

Film-Tech

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3. PARTS REQUIRED

- 1 - R2 Reproducer
- 1 - M2 Motor
- *1 - D2C Drive (Direct drive for Century Projectors)
or
D2S Drive (Chain drive for Simplex or similar Projectors)
- 1 - D3S Drive (For 60 cycle operation of motor)
or
D3F Drive (For 50 cycle operation of the motor)
- 2 - L2 Lamps
- 1 - 4930 Phototube
- 2 - 6AK5 Vacuum Tubes
- 1/2 - oz. bottle of F2 Fluid

*NOTE: The D2C Drive for Century Projectors is a simple, direct drive which, having considerably fewer parts than the chain drive, can be supplied and installed at a much lower cost. The D2S Drive is a universal chain drive designed for Simplex projectors but it will also work on Century and many other projectors.

4. INSTALLATION PROCEDURE

4.1 General Instructions

- 4.11 Read the instructions below in conjunction with the assembly drawing, WEX-211. Close adherence to the sequence of operations given in the instructions will make the job easier and save time.
- 4.12 The following loose screws and washers not shown on the first issue of the assembly drawing are shipped with the reproducers for mounting purposes:
 - 4 3/8" - 16 X 1 1/4" H.C. Screws (use 4 on Century "L" Pedestal, 2 on Century "C" and "5 Point Improved" Pedestals),
 - 2 3/8" - 16 X 2 3/4" H.C. Screws (use on Century "C" and "5 Point Improved" Pedestals only),
 - 4 3/8" Steel Washers
- 4.13 Check the M2 Motor to insure that it rotates in the proper direction which is clockwise when viewing the flywheel end. If the direction of rotation is wrong, change it by reversing the two leads in the receptacle at the rear end of the motor. (This motor is also used on other applications requiring rotation in the opposite direction and while an effort is made to have all those shipped for R2 Reproducers rotating clockwise, it is possible that an occasional one will be shipped reversed.)
- 4.14 If a Century Model "C" or "CC" Projector is used with a D2C Drive it will be necessary to remove the lower gear (Century No. GR-4-G) from the vertical drive shaft of the projector before the direct drive can be installed. Do this in accordance with Section 5, below, before any work is done on the reproducer.
- 4.15 If the drive between the reproducer and the projector is to be a D2C type, follow the installation instructions in Section 4.2, below. If it is to be a D2S type, follow the instructions in Section 4.3, below.

4.2 Installing the Sound Head with Direct Drive (D2C) to Projector

- 1st - Fasten the reproducer in place with the two 3/8" - 16X 1 1/4" screws and washers furnished. Start the screws in the rear of the reproducer, then lift the sound head into position so that the screws fit in the sockets at the top of the support. Insert the two lower screws with washers (3/8" - 16 X 1 1/4" screws for an L type Pedestal or 3/8" - 16 X 2 3/4" screws for "C" or "5 Point Improved" Pedestals) and tighten all four screws.
- 2nd - Mount the lower (takeup) magazine using the two 5/16" - 18 X 1 5/8" Fl. C. Screws furnished.
- 3rd - Remove the R294 motor coupling from the motor shaft and fasten it to the motor driven shaft in the reproducer, lining up screw with flat on shaft.
- 4th - Mount the R297 take-up belt idler pulley on main frame with the two 1/4" - 20 X 1 1/2" H.C. Screws and washers.
- 5th - Mount the R285 motor bracket and M2 motor, inserting the motor shaft in the flexible coupling, with the special rubber washers and rubber tubes and the four special steel screws and washers furnished. The steel washer should be next to the head of the screws and on top of the rubber



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2. DESCRIPTION OF REPRODUCER

2.1 General

The new Westrex "Master" R2 Film Reproducer is the first reproducer developed by the Westrex Company in seven years. This interval of time has been sufficiently long to permit a well evaluation of previous reproducers, and the new R2 type embodies all the improvements and indicated by such evaluation. When the former designs of reproducers are in good adjustment, film in good condition, their performance meets the needs of the theatre industry satisfactorily. They are, however, subject to two vagaries which sometimes affect their performance to a perceptible to a critical listener. These are scanner bearing trouble and the physical condition of film, either of which results in an increase in the rate of flutter.

