounting the flywheels of the capstans remember that they should be without clearance and should rotate easily.

C. ADJUSTMENTS

The adjustments mentioned below have already been carried out in the works. They must only be repeated in necessary cases, for instance when replacing parts.

a. Pad rollers (fig. 7, 8)

The rollers should not touch the sprocket. With 2 thicknesses of film the roller should just run freely. With 3 thicknesses of film the roller should jam lightly. Readjustment is done in the following way:

1. Unscrew the locking screw "A" of pin "8" (fig.7).
2. The distance roller - sprocket becomes greater or smaller respectively when pin "8" is screwed in or unscrewed.
3. Fix the locking screw.

Axial adjustment of the rollers it not necessary.

b. Runner plate + holder (fig. 7, 8)

This has been provided with a firm and a flexible side pressure roller. The firm roller is at a distance "A" (fig.a) from the mounting surface of the film track.

$A = 97.45 - 0.05 \text{ mm}$ for 35 mm film
To be adjusted with model no. C1 708 85
 $A = 114.95 - 0.05 \text{ mm}$ for 70 mm film
To be adjusted with model no. C1 708 86

The leaf spring of the other roller should lie with a light pressure against this roller. The filmstripper of the intermittend sprocket should run freely from the spindle. To be adjusted with ring "D".

c. Shutter (fig.6)

1. Unscrew the 6 screws "G" of the shutter.
2. Put the intermittent unit into the feed position.
3. Turn the shutter to about 15° in front of the film window.
4. Fix the shutter.

Note: The shutter turns anti-clockwise. Now check with a test film whether the picture still travels. Pull at lower side. Re-adjust shutter in rotation direction. Pull at upper side. Re-adjust shutter opposite to the rotation direction.

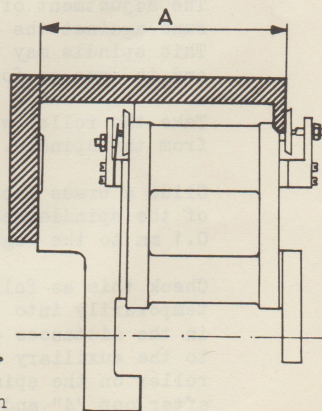


Fig. a

d. Shutter safety device (fig.6)

If the shutter is re-adjusted the position of the safety device should be corrected as well. The direction of movement of the slide piece "E" should be perpendicular to the straight side of the shutter. Be careful that the slide piece "E" does not jam. A slight clearance is desirable according to dirt deposit.

The stroke, which the cooling plate holder makes before arm "A" fig.10 comes against the protection, can be adjusted with ring "D". This stroke should be as small as possible.

e. Frictions of lower and upper spool box (fig.15)

The frictions can be adjusted with knurled nut "A". These adjustments should be very slight in order to limit wear and tear of the film as much as possible. The minimum is as follows:

Upper spool box

When stopping with a full reel the loop which then forms should remain small.

Lower spool box

When starting with a full reel the loop should not become too big. Moreover, the film must still be wound sufficiently tautly.

f. Sound head (fig.13)1. Pressure roller

The adjustment of the spindle is such that the film always runs against the foremost flange of the pressure roller. This spindle may only be re-adjusted in case of emergency and is done as follows:

Take the roller with the foremost and hindmost dust ring from the spindle.

Slide a brass tube (Int. dia. 6 mm) over the whole length of the spindle and bend the spindle 0.07 mm upwards and 0.1 mm to the right.

Check this as follows: Introduce a spindle (dia. 8 mm) temporarily into the centre of rotation. The difference in the distances of both ends of the spindle with respect to the auxiliary spindle should be 0.1 mm. Remount the roller on the spindle. Only fix the hindmost dust ring after cap "4" and dust ring "10" have been refitted and the hindmost dust ring has been pressed lightly against the pressure roller. There should be hardly any axial clearance of the pressure roller.

Stretch the spring by turning bush "B" (about 300°, pressure 1200 gram). Fix the bush with a screw. It must now be possible to slide a strip of paper (thickness 0.07 mm) easily between pressure roller and sound track at the front side. A double strip, however, should jam. At the rear side a single strip should jam.

2. Optical system

Feed the exciter lamp with alternating current and adjust the sound-optical system "25" so that a maximum output power is obtained. Also make sure, that the front side of the optical system still remains about 0.5 mm from the film. Screw "A" should fall into the slot "D" of the optical system. Then the exciter lamp can be switched to direct current supply again. Then make a loop of 6000 c/s in the sound head. Slightly tauten the loop so that the film now lies around the sound track. Adjust the objective "19" with the eccentric pin "15" so that a clear picture is projected on the slit, visible through the window of the mirror holder. Place the slit perpendicularly to the sound track by the eccentric pin "15". Make sure that the slit bush comes into a position where-by it is nearest to the mirror. Focus the objective "19" again. Now let the loop run through the sound track and place the sound track in the middle of the slit with the set screw "11".

Adjust the maximum output voltage by slightly turning both eccentric pins alternatively. Repeat this with a loop of 9000 c/s. (If one does not dispose of frequency loops it is possible, in case of emergency, to make do with a piece of film on which many S-sounds are present).

3. Simultaneous adjustment of 2 sound heads

Adjust the anode voltage of both photo cells to 100 V with a meter without own power consumption (for instance MACS II).

A 1000 c/s loop is turned alternatively through both sound heads and the output voltages are adjusted at equal level by means of the photo cell potentiometers.

(Turn back sound head with the highest output voltage).

If there is no such a loop available, the output voltages can also be adjusted by feeding the exciter lamps with alternating current. (The dip filter, if any, in the amplifier should then be removed during the measurements).

g. Magnetic sound head (fig. 12)

1. Pressure roller "17"

The flanges of the roller must run freely. This can easily be checked with a mirror. Adjustment with screw 4, then lock with screw "B".

The pressure with which the roller lies against the capstan is 600 grams. The torsion spring must be adjusted with bush "A". This bush is to be fixed with a screw.

2. Tension roller "11"

Check the axial adjustment with a mirror when the film is running through the projector. Adjust with screw "4", lock with screw "B". The torsion spring should give the roller a pressure of 400 grams. Adjustment with bush "A". Fixing with a screw.

h. Distance picture-sound (fig. 1)

For magnetic sound this distance is 28 pictures. This can be adjusted by slightly unscrewing the bolt near roller "D" and by turning roller "E".

For optical sound the distance is 20 pictures, to be adjusted with roller "12".

D. OPERATION (fig. 16, 17, 11)

1. Open the water stop-cock.
2. Put the picture framing device in the middle position.
3. Open the pad rollers.
4. Open the fire plate.
5. Pull sufficient film out of the drum and lay the film into the projector according to drawing.
6. Close the pad rollers.
7. Close the fire plate.
8. Turn a few times by hand to see whether the loops are properly adjusted. Upper loop as small as possible.
9. Switch on projector.
10. Adjust the pressure tapes by loosening the nut "6", until the picture starts jumping. Then screw down until the picture just stands still. Too large a pressure causes unnecessarily great wear and tear.
11. Check whether the picture is in sharp focus.
12. When the film runs through the magnetic sound head the red arrows of the stretching roller should be opposite to each other.

In order to make the projector suitable for 35 mm film, the following parts should be replaced.

1. Film track.
2. Pressure tapes.
3. Aperture plate.
4. Pad roller feed and holdback sprocket.
5. Pressure roller, magnetic sound head.

Moreover the speed should be changed if necessary.

Since the pad rollers are mounted on a centering pin, re-adjustment at reconstruction is not necessary.

Film direction in upper drum: this can be modified at choice by the operator by changing the lip "B" fig.10.

Replacing pressure bands:

1. Open cooling plate holder.
2. Lift knob "A" and pull the cooling plate forward. The flexible tubes admit a clearance of about 10 cm.
3. Be careful that the coloured ends of the pressure bands come on to pins with the same colour.

Be careful that the film track is always laid down with the side pressure rollers facing upwards, in order to prevent damage.

E. DISTURBANCES IN SOUND

In case of disturbances in sound first check the amplifier installation.

a. No sound

Exciter lamp or photo cell is defective.

b. Weak sound

The exciter lamp is burnt black or the filament of it is sunk down. Photocell is insensitive. Optical system is dirty. Clean according to G.

c. Distorted sound

Bad film copy.

Optical system is dirty. Clean according to G. The torsion spring of the pressure roller is broken or weakened. Replace and adjust with the aid of the data under C.f.1.

Split bush "20" (fig.13) is no longer perpendicular to the sound track. Re-adjust sound head according to C.f.2.

d. Sound of the projectors not equal in strength

After having checked the above mentioned points b and c the sound heads are re-adjusted according to C.f.3.

F. REPLACEMENT OF PARTS

Mostly when replacing a pinned part the old pin-holes can no longer be used, since they are bored when mounting.

After the new part has just been mounted (clearance) it needs no re-pinning.

a. Pad rollers (fig.1)

1. Undo the two screws "11".
2. Take the pad roller off the centering pin. When placing a new pad roller re-adjust according to (C.a.)

b. Sprocket -spindle and -support (fig.5)

1. Remove film stripper.
2. Undo the fixing screw of the sprocket.
3. Slide the sprocket from the spindle.
4. Remove the rear cover.
5. Undo the two screws of the support.
6. Take support with spindle out of the projector.

When a new gear is mounted, the hole for the tension pin of the gear must be drilled.

The axial clearance of the spindle in the support must be 0.01 - 0.02 mm.

c. Cooling plate (fig.11)

1. Cut of the water pipe.
2. Remove the covering cap "M" fig.1.
3. Loosen the flexible pipes.
4. Pull out knob "A".
5. Slide the cooling plate out of the holder.

When renewing the flexible water pipes be careful that the shutter runs freely and the flexible pipes do not come into the light beam.

d. Cooling plate holder (fig.10)

1. Remove cooling plate (see F.c.)
2. Loosen the electrical connections of the coil of the dowser.
3. Take the circlip from the spindle.
Now the cooling plate holder can be pulled from the spindle.

e. Shutter with spindle and support (fig.6)

1. Remove cooling plate with holder.
2. Take part "E" and "F" of the shutter safety device from the spindle.
3. Undo the six screws "G" of the shutter.
4. Take the shutter from the spindle.
5. Remove rear cover.
6. Undo the four screws of the shutter support. For that purpose slits have been provided in disc. "H".
7. Take the support with spindle out of the projector.

8. Turn the locking nut "A" from the spindle, mind the locking screw.

9. Remove the innermost circlip.

The spindle with disc and ball bearings can now be taken out of the support. When mounting adjust according to C.c. and d. Removing the rear cover is advisable, as to be able to see that no damage is done to the gears.

f. Runner plate (fig.7,8)

1. Open cooling plate holder.
2. Open both pad rollers.
3. Loosen the winged bolt "B".
4. Lift the film stripper with the finger.

The runner plate can now be pulled from the projector. Be very careful not to but the intermittent sprocket.

g. Oil pump (fig.9)

1. Take the rear cover from the projector.
2. Remove the oil pipe.
3. Undo the four screws "A" of the pump.
4. Tilt the pump a little and take the filter out.
5. Take the pump out of the projector.
6. Take the Novotext gear "5" from the spindle.
7. Remove the bottom plate "B".
8. The gears, with spindle, can now be replaced.

