

Westrex

7000 series

PROJECTION EQUIPMENT

Technical Information
Vol.1.



7000 SERIES PROJECTOR AND REPRODUCER ASSEMBLY

VOLUME 1 33593A: TECHNICAL INFORMATION

INSTALLATION

OPERATION

MAINTENANCE

VOLUME 2 33593B: DRAWINGS

MAIN ASSEMBLIES

FIRST SUB-ASSEMBLIES

STOCKLISTS (PART NUMBERS)

WIRING DIAGRAMS

SCHEMATIC DIAGRAMS

INSTRUCTION DIAGRAMS

ISSUE 2

1. 3. 75

VOLUME 1 33593A

WESTREX 7000 SERIES PROJECTOR AND REPRODUCER ASSEMBLY

TECHNICAL INFORMATION

CONTENTS

	SECTION	PAGE
7000 SYSTEM FEATURES & DESIGNATIONS		3,
7000 PROJECTOR/SOUND REPRODUCER	1, 2,	4, 5,
7001 6000 FOOT UPPER FILM SPOOL PAY-OFF UNIT	3,14,	9,28,
7002 6000 FOOT LOWER FILM SPOOL TAKE-UP UNIT	4,15,	10,29,
7003 PEDESTALS	5, 6,16,	11,12,30,
CODING SCHEDULE	7,	13,
LENSES	8,	14,
OPTIONAL ATTACHMENTS	9,	15,
SPARES	10,	16,
INSTALLATION	11,12,	17,18,
SETTING UP AND COMMISSIONING	13,	21,
'ORCON' XENON LAMPHOUSES	18,	32,
AUXILIARY ATTACHMENTS	19,	33,
LUBRICATION	20,	34, 35
5009-A AMPLIFIER SETTING UP INFORMATION	21,	36,37,38

7000 SYSTEM FEATURES & DESIGNATIONS	50 Hz Supply	60 Hz Supply	Manual Operation	Auto. Shut Down	Two-speed Operation	Selsyn Interlock	Cinelogic	5035 Film Carrier	
7000-A-M	X		X						
7000-A-M-AB	X		X	X					
7000-A-M-FC	X		X					X	
7000-A-M-AS-FC	X		X	X				X	
7000-B-M		X	X						
7000-B-M-AS		X	X	X					
7000-B-M-FC		X	X					X	
7000-B-M-AS-FC		X	X	X				X	
7000-A-M-I	X		X			X			
7000-A-M-TS	X		X		X				
7000-A-M-AS-I	X		X	X		X			
7000-A-M-AS-TS	X		X	X	X				
7000-A-C	X						X		
7000-A-AS-C	X			X			X		
7000-A-M-AS-I-FC	X		X	X		X		X	
7000-A-AS-C-FC	X			X			X	X	

WESTREX 7000 SERIES

Projector and Photographic Sound Reproducer Assembly

1.00 General Description

- 1.01 The 7000 Series Projector and Photographic Sound Reproducer assembly is available in three basic configurations. One of these comprises modules which can be fitted to an existing Westrex 2024 or 5003 type pedestal when modified by the substitution of a fabricated tilting member in place of the heretofore cast iron unit. The second assembly includes a console construction pedestal into which amplifiers and associated equipment can be fitted.
- 1.02 Figures 1 and 2 illustrate the basic assemblies, with overall dimensions and indicate the code numbers of the individual modules. Optional features include, auto shut-down required to comply with Home Office or other local regulations, when the projection room may be unattended for more than 15 minutes.
- 1.03 The standard machine assembly caters for 6000 ft. (1,828 m) of film and thus in all probability two projectors will be required for continuous presentation. There are, however, instances where there is less justification for the use of two projectors in which case a single machine of either of the two types referred to above can be installed to work in combination with a 5035 Westrex pay-off, take-up and rewind Carrier standing at the rear, side or front of the projector, catering for continuous presentation of 13500 ft. (4,115 m) of film, whilst a second 13500 ft. (4,115 m) reel can be simultaneously rewound at speed (see Data Sheet DST/113). Under this condition of usage the 6000 ft. (1,828 m) presentation capability on the projector itself can be used for "shorts", news, advertisements and what might be regarded as programme inserts which may change more frequently than the main programme. Figs. 3, 4 and 5 show the location of a 5035 Carrier relative to a typical projector assembly as illustrated in Figs. 1 and 2.

Detail Description

2.00 7000 Projection and Photographic Sound Reproducer

- 2.01 This unit houses in one aluminium alloy case the essential film drive details, an integrated curved gate and intermittent assembly, drum shutter, racking control details, lens mounts, a motor drive system and a detachable photographic sound track scanning unit.
- 2.02 The optical system requires only one focusing lens, supplemented as required by two lenses for Cinemascope and standard wide screen presentation to obtain the same picture height.
- 2.03 The aperture plate moves automatically to present the required picture format, being mechanically coupled to the swinging lens unit carrying the supplementary lenses.
- 2.04 The internal drive system employs one single sided steel wire strengthened toothed belt between motor and mechanism and a similar double sided belt is used to couple the film transport sprockets, intermittent and shutter drive pulleys together. A change between 50 or 60 HZ supplies requires a change in the drive pulley and belt associated with the drive motor only.
- 2.05 Provision is made on the shutter drive shaft whereby phasing between shutter and intermittent can be easily set and should need no change unless the double sided belt is for some reason temporarily removed.
- 2.06 Figs. 6 and 7 show typical belt drive systems for 50 and 60 HZ operation. The drive motor employed is smaller than that required for most projectors due to the omission of spiral gears, the low inertia of the drum shutter and the light film drag required with the special curved gate. The motor is of the induction capacitor run type, with starting torque sufficient to ensure starting against the maximum initial restraining force presented by the movement of the film in the gate. This type of

motor has no internal centrifugal switch, and thereby reduces maintenance to a minimum.

- 2.07 Referring in more detail to the integrated curved gate and intermittent unit, a laminated Sindanyo heat screen is provided which keeps the gate guides, film band springs and aperture plate at a temperature well below that which might adversely affect the stability of the picture and its focus.
- 2.08 A switchable festoon framing lamp enables the dividing frame line to be accurately located above the picture exposed, so that correct registration on the screen is always achieved. To enable the gate film retaining band springs to be easily replaced it is simply necessary to remove the retaining nut at the top of the gate whereupon the bandsprings and their spacing links can be lifted clear of the rest of the gate.
- 2.09 The picture changeover assembly Ref. drawing LSO 17439 incorporates 2 solenoids, one to close and the other to open, to permit the passage of light to the film. To perform a changeover between two machines the opening solenoid on say No. 2 machine is connected in parallel with the closing solenoid on No. 1 machine and vice versa.

The solenoids are fed momentarily via the changeover contactor or push button from a 12V DC power unit. The light shutter blades and solenoids move horizontally so that friction is adequate to hold the blades in position.

It should be seen that under operational conditions there is no obstruction of light when open or creepage of light past the blade when closed. To indicate when the unit is in the open position, a microswitch operated by the position of the blade completes a 12V DC supply to a lamp within the changeover button.

- 2.10 The projector is designed to operate with a take-up torque motor to handle 6000 ft. (1,828 m) of film on an 8" (20.3 cm) diameter spool center. To fulfil this requirement it is essential that during starting run up of the projector, the film issuing from the projector is instantly taken up to

avoid the formation of a film loop. To this end a differential dashpot damped shock loop absorbing arm and roller device is fitted to operate between projector and take-up unit. By means of automatic sequential switching the take up is energised before the projector drive motor, giving time for the take up to gradually increase the film tension to 35 ounces (992.25 g). By the use of a 'Brimistor' connected in series with the take up motor and provided a standard light weight spool is used, the shock arm will gradually descend to absorb the growing film tension and at the moment of starting, avoid film loop formation other than that which can be absorbed by differential operations of the shock arm. The take up shaft is fitted with a clutch assembly which provides differential resistance to movement in the reverse direction thus preventing the spool from "rolling back" and causing an undesirable loop in the film before power is applied to the motor.

- 2.11 The sound track scanning unit is attached to the main projector panel with vibration isolating details, so that by utilizing an exciter lamp with a heavy gauge filament, and high output silicon photovoltaic cell any microphonic pickup is avoided.
- 2.12 For manual control, a panel located above the lens system carries push buttons and a mains supply switch enabling the machine to be stopped and started, changeover of picture and sound to be achieved between two projectors and the framing lamp to be energised.
- 2.13 In the event that an auto-shutdown, fail safe facility must be provided to comply with Home Office or other local regulations, a slightly more elaborate control system is provided whereby the system cannot be restarted until the cause of shutdown has been cleared and all controls automatically set for recycling. Such a system avoids the risk of the projectionist accidentally restarting the machine when re-lacing with film.
- 2.14 A power supply unit with separate outputs for the exciter lamp and other control items (relays c/o unit, framing lamp etc.) is located in the projector housing.

Factory made cable forms with push on connectors interconnect all internal units for easy servicing or replacement.

The power supply and ground leads which enter the assembly via the pedestal are brought through to the master terminal block in the projector to which all other units are connected.

Each basic unit is provided with its own mains fuse to meet underwriters approval.

- 2.15 To achieve optimum track scanning the sound drum and its associated flywheel shaft are assembled with extra high grade ball races and sealed to prevent subsequent damage which may result from any attempt to dismantle the assembly in the field. To obtain the lowest possible "Wow" and "Flutter" the scanning drum is ground whilst in its assembled housing and the damping arm rollers are of aluminium alloy and ball race mounted.

3.00 7001 - Upper film spool pay-off assembly

- 3.01 This assembly is housed in a rectangular aluminium housing. It is a friction device of simple and robust construction. A grounding contact prevents the generation of static charge on the film.

4.00 7002 Lower film spool take-up assembly

- 4.01 This assembly is housed in a rectangular aluminium alloy case similar to the upper spool assembly and is fitted with a torque motor, the hollow shaft of which takes a 5/16" (8 mm) diameter film spool shaft.
- 4.02 To provide means of setting the maximum take-up film tension so that the film reel remains firm throughout the wind, a tapped auto-transformer is incorporated, the secondary of which is usually connected to the 140 volt tapping and from thence power is fed to the torque motor via a 'Brimistor' the resistance of which diminished from approximately 150 Ohms at normal temperature to 50 Ohms hot. When after about 3 seconds the film is fully tensioned with the 'Brimistor' in circuit, a timed relay located in the projector, starts the projection motor and simultaneously short circuits the 'Brimistor' to achieve maximum starting film tension in the order of 35 ounces (992.25 g) at 4" (10.2 cm) radius. Under this set up condition the film tension at the end of the wind ($12\frac{1}{2}$ " (31.8 cm) radius) will be in the order of 11 ounces (311.85 g) which will meet the conditions for a satisfactory wind.

5.00 7003-A Pedestal

- 5.01 When an existing 2024 type pedestal or equivalent is to be used a set of modification parts is available. This is coded Mod. 1534 Set of Parts and contains all parts and fitting instructions. Fig. 8A. An alternative mounting Fig. 8B is coded Mod. 1535 Set of Parts.

6.00 7003-B Console Pedestal

- 6.01 The pedestal shown in Fig. 9 is designed to provide maximum vertical stability and in addition the cabinets can provide accommodation for all essential control equipment and the sound amplifier system.
- 6.02 The pedestal caters for the housing of a take-up system similar to that described under section 4.00 in the cabinet immediately below the projector.
- 6.03 The rear of each cabinet section is provided with a door to give easy access for maintenance.
- 6.04 This pedestal provides adjustment for a projection angle +5 deg. to -17 deg. but can be increased if required by setting the base of the pedestal itself at an angle. Screwed rods are used to ensure maximum rigidity. Levelling screws and floor pads are located at each corner of the pedestal assembly.

7.00 Coding Schedule

7.01 7000-A-M Projection and Photo sound reproducer, complete with:-

- a. 240V 1 phase 50 HZ drive gearing and induction motor.
- b. Exciter lamp and auxiliary supply power unit.
- c. Manual control panel.
- d. Photovoltaic cell.

(This unit does not include projector lenses or any special lens adaptors - see below.)

7.02 7000-B-M Projector and Photo sound reproducer as for 7000-A except that the drive gearing and motor are for 240V 1 ph 60 HZ.

7.03 7002-A Lower spool take-up unit with 240V 1 phase 50/60 HZ torque motor. This unit also includes a tapped transformer and series 'Brimistor' to enable the film tension to be correctly set.

7.04 7003-A Pedestal is a modified Westrex 2024 pedestal to support the above units.

The details required for field modification are collectively coded Mod. 1534 or Mod. 1535 Set of Parts.

7.05 7003-B Console Pedestal (Fig. 9). This two compartment console supports the projector and provides assemblies. It also provides accommodation for the take-up units and for amplifiers automatic control systems as required.

8.00 Lenses

- 8.01 Prominar projection lens of any focal length from 2" to $5\frac{3}{4}$ " and cylindrical anamorphic lens for Cinemascope projection.
- 8.02 Kollmorgan Magna-Com lens to enable the wide screen format image height to match that of the Cinemascope image.
- 8.03 Exceptionally, to avoid the need for a very long focal length lens, the Magna-Com may be used as a minifier. It is then compounded to the anamorphic lens by means of an adapter, Part No. 43065, and the projection lens is selected to give the wide screen width required.

9.00 Optional Attachments

- 9.01 An AC02/G1 auto shut-down fail safe unit with film driven tachometer to fulfil the requirement of the Home Office Regulation if the projection room is left unattended for more than 15 minutes. The system will shutdown in entirety to await correction of the fault and recycling caused by: -

Drive motor running too slow.

Film running too slow or broken.

Film runs out except at the moment of machine changeover when for technical convenience its control system is inhibited.

The projection light intensity dropping below a preset value.

10.00 Spares

10.01 For 1 machine (recommendation for short term)

- ✓ 1 - Brimistor CZ12
- ✓ 10 - Fuses 0.6A (drive motor and power unit)
- ✓ 5 - Fuses 2.0A (take-up control)
- ✓ 2 - 10V 5A PF Exciter Lamps
- 1 - Aperture Plate (with pilot holes)
- ✓ 2 - Gate Band-springs
- ✓ 1 - Gate Band-spring assembly
- ✓ 1 - Photovoltaic Cell (2550A)
- 2 - Framing Lamps 12V
- 1 - Can of 2009A Oil (intermittent)
- 1 - LSD 42771 Belt
- 1 - Belt motor drive (as required 50 or 60 Hz)
- 3 - Midget Panel lamps

11.00 Installation material

No additional material other than that supplied for a Westrex sound system is required.

The following tools are essential 6BA, 4BA, 2BA, $\frac{1}{4}$ BSF and 5/16BSF Cap head screw Allen keys with and without extension handles, a range of flat wrenches and a long screw retaining screwdriver with 3/16" (5 mm) blade.

12.00 Installation

- 12.01 Internal cabling and the method of machine interconnection contribute considerably towards ease and speed of installation.
- 12.02 Unpack the equipment with care and check that all the parts shown on the stocklist and shipping sheets are included and there is no evidence of transportation damage or mishandling. Any such incidence should be reported immediately.
- 12.03 Clean off the protective grease from those items so treated. 'Inhibisol' or 'Isopropyl Alcohol' may be used with care.
- 12.04 For the purpose of this manual it is assumed that existing projectors are to be replaced and that the sound amplifiers and loudspeaker system are existing. Thus as far as the sound installation is concerned it is only necessary to connect the low impedance silicon photovoltaic cell to the existing pre-amplifier. The exciter lamp wiring and power supply unit already form part of the 7000 projector.
- 12.05 The 7003-A or B pedestals should be set up in their approximate final positions to line up with the portholes which should be spaced approximately 4'6" (137 cm) apart. Measure and set the projection angle by means of the handwheel or Star nuts which will aid in establishing how far the pedestal must be spaced away from the porthole wall. Reset the tilting bracket to the horizontal for convenience of further assembly.
- 12.06 If a 7003-A pedestal is to be used, screw the 7002-A lower spool box to the underside of the tilting bracket. (Ignore this paragraph if a 7003-B pedestal is to be used.)
- 12.07 Place the 7000 Projector and reproducer unit on the top side of the tilting bracket and screw it to same with the bolts provided. The front panel face must be set so that film from a spool on the take-up shaft lines up with the exit rollers on the projector. (This means the front panel of

the projector is about $\frac{1}{2}$ " (13 mm) in front of the tilting bracket edge on the operating side.)