In the new reproducer a unique mechanical filter system has been developed for minimizing of both scanner bearing and film troubles. In this design the film compliance is outlined attenuation of high frequency mechanical disturbances and means are provided for greatly reducing possibilities of film irregularities setting up low rates of flutter sometimes referred to

2.2 Special Features

The following features are considered worthy of special note:

- (a) The screw for adjusting lateral movement of the sound track in the light beam is provided an indexed head. This index permits returning the alignment quickly to normal after offset to eliminate sprocket hole or frame line noise on the occasional film which has placed sound track.
- (b) An unvarying tension of 300 grams is maintained on the film between scanner drum and sprocket by means of eddy current drag produced in the flywheel. This is done by placing copper ring in the flywheel, (see Fig. 1) and causing it to rotate in a magnetic field by high coercive force magnets. The amount of drag and consequently the amount of film is adjusted at the factory by setting the air gap between the copper ring and the magnet attempt should be made to change this adjustment in the field.

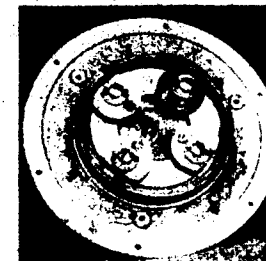


Fig. 1
View of Flywheel
with Cover Removed
to Show Magnets

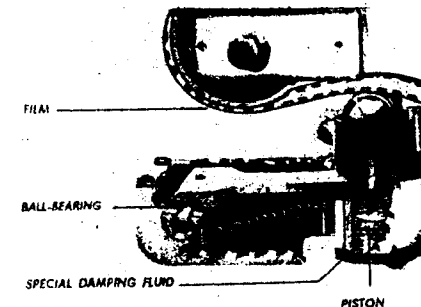


Fig. 2
Cut-Away View of
Flutter Suppressor



Features (Continued)

compliance damper assembly is provided in the form of an hydraulic flutter suppressor. It consists of a casting (see Fig. 2) in which is mounted a pivoted arm supporting a ball bearing mounted roller over which the film rides. The roller is tensioned against the film by a spring attached to the pivoted arm. The spring tension is adjustable by means of a screw and lock washer. Variations in the film tension as the film passes over the roller imparts irregular motions to the latter in the vertical plane. These motions are damped out by a viscous damper associated with the roller. The cup containing the damping fluid is readily removed for inspection by loosening a set screw. The damping fluid has been carefully chosen to have proper characteristics and to have a minimum of viscosity change with temperature. When replacing the oil great care should be exercised to insure that only the specified type of fluid (Westrex F2 oil) is used.

collector lens assembly, consisting of a doublet lens followed by a single lens, has been added between the film and the phototube. The doublet images the film plane in the aperture of the single lens, thus providing a plane in which separator lenses may be placed for scanning 0, 100% up-pull or double sound track, should this requirement arise. The single lens images the aperture of the doublet onto the cathode of the phototube. Under this condition the spot of light used on the phototube cathode does not vary in area but in intensity as the moving striations on the sound track modulate the light beam. This condition of constant area and variable intensity is an advantage in that the variations in light are effective over the entire photosensitive area covered by the light spot.

two-stage phototube amplifier consists of a gain stage, followed by an impedance transforming stage of the cathode follower type, thus eliminating the usual output transformer which added weight and cost to previous designs.

flutter from this reproducer is remarkably low as shown in Figure 3. In this figure it will be noted that at no flutter frequency does the amount exceed $\pm 0.04\%$ while the total integrated flutter from 2 to 200 cycles does not exceed $\pm 0.08\%$. This performance is considerably better than the present Academy Standard and it might be said that the problem of flutter has at last been solved for theatre reproduction.

time of recovery after the passage of a film splice is less than one second.