The magnet is fixed with three screws "3" in the filter.

h. Adjustable coupling (fig.14)

1. Open the cover of the drive box.
2. Unscrew the plate on the coupling (three screws).
3. Undo the three screws behind the plate.
4. The coupling can now be taken from the spindle.

When mounting first put the V belts over the discs.

i. Motor (fig.14)

1. Loosen the electrical leads.
2. Unscrew a little the four nuts "A" of the motor.
3. Lift the motor. The slit holes make this possible.
4. Fix the motor in this position with one nut.
5. Open the cover of the drive box.
6. Remove both belts.
7. Unscrew entirely the four nuts (support the motor).

The motor can be taken from the drive box.

j. Driving spindle (fig.2)

1. Remove oil pump (see F.g.)
2. Remove coupling (see F.h.)
3. Undo the six screws of the flange.
4. Take the support with spindle out of the projector.
5. Remove gear "4" from the spindle.

Now the spindle with disc and foremost ball bearing can be taken out of the support.

k. Intermittent sprocket (fig.4)

1. Remove the runner plate (see F.f.)
2. Undo the fixing bolt "1".

Now the sprocket can be pulled from the spindle.

l. Intermittent unit (fig. 2, 4)

1. Remove rear cover.
2. Take oil pipe out of the projector.
3. Remove the intermittent sprocket "6" fig.4.
4. Turn the framing knob until one of the stop and positions and remove the screw which becomes visible through hole "G", fig.1.
5. Turn the framing knob into the other stop position and remove the other screw.
6. Put the framing disc in the middle position. Through hole "G" fig. 1 a line is visible.
7. Turn the flywheel of the intermittent unit until the red line coincides with the dot on the casing.

When mounting take care that:

1. The red mark line on the flywheel of the intermittent coincides with the dot on the casing.
2. Put the mark lines "B" fig.2 on the fork and the support of the idler gears in line with each other.

Check:

1. Whether the Novotext idler gear has a little clearance.
2. Whether the framing disc can be turned to the stop positions.

The intermittent unit must be sent to the works in Eindhoven for repair.

m. Framing spindle (fig.1)

1. Undo the four screws of the support.
2. Take the framing spindle out of the projector. Be careful that the joint is not damaged.
3. Undo the screw on the support. Then the spindle can be pulled out of the support.

n. Main shaft (fig. 2, 3)

1. Remove rear cover.
 2. Remove the screen plate at the side of the lamp.
 3. Remove the shutter with support (see F.e.)
 4. Take the flywheel from the capstan.
 5. Remove the hold back sprocket with support (see F.b.)
 6. Take the driving spindle out of the projector.
 7. Undo the screws of the support of the main shaft.
 8. Pull the spindle forward until the supports come clear of the centering pins. Lift the spindle some what.
- The spindle can now be taken out of the projector.

Take care that when mounting the two lines "B" fig.2 are opposite to each other.

G. LUBRICATION, MAINTENANCE, COOLING

The projector is provided with a geared oil pump. All moving parts in the projector box are lubricated by this pump. For the remaining points see the summary.

Re-filling

<u>Temperature</u>	<u>Oil to be used</u>
+ 5° and lower	3671/10
+ 5° - + 25° C	3672/10
+25° and higher	3673/10

Level

For each angle up to 20° which the projector makes, slanting forward or backward, the oil level should coincide with the upper side of the red circle "F" fig.1. With an angle of inclination of more than 20° bent forward, it is sufficient when the oil stands up to the lower side of the circle.

When placing a new projector, or after replacement of important parts, such as intermittent unit, main spindle, and such, refill after 20, 50, 100, 200, 250 hours. Then every 250 hours. Proceed as follows:

Drain the oil by means of cap "A" fig.2. Take the oil filter out of the pump. Clean filter gauze with carbon tetrachloride. Mount the whole and fill the projector with new oil. On the upper side of the projector a filling cap "C" has been provided.

An overflow tube has been mounted on the intermitted unit. If oil flows out, the oil supply is in order.

Summary of Greasing W = weekly M = monthly

<u>Part</u>	<u>Moment</u>	<u>Type of oil</u>
Ball bearings of fire trap	} After revision	Projector oil
Ball bearings of capstan		Projector oil
Pressure roller magnetic sound head		Cardan oil
Pressure roller optical sound head		Cardan oil
Ball bearings motor	}	Ball bearings grease
Guide rollers		Projector oil
Stretch roller		Projector oil
Pad rollers		Projector oil
Bearing of intermittent mechanism	W	Projector oil
Hinge points film rupture device	M	Projector oil
Carriage of objective holder	3M	Cardan oil
Friction discs	3M	Cardan oil
Coupling spindle connection	3M	Ball bearing grease
Conical gears	3M	Ball bearing grease
Armature of dowser magnet	M	Molykote powder

Do not grease: Shutter safety device and dowser because of the deposit of dust.

Ball bearing grease - EL 4850
 Cardan oil - 8757/00

Cleaning

The parts which come into contact with the film must be cleaned daily. These are rollers, sprockets, castans. Clean runner plate and pressure bands after every reel. When the dirt sticks fast it can be removed with a piece of wood and some projector oil. Never use metal. Wipe out projector box and drum with a duster.

Demagnetizing should be done every week.

Cooling

With the two cocks in the lower base the water supply to the cooling plate in the projector and to the arc lamp can be adjusted. A small water current is sufficient.

Lower base and wiring diagram

- II Connecting block of projector motor.
- III Motor windings. H is main-winding, N is auxiliary winding.
- IV Plug of illumination in door.
- V Transformer for pilot bulbs.
- VI, VII Pilot bulb type 8008N.
- VIII Exciter lamp type 7251C.
- IX Coil of dowser.
- X Fuse with holder of doorillumination (250 V, 500 mA).

Connections

- 20-60 - 220 V alternating current
- 40 - Earth
- 80-81 - Exciter lamp
- 103-103A-104-104A - Change over switch
- 50-52 - Selector switch
- 22-23 -
- 67-67A - Contacts of water pressure switch

Description	Code number	
Automatic switch, projector motor	08 701 00	SK1
Change-over switch	C1 904 72	SK2
Push button switch motor on	E2 583 81	SK3
Push button switch motor of	E2 583 81	SK4
Push button switch motor of	E2 583 81	SK5
Micro switch, automatic filmrupture device	C1 050 74	SK6
Micro switch, centrifugal unit	C1 050 74	SK7
Selector switch, 35 or 70 mm film		SK8
Waterpressure switch, complete	C1 106 79	SK10
Micro switch, waterpressure switch	C1 106 80	
Connecting strip	E1 572 14.3	
Holder, pilot bulb	976/1x9	
Starting capacitor 2 μ F	48 289 10/U2M	
Starting capacitor 4 μ F	48 289 10/U4M	
	Type number	
Pilot bulb	8008N	
Exciter lamp, optical sound head	7251C	
Photo electric cell	3554	