- 12.08 If a 7001 type pay-off unit is to be fitted it may now be lifted to rest on top of the projector case so that all fixing screwholes and the aperture through which the cables pass are in line. Screw the two units together with the screws provided.
- 12.09 The unit interconnecting wiring having been preformed may now be plugged to their respective units as shown in the diagram Fig. 11.
- 12.10 Fuses should be in situ but it may be desirable to check their presence and value.
- 12.11 The mains supply and ground wires must be brought into the base of the pedestal and from there via a short length of flexible conduit into the projector where the mains intake terminals are located.
- 12.12 Repeat the procedure for machine 2 and interconnect the two machines as shown in the diagram Fig. 12.
- 12.13 If the projector/reproducer is of the manually controlled type, the right hand switch on the control panel Fig. 13A may be closed to energise the internal power unit and light the exciter lamp. The exciter lamp current has been set at about 3.5A which should ensure that the lamp will have an extremely long life and that the input to the photovoltaic cell will not be such as to overload any section of the pre-amplifier. If the lamp current is reduced too far the filament will be unduly biased towards the red end of the spectrum.
- 12.14 Press the red motor button and the take-up motor should immediately start to turn clockwise when facing the spool and after 3 seconds the projector drive motor will start. This sequential operation enables the assembly to start up without film loop formation which might otherwise damage the film. Press the motor button again to stop the machine.

- 12.15 With 6000 ft. (1,828 m) (25" (63.5 cm) diameter) spools having 8" (20.3 cm) diameter centres lace a short length of film, as shown in Fig. 14 turning the pay-off and take-up spools so that there is no initial film loop between projector, pay-off and take-up units. Again start the assembly by pressing the motor button where-upon the shock loop arm gradually descends and as it reaches the bottom of its travel or just before, the take-up tension will be reaching its maximum. The Brimistor in the take-up motor circuit is now short circuited and simultaneously the projector drive motor accelerates to its correct speed.
- 12.16 Should the starting operation show that there is a tendency for an unmanageable film loop to form between projector and take-up spool, rechecking the setting up and test instructions will quickly indicate whether the voltage to the take-up motor is incorrect, whether the shock loop arm dashpot is set for too much or too little drag or whether the time delayed relay is operating too quickly or too slowly. All these adjustments together with the voltage applied to the projector drive motor have a bearing on the achievement of an optimum run up performance. Individually however the adjustments are not very critical.
- 12.17 If the projector/reproducer is to incorporate fail safe auto-shutdown details and possibly auto-changeover facilities, the control panel will be of a type similar to that shown in Fig. 13B or C.
- 12.18 Check by pressing the changeover button that the shutter opens and that the sound changeover relay in the 5009 Amplifier system operates to accept sound input from this same machine. If this is reversed, the termination of a pair of the interconnecting wires between machines would appear to be reversed. Check with Fig. 12.
- 12.19 Press the framing lamp button to illuminate the film for correct lacing and press again to extinguish the lamp. If the intensity of the illumination is too high a higher voltage lamp may be used. When the intermittent is in its hold position the lacing frame (above the gate) should show the frame line across the center of the framing aperture corresponding with perfect registration in the projector aperture. Fig. 18.

13.00 Setting up and Commissioning

To a great extent the equipment arrives set up and tested with the exception of the projection optical details but to assist the field maintenance engineer and those concerned with field or factory overhaul the following information may be of assistance.

Projector/Reproducer Assembly (Ref. Figs. 15 and 16)

- 13.01 It is essential that all film retainers associated with the film sprockets (with the exception of the one on the intermittent unit) shall be set so that in the closed position all 4 ballrace rollers are resting firmly with 2 thickness of the film (0.12" (3.048 mm)) between sprocket and rollers. The bogie action of the film retainers ensures that joins will pass easily and safely without the risk of the film leaving the sprocket.
- 13.02 The intermittent sprocket film retainer employs steel shoes to ensure that under all circumstances the film is held to the root of the sprocket tooth, to eliminate any vertical film jitter from this source.
- 13.03 The optical system must be aligned perfectly and to this end a simple gauge is available or can be made up similar to the one shown in Fig. 17.

The C/L of the film should be 1.15/16 (49 mm) of an inch from the front face of the main panel. The optical C/L of the picture area should be 1.875" (47.605 mm) from the front face of the main panel.

The backing lens mounting barrel is 2.782" (70.663 mm) diameter and lenses not of this diameter will require an appropriate adapter.

- 13.04 To cut the aperture plate to the required size the following procedure should be used. The pre-cut apertures in the plate are accurately positioned on the optical centre of the projector during manufacture, however, this adjustment may be disturbed during transit and should be checked and adjusted if required. See Fig. 20 and refer to 13-08.

When this has been done project the aperture image onto the screen, and centralise within the masking by tilting the mechanism and moving the whole assembly laterally as required. Do NOT use the adjustments as in Fig. 20 for the purpose.

The apertures may then be filled within the limits of the lines scribed on the face of the plate. See Figs. 18 and 19.

13.05 Assuming that Cinemascope and wide screen are to have a common height, the focussing procedure should be:-

- a. Temporarily remove the anamorphic lens and aperture plate, and focus the projected image of a target film on the screen with the backing lens only, levelling the image, if necessary, by levelling the projector pedestal.
- b. Reinsert the anamorphic lens, rotate to obtain the correct rectilinear format and lock in situ. Loosen the front cell element by means of the black ring, rotate the knurled ring until the front lens element is set for the projection throw as indicated on the lens barrel and lock up with the black ring. Exactly centralise the projected image upon the screen horizontally by moving the whole projector assembly laterally as required. The optical system is now set up for optimum presentation of a 2.35:1 Cinemascope film. At this stage the fixed top and bottom screen masking, and the Cinemascope side masking limit stops should be adjusted to match the projected 2.35:1 image of the target film, with appropriate correction for keystone effect.
- c. Unlatch and swing the Magna-Com Lens into register with the engraving 'MAG' towards the screen, loosen the small Allen screw which locks the slidable ring at the front of the lens and slide the front lens element in or out until the projected image is in focus. Tighten the locking screw. Adjust the wide screen side masking limit stops to match the image of the target film, again, with appropriate correction for keystone effect.

The same procedure should be undertaken for the second projector without, of course, making any adjustments to the screen masking. Reinsert aperture plate(s) and file in the usual way, taking care not to disturb the focus position established with the film.

- 13.06 The tool shown in Fig. 17 can be used for setting the optical centre of the backing lens with the screw provided, and for aligning the swing lens by setting the pincatch on the swing lens release arm.
- 13.07 The curved gate and intermittent unit is an integrated assembly which can, to a great extent be set up before fitting onto the projector main plate.

The essential points to check, however, are:-

- a. That the Band spring assembly lower link hooks squarely onto the tensioning bar which in turn must move smoothly up and down within the limits of the small side springs.
 - b. That the side pressure guide to the film has no sharp leading edge which might catch into a damaged film sprocket hole and that the curved gate members pass smoothly into its latched position without fouling any sharp corners on the vertical guide rails or side guide details. The location of the outer side guide (nearest the operator) determines the position of the film in the gate with respect to its guiding edge.
- 13.08 The cam system which raises and lowers the aperture plate incorporates two adjusting devices (Fig. 20).
- a. The pivot point of the lifting arm is taken from a slot so that by moving the pivot point nearer or further away from the cam the total travel of the aperture plate can be increased or decreased.

- b. The eccentric housing of the pin which carries the aperture plate can be rotated to raise or lower the motion as a whole. This adjustment is used to centralise the lower (Cinemascope) aperture.

The upper (wide screen) aperture can be centralised by adjusting the limit stop screw near the bottom of the film gate. Slacken the locking nut, rotate the screw a few degrees either way until the aperture is in the required position and then re-tighten the locking nut.

- 13.09 To remove the fixed section of the gate for close examination the drum shutter cover must be removed and the band spring gate section released by removing two 2BA Allen capped screws at the rear of the projector main plate. Care must be taken to see that the curved gate member is open and that the loosened detail does not fall to the ground.

With the unit in the hand, the width of the gate, the setting of the fixed side guide and the freedom of movement of the spring loaded movable side guide can be easily checked.

Lace 18" of film in the gate and close the moveable section onto its latched position. Attach to one end of the film a spring balance and pull the film through the gate.

The measured film drag should not normally exceed 8 ounces (226.8 g) although ultimately the gate tension setting will be determined whilst projecting, to reduce to a minimum any vertical picture jump. Any excessive film drag should be avoided as this may cause the film sprocket holes to be damaged or unnecessarily worn. If at the other extreme, the film drag is reduced to the point where the band springs become slack there could be some risk to intermittent sprocket teeth fouling the curved ends of the band springs, if the gate had been racked to its uppermost position.

The essential factor is that picture jitter horizontally and vertically should not be greater than 0.2% of the picture width or height respectively which can be easily assessed from viewing the screen image of a good target film.

- 13.10 If the projector drive motor should fail to start at a point where the intermittent cross and cam are about to engage (point of heaviest load) the film drag should not be slackened but rather the drive motor voltage should be raised.
- 13.11 The upper and lower limits or racking are set to be slightly greater than $\frac{3}{4}$ of a frame height.
- 13.12 The shock loop absorption roller and arm are differentially damped to move freely in an upward direction but against an adjustable drag in the downward direction. The setting of the drag will require finalisation when the projector and take up can be operated together, but, for preliminary setting a weight of 20 ounces (567 g) hooked onto the roller should bring the arm to the bottom of its travel in 3 seconds.
- 13.13 The tension of the film in the sound track scanning loop between film sprocket S2 and S3 is set by an adjustable spring at the rear of the scanning panel between the two roller arms and should be such that the pull at either arm should be 14 ounces (396.9 g). Ref. Fig. 21. A ground spring also at the rear of the panel is set to ensure that the arm rollers stabilise at a position approximately central within the maximum travel range as indicated by a horizontal line bisecting a circular window when the machine is running.

This setting should provide adequate clearance to avoid the roller arms and stops touching when running.

If it is apparent that the red line cannot be made to exactly bisect the circle, the toothed rubber belt sprocket driving film procket S3 may be turned relative to the belt sprocket for S2 to make such correction as necessary. To make this adjustment the belt must be temporarily lifted from the belt sprocket of S3.

- 13.14 The scanning drum flywheel may be removed by loosening the screw indicated at the edge of the flywheel. It is important that no attempt is made to remove the sealed scanning drum shaft assembly from its bearing housing to avoid damage to the high precision bearings and upsetting the concentricity of the scanning drum which has been ground whilst turning in its bearings. Alignment check dimensions are shown in Fig. 22.
- 13.15 The exciter lamp 10V 5A has a prefocused base and heavy gauge filament to reduce the effects of vibration. The lamp is mounted on a bracket which has adjustment by means of the clearance in its fixing holes so that light can be concentrated across the slit width for maximum output signal. To assign the correct vertical position of the lamp a piece of translucent paper held across the exit element of the lens tube will show whether the beam of light is centralised vertically within the tube by the vertical setting of the exciter lamp bracket. It is not intended that the lamp should work at more than about 3.5 amperes to avoid overloading the photovoltaic cell and its pre-amplifier. To assign a preliminary setting to the lens tube the clamping screws must be slackened so that focus and azimuth adjustments can be made and the exit element of the lens tube moved up a position 0.24" (6.096 mm) (Fig. 23A) in front of the scanning drum (without film). The provisional setting of azimuth is made by setting the adjusting handle to a horizontal position which can be easily carried out with the aid of a simple jig as shown in Fig. 23B.

- 13.16 The 2500A Photovoltaic cell is located immediately behind the collector lens such that by removal of the lens access will be given to the cell which is locked in with a post retaining nut. Care must be exercised to ensure that under operational conditions neither of the cell leads nor terminal tag is grounded and that the cable shielding is insulated at this point when locking the entire assembly into position. No part of the assembly must prevent absolute free motion of the scanning drum, hence the use of a special small nut holding the cell in situ.
- 13.17 To check the accuracy of phasing between the intermittent sprocket and the drum shutter the following action should be taken.
- 1) Disconnect or switch off the power supply to the projector.
 - 2) Remove the rear cover of the projector.
 - 3) Remove the shutter cover.
 - 4) Turn the racking handle fully clock-wise
 - 5) Turn the projector by the inching knob until the Red line on the shutter shaft adjustable coupling is at 6 o'clock and the Red line on the intermittent balance wheel is at 3 o'clock, see Fig. 24. In this condition phasing is correct and the straight edges of the drum shutter will be at 90° to the film path.
 - 6) If the relationship between the lines is not as stated adjust as follows:-
 - a) If there is a large error, remove the drive belt from the upper belt sprocket and move the shutter shaft into approximate phase, replace the belt.

- b) For small adjustments or after adjusting as in a) loosen the two screws in the shutter shaft adjustable coupling, then holding the intermittent balance wheel to prevent movement adjust the outer half of the adjustable coupling until the line is at 6 o'clock. Tighten the screws and turn the projector by hand checking as at 5) above.
- 7) Restore 1, 2, 3, 4 above in reverse order.

14.00 7001A Pay-Off Assembly

- 14.01 The simplest 7001 -A Pay-off is fitted with a friction clutch-holdback unit only and should be adjusted with the knurled ring nut so that the measured drag on the film at 4" (10.2 cm) radius shall be between 5 and 10 ounces (141.75 and 283.5 g). A standard new film spool centre must fit snugly on to the take-up shaft which must in turn be set at right angles to the mounting baseplate. A bent or worn spool or shaft will lead to film damage effecting the sprocket holes and sound track.

The bearing support of the friction clutch assembly is manufactured from a plastic material which would insulate the spool from ground and could result in an electrostatic charge accumulating on the spool for which reason the metal shaft is grounded, via the carbon brush and wiring to its retaining screw.

15.00 7002A Take-up Assembly

- 15.01 The take-up motor in this unit is identical to that used for rewind in the 7001B unit but is fitted with a differential clutch so that the spool can turn freely in the take-up direction but is slightly restrained from turning in the opposite direction to prevent the reel spilling its film on to the floor when the machine is standing stationary and so avoids the formation of a film loop in the path between projector and take-up.
- 15.02 The torque of the take-up is determined by the voltage setting on the auto transformer inside the assembly but this voltage is fed via a Brimistor which is shorted out after 3 seconds. Thus the torque of the take-up motor is gradually increased avoiding damage to the film which would ensue if full tension were applied instantly. A relay with adjustable delay closure is located in the projector and not only short circuits the 'Brimistor' but switches on the projector motor.

16.00 7003A Pedestal

- 16.01 The principal requirement in the construction of these pedestals is that the structure shall stand firmly on a level floor and that the tilting member shall under all setting of projection angle be absolutely rigid.

17.00 7003B Pedestal

- 17.01 This console pedestal fulfils all the functions of the 7003A pedestal and 7002A lower take-up assembly but in addition permits the fitting if required of the sound amplification system and failsafe equipment in one of the compartments.

18.00 "Orcon" Xenon Lamphouses

- 18.01 These assemblies are rated to suit the screen illumination required in the order of 16^{+4}_{-6} foot lamberts measured as defined in ASA specification PH22-124, depending on the type of screen in use. The overall dimensions are shown in Fig. 25.

19.00 Auxiliary Attachments

To facilitate the operation of one of the foregoing projects with a 5035,
2 x 13500 foot (4,115 m) film carrier.

19.01 For fitting to a 2024 pedestal, 7001 Pay-off unit, 7002 Take-up unit
Reference Fig. 3

- 1 - Horizontal film guide attachment
- 2 - Free running flanged guide rollers used in place of the spools on
the 6000 foot (1,828 m) pay-off and take-up shafts.

19.02 For fitting to a 7003B pedestal and Orcon Lamphouse.
Reference Fig. 4

- 1 - Vertical Film Guide attachment
- 1 - Horizontal Film Guide attachment
- 1 - Free running flanged guide roller used in place of the spool on the
6000 foot (1,828 m) take-up shaft.

19.03 For fitting to a 7003B pedestal and 7001 pay-off unit.
Reference Fig. 5

- 1 - Flanged guide roller and shaft assembly
- 1 - Free running flanged guide roller used in place of the spool on the
6000 foot (1,828 m) pay-off shaft
- 1 - Free running flanged guide roller used in place of the spool on the
6000 foot (1,828 m) take-up shaft.

19.04 For details of these items refer to information index.

20.00 Lubrication

20.01 Lubricants - The following lubricants must be used.

2009-A Oil for the intermittent unit and for the idler pulleys.

97116 Grease (or equivalent) for all rubbing surfaces.

DO NOT OIL OR GREASE THE PROJECTOR WHILE IT IS RUNNING. DO NOT oil the ball bearings. They are filled during manufacture and require no additional lubrication.

20.02 Intermittent - Fig. 15

Fill the intermittent unit with 2009-A Oil through the filler opening after removing the filler plug (2 BA SOC HD CAP SCREW) above the outrigger bearing bracket, until it is half way up the window below the outrigger bearing bracket. Check level daily projector stationary and intermittent in mid-rack (normal) position.

Note:- There will be no level indication when the projector is running.

20.03 Plain Bearings

There are five positions in the mechanism where plain bearings are used. In three of them i. e. fixed and adjustable idler pulleys and the outrigger bearing of the intermittent unit these are of the oil impregnated type which need periodical replenishing. The lens holder/aperture plate linking shaft is also carried in plain bearings but this is a low stress limited movement shaft.

20.04 The following lubrication routine should be followed:-

Daily - Check intermittent oil level (Section 20.02)

Weekly - Apply a few drops of 2009-A Oil to each idler pulley bearing (Fig.16 Sect. 20.03) and to the outrigger bearing on the intermittent (Fig. 15 Sect. 20.03)

Monthly - Apply a few drops of 2009-A Oil to the bearings of the aperture plate lifting shaft. Fig. 16. Apply a light smear of 97116 Grease behind the retaining plate of the intermittent unit Fig. 16 and on the pinion and rack of the intermittent unit Fig. 15.