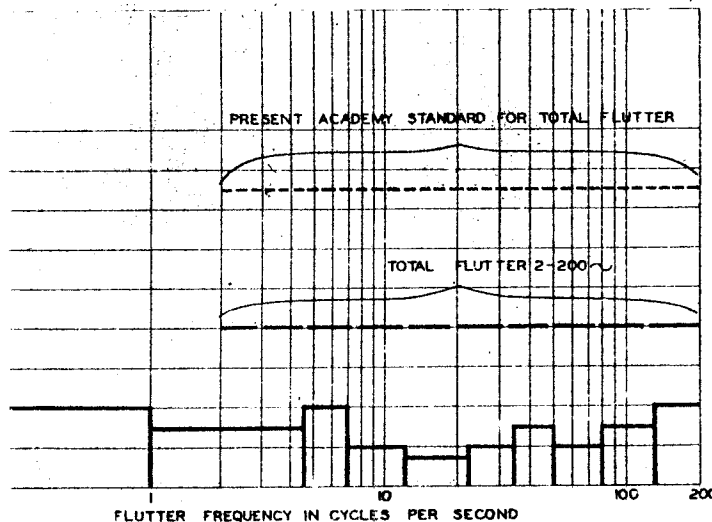


FIG. 3
FLUTTER OUTPUT
OF R2 REPRODUCER



4.2 Installing the Sound Head with Direct Drive (D2C) to Projector (Continued)

washer. Three of the screws go in from above (one on operating side and two on other side of soundhead) and one from below (on operating side of sound head). Tighten the four screws securely. These are special screws which when tight provide correct pressure on the rubber washers. Line up motor shaft with motor driven shaft in the sound head by loosening the four motor fastening screws and shift the motor into line. Retighten the four screws. Secure the coupling to the motor shaft, lining up set screw with flat on the shaft.

12th - Mount the R2320 motor housing and door, using three $3/8-16 \times 1 \frac{1}{2}$ H.C. Screws and washers.

13th - Mount projector on reproducer set using $3/8-16 \times 1 \frac{1}{2}$ H.C. screws but do not tighten. Four screws should be used with Century projectors and two with other projectors. If an oil tray is used, insert tray between projector and reproducer. Care should be taken that projector is mounted squarely and not at an angle. If the projector is a Century "C" or "CC" type equipped with a G2-4-G Gear at the lower end of the vertical shaft, remove the gear in accordance with Section 5, below, if a D2C Drive is to be installed with the reproducer set.

14th - Install the R221 impedance drum as follows:

Remove the L3 Lens (collector lens) and insert the R221 impedance drum in the sound head from the drive side of the reproducer.

Secure with the three $1/4-20 \times 5/8$ F.I. screws from the operating side of the reproducer. Replace the L3 Lens.

Remove the three screws from the R245 bearing cover plate on the rear of the scanner housing, remove and discard the R2329 chipboard gasket and replace the cover plate. Remove the three R2363 fillister head screws from the scanner housing cover which hold the flywheel in place for shipment (these screws are not in countersunk holes). Tighten the three screws in the R245 bearing cover plate. This places the flywheel in its operating position.

15th - Assemble upper flexible shaft coupling of the D2C drive to lower end of projector vertical shaft and fasten with the screw provided. (This coupling is the longer coupling of the two).

16th - Adjust projector to insure clearance of the D2C Drive through the reproducer. Now tighten the four projector holding screws.

17th - Insert flexible shaft in coupling of D2C Drive. Do not tighten set screws in coupling.

18th - Slide lower coupling (this is the shorter coupling of the two) of D2C Drive on to the flexible shaft and then slip it on to the vertical drive shaft of the drive, fastening with the screw provided.

19th - Remove two set screws in upper coupling of D2C Drive and line up flats of the flexible shaft with the set screw holes. Insert set screws and tighten.

20th - Remove two set screws in lower coupling of D2C Drive and line up flats of the flexible shaft with the set screw holes. Flats may be brought in line by rotating projector. Insert set screws and tighten.