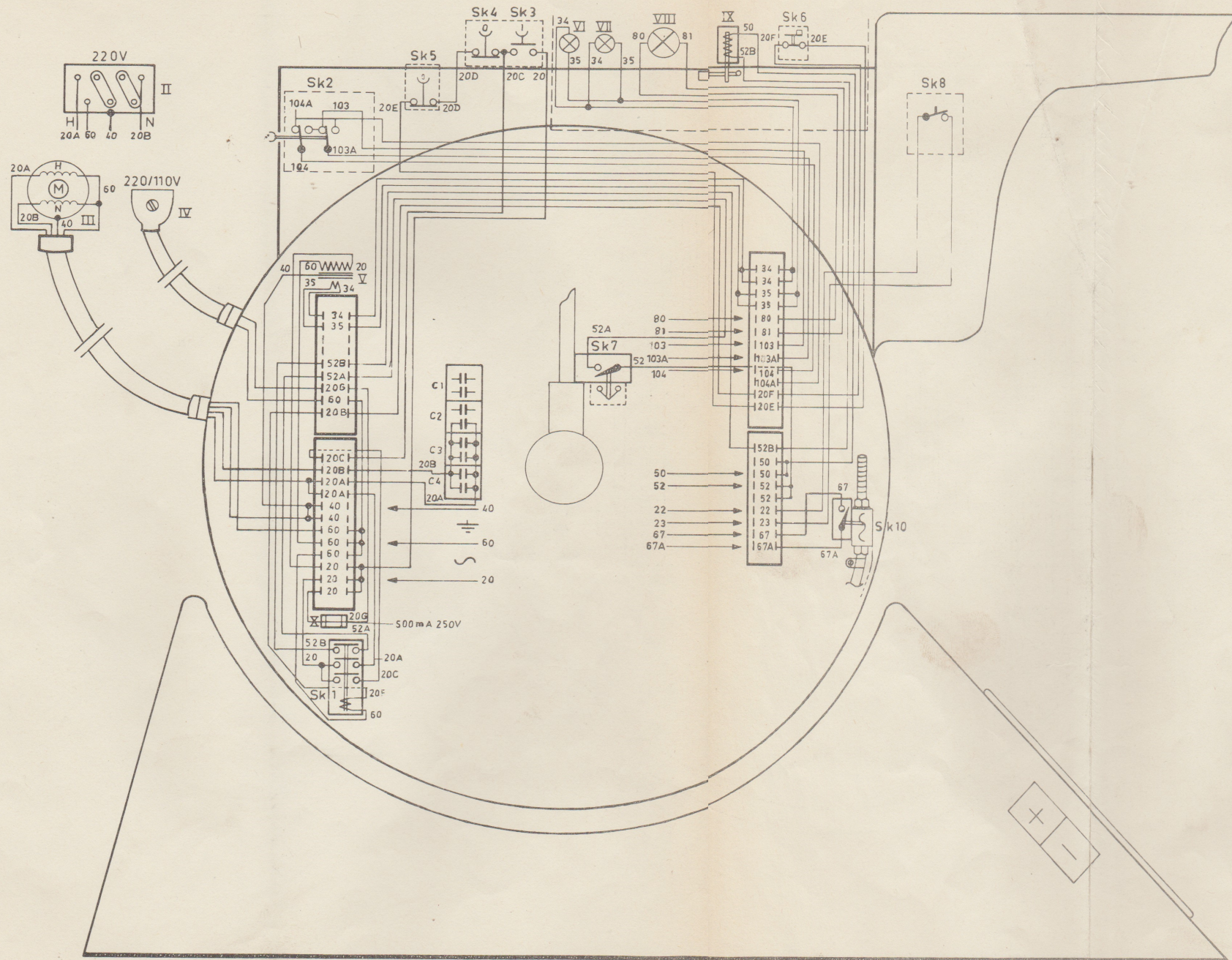


Fig.18

Fig. 1 Operating side of Projector

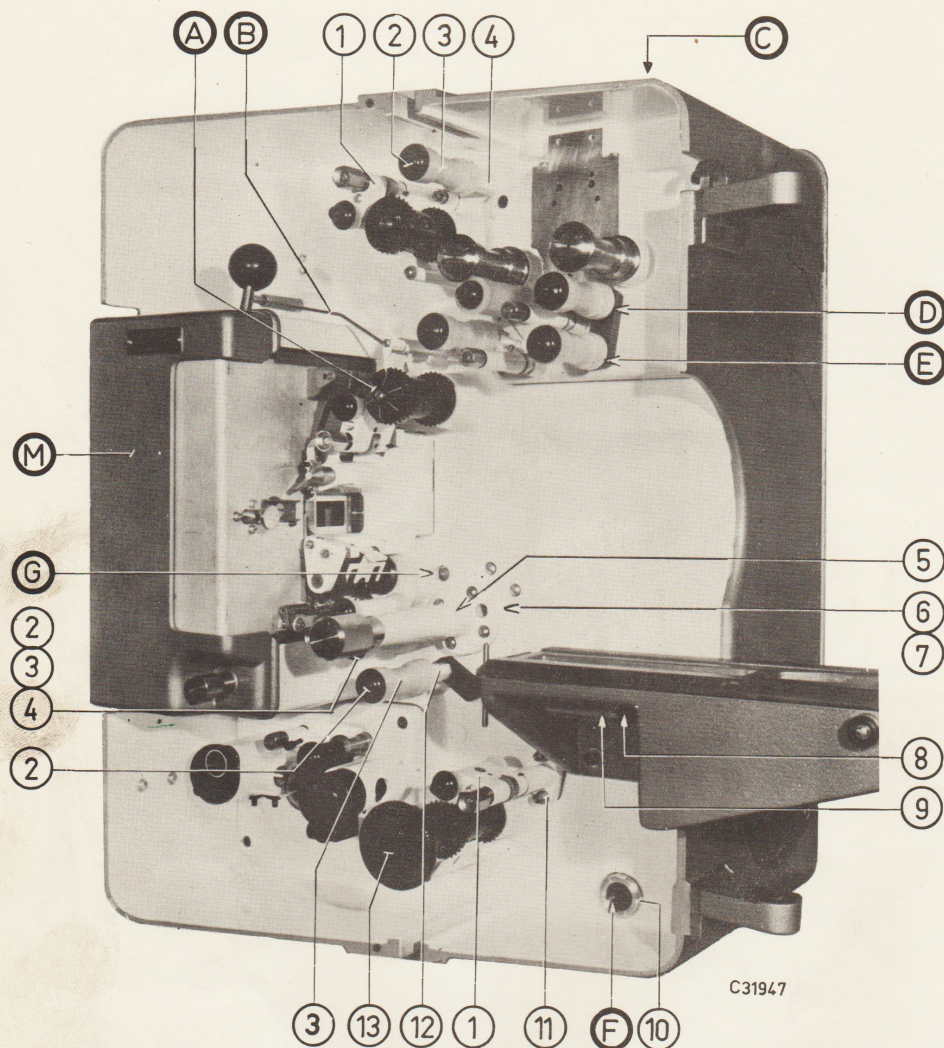


Fig.1

1	Pad roller complete	70 mm	C1 606 13
		35 mm	C1 606 29
2	Cap		C1 407 79
3	Roller		P5 635 26
4	Spindle		C1 406 97
5	Framingshaft		C1 050 53
6	Joint		C1 050 71
7	Packing of framingshaft		C1 050 56
8	Spring in carriage of objective holder		C1 605 66
9	Cylindrical pin		B 042 AA/5x16
10	Joint		22 456 03
11	Screw		C1 704 72
12	Spindle		C1 407 09
13	Inching knob		A9 869 09
	Micro switch of filmrupture device		C1 106 80
	Leaf spring of filmrupture device		C1 050 66
	Spring of filmrupture device		A3 646 09
	Illuminating lamp in door: Philineatube		220 V 50 W

Fig. 2 Rear side of Projector

1	Intermittent unit	C1 750 00
2	Asbestos cable	R 302 KA/63
3	Photocell cable	R 287 KA/01AA0
4	Gear wheel	C1 750 66
5	Tension pin	B 074 AF/4x28
6	Ball bearing	89 181 07
	Circlip of pos. 6	B 045 AF/35
7	Shaft	C1 705 52
8	Joint	22 456 03
9	Rubber bush	C1 750 65
10	Rubber sealing tube in rear cover	C1 050 43

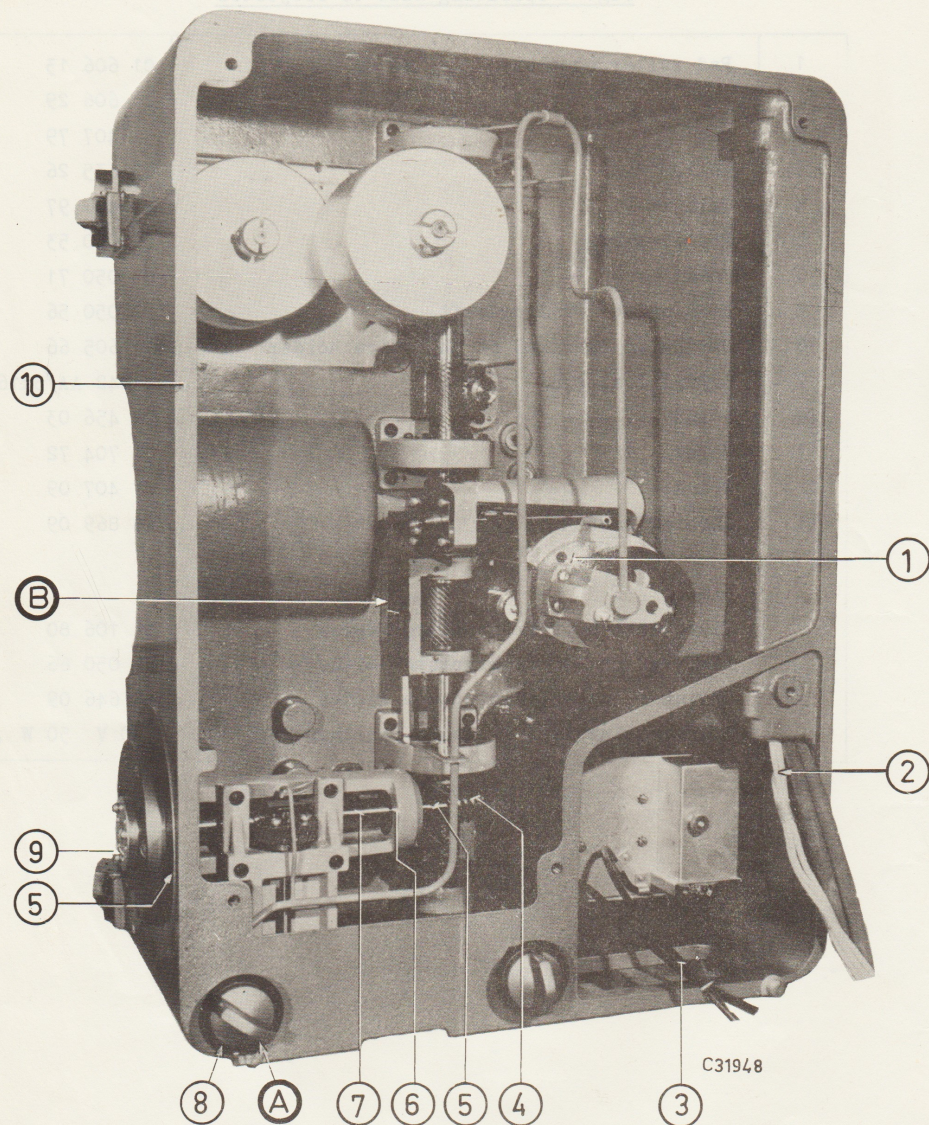


Fig.2

Fig. 3 Main shaft

1	Ball bearing	89 225 18
2	Ball bearing	89 186 10
3	Ball bearing	89 181 10
4	Tension pin	B 074 AF/3x24
5	Tension pin	B 074 AF/5x36
6	Gear wheel	C1 750 48
7	Fork	C1 750 10
8	Gear wheel	C1 750 09
9	Gear wheel	C1 750 25
10	Shaft	C1 750 51