21.00 Setting Up The 5009A Amplifier System.

21.01 It is assumed that with the aid of the drawings herewith the reproducers, amplifiers and loudspeakers have all been correctly connected. Inspect the amplifier and ensure that all plugable items are firmly inserted into their correct sockets.

Three points in the system permit adjustment of gain:-

- i. In the pre-amplifier section, by individual machine balancing potentiometers.
- ii. By the master fader.
- iii. By trimpots in the 33223A Power Amplifiers.

21.02 In order to benefit from the very good signal to noise ratio of which the system is capable the following setting up procedure must be followed.

21.03 Set main fader to mid position and fader on Non Sync or Cassette Replay Unit to maximum. Play commercial LP record or tape into auditorium, adjusting to audience acceptable level by rotating trimpot in 33223A Stage Power Amplifier. Clockwise rotation increases gain, and vice-versa. Determine by listening whether the acoustic output of the HF and LF Speakers is balanced, and adjust the HF attenuator on the 31772C or D network if necessary. Ensure that the HF Horn is tilted to an angle which gives satisfactory distribution over the whole auditorium area.

21.04 Ensure that the exciter lamp and optical tube are free from dust, and that the exciter lamp power unit is set to deliver 5.3 volts. Connect suitable meter across input to main fader (cordage with violet sleeve) and run 1 KHz loop on each projector adjusting machine balancing potentiometers until meter reads OdBm (0.78 volts).

- 21.05 Make a test reproduction on No. 1 machine of ASTR5 Photo test reel, if available, or of typical programme material. The treble and bass controls on the 33591A photo card are set in manufacture to give an overall system response which has been found by experience to suit the majority of situations, a small readjustment may sometimes be desirable. The upper control is for bass and the lower for treble. Clockwise rotation increases the bass (or treble) attenuation, and vice-versa.
- 21.06 Run multi-frequency test film on both projectors, adjusting the response of No. 2 machine to correspond with that of No. 1. Keep a record of the figures obtained to facilitate the future maintenance of the characteristics set up during commissioning.
- 21.07 Back-off trimpot in monitor amplifier if necessary so that excessive power cannot be delivered to the monitor speakers.

Drawings

33591A Photo Pre Amp Assembly -
Schematic -
Stocklist -

33225A Line Amp Stocklist -
Assembly LSD 95411
Schematic LSL 142335
Stocklist P14593

33227A Pre Amp Control Assembly LSR 14171
Wiring LSR 14172
Stocklist P14599

33223A Power Amplifier Assembly LSR 14210
Wiring LSO 14212
Schematic LSO 14170
Stocklist P14575

33226A Circuit Card (Power Amp) Assembly -
Stocklist P14596

5009 A & B Amplifier and Control Assembly LSR 14195
Wiring LSO 14239
Schematic LSO 14238
Stocklist P 14473
External Wiring LSD 84229

5022A Disc Reproducer Assembly LSX1 6882
Wiring LSO 16883
Schematic LSO 16884
Stocklist P16681 (R)

5010 Loudspeaker Wiring LSO14269
Stocklist P14479

5013 Loudspeaker Wiring LSO14271
Stocklist P14497

2217D Monitor Speaker Assembly -
Stocklist P14711

31772C Network Assembly LSO 12095
Wiring LSL 8604
Schematic LSA 8605
Stocklist P14821

31772D Network Schematic LSL18092
Stocklist P18091

5009/7000 Inter-Connection wiring LSL17743

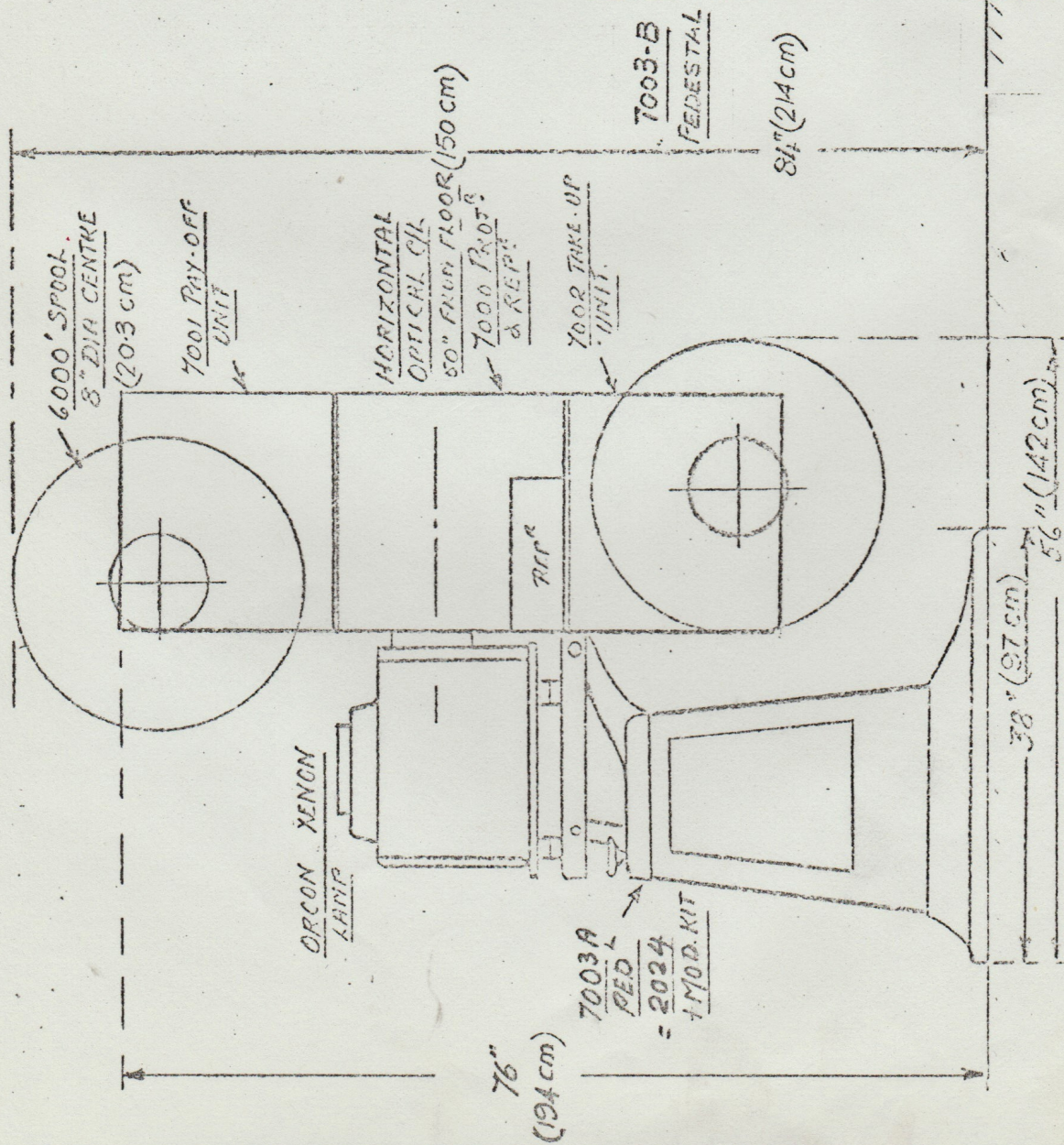


FIGURE 1

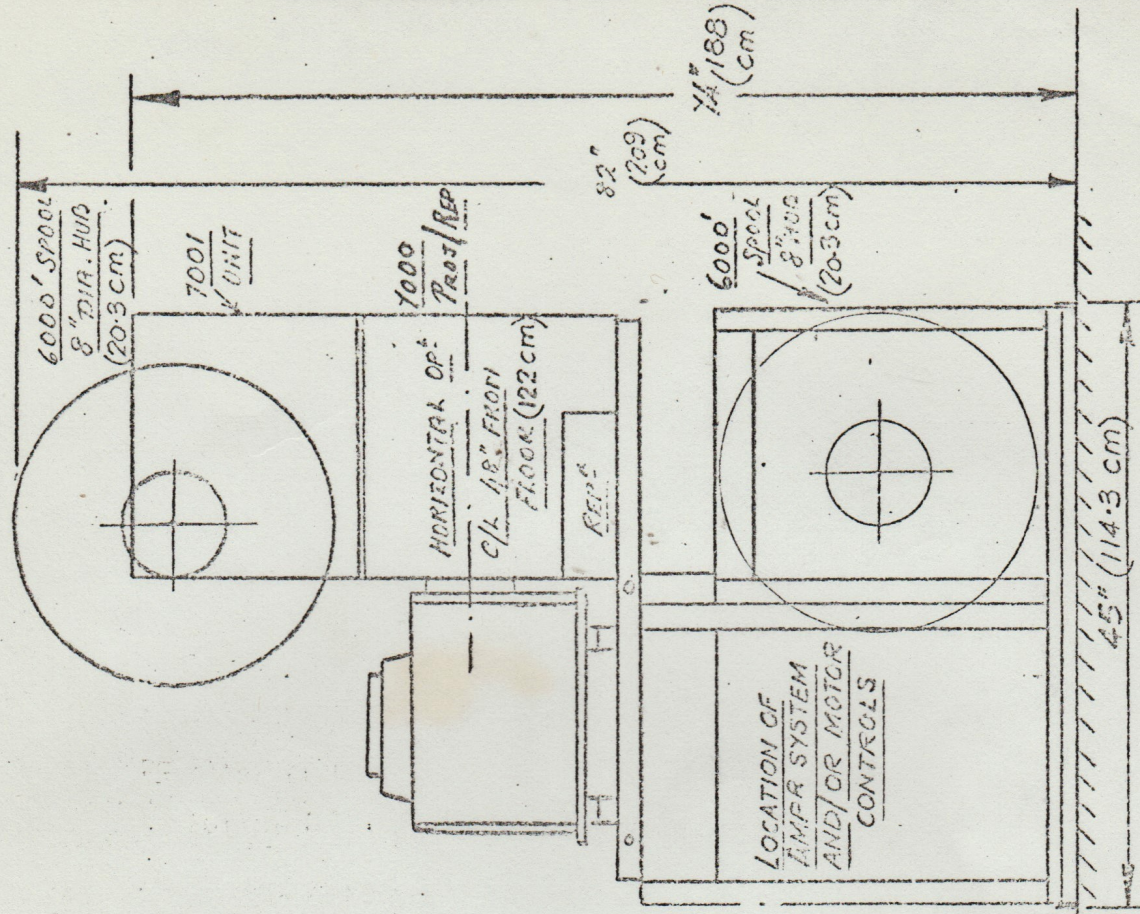


FIGURE 2

5035 FILM CARRIER

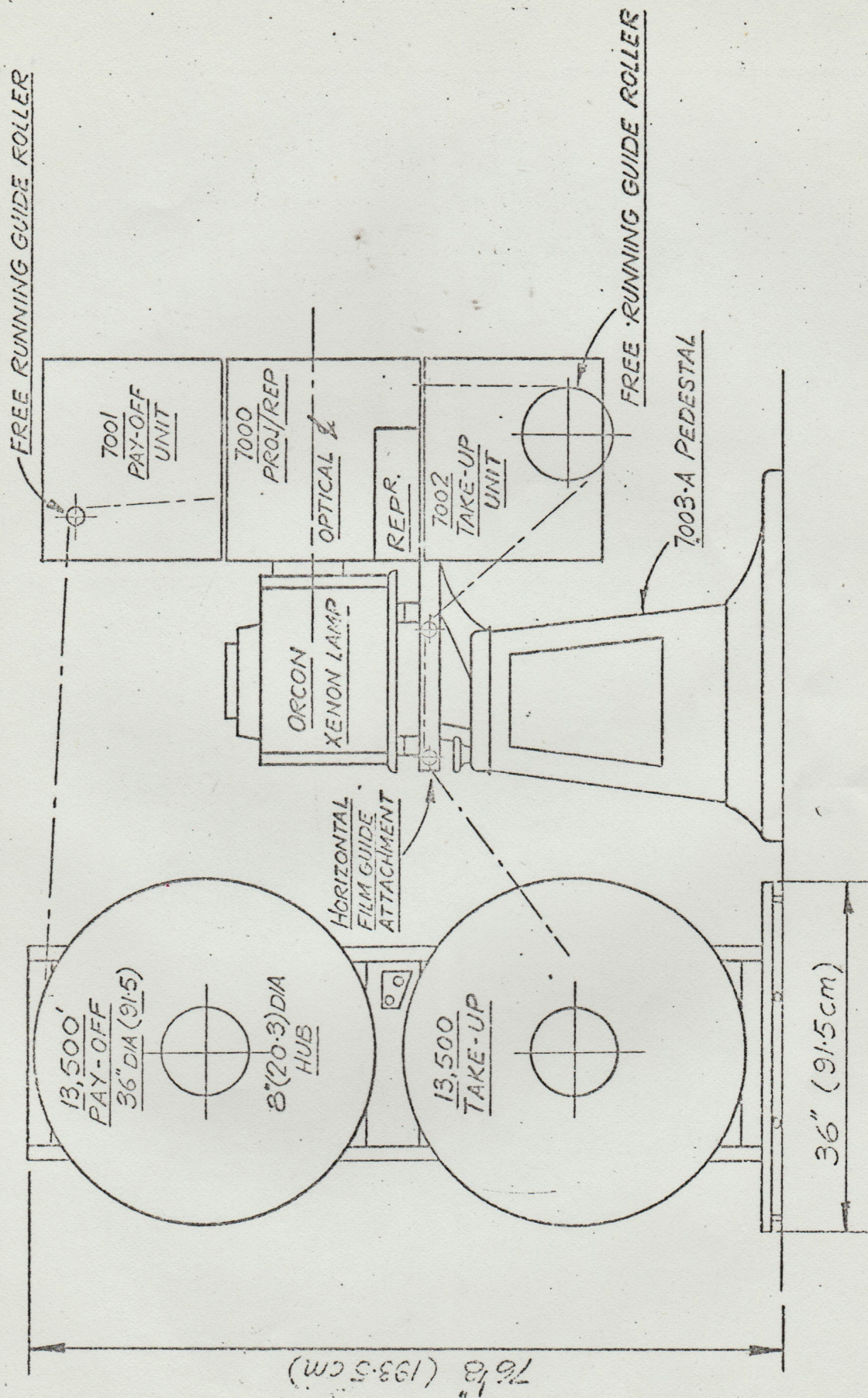
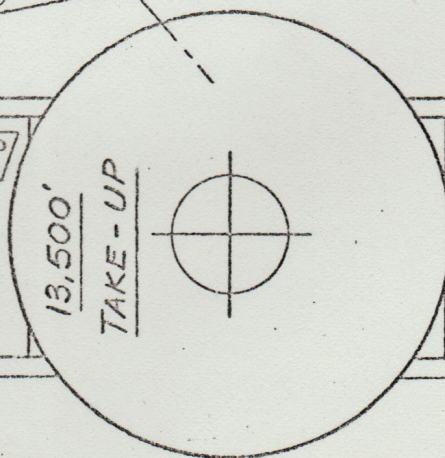
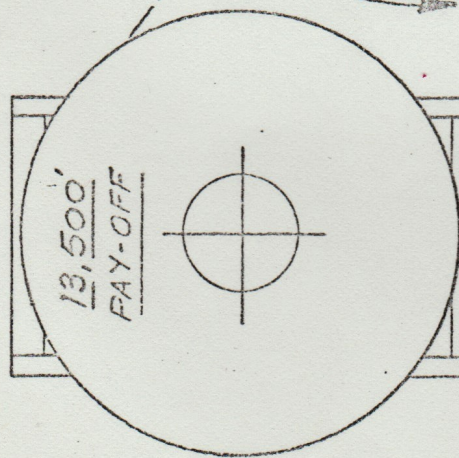


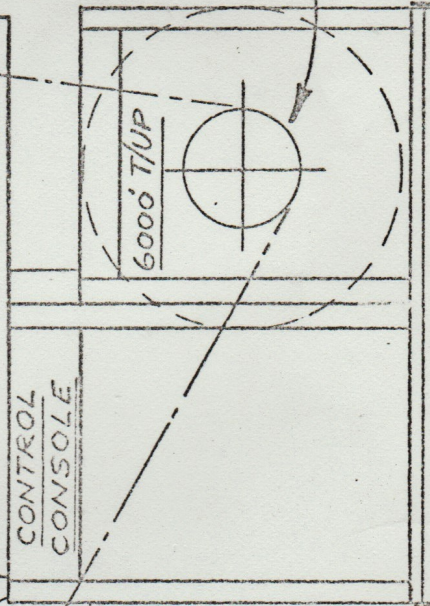
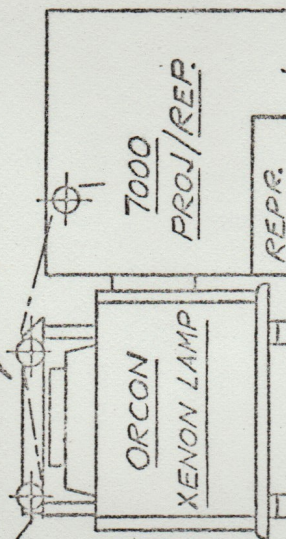
FIGURE 3

5035 CARRIER



VERTICAL FILM GUIDE ATTACHMENT.