21st - Install take-up belt, cutting to proper length, and adjust R297 idler pulley to provide proper tension of the belt.

22nd - Remove the oil reservoir in the damper of the hydraulic flutter suppressor by loosening the set screw and fill to the inside groove with F2 Fluid. Replace reservoir and tighten set screw.

23rd - Connect the reproducer to the sound system and power supply. The "Pot. Out" and "Pot. G" terminals of the A4 Amplifier are for the 600 ohm output line. The 6.3 volts terminals are for the vacuum tube filaments (6AK5 type, total heater current 350 milliamps). The "LP" terminals are for the L2 Exciter Lamps (9 v., 4 amps., d.c.) and the "FB" terminal is for the changeover relay. The "480V" terminal is for plate and phototube voltage and must be such that the voltage delivered between phototube socket contact #4 and the ground terminal is minimum 80, maximum 85 volts. Also connect the motor to the power line.

4.3 Installing the Sound Head with Chain Drive (D2S) to Projector

The D2S Drive consists of the R23E3 Chain Drive Assembly, the R2217 Chain Sprocket, the R2272 Silent Chain and the R2275 Idler Roller. It is installed as follows:-

1st to 7th - Mount the Sound Head as in Section 4.2, above.

8th - Tighten projector screws, left loose in 7th, above, and then assemble the chain sprocket of the D2S Drive on to the lower sprocket shaft, making the hub flush with the end of the shaft.



6.3 Turning on the Sound Head and Making Change-Overs

- 6.32 The three-position switch on the exciter lamp compartment controls the exciter lamp and vacuum tube filaments of the A4 Amplifier. No. 1 position lights No. 1 lamp (the outside lamp) and the vacuum tube filaments and No. 2 position lights No. 2 lamp and the vacuum tube filaments. The center position is "OFF". The lamp that is on should be placed in position just behind the lens by a simple movement of the bracket. The other lamp serves as a spare in case of a filament burn-out.
- 6.33 The volume of the sound output is controlled by the potentiometer on the door of the phototube amplifier compartment. Advancing the potentiometer in a clockwise direction (i.e., toward the higher numbers) increases the volume.
- 6.34 The machine is connected into the system by operating the pushbutton located above the volume control potentiometer. Successive operation of the pushbutton has no effect but operation of the pushbutton on another machine (on two and three machine installations) switches the sound to the other machine. Change-overs are therefore made by standing by the incoming machine and pressing the pushbutton when the proper cue appears on the screen.
- 6.35 The change-over pushbutton can be supplemented for remote control (at any part of the booth desired by the operators) by connecting another button or switch in parallel with the one on the machine.

6.4 Threading the Film

- 6.41 The film is threaded in the reproducer as follows: After passing the film around the impedance drum, close the impedance roller. Pass the film over the flutter suppressor to the sound sprocket leaving one or two sprocket holes slack (excess film at this point will dispose of itself in the loop above the scanner when the machine is started but too much loop will, of course, tend to throw the sound out of synchronization with the picture). Close pad roller on sound sprocket. Use the take-up sprocket pad roller as a loop setter to give proper loop between the sound and take-up sprockets. Close pad roller on take-up sprocket.
- 6.42 When the machine is running the red line on the flutter suppressor will be approximately parallel with the cover plate.

6.5 Adjusting the Sound Optical System

- 6.51 Turn on the exciter lamp that is behind the scanning lens assembly. With no film in the machine a rectangular spot of light should be seen on the phototube cathode. Remove the phototube and hold a white card in the cathode plane. An image of the filament wire of the exciter lamp should be seen in the exact center of a much subdued circle of light and the image should be more pronounced on the back wall of the amplifier compartment where it strikes the hinge of the cover. Also, when the card is held near the collector lens a thin bright line of light should be seen and it should be exactly 90° from the vertical axis of the film.
- 6.52 If the above does not apply, loosen the nut securing the scanning lens assembly and move the lens tube until it does apply. Also, adjust the exciter lamp vertically by means of the two thumb nuts provided on the exciter lamp bracket.
- 6.53 The optical system is now in approximate adjustment. Complete the adjustments for focus and azimuth with a 1000-5000 c.p.s. loop in the usual manner. USE ONLY 8000 C.F.S. FILM WHOSE AZIMUTH HAS BEEN CERTIFIED CORRECT because ordinary 8000 c.p.s. recordings have been found to have errors as high as 14 db for azimuth.