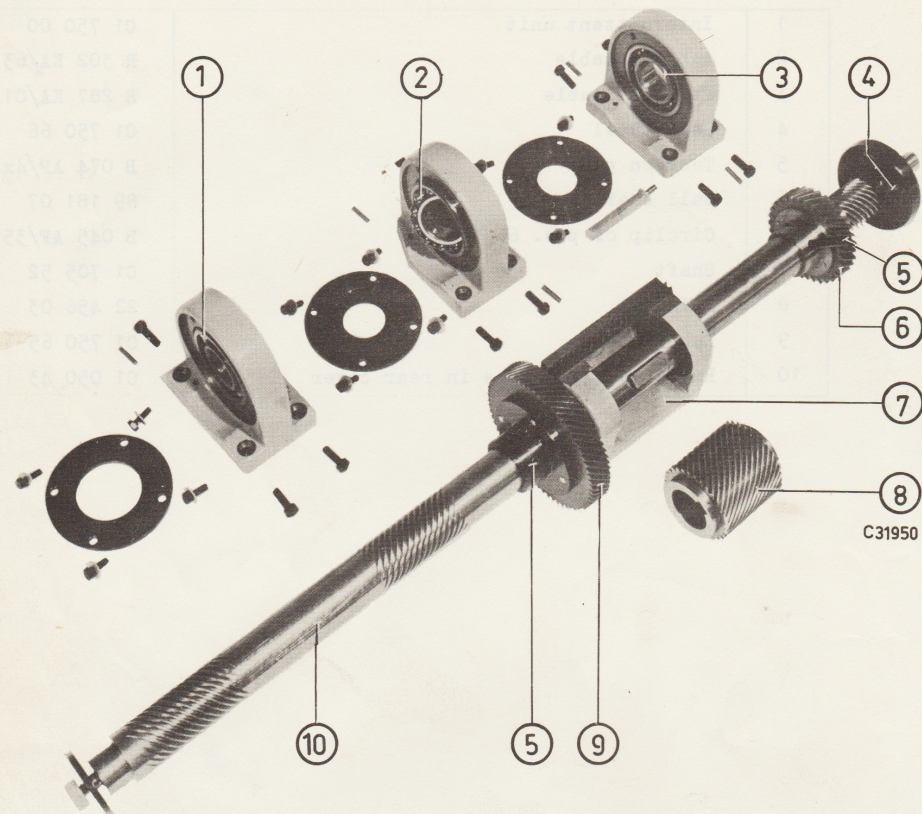


Fig.3

Fig. 4 Intermittent unit

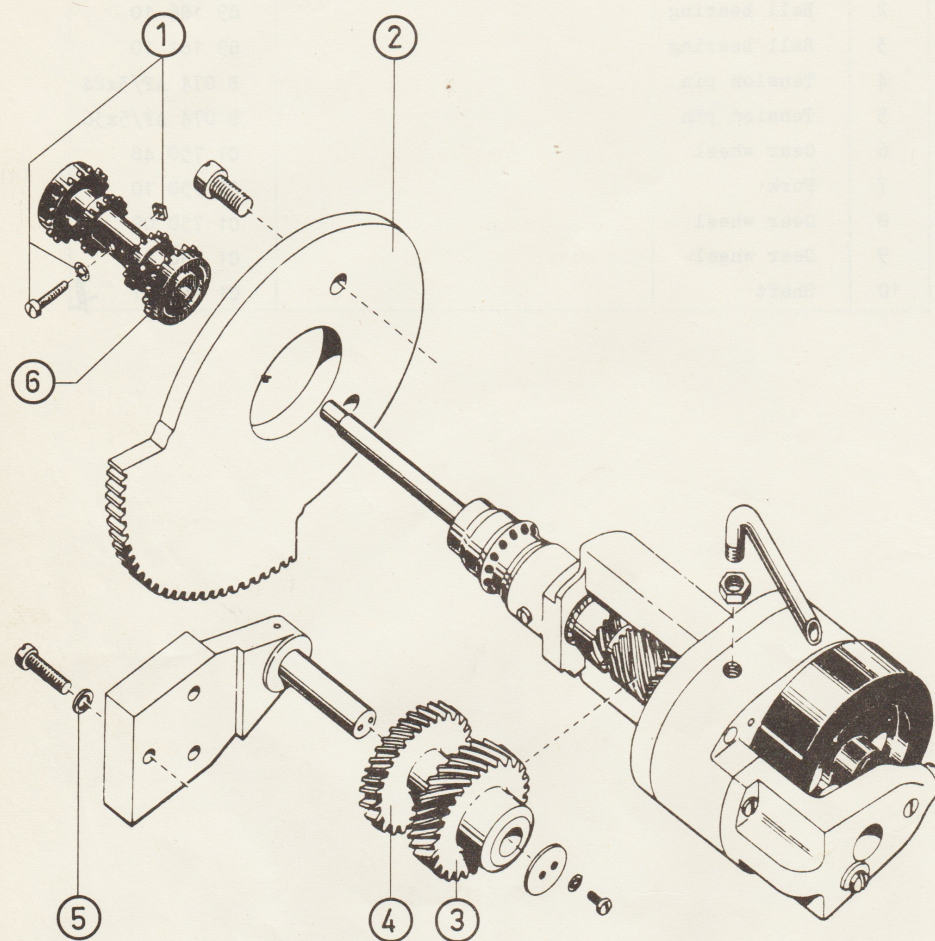


Fig.4

1	Fixing material intermittent sprocket	C1 705 62
2	Framing disc	C1 050 15
3	Gear wheel	C1 750 11
4	Gear wheel	C1 750 12
5	Washer	C1 750 17
6	Intermittent sprocket + pos. 1	C1 705 42
	Leaf spring of framing disc	C1 704 19
	Intermittent unit complete	C1 750 00

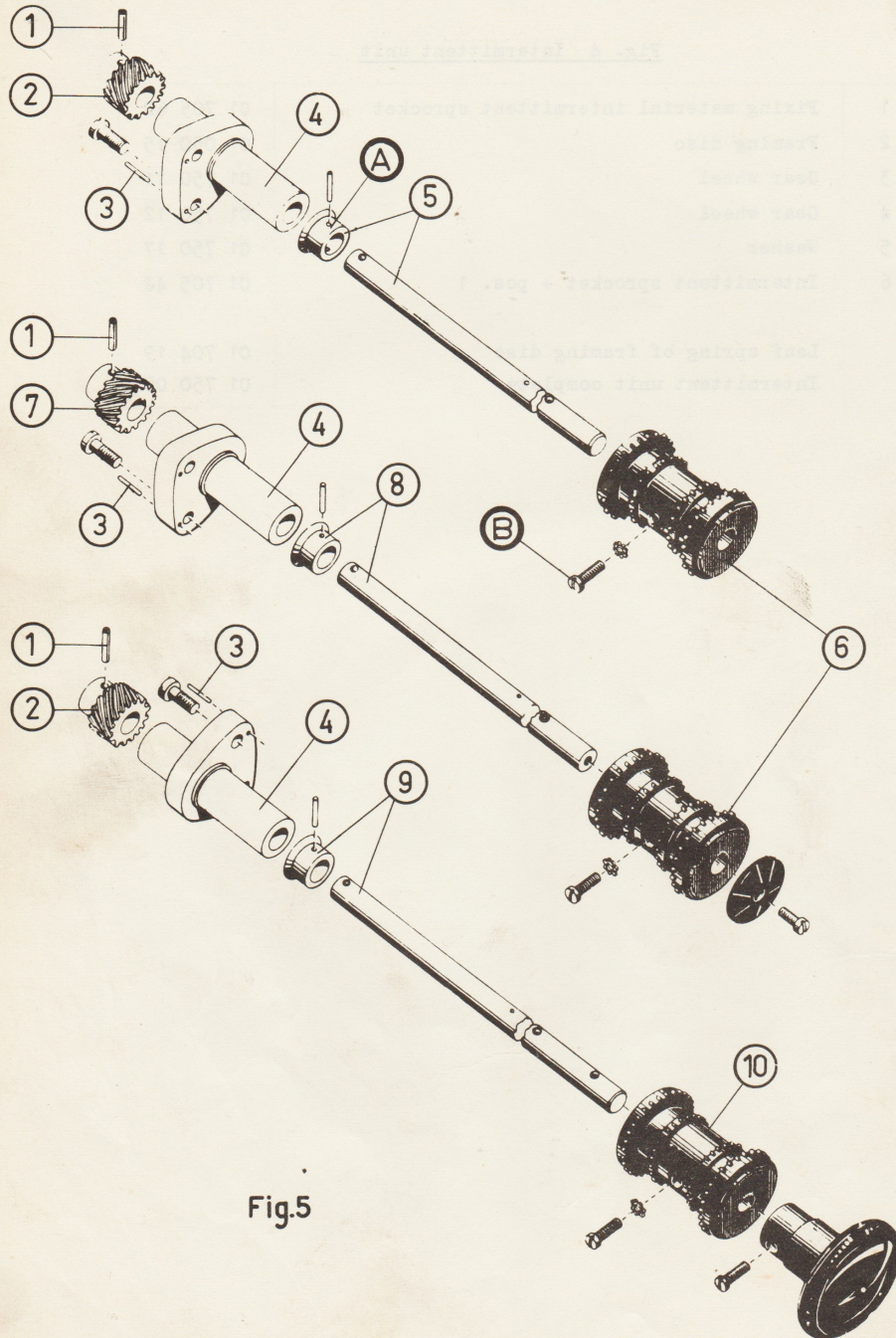
Fig. 5 Sprocket shafts

Fig.5

1	Tension pin	B 074 AF/4x24
2	Gear wheel	C1 750 34
3	Cylindrical pin	B 042 AA/3x16
4	Support	C1 750 33
5	Shaft + oilring	C1 705 55
6	Feedsprocket	C1 703 37
7	Gear wheel	C1 750 35
8	Shaft + oilring	C1 705 57
9	Shaft + oilring	C1 705 56
10	Hold back sprocket	C1 703 38
Spindle with support and gear wheel complete upper feedsprocket		C1 750 37
Spindle with support and gear wheel complete lower feedsprocket		C1 704 08
Spindle with support and gear wheel complete hold back sprocket		C1 750 38

Fig. 6 Shutter with shaft

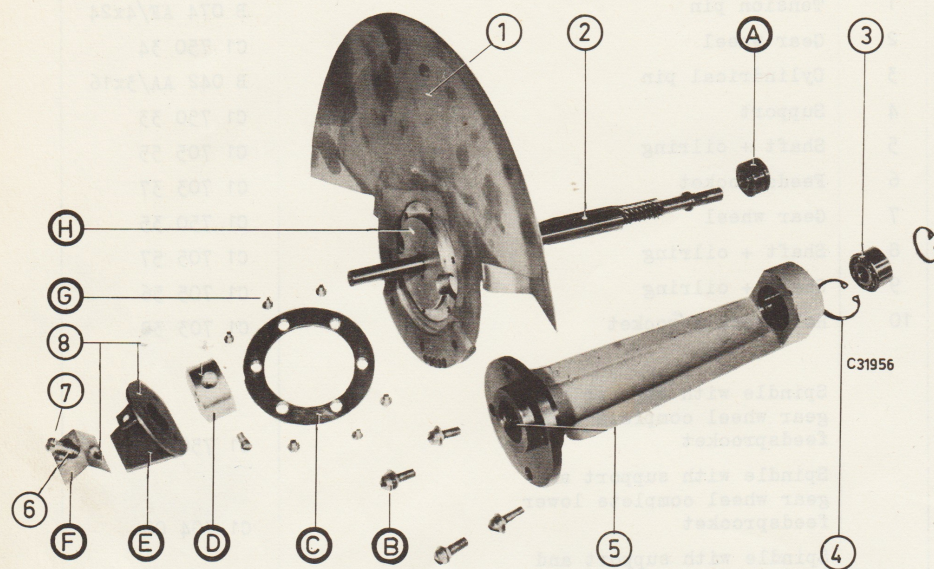


Fig.6

1	Shutter	C1 750 31.2
2	Shaft	C1 705 53
3	Ball bearing	89 183 50
4	Circlip	B 045 AF/30
5	Ball bearing	C1 751 36
6	Spring	C1 751 34
7	Screw	C1 751 30
8	Safety device complete	C1 705 54

Fig. 7 Runner plate 70 mm

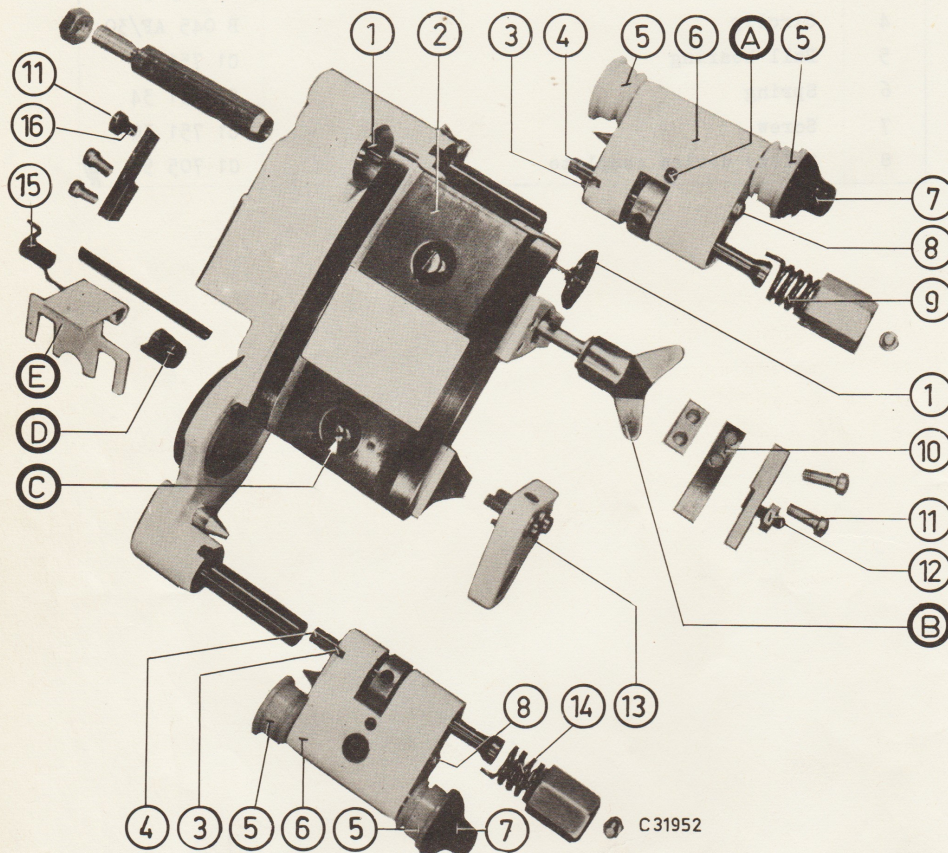


Fig.7

1	Side pressure roller	C1 605 46.2
2	Runner plate	C1 606 93.2
3	Tension pin	B 074 AF/2x24
4	Pin	C1 606 12.1
5	Roller	P5 635 21
6	Body of pad roller unit	C1 607 17
7	Cap	C1 605 75.1
8	Adjusting pin	C1 605 72.1
9	Torsion spring	C1 606 16
10	Leaf spring	C1 605 48
11	Nut	B 085 AF/8N-32
12	Adjusting screw	C1 605 52.1
13	Bearing with support	C1 605 57.1
14	Torsion spring	C1 605 74
15	Spring	C1 605 89
16	Adjusting screw	B 084 CF/8N-32 $\frac{1}{2}$
Runner plate complete		C1 606 15