HORIZONTAL FILM GUIDE ATTACHMENT



8" DIA FREE RUNNING
CENTRE OR GUIDE ROLLER

FIGURE 4

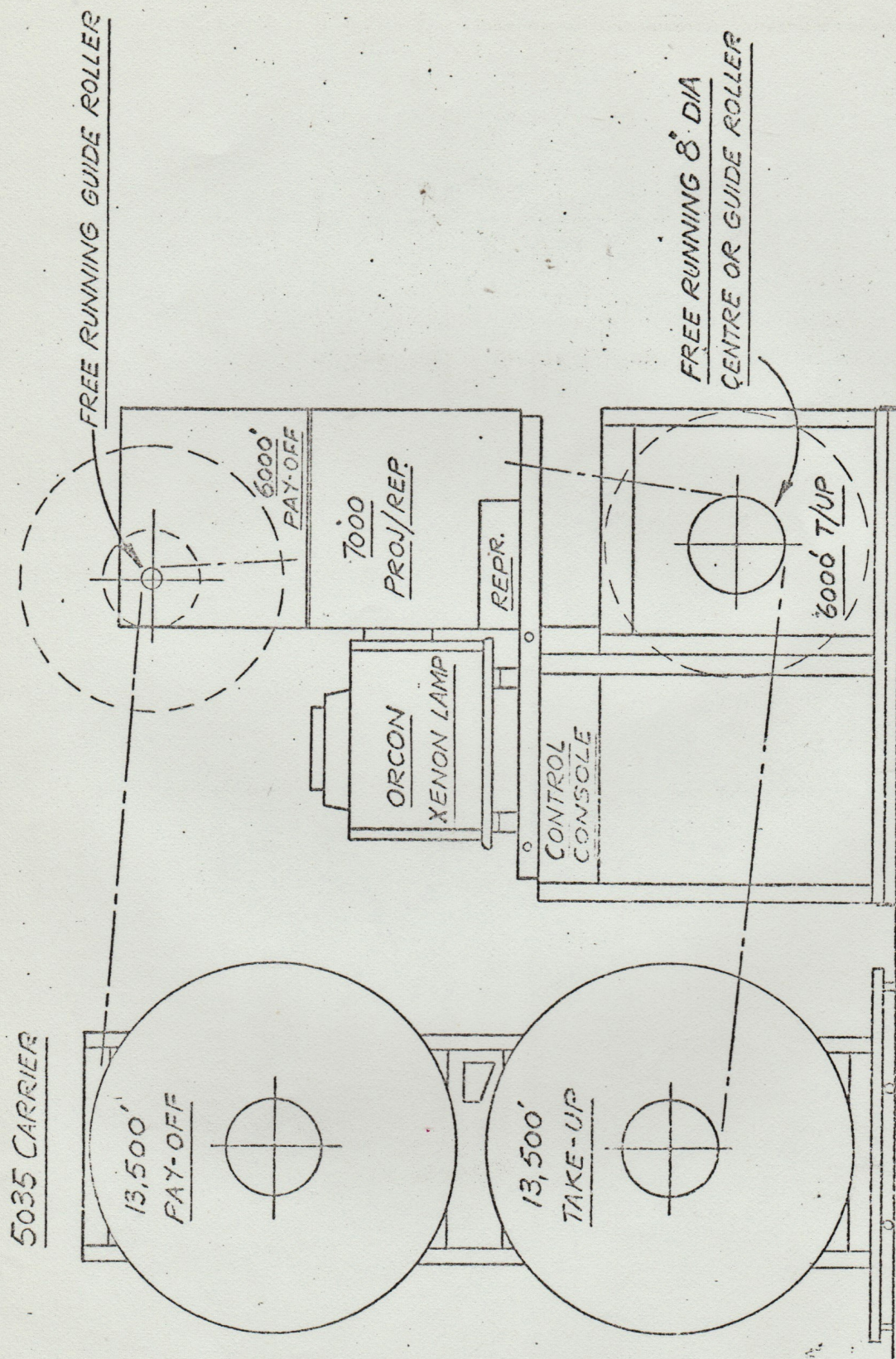
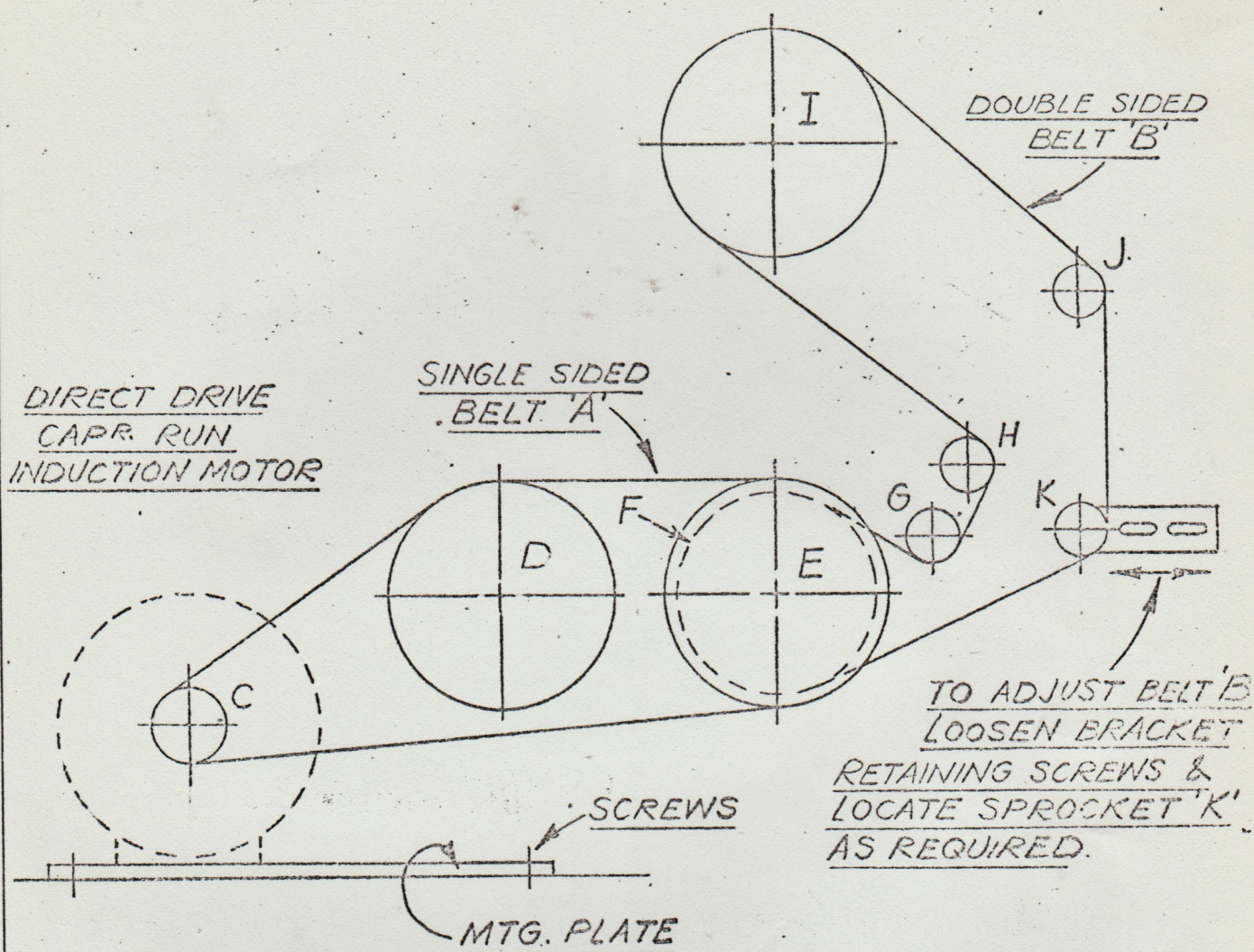


FIGURE 5

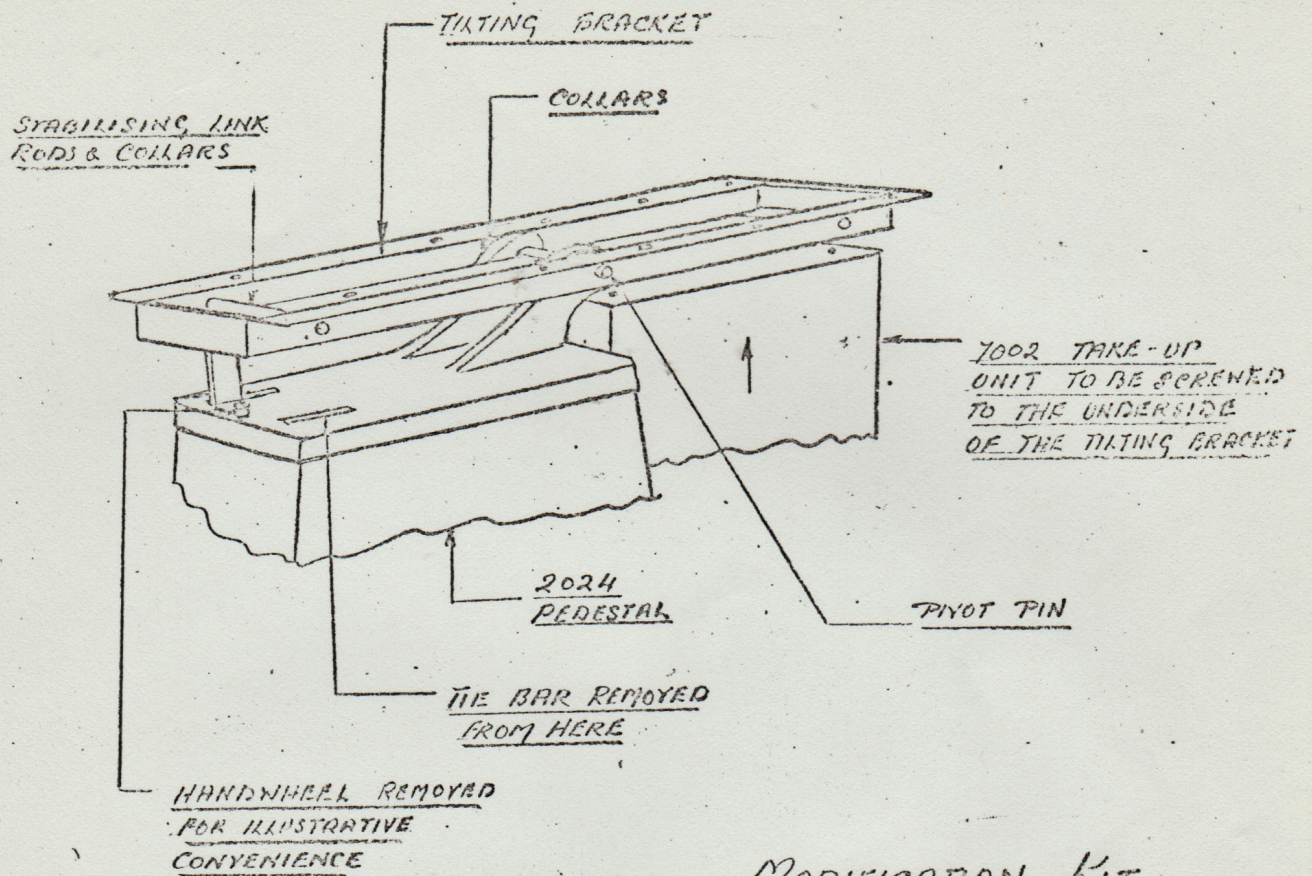


TO ADJUST BELT 'A'
LOOSEN PLATE RETAINING SCREWS
& LOCATE PLATE AS REQUIRED

SPROCKETS	C	D	E	F	G	H	I	J	FOR 50 HZ. 6P. MOTOR
	24	64	64	60	15	15	60	15	
	20	60	60	60	15	15	60	15	FOR 60 HZ. 6P. MOTOR

BELTS	A	B	
	150 PITCHES	220 PITCHES	FOR 50 HZ. 6P. MOTOR
	150 PITCHES	220 PITCHES	FOR 60 HZ. 6P. MOTOR

FIGURE 6



MODIFICATION KIT
APPLIED TO 2024
PEDESTAL

FIGURE 8

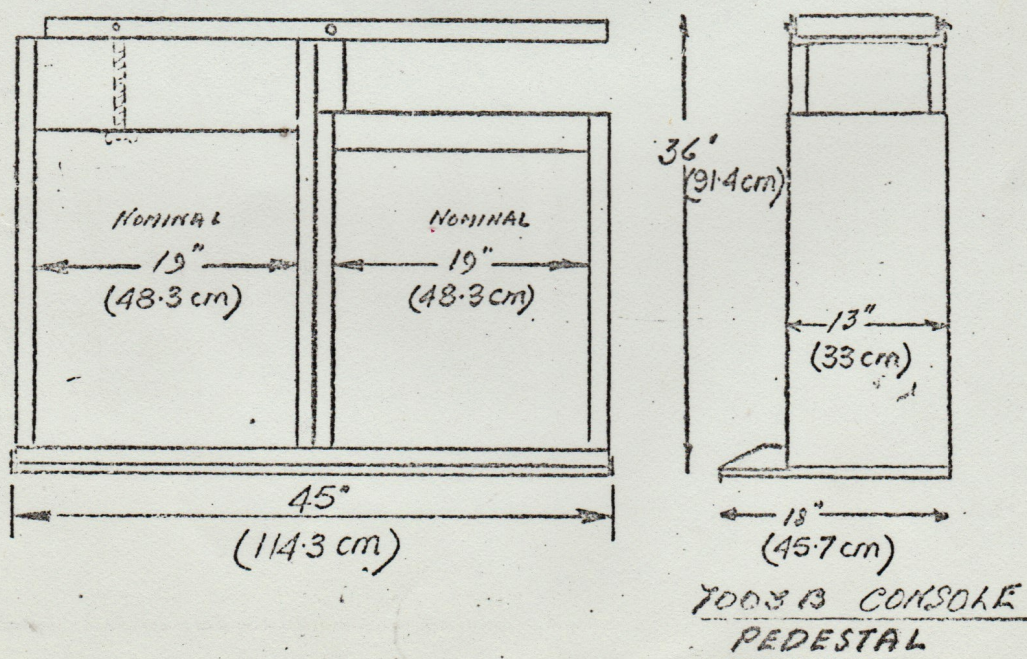
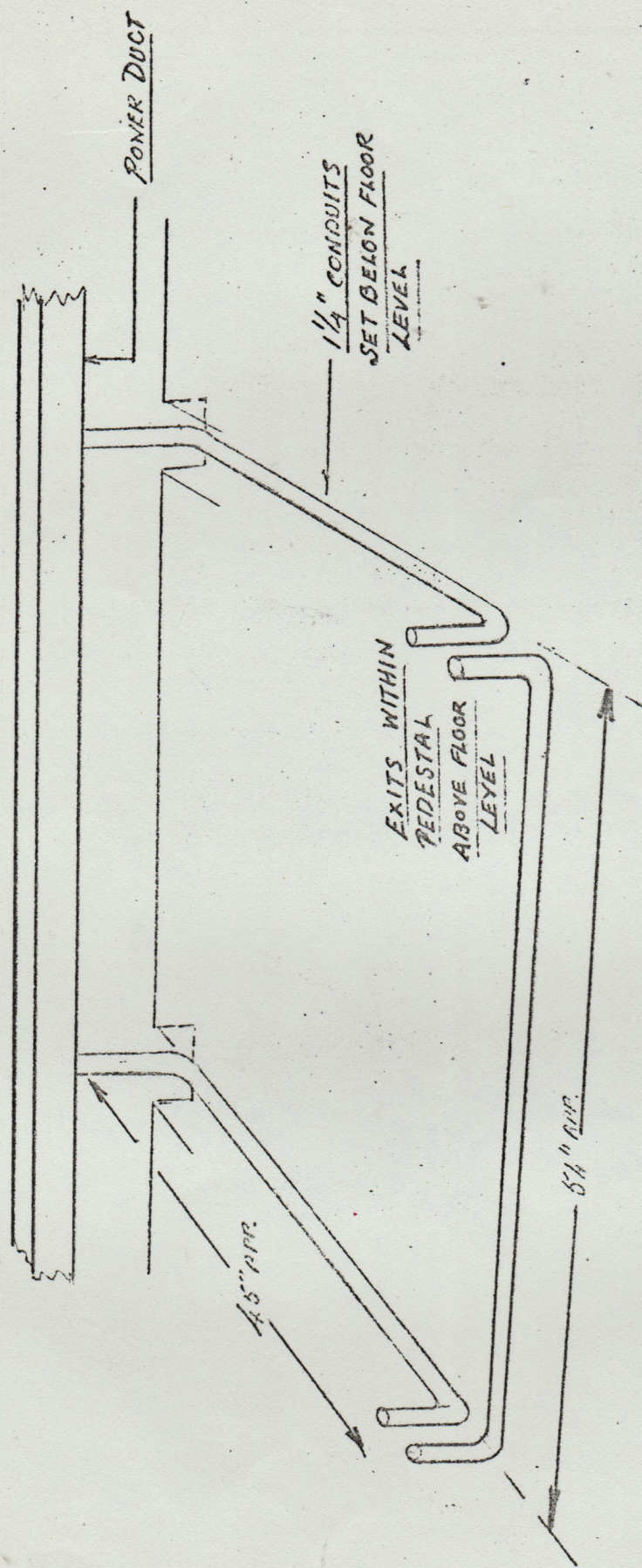
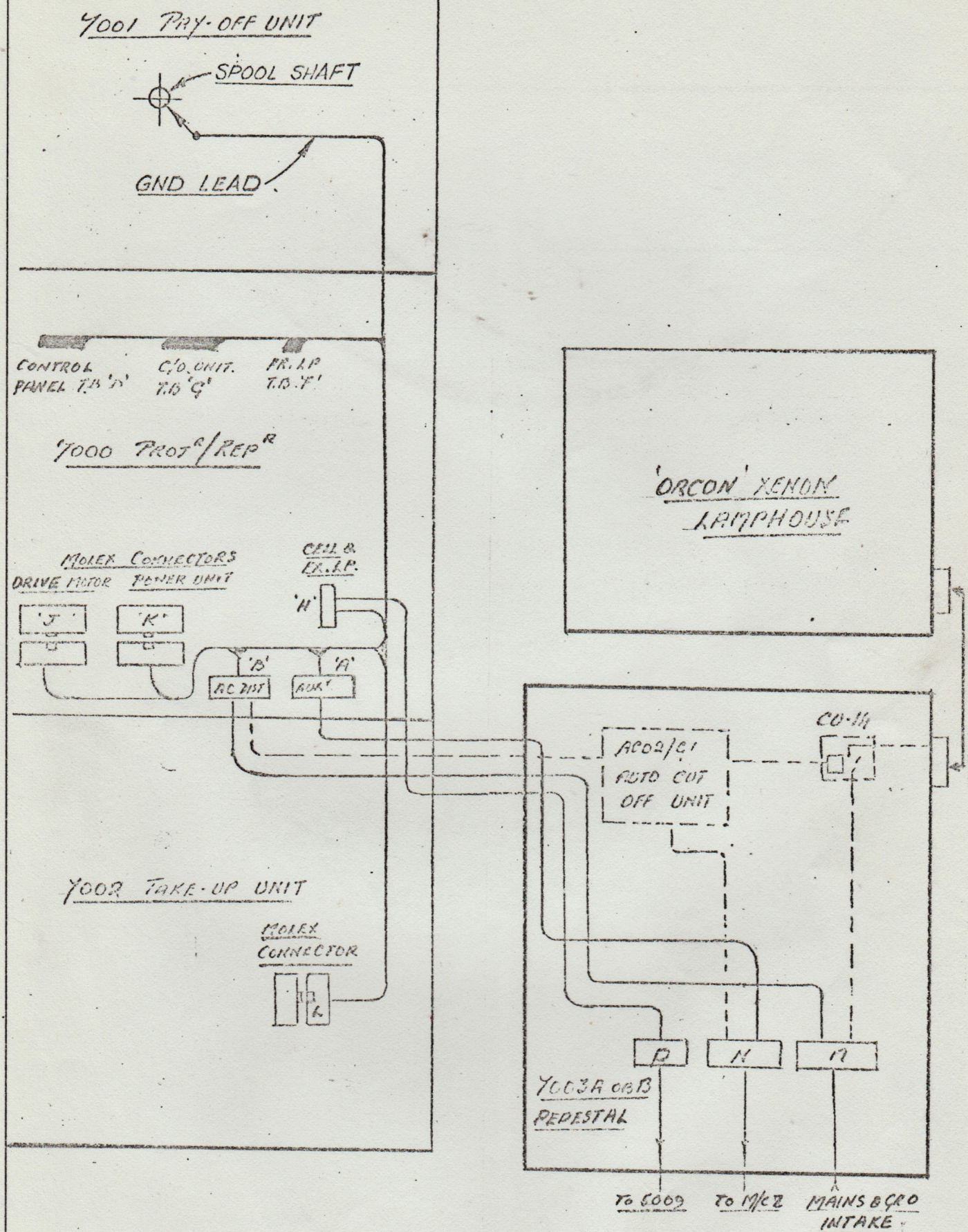