6.6 Gain and Frequency Response.

- 6.61 Gain and frequency response of the optical system and A4 Amplifier may be checked with an approved film and a vacuum tube voltmeter.
- 6.62 To check gain and frequency response, open the output line of the reproducer by removing the external wire going from the "Pot. Out" terminal to the main amplifier system. Connect a 500 ohm lead across the "Pot. Out" and "Pot. C" terminals and connect the vacuum tube voltmeter across this resistance.
- 6.63 The gain and frequency response should then be as given on Drawing WEXL-1009.

6.7 Working on One Machine While Other is Running

- 6.71 The sound from the idle reproducer is completely disconnected from the system by the change-over relay. Also, the filaments of the A4 Amplifier are disconnected by operating the exciter lamp switch to the center ("OFF") position. The sound circuits of the idle machine can then be worked on without creating noise in the system.
- 6.72 It must be remembered, however, that the power supply on the main terminal strip is still hot (the 6.3 volts and 4150 volts) and care should be exercised that they are not shorted or grounded by metal tools.



4.3 Installing the Sound Head with Chain Drive (D2S) to Projector (Continued)

- 9th - Place the silent chain on the sprocket of the D2S Drive and assemble the gear and assembly of the drive in to the projector. The 17 tooth pinion is slipped into the ring on the projector and is held in place by four pivot screws in the pulley. The secured in the regular manner. The oil cup is necessary only with other than Centura.
- 10th - Mount the Chain Idler Roller Assembly of the D2S Drive, leaving the chain fully alo
- 11th - Same as 6th in Section 4.2, above.
- 12th - Adjust the chain idler of the D2S Drive to take up most of the slack in the drive c
- 13th, 14th and 15th - Same as 15th, 16th and 17th in Section 4.2, above.

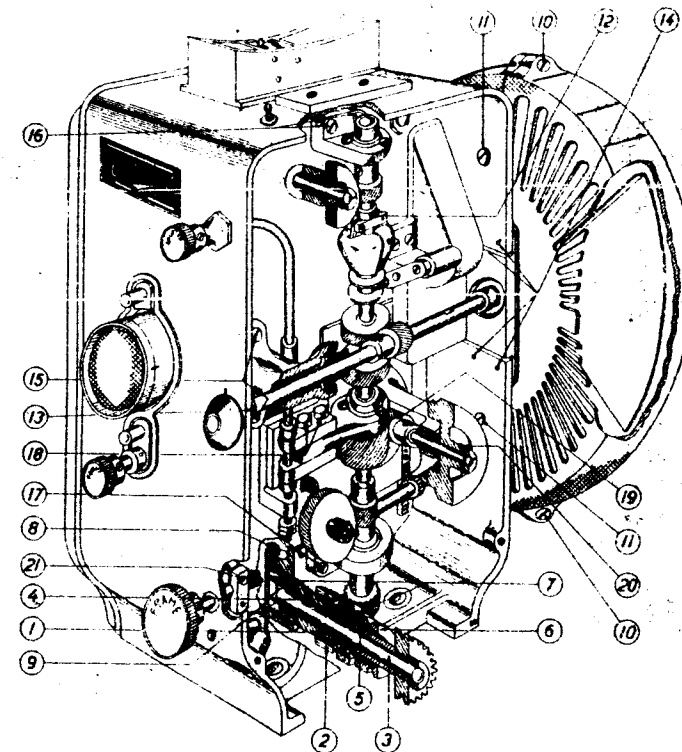


Fig. 4
MODEL O CENTURY PROJECTOR
DRIVING SIDE



If the film amplifier must be removed while the show is in operation, carefully unsolder the "180" and "6.3V" wiring and tape the bare ends of each conductor.

collaneous

Replace the exciter lamps when they blacken to the extent of reducing the sound output by 3 db as determined by comparison with a new lamp.