Fig. 8 Runner plate 35 mm

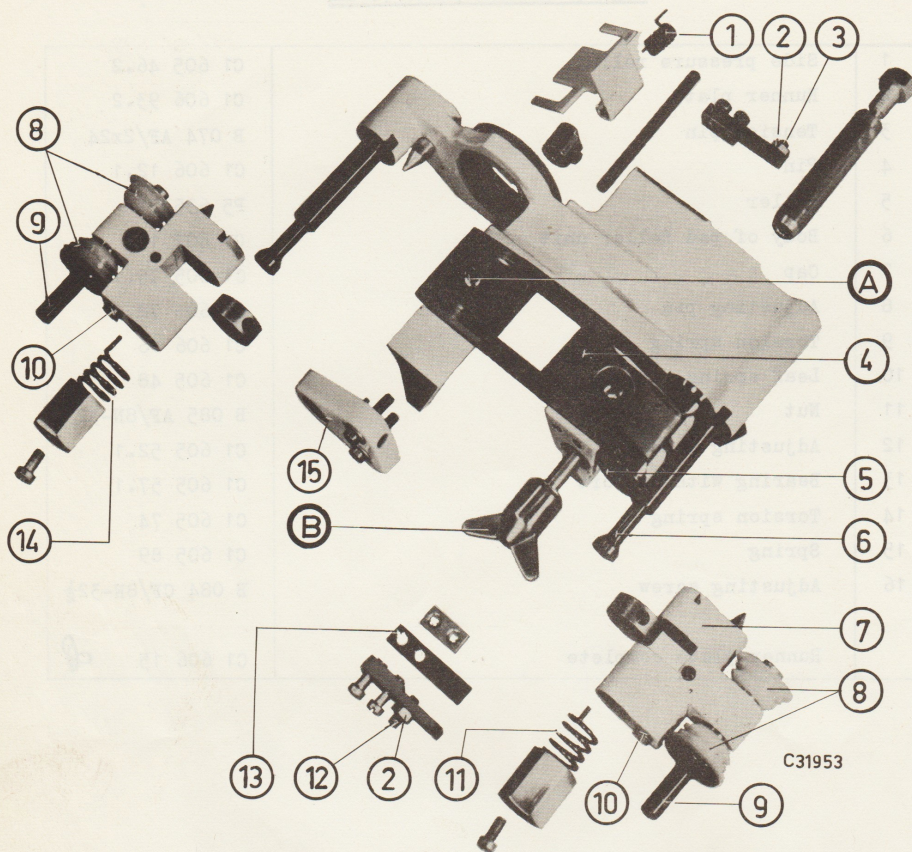


Fig. 8

1	Spring	C1 605 89.0
2	Nut	B 085 AF/8N-32
3	Adjusting screw	B 084 CF/8N-32 $\frac{1}{2}$
4	Runner plate	C1 606 95.2
5	Side pressure roller	C1 605 46.2
6	Pin	C1 606 12.1
7	Body of pad roller unit	C1 607 18
8	Roller	P5 635 22
9	Cap	C1 606 28
10	Adjusting screw	C1 605 72.1
11	Torsion spring	C1 606 16
12	Adjusting screw	C1 605 52.1
13	Leaf spring	C1 605 48
14	Torsion spring	C1 605 74
15	Bearing with support	C1 605 57.1
	Runner plate complete	C1 606 34

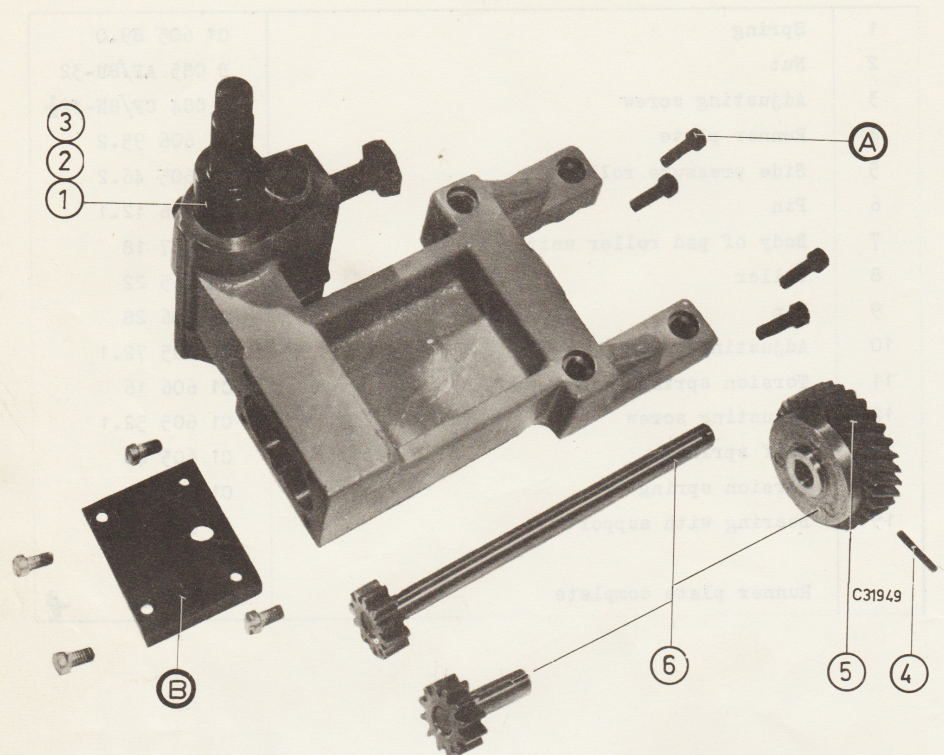
Fig. 9 Oil pump

Fig.9

1	Filter gauze	22 448 00
2	Magnet	22 414 44
3	Set screw for magnet	997/3x4
4	Tension pin	B 074 AF/2x24
5	Gear wheel	C1 750 58
6	Set shafts with gears	C1 409 98 <i>h</i>

Fig. 10 Cooling plate holder

1	Knob	23 575 10
2	Leaf spring	C1 703 60
3	Coil for dowser	C1 902 09
4	Tension pin (fixing dowser)	B 074 AF/2x12
5	Connecting strip	967/T14
6	Dowser	C1 902 11
7	Insulating ring	C1 804 47