FIGURE 9



**SUGGESTED POWER
& INTERCONNECTION
CONDUIT LAYOUT**

FIGURE 10

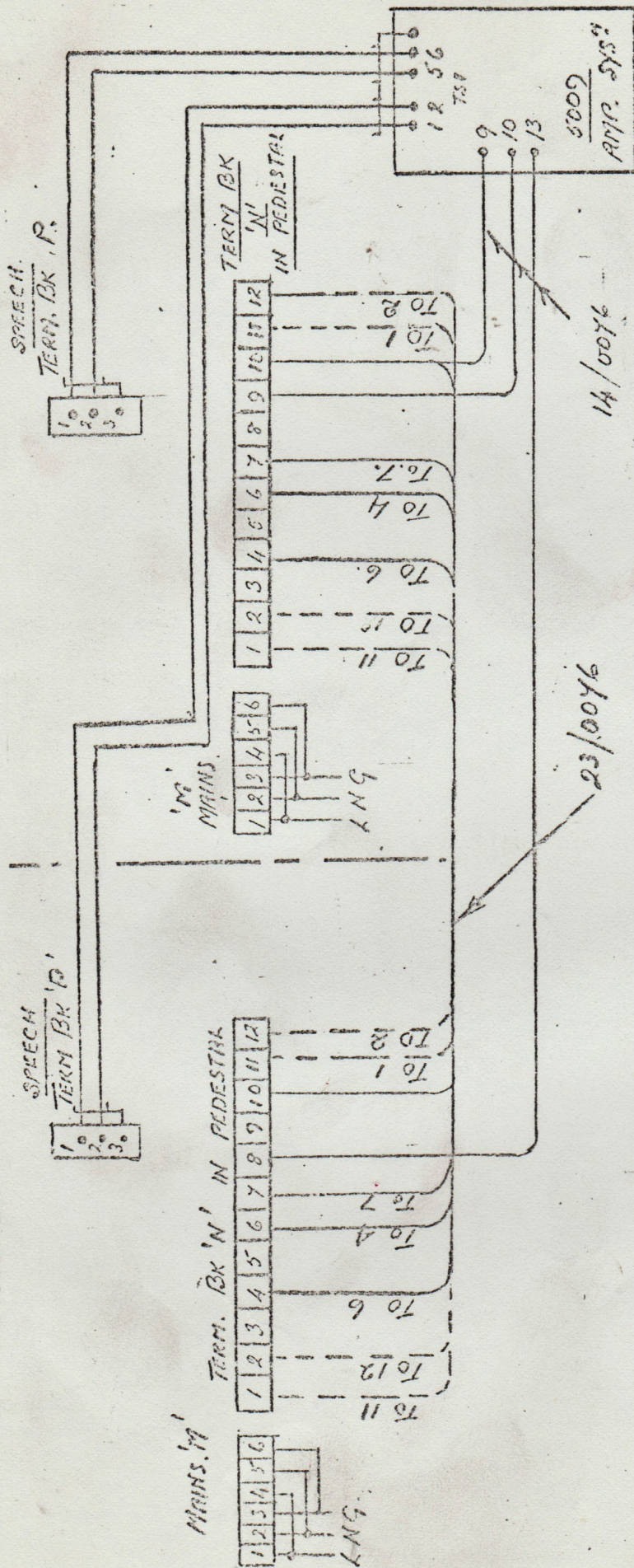


**7000 PROJ. R/REP. R ASSY. UNIT INTERCONNECTION
CABLE FORMING**

FIGURE 11

MACHINE 1

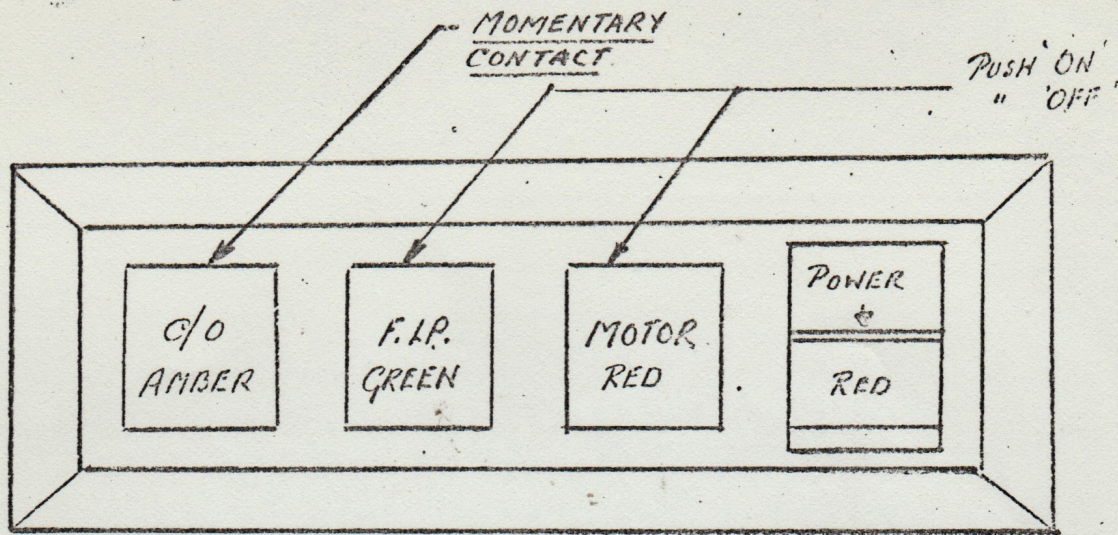
MACHINE 2



7000 SERIES PROJ.^R/REP.^R INTER-CONNECTING DIAGRAM FOR A TWO MACHINE INSTALLATION

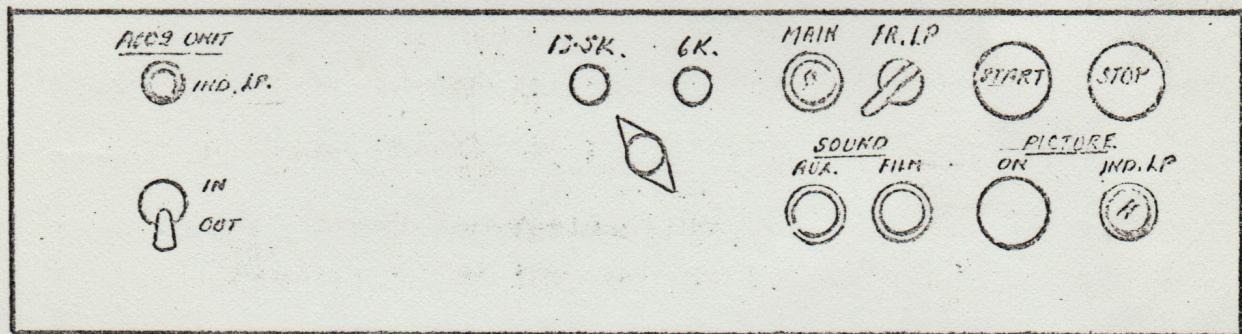
DOTTED CONNECTIONS ARE ONLY
REQUIRED WHEN ACO2/G1 & CU14
FAIL SAFE UNIT IS INCORPORATED