Replace the vacuum tubes when they reduce the sound output by 1 or 2 db compared to a new tube with sound generated by permitting a small amount of light from an a.c. lamp to strike the phototube. Also replace them when they are microphonic. (Note: A tube found to be microphonic in the first stage may be satisfactory in the second stage.)

Replace the phototube when it differs by 3 db from a new one when checked with sound generated by emitting a small amount of light from an a.c. lamp to strike the phototube. (The actual phototube current with 8.6 volts on the exciter lamp, no film in the machine and a microammeter in series with contact 4 by means of a socket adaptor, should be approximately 3 microamperes.)

Keep all lenses clean. When cleaning use care not to scratch them. First remove as much dirt as possible with a soft brush. Then polish with lens cleaning fluid and lens tissue.

FILES REQUIRED FOR INSTALLATION

- 24 - A1 Amplifier - Schematic - (File 4.03)
- 11 - R2 Reproducer - Assembly - (File 4.36)
- 20 - R2 Reproducer - Wiring Diagram - (File 4.36)
- 1009 - A1 Amplifier - Gain Frequency Characteristics - (File 4.03)



5. REMOVAL OF GR-4-G GEAR FROM CENTURY MODELS "C" AND "CC" PROJECTORS TO PERMIT USE OF DIRECT (D2C) DRIVE

- 1st - Remove the intermittent flywheel from driving side of projector by removing screw #20, Fig. 4.
- 2nd - Remove half of shutter guard from driving side by removing two screws #10, Fig. 4.
- 3rd - Remove shutter shaft indicating knob #13, Fig. 4, by loosening the set screw in its hub.
- 4th - Remove four screws #14, Fig. 4 (two upper and two lower) from shutter shaft bracket (outer).
- 5th - Remove two screws #15, Fig. 4, from shutter shaft inner bracket.
- 6th - Remove complete shutter shaft assembly as a unit. If necessary, tap bracket lightly with wooden handle of screw driver to loosen.
- 7th - Remove the two screws #16 and two screws #17, Fig. 4, from the upper and lower bearing brackets of the vertical shaft assembly. These brackets are also dowelled.
- 8th - Remove the two hex head screws #18, Fig. 4, on the bearing bracket and remove the vertical shaft assembly. Remove the Century GR-4-G steel gear from its lower end by removing the screw holding it to the shaft.
- 9th - Replace the vertical shaft assembly using the four screws; two in upper and two in lower bearing brackets. Do not tighten screws.
- 10th - Revolve the center bearing bracket to engage the arm, and insert the two screws #18, Fig. 4. Do not tighten.
- 11th - Adjust vertical shaft for proper mesh between upper and lower sprocket shaft gears and tighten four bearing bracket screws. The gears should mesh closely enough to prevent an excessive amount of backlash but not sufficiently close to cause binding. (This mesh is largely controlled by the dowel pins which in many cases will be tight enough to obviate any adjustment of the mesh).
- 12th - Turn the vertical shaft by hand a number of times and then tighten the two hex head screws #18, Fig. 4, holding the bearing bracket in place.
- 13th - Install the complete shutter shaft assembly and secure inner bearing bracket in place with screws #15, Fig. 4. Before tightening the four screws #14, Fig. 4, in the outer bearing bracket, adjust for proper mesh of the shutter shaft gears. The gears should be meshed close enough to prevent an excessive amount of backlash but not sufficiently close to cause binding.
- 14th - Assemble shutter shaft indicating knob and secure with set screw.
- 15th - Assemble intermittent flywheel and secure in place with screw #20, Fig. 4.
- 16th - Replace half of shutter guard with screw #10, Fig. 4.