Circlip on hinge pin of cooling plate holder B 045 BF/20

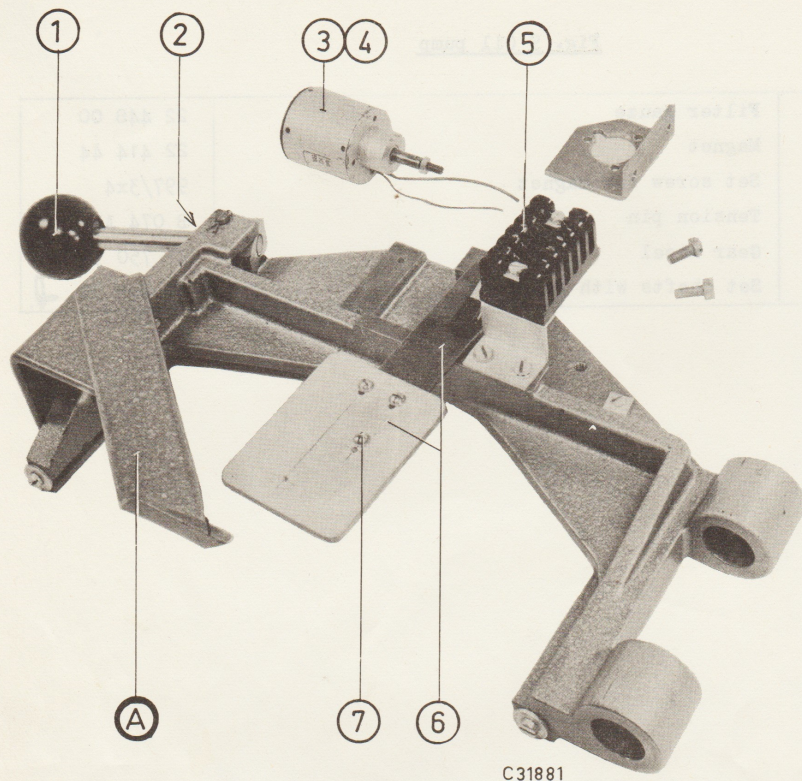


Fig.10

Fig. 11 Cooling plate

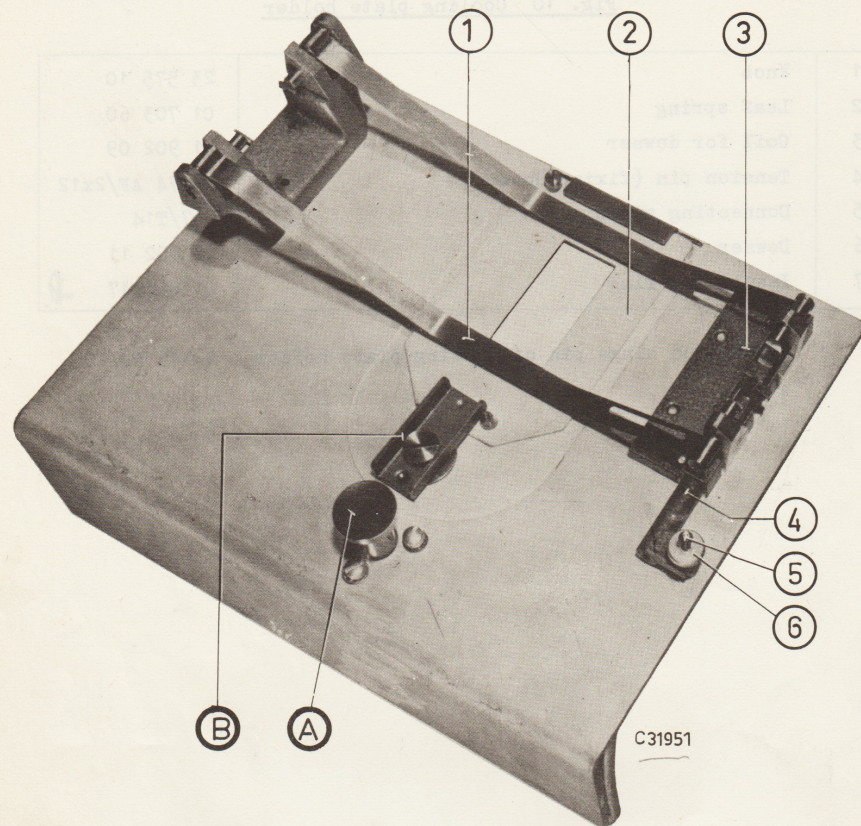


Fig.11

1	Pressure bands (1 set) 70 mm	C1 607 30
	Pressure bands (1 set) 35 mm	C1 607 29
	Pressure bands with velvet (1 set) 70 mm	C1 410 25
	Pressure bands with velvet (1 set) 35 mm	C1 408 92
2	Aperture plate 70 mm	C1 704 70
	Aperture plate 35 mm	C1 704 64
	Aperture plate 35 mm CO	C1 704 66
	Aperture plate 35 mm WS 1 : 1.75	C1 704 67
	Aperture plate 35 mm WS 1 : 1.85	C1 704 68
	Aperture plate 35 mm WS 1 : 2	C1 704 69
	Droopsnoot <i>ALANIC</i>	C1 704 71
3	Lower bracket ✓	C1 705 60
4	Tension pin ✓	B 074 AF/1,5x8
5	Screw ✓	C1 605 98.1H
6	Knurled unit ✓	C1 605 99.1H
Cooling plate complete <i>4822 413.50013.</i>		C1 606 17 <i>Q</i>

X C1.704.24

Fig. 12 Magnetal sound head

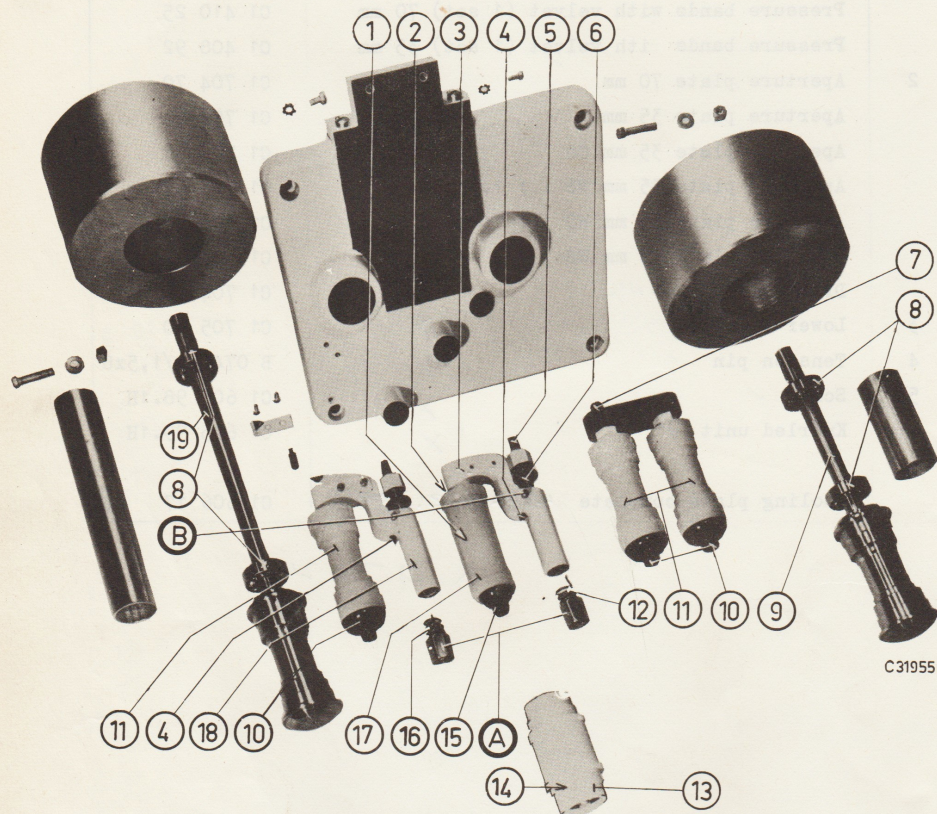
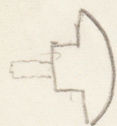


Fig.12

1	Circlip	B 045 AF/22
2	Spring	C1 407 06
3	Lever with shaft	C1 704 89
4	Adjusting screw	C1 407 09
5	Spindle	C1 407 48.2
6	Ring	22 414 99
7	Spindle	C1 407 49.2
8	Ball bearing	C1 407 85
9	Capstan (short)	C1 407 11
10	Cap	C1 407 79
11	Guide roller	P5 635 26
12	Torsion spring	C1 705 79
13	Pressure roller with ball bearings 35 mm	C1 606 53.1
14	Circlip	B 045 AF/22
15	Cap	C1 407 05.2
16	Torsion spring	C1 705 78
17	Pressure roller with ball bearings 70 mm	C1 408 52
18	Lever with shaft	C1 407 04
19	Capstan (long)	C1 407 13
10 Channel magnetic sound head (Am.)		C1 313 50
10 Channel magnetic sound head (Eur.)		C1 313 77
6 Channel magnetic sound head (Am.)		C1 313 80



C1-407-05

Fig. 13 Optical sound head

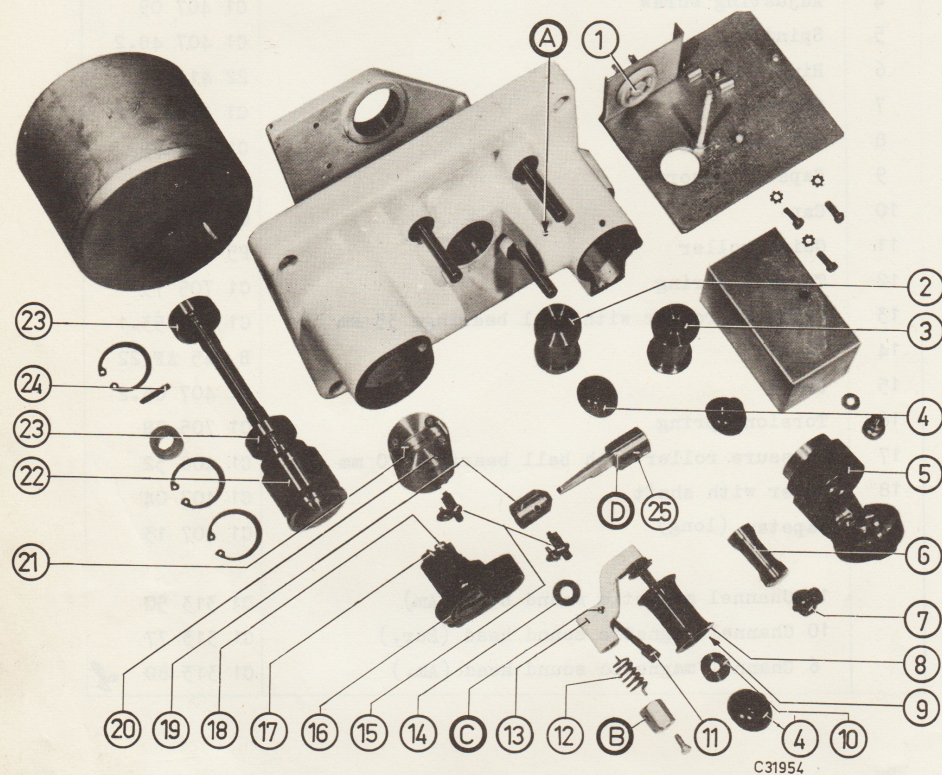
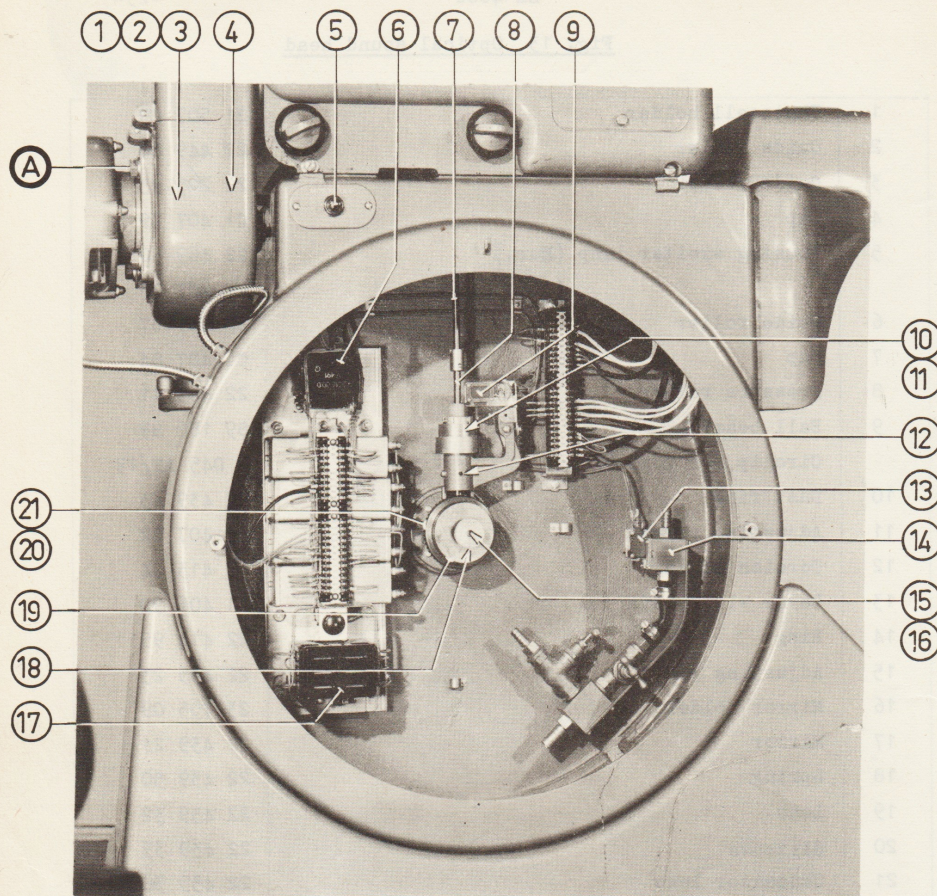