FIGURE 12



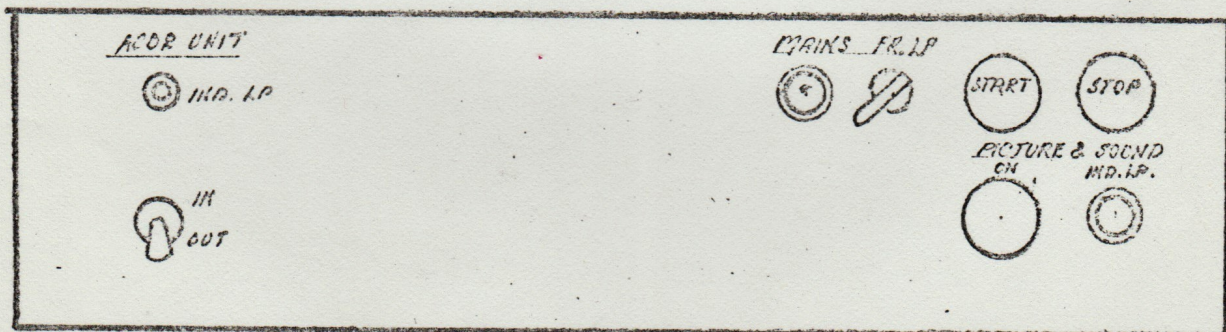
MANUAL SWITCH CONTROL PANEL

FIGURE 13 A



MANUAL PUSH-BUTTON CONTROL PANEL
FOR A SINGLE PROJECTOR AND 5035 CARRIER
INCORPORATING AUTO CUT-OFF UNIT

FIGURE 13 B



MANUAL PUSH-BUTTON CONTROL PANEL
FOR TWO PROJECTOR SYSTEM EACH
WITH AUTO CUT-OFF UNIT

FIGURE 13 C

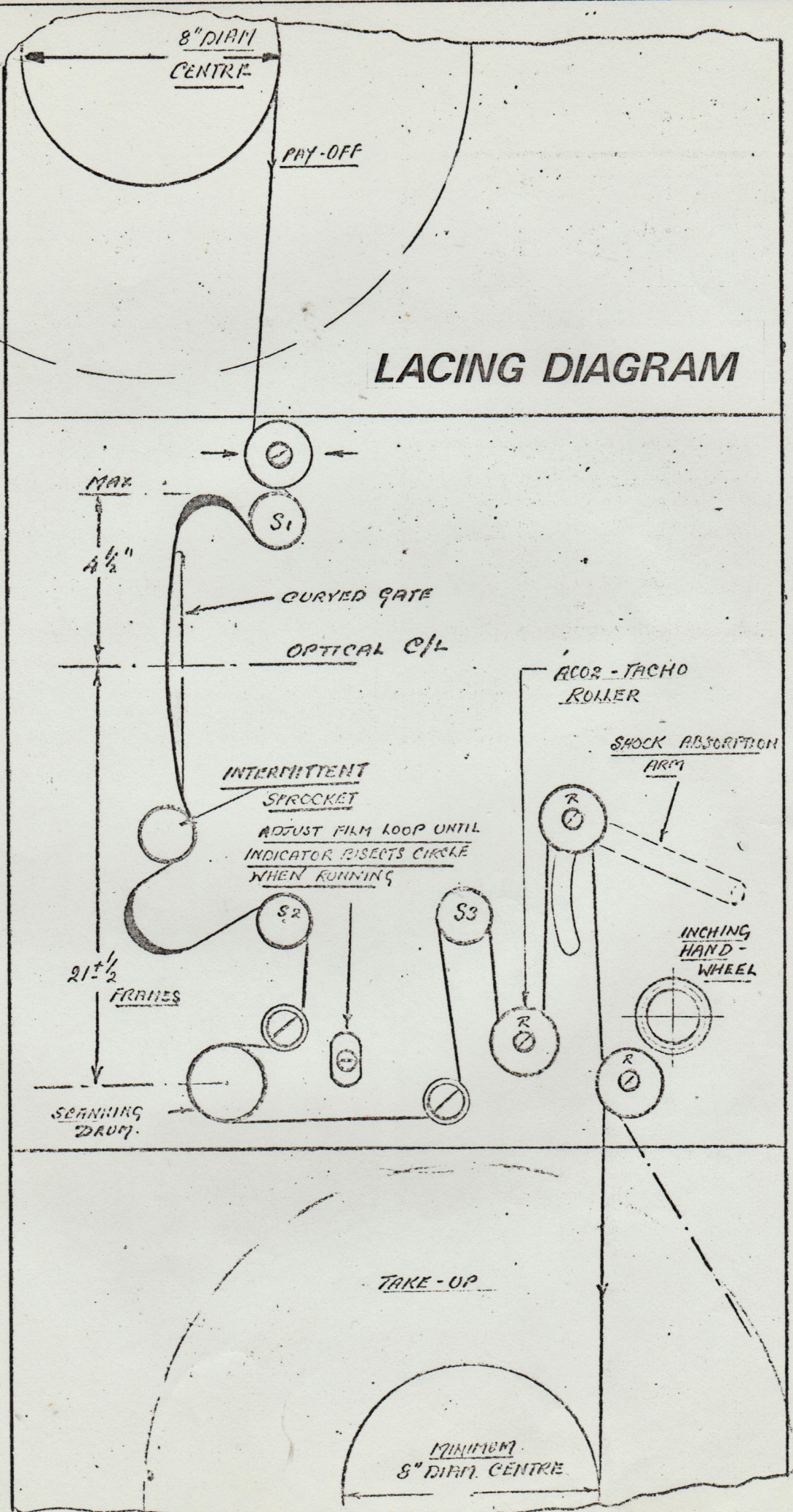
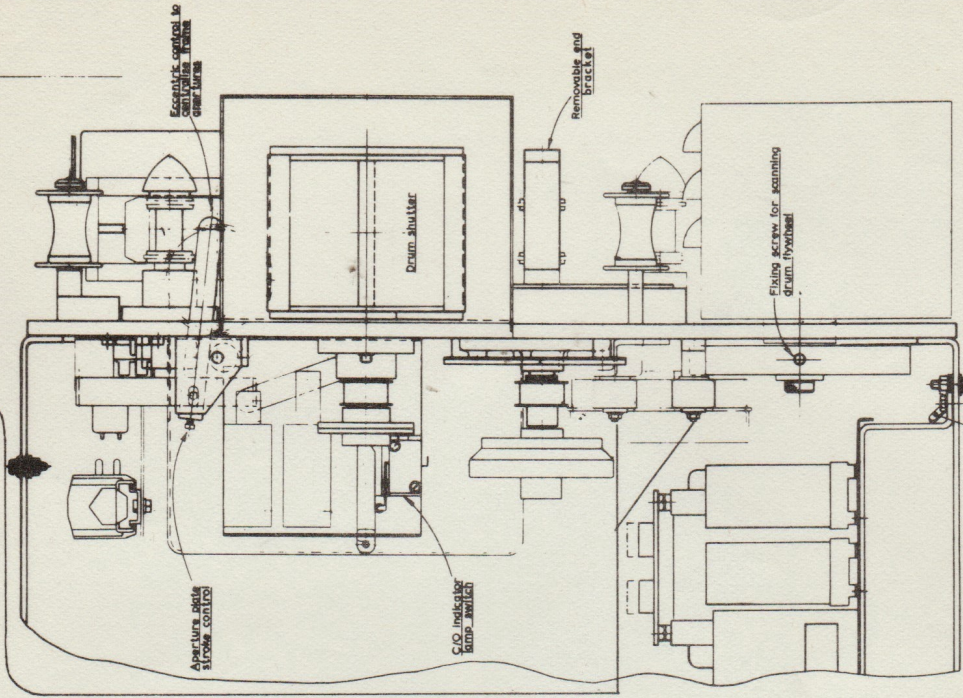
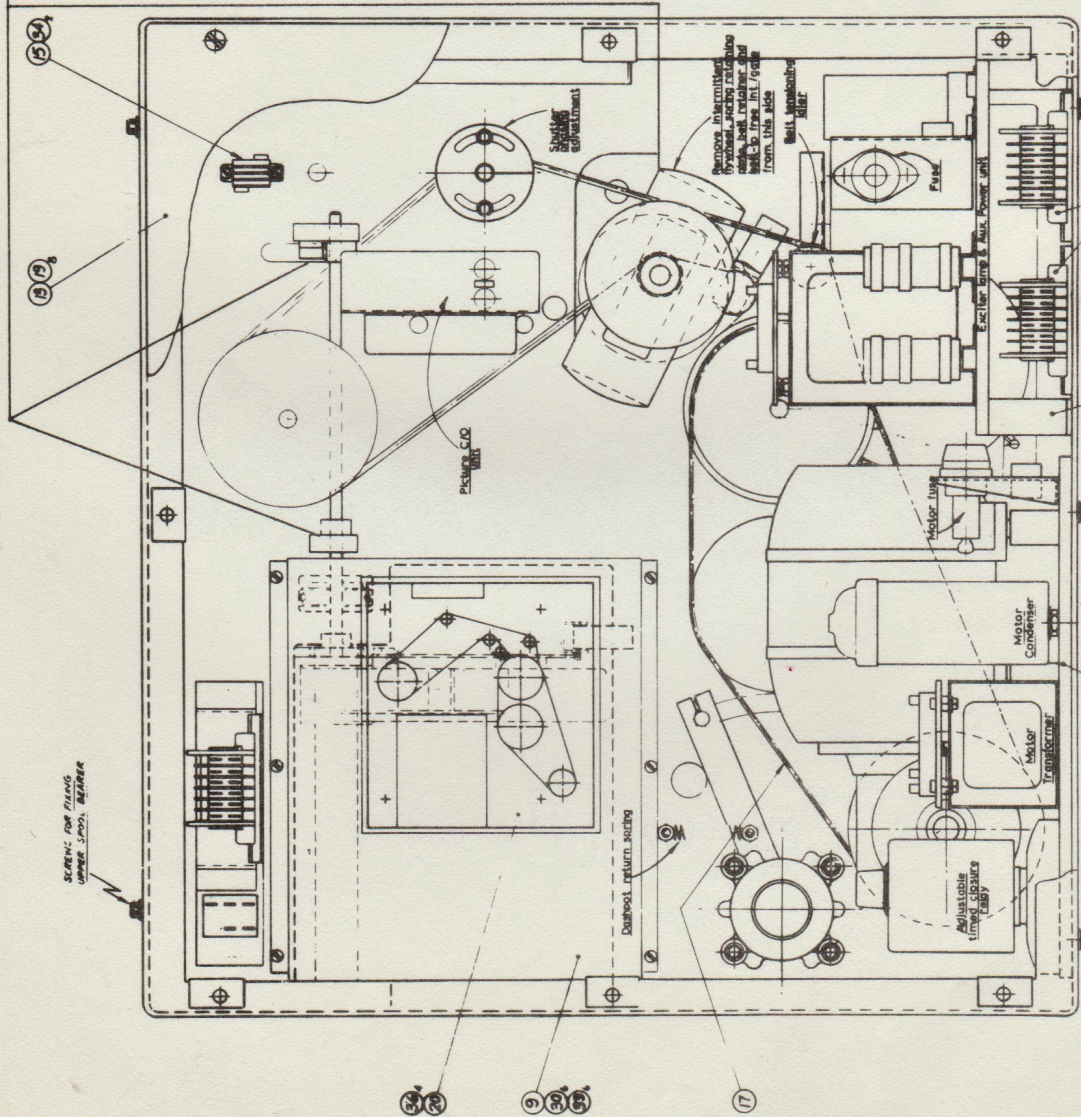


FIGURE 14

LUBRICATION

MONTHLY	WEEKLY
Apply a few drops of 2009-A Oil to the bearings of the aperture plate lifting shaft. Apply a light smear of 97116 Grease behind the retaining plate of the intermittent unit.	Apply a few drops of 2009-A Oil to each idler pulley bearing (Section 20.03).