Fig.13

1	Photocell holder	B1 507 09
2	Guide roller	22 449 80
3	Guide roller	22 265 95
4	Cap	C1 407 79
5	Housing exciter lamp (Eur.) (Am.)	22 469 60 C1 407 75
6	Guide roller	22 439 07
7	Cap	C1 407 84
8	Pressure roller	22 443 11
9	Ball bearing	89 180 99
	Circlip for pos. 9	B 045 AF/19
10	Dust ring	22 439 43
11	Adjusting screw	C1 407 82
12	Torsion spring	22 413 24
13	Lever with shaft	C1 406 90
14	Ring	22 414 99
15	Adjusting pin	22 439 23
16	Mirror holder	23 705 09
17	Mirror	22 439 21
18	Spring	22 439 50
19	Lens	22 439 32
20	Slitbush	22 439 35
21	Condensor lens	22 439 36
22	Capstan	22 439 26
23	Ball bearing	89 225 16
24	Tension pin	B 074 AF/3x36
25	Optical system	C1 407 94
	Photo cell	3554
	Exciter lamp	7251C

Fig. 14 Lower Base and spoolbox



C32880

Fig.14

1	Friction disc	JW 250 47
2	Bush	JW 250 49
3	Screw	JW 250 73
4	V-Belt	89 115 45/630
5	Switch	970/1/2x350
6	Transformer	V3 616 00
7	Coupling shaft with bush	C1 050 88
8	Shaft with bush	C1 708 87
9	Micro switch	C1 050 74
10	Spring centrifugal unit	C1 703 89
11	Tension pin	B 074 AF/2,5x24
12	Ball bearing	89 181 03/20
13	Micro switch	C1 106 80
14	Waterpressure switch	C1 106 79
15	Red shaft	C1 050 21
16	Ball bearing	89 225 25
	Circlip for pos.16	B 045 BF/12
	Circlip for pos.16	B 045 AF/28
17	Magnetic switch	08 701 00
18	Spring of friction	C1 050 25
19	Felt disc	22 415 78
20	Set of conical gears	C1 704 87
21	Tension pin	B 074 AF/2,5x14
	Flexible pipe water cooling	K 150 LB/14x8
	For fire trap please see upper box fig. 15	
	Reel shaft (Am.)	C1 708 83

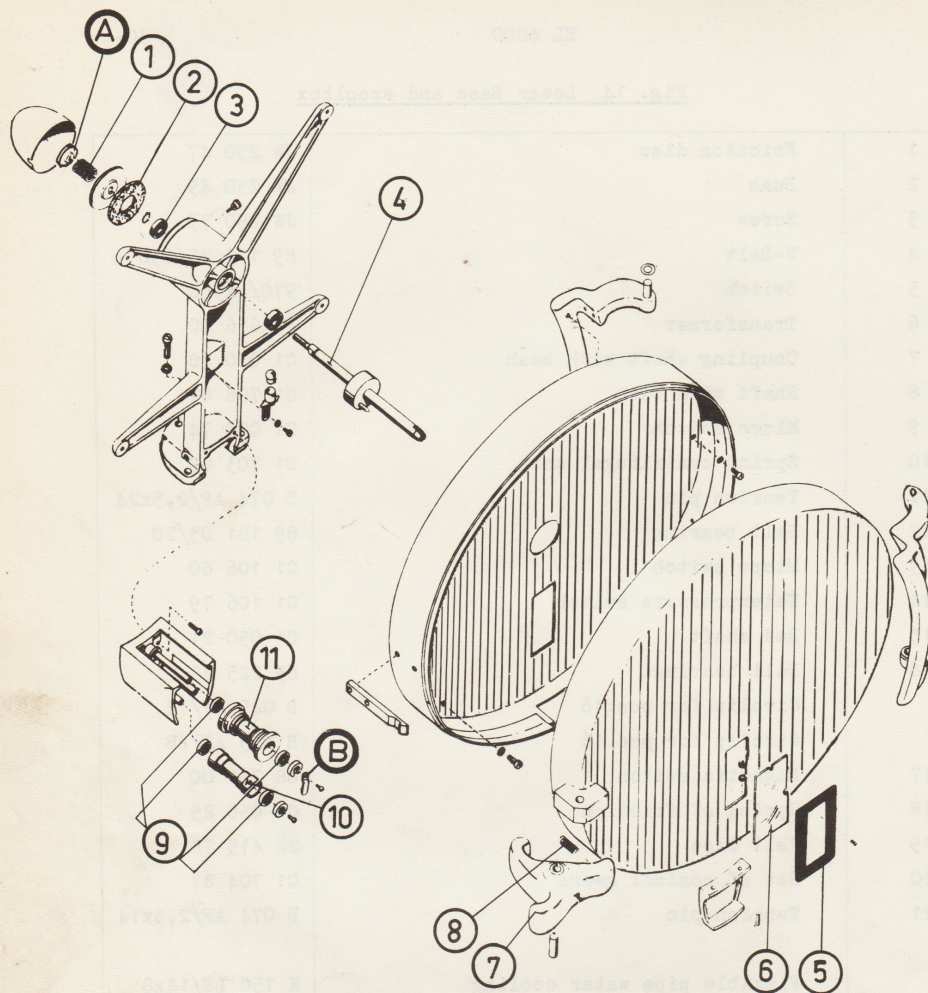
Fig. 15 Upper spoolbox

Fig.15

1	Spring	C1 050 25
2	Felt disc	22 415 78
3	Ball bearing	89 225 25
	Circlip for pos. 3	B 045 BF/12
	Circlip for pos. 3	B 045 AF/28
4	Reel shaft	C1 050 12
5	Frame	C1 050 35
6	Gauze	C1 050 37
7	Catch of door	22 452 73
8	Spring	22 532 37
9	Ball bearing	89 181 03/20
	Circlip for pos. 9	B 045 AF/22
10	Roller	C1 050 05
11	Roller	C1 050 01
	Fire trap complete	C1 050 07
	Pilot lamp	8008N
	Holder pilot lamp	976/1x9
	Reel shaft (Am.)	C1 708 72
	Roller, fire trap inflammable film (Am.)	C1 708 69

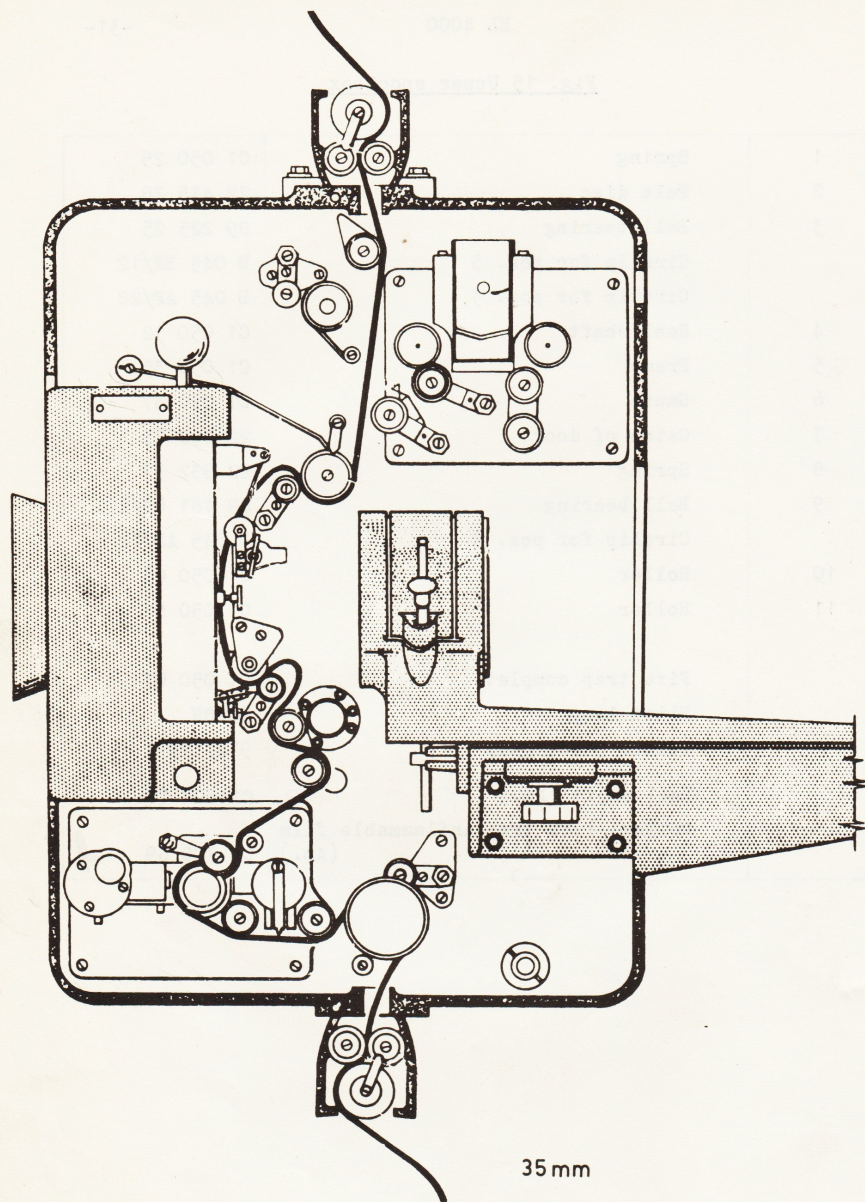


Fig.16

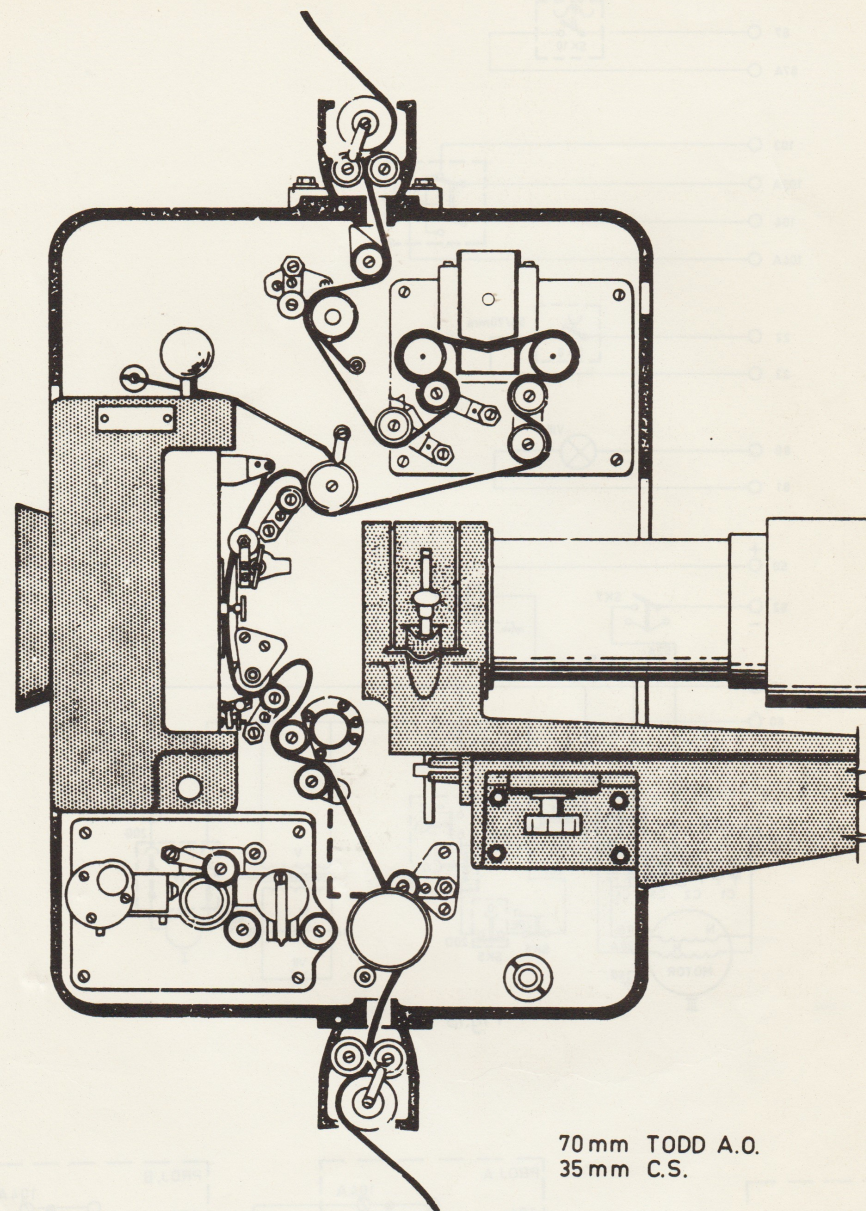


Fig.17

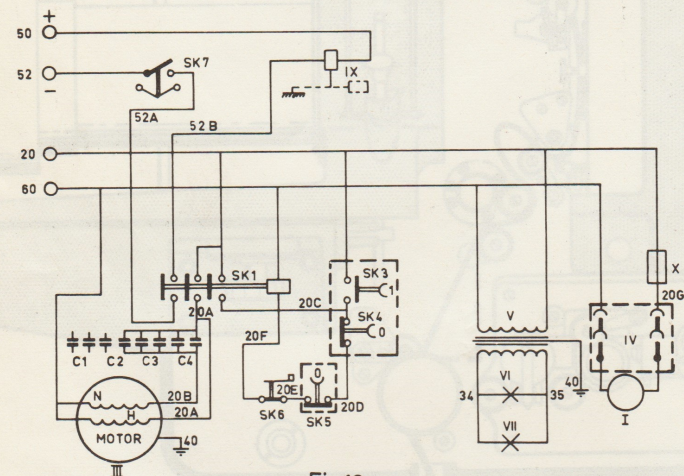


Fig.19

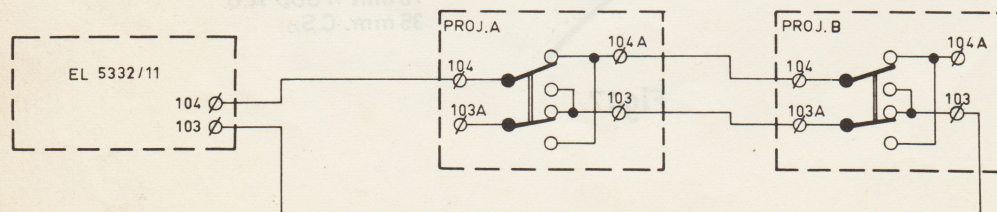


Fig.20

PHILIPS *Service*

ELA CINEMA

SUPPLEMENT EL 4000

CONTROL AND OVERHAUL

[illegible]

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93 730 11.1.10

Since the first Todd-AO projectors were put into use in 1955, improvements have been introduced which can be made in installed projectors according to the instruction given below :

I. Check of the leaf springs on the framing disc

It has appeared that with heavy shocks during transport one or both leaf springs are forced (they should bear the whole Maltese cross). Projectors of later series are therefore provided with a protection. For projectors already installed this protection is not necessary, but on the other hand it is desirable to inspect both leaf springs.

This is done as follows :

- . Remove the runner plate and the intermittent sprocket.
- . Remove the rear cover and dismount the oil connection on the intermittent movement.
- . Take the movement with both hands and try to push it alternately upwards and downwards; if the framing disc moves thereby, the springs are too slack. If necessary, dismount the movement and replace one or both leaf springs.
- . Tighten the fixing screws firmly.

II. Inspection of intermittent movement

- . Dismount the cross according to the points given below :
- . Remove the rear cover.
- . Dismount the oil connection on the intermittent movement and bend the pipe sideways.
- . Remove the intermittent sprocket.
- . Put the framing device in the middle position.
- . Turn the flywheel of the movement until the red dash coincides with the dot on the cross. Mark the position of the shutter.
- . Turn the framing knob up to one of the stop positions - remove the screw which becomes visible through the hole "G" (fig. 1 doc. EL 4000)
- . Turn the framing knob in the other stop position and remove the second screw.
- . Put the framing device in the middle position. A dash is visible in front of the hole "G" (fig. 1, doc. EL 4000)
- . Take the cross cautiously out of the projector.

Check the axial clearance of the cross shaft; this should be very small. If it is too great, the cross must be replaced - check axial clearance and adjustment of intermittent movement shaft as follows (fig. 1) :

Undo both lock screws A on the pivots B and C and unscrew pivot C about 3 turns - place the cross vertically and allow it to rest on the cross shaft - turn the lower pivot B so far back that the flywheel runs heavily in the stop position - then tighten the pivot slowly until the moment that the flywheel is slightly rotatable again - check that with the other three stop positions the flywheel is also slightly rotatable. Now tighten the lock screw of pivot B firmly. Then screw pivot C home until one feels that it just touches the intermittent movement shaft and then turn it $\frac{1}{4}$ turn back and lock it with relevant lock screw A. Check once more whether the flywheel is slightly

rotatable in all stop positions while the movement rests vertically on the shaft.

III. Oil joint with intermittent sprocket

- . Mount the rubber ring D (fig. 1) with a few drops of plio-bond or another oil-proof glue.
- . This ring closes a half-moon shaped opening in the framing disc, as a result of which the oil could run out in the form of vapour and deposit at the intermittent sprocket and surroundings.

IV. Replacement of oil catch bush "E" (fig. 1).

For this bush a more favourable shape has been chosen so that the possibility of leak oil coming into the intermittent sprocket has been reduced considerably.

- . Remove the old bush.
- . Transfer both screws to the new bush and mount the latter into place.

V. Removal of the pressure spring under the fork (on main shaft)

A number of projectors was provided with this spring. It appears that this spring is completely superfluous. Moreover the projector will run somewhat lighter without this spring.

- . Lift the fork as highly as possible (with the intermittent unit not yet placed back in the projector) and take off the spring without using tools. The parts for locking the spring need not be removed.

VI. Oil leak at the shutter

It has appeared that the shutter sucks oil vapour through the running-back hole which has been bored under the shutter shaft slantwise in the projector housing. By pressing a pipe-cleaner in this hole (cut off superfluous length) it is ensured that oil liquid can flow back through the pipe-cleaner into the projector, but that oil vapour cannot be sucked to the outside.

VII. Mounting of intermittent movement

After the abovementioned points have been finished, the movement is re-mounted in the projector.

The mounting can be done in the reverse order observing the following points :

- . Put the red mark on the flywheel in line with the dot on the casing.
- . Place the shutter in the marked position.
- . Be careful that the marks on fork and support of the idler gears are in line.

. Then check :

- whether the idler gear has the correct clearance (minimum, but just perceptible);
- whether the framing disc can be turned to both stops.

VIII. Check for adjustment of the idler gear

If it has appeared to be necessary to replace the leaf springs

on the framing disc (see point I) the possibility exists that the support with idler wheel has moved during transport. Re-adjust this in such a way that clearance between idler gear, main shaft gear in fork and the intermittent gear is minimum, but still just perceptible (3 screws on front side) Finally remount rear cover of the projector.

Attention! Do not tighten the screws of rear cover too firmly.

IX. Mounting intermittent sprocket

- . Clean the shaft and the drilling of the sprocket with a non-fibrous cloth (e.g. chamois-leather).
- . Then lightly oil shaft and hole (Esso-handly oil) and slide the sprocket cautiously up against the stop. Should contrary to expectation the sprocket eat halfway into the shaft then do not wriggle, but heat the sprocket with a small flame, so that it expands and can be removed.
- . Then remove the corrosion traces cautiously with the oil stone and restart as mentioned above.

X. Mounting of the runner plate for 70 mm and 35 mm respectively

If it has appeared to be necessary to replace the leaf springs on the framing disc (see point I) then it is desirable to check whether the outer bearing on both runner plates has been properly aligned.

This is checked as follows:

If one turns the projector by hand, the intermittent movement should run equally lightly with or without runner plate. Readjust the outer bearing if necessary. For that purpose both set pins should be removed. Finally properly grease with Esso-handly-oil.

XI. Dowser

In the case of complaints regarding the picture change-over it may be desired to mount new dowser and/or to carry out the following checks. The new dowser consists of one piece of blackened ferrochrome plate and is provided with an improved hinge construction.

The advantages are:

- . more solid than the old dowser, so that there is less possibility of warping
- . less friction when opening and closing, thus more rapid functioning
- . the blackened version prevents stray light on the projector screen.

If a protecting plate is found around the picture changeover relay it is desirable to saw a piece out of the former according to fig. 2. This is done in order to be able to reach the easily, if necessary.

Mounting (see fig. 3)

- . The head of the special screw "1" supplied with the dowser keeps at the same time the tie rod "2" in place so that the split cotter pin becomes superfluous.
- . The arm of the dowser "3" may not scour against the casting or along the protection plate; bend the arm a little if

necessary.

- . Amply grease the centre point, the set of rods and the lifting magnet with Esso handy oil.
- . When closing the dowser, the arm should strike against a clamped felt "8" soaked in cardan oil. The striking may not take place in the lifting magnet.
- . It may happen that when releasing the changeover relay in the cabinet EL 5333, the three changeover contacts bump a few times against the fixed contacts before they make a permanent contact. The consequence is a few interruptions of the energisation current by the relevant lifting magnet so that this attracts too late. By bending the fixed contacts about 0.5 mm this inconvenience can be eliminated.

Final check of the picture changeover

Change over a few times with running projectors without film and with burning arc lamps:

- A. A black stain on the screen is caused by dowser opening too slowly (possible causes: dowser fouls against something, dowser mechanism wriggles or is insufficiently greased, tension on lifting magnet too low, "bumping" of the contacts of the change over relay).
- B. Double picture on the screen is caused when dowser falls too slowly (possible causes: dowser fouls against something, dowser mechanism wriggles or is insufficiently greased, the shaft of the armature of the lifting magnet jams) or if the other dowser opens too rapidly (tension on lifting magnet too high).

XII. The indication disc with six white stripes on the 2nd sprocket may lose its correct adjustment by dismantling and mounting of a intermittent unit. This should also be corrected.

XIII. Conical toothed wheels of under-friction

Check that between both conical toothed wheels the clearance is not too great and lubricate the toothed wheels monthly with cardan oil, type number 8657.

Also consult the maintenance instructions of projector DP70, code number 93 728 71.

The following parts destined for this revision are supplied under code number A9 893 11.

- 2 leafsprings for intermittent movement
- 1 oil sealing ring of intermittent movement
- 1 oil catch bush
- 1 dowser (newest version).