10 POSH

SHEET 2 OF 2
PART OF AC-LEOP-7

STOCK NO. 17645
DRAWING NO. 17645

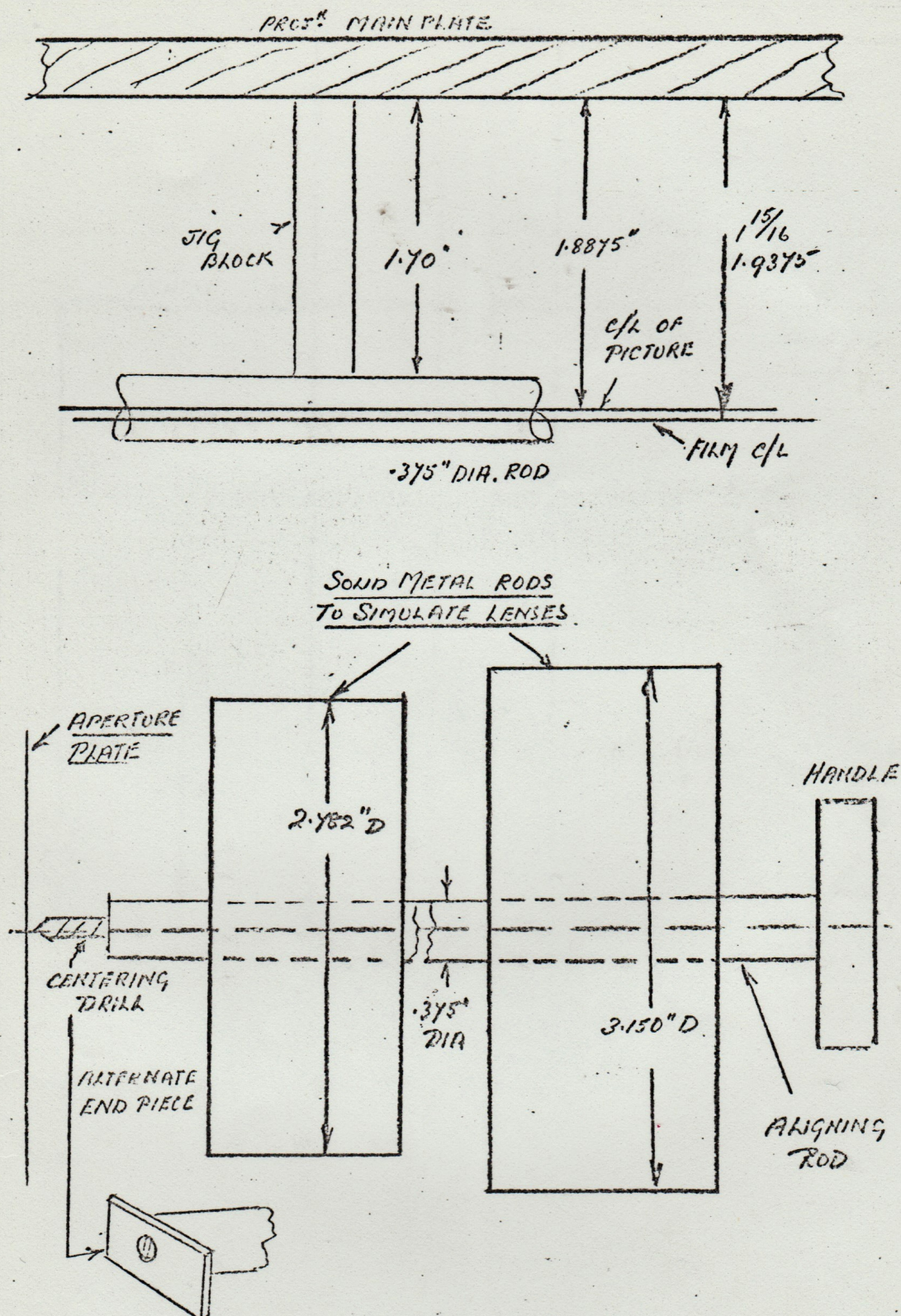
PROCTOR
ASSEMBLY
WESTINGHOUSE CO. LTD. LONDON
17645

FIG. 16

5 26 27 INTO HANG BUSHES IN CASE

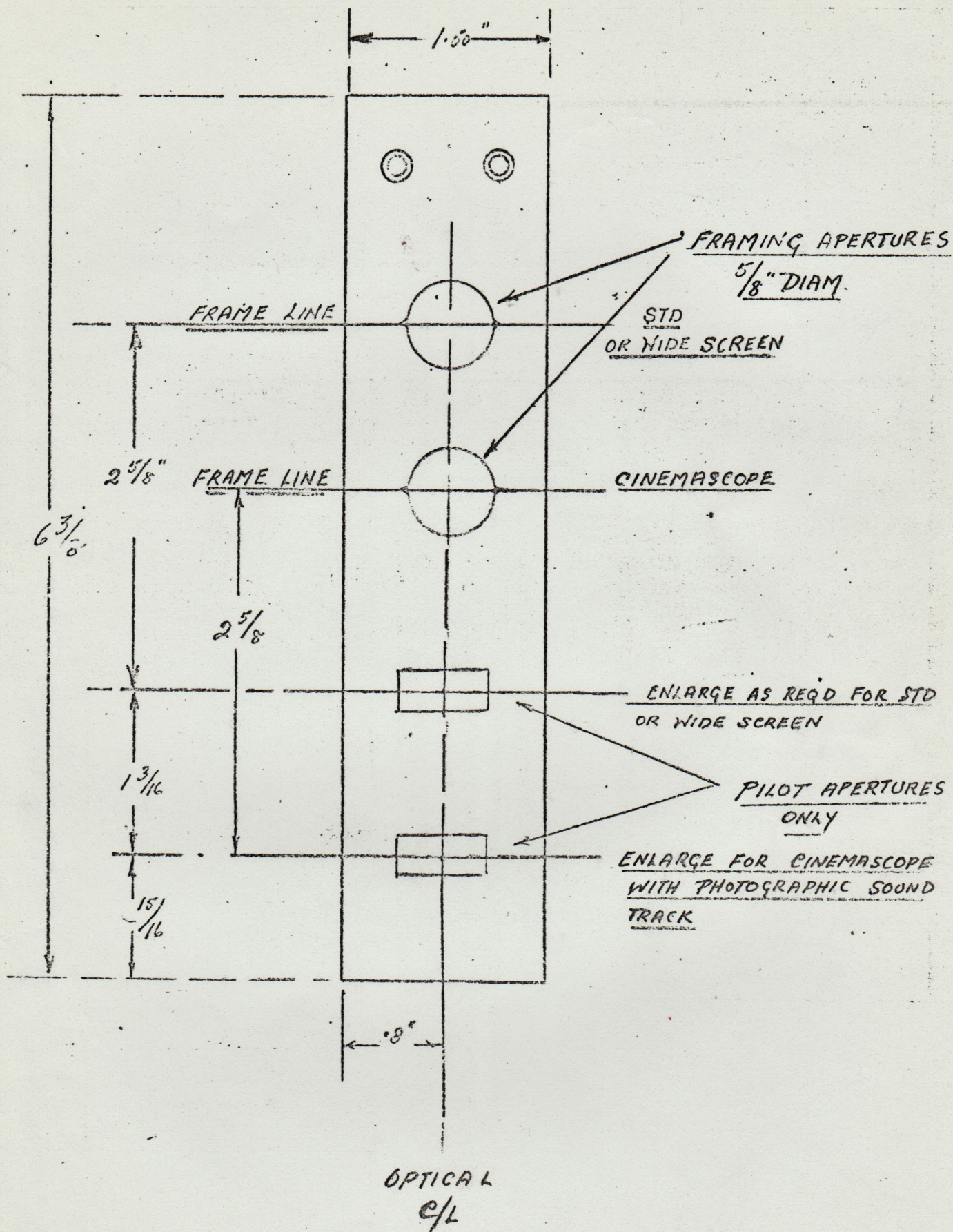
SCREWS FOR BUSHES TO FRAME IN MEDICAL

17645



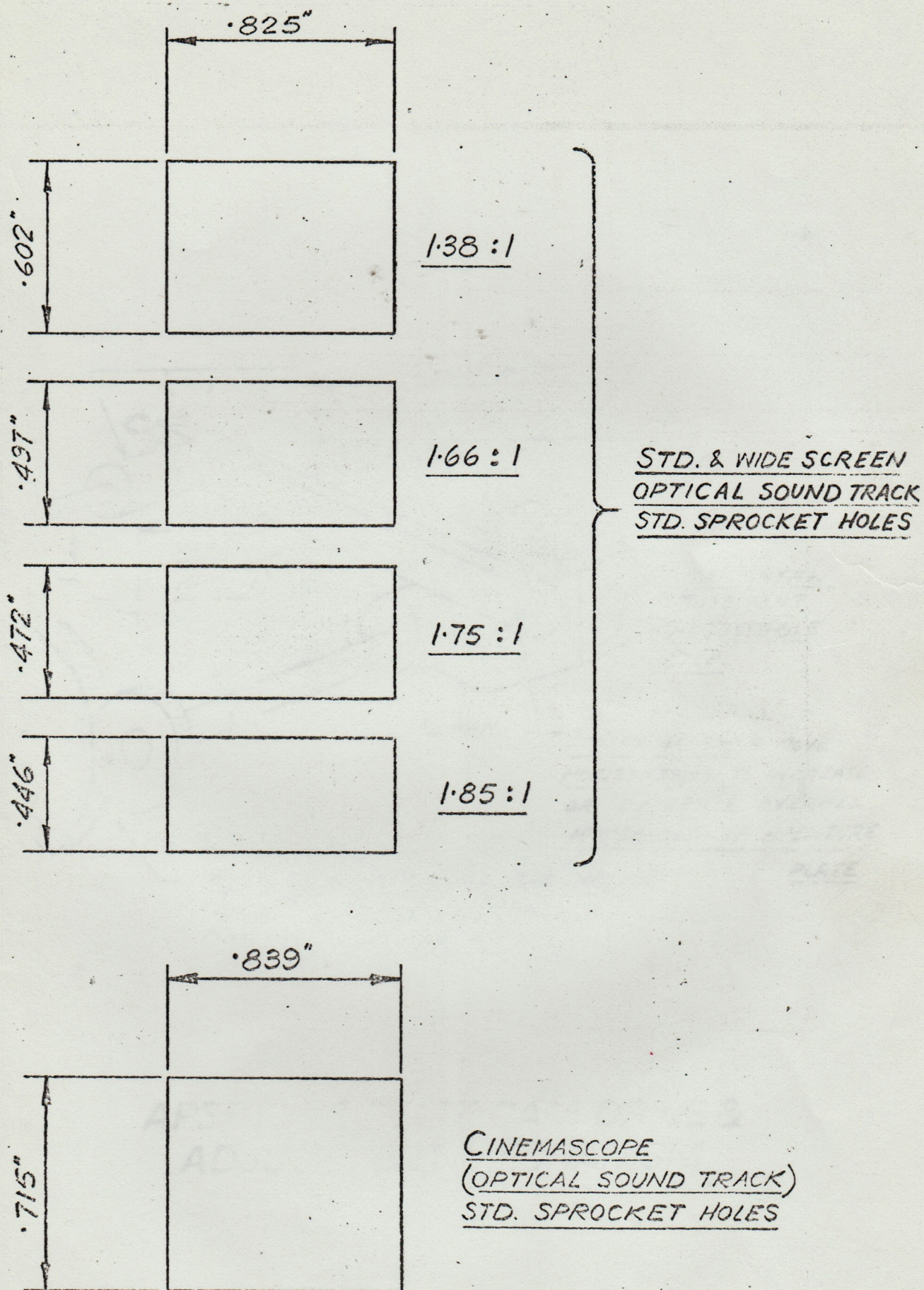
OPTICAL ALIGNMENT TOOL

FIGURE 17



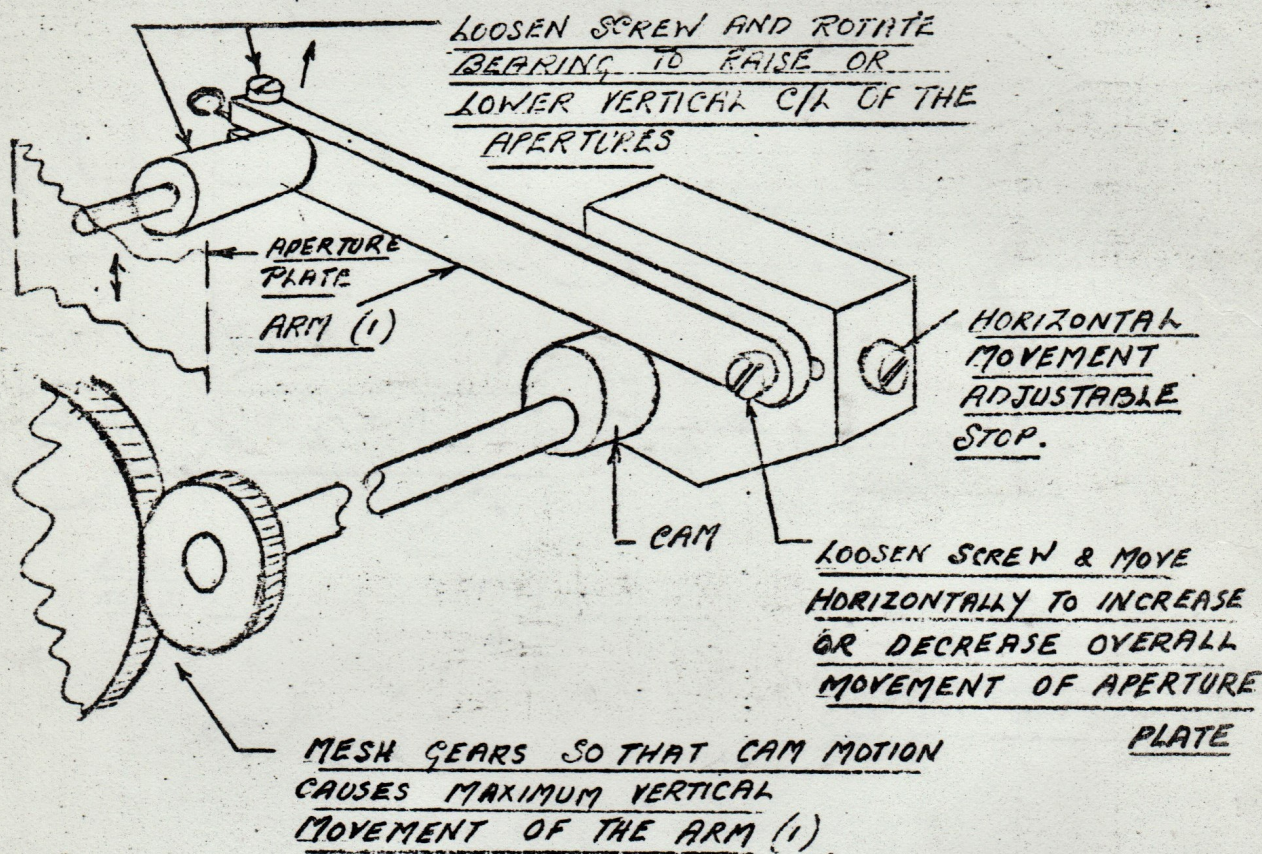
84487 APERTURE PLATE

FIGURE 18



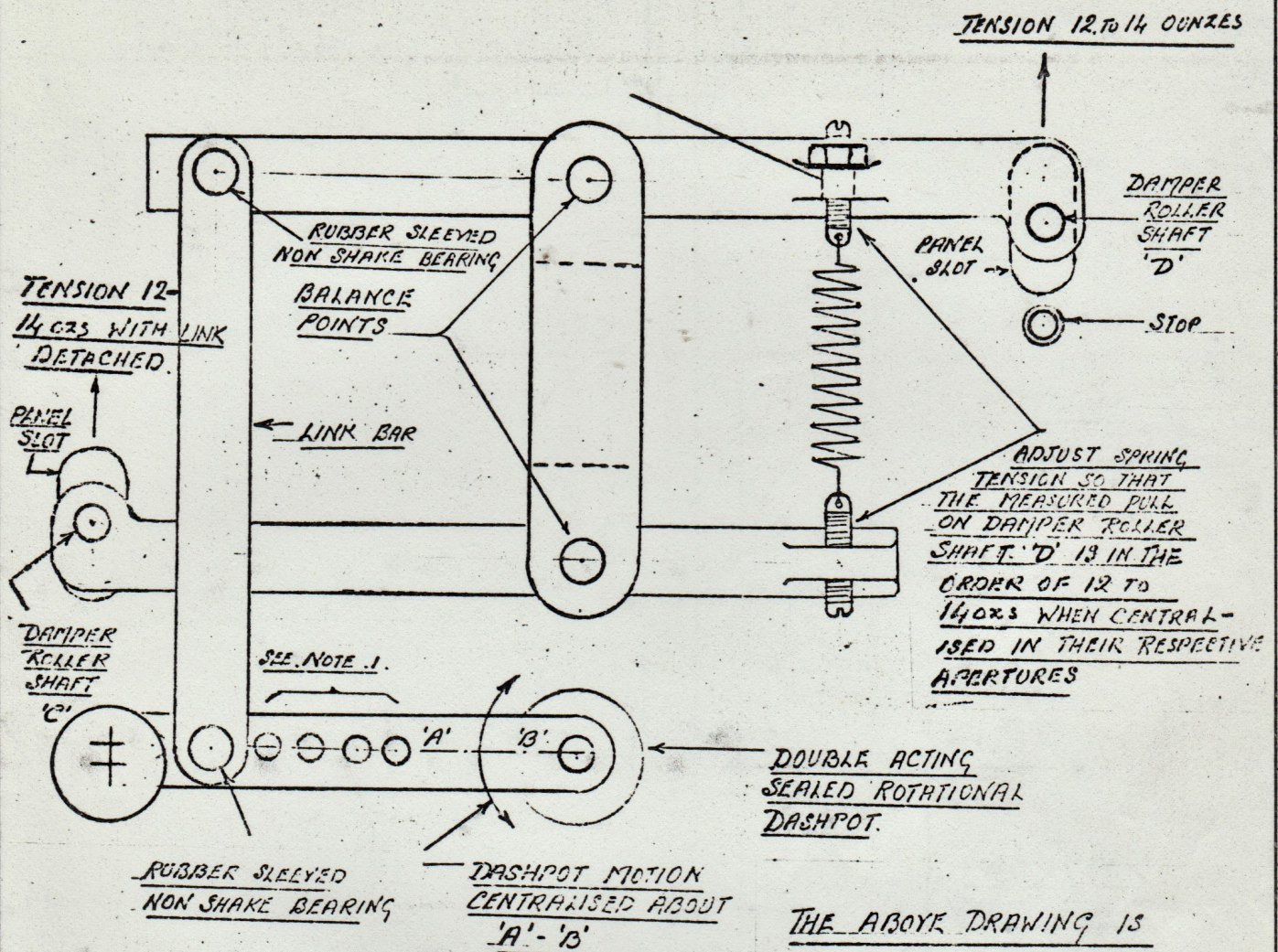
35mm. FILM PROJECTOR-IMAGE AREAS

FIGURE 19



APERTURE PLATE CAM DRIVE & ADJUSTMENT MECHANISM

FIGURE 20



THE ABOVE DRAWING IS
FOR INSTRUCTIONAL PURPOSES
ONLY & IS NOT TO SCALE

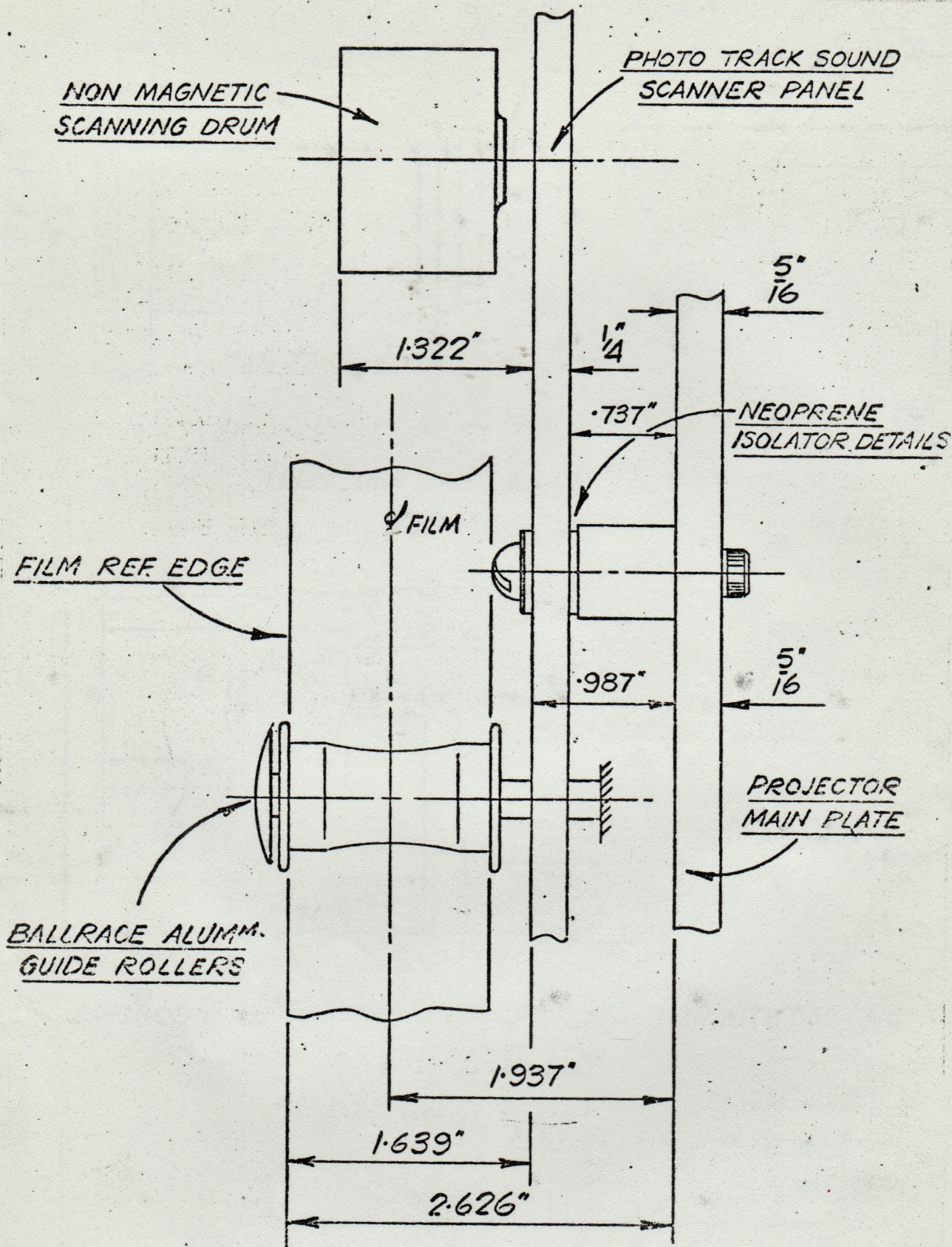
NOTE 1.

INSPECTION SHOULD SHOW THAT
ARMS & ROLLERS MOVE WITH PERFECT
FREEDOM APART THE DAMPING EFFECT
OF THE DASHPOT & THAT THERE IS
NO OBSTRUCTION TO THE SCANNING DRUM
ROTATION - UNDER THESE CONDITIONS
THE DAMPER ROLLER SHAFTS 'C' & 'D'
SHOULD CENTRALISE VERTICALLY IN THEIR
RESPECTIVE PANEL SLOTS WHEN FILM
IS BEING SCANNED. IF HOWEVER THERE IS
ANY TENDENCY FOR SHAFT 'C' TO FOUL
THE TOP OF ITS SLOT, WEIGHTING WASHERS
OR SCREWS MAY BE ATTACHED AT THESE
TAPPED HOLES

NOT TO SCALE

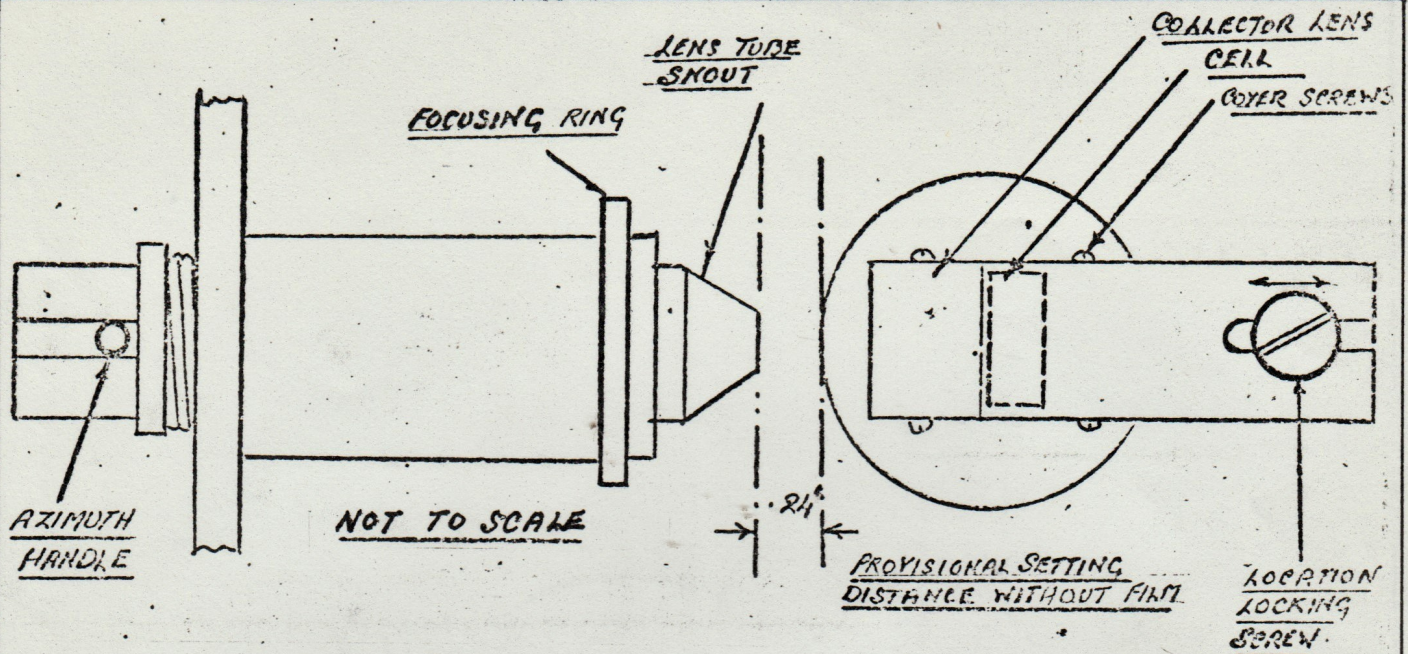
**DAMPER ARM ASSEMBLY SETTING UP INSTRUCTIONAL
INFORMATION TO BE CARRIED OUT TOGETHER WITH
ANY FILM ROLLER ALIGNMENT PRIOR TO THE SCANNING
UNITS ATTACHMENT TO THE PROJECTOR MAINPLATE**

FIGURE 21



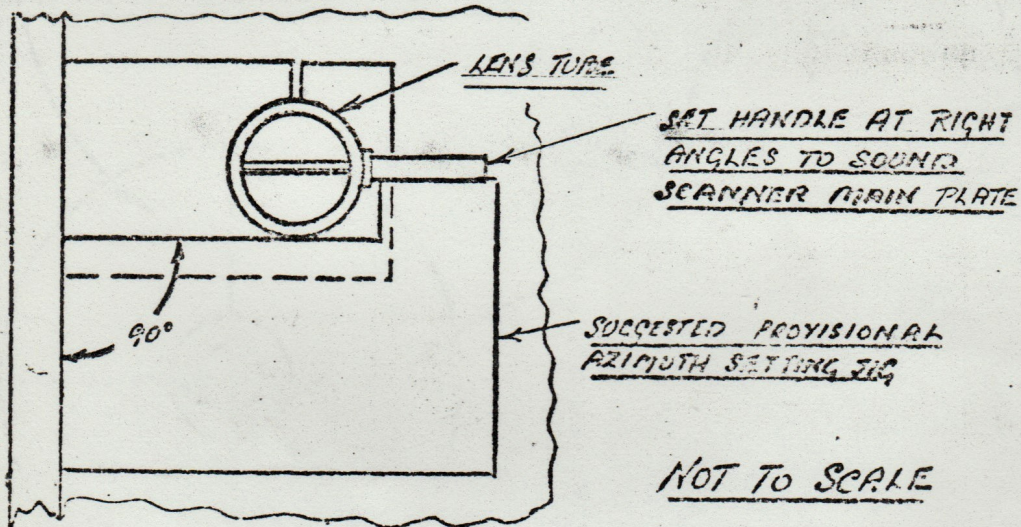
CHECK DIMENSIONS IN SETTING UP THE PHOTO TRACK FILM SCANNING DETAILS

FIGURE 22



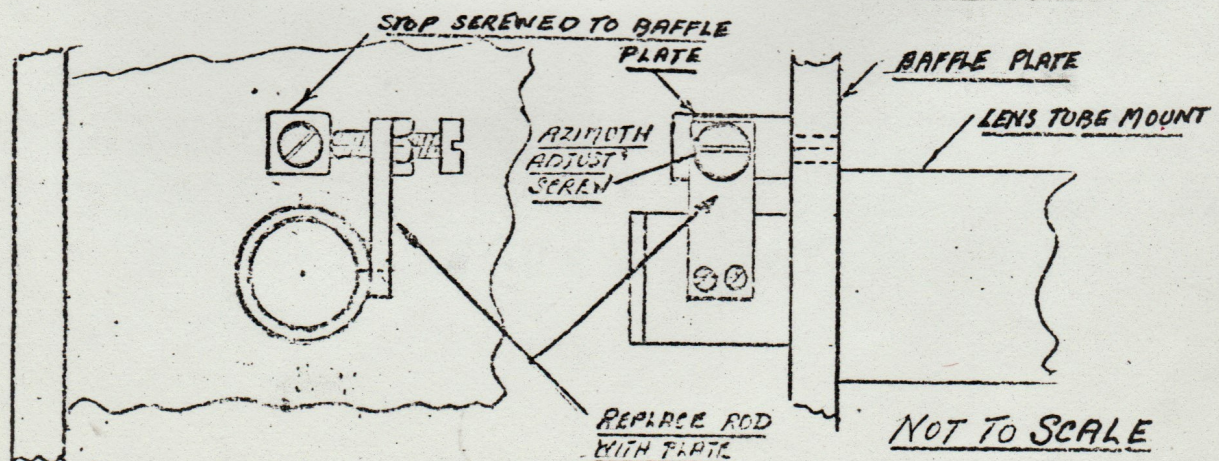
LENS TUBE & CELL MOUNT DETAILS

FIGURE 23A



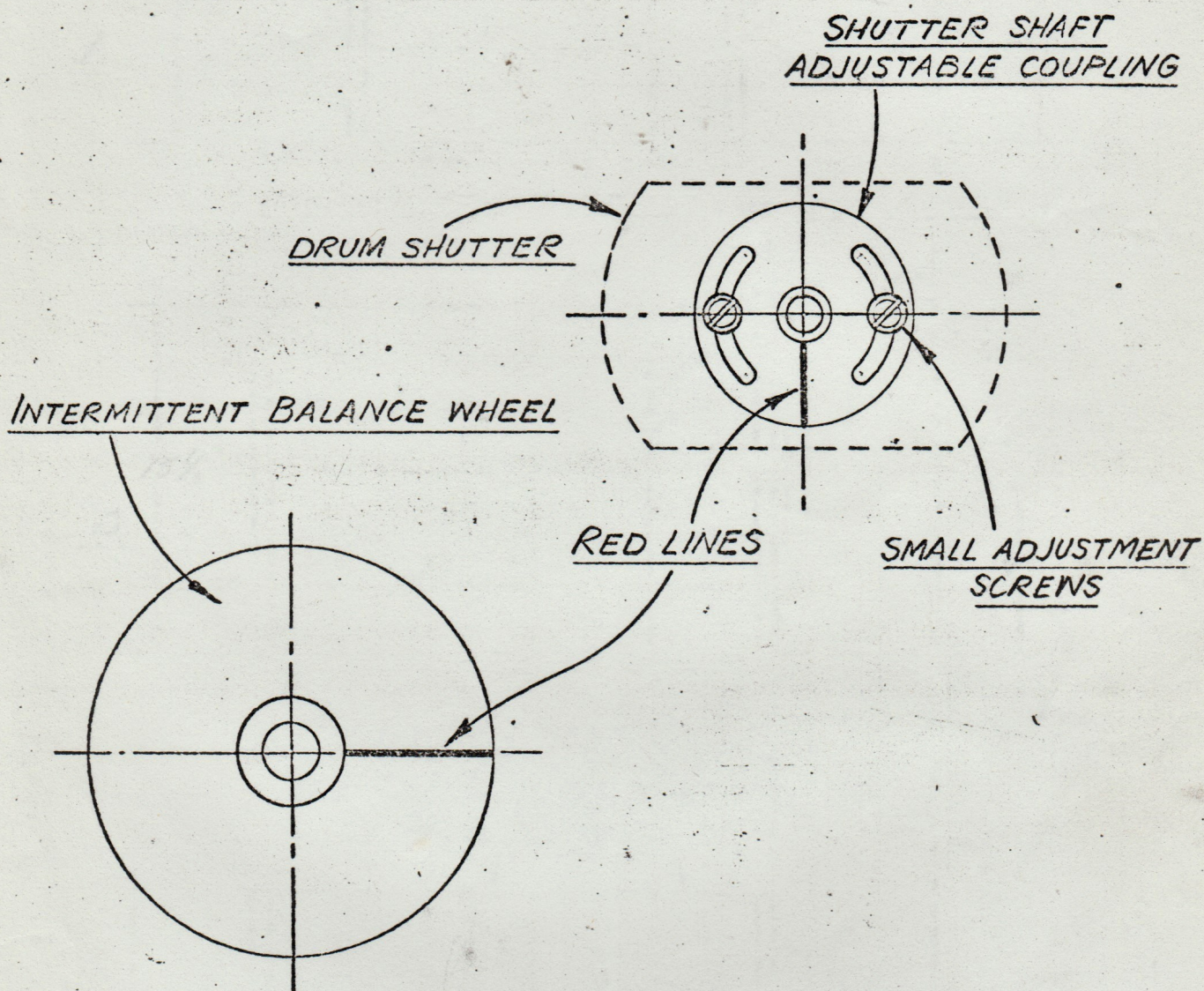
METHOD OF ESTABLISHING A PROVISIONAL AZIMUTH SETTING

FIGURE 23B



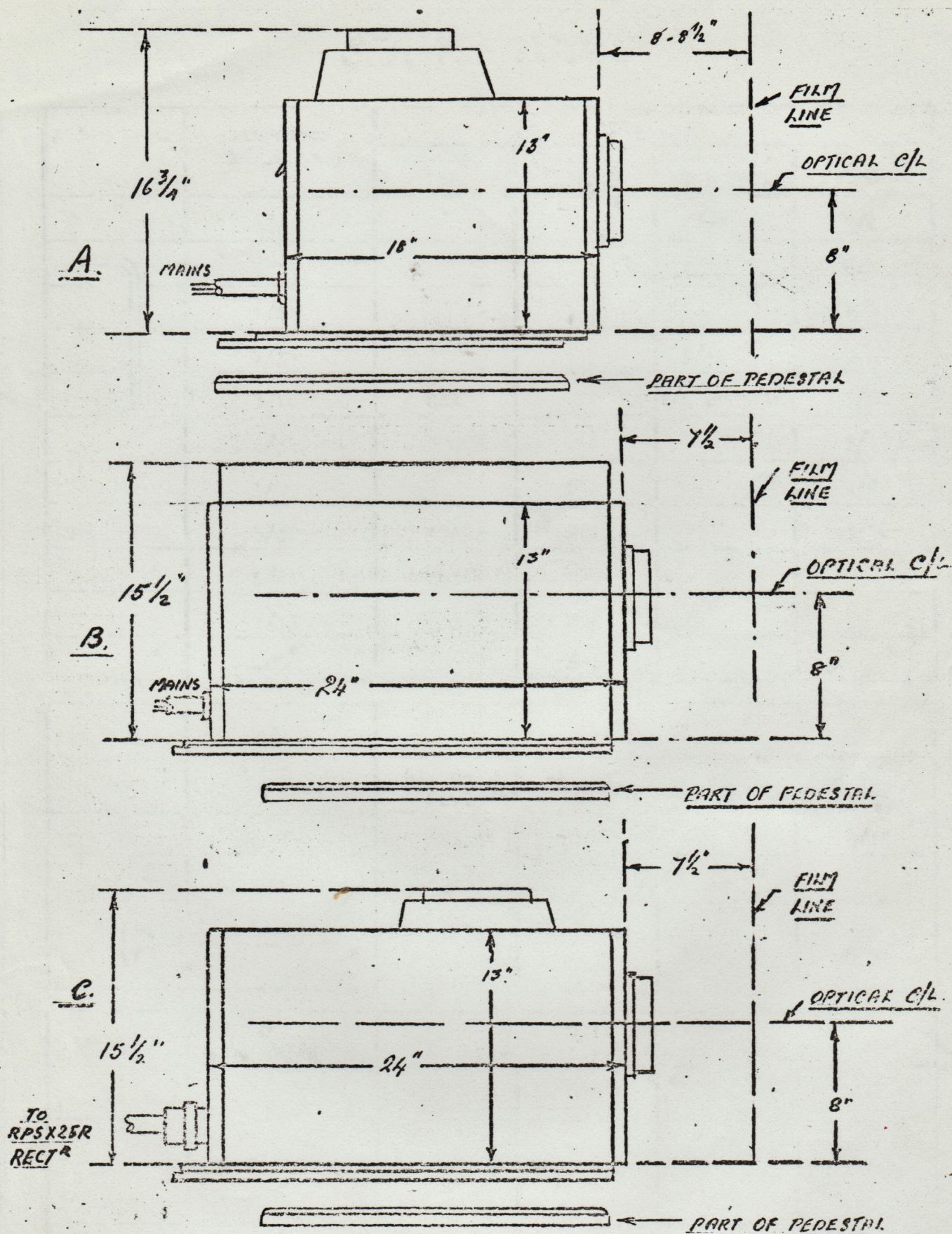
SIMPLE METHOD OF CONTROLLING AZIMUTH

FIGURE 23C



**POSITION OF INDICATOR LINES WHEN PHASING
BETWEEN INTERMITTENT AND DRUM SHUTTER
HAS BEEN COMPLETED**

FIGURE 24



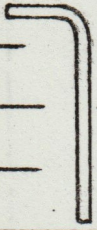
'ORCON' XENON LAMPHOUSES

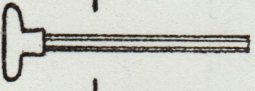
OVERALL DIMENSIONS & LOCATION ON PROJECTOR

	LAMPHOUSE	LAMP	AMPS. D.C.
A' -	1000B	X1000	35
B' -	1000/1600B	X1600	50
C' -	2500B	X2500 or X4000	65-100

FIGURE 25

SERVICE TOOLS

Allen Keys	Dimension A/F.(ins.)	Suitable for -			
		BA.Cap Scr.	BA.Set Scr.	BSF/Whit Cap Scr.	BSF/Whit Set Scr.
	3/8			1/2"	3/4
	5/16			3/8	5/8
	1/4				1/2
	7/32			5/16	7/16
	3/16	OBA		1/4 or 3/16	3/8
	5/32	2BA			5/16
Long Arm	1/8		OBA		1/4
Long Arm	3/32	4BA	2BA		3/16
	5/64	6BA			
	1/16	2BA	4BA		
	.05		6BA		

Allen Keys with Handles:- Coding.	A/F (ins.)	Suitable for -			
		BA. Cap Scr.	BA. Set Scr.	BSF/Whit Cap Scr.	BSF/Whit Set Scr.
LSD-68290	5/32	2BA			5/16
LSD-68291	3/16	OBA		1/4 or 3/16	
					

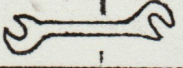
Spanners:- Coding.	A/F (ins.)	Suitable for - Hexagonal Bolt Heads and Nuts.			
LSD-64307	39/64 x 17/32 .604 x .529			1/4 & 5/16	
LSD-69683	15/32 x 11/32 .460 x .340			1/8 & 3/16	
LSD-63269	21/64 x 1/4 .325 x .247	2BA & 4BA			
Slimline	1.00 x .88 1 x 7/8			5/8 & 1/2	
Slimline	1.25 x 1.063 1 1/4 x 1 1/16			3/4 & 11/16	
					

FIGURE 26

THROW X 0.825 = SCREEN WIDTH = LENS
 SIZE (HALF SCREEN WIDTH FOR SCOPE)
 LENS IN MM INS X 25.4.

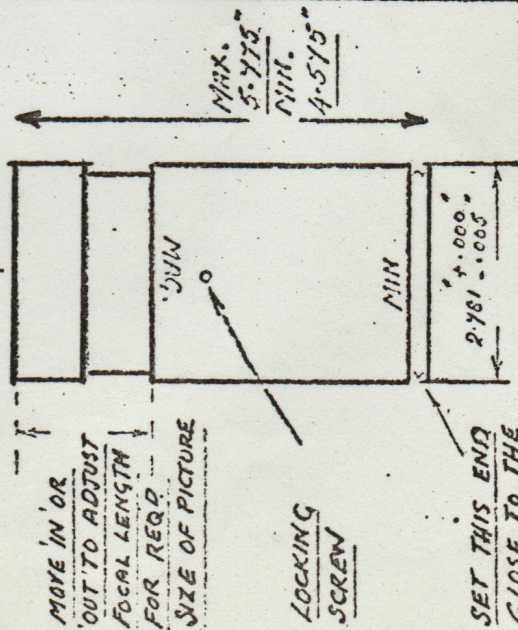
MATERIAL

FINISH

This drawing and information hereon are the confidential and copyright property of the WESTREX Co. Ltd., and must not be disclosed, loaned, copied, or used for manufacturing, tendering, or for any other purpose without their written permission.

Focal Length of Cinelux Backup Lens

SCREEN



SET THIS END CLOSE TO THE BACKING LENS TO OBTAIN MINIMUM LOSS OF LIGHT

* Cinelux 70/35 for projection of 35mm film. All shorter EF backup lenses are Cinelux 35 series. EF's in inches.

LSD.-55671

LEN5

MAGNA-COM 65

SCALE / APPD.

THIRD ANGLE PROJECTION

WESTREX CO. LTD. LONDON

TOLERANCE ON DIMENSIONS

FRACTIONAL DIMENSIONS $\pm 1/64"$

DECIMAL DIMENSIONS $\pm .005"$

UNLESS OTHERWISE SPECIFIED

Resultant EF Range with Magna-Com 65 as Picture Magnifier

Resultant EF Range with Magna-Com 65 as Picture Minifier

2.00"	1.24" to 1.40"	2.86" to 3.22"
2.25"	1.40" to 1.57"	3.21" to 3.63"
2.50"	1.55" to 1.75"	3.57" to 4.03"
2.75"	1.71" to 1.92"	3.93" to 4.43"
3.00"	1.86" to 2.10"	4.29" to 4.84"
3.25"	2.02" to 2.27"	4.64" to 5.24"
3.50"	2.17" to 2.45"	5.00" to 5.64"
3.75"	2.33" to 2.62"	5.35" to 6.05"
4.00"	2.48" to 2.80"	5.71" to 6.45"
4.25"	2.64" to 2.97"	6.07" to 6.85"
4.50"	2.79" to 3.15"	6.43" to 7.26"
*4.75"	2.95" to 3.32"	6.79" to 7.66"
*5.00"	3.10" to 3.50"	7.14" to 8.06"
*5.25"	3.26" to 3.67"	7.50" to 8.47"
*5.50"	3.41" to 3.85"	7.86" to 8.87"
*5.75"	3.57" to 4.02"	8.21" to 9.27"
*6.00"	3.72" to 4.20"	8.57" to 9.68"

REFERENCE 7000 SYSTEM

ORIGINAL SPEC.

LEN5

MAGNA-COM 65

DRN APP. DR. APPD.

CHKD APP. ENG.

LSD.-55671