6. OPERATING INSTRUCTIONS

6.1 Lubrication

- 6.11 Put one drop of oil on each gear and one drop of oil in the oil cups. Repeat at occasional intervals but DO NOT OVER-OIL as too much oil is definitely detrimental. DO NOT ATTEMPT TO OIL THE M2 MOTOR AT ANY TIME because it is a ball bearing motor and does not require oil. Greasing of the bearings on the M2 Motor should be carried out not oftener than twice yearly using the Westrex L2 Lubricant which is a high quality ball bearing grease packaged in a collapsible metal tube having a long neck which fits into the set-screw hole of the bearing. To grease, remove set screw, insert neck of tube and squeeze in a small amount of grease.

6.2 Installing Tubes and Exciter Lamps

- 6.21 With the reproducer connected to the sound system per Step 17, Section 4.2, above, insert the No. 930 phototube in the phototube socket. Adjust the position of the phototube so that the shadow of the anode does not fall within the rectangle of light on the cathode. (This shadow, when present, decreases the output by about 2.6 db).
- 6.22 Insert the two No. 6AK5 vacuum tubes in their respective sockets. The No. 6AK5 vacuum tubes must be as non-microphonic as possible, particularly V1, to prevent the pickup of machine noise and it may be necessary to try several tubes in V1 to obtain a quiet one.
- 6.23 Insert the two No. L2 Lamps in the exciter lamp sockets, pressing down and giving a clockwise twist to lock in position.
- 6.24 Adjust the voltage across the L2 Lamp as measured at the lamp socket, to minimum 8 volts, maximum 8.5 volts.

Issue 1
March 19, 1946

Westrex Corporation
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**1. Abstract**

This addendum includes:

- a) Description of Gear GR-67.
- b) Reason for replacement and application.
- c) Instructions on the replacement of take-up sprocket driven fibre gear GR-45-SH by cast iron Gear GR-67 on R2 Reproducers.
- d) Ordering information

2. Description

- 2.1 The GR-67 Gear is a cast iron gear similar in physical dimensions to take-up sprocket driven fibre gear GR-45-SH, and it is recommended that the new type of flange clamping screw, SC-641, be used, which is sturdier than the present clamping screw used with the GR-45-SH Gear.

3. Reason and Application

- 3.1 When the R2 Reproducer is operated with certain competitive projector heads, notably Simplex E7 mechanisms, where the shaft of Gear GR-45-SH also carries the projector drive coupling gear, the teeth of Gear GR-45-SH are likely to shear because of the excessive imposed mechanical strain.
- 3.2 When Century heads are used, the shaft of Gear GR-45-SH is not used for driving the projector and the fibre gear GR-45-SH should not be replaced.

4. GR-67 Gear - Replacement Procedure

- 4.1 Remove Gear GR-45-SH and fit in its place Gear GR-67 using the new Clamping Screw Century Part #SC-641.
- 4.2 Re-adjust the alignment of the horizontal drive shaft in the R2 Reproducer to insure quiet operation. This is done by slacking the four screws which hold the two horizontal drive bearing castings in position and tapping the bearing castings gently until a small degree of backlash is introduced between Gear GR-67 and the steel pinion on the horizontal drive with which it meshes.

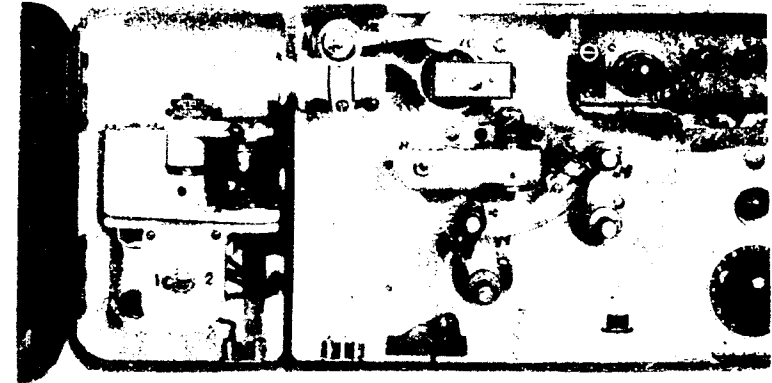
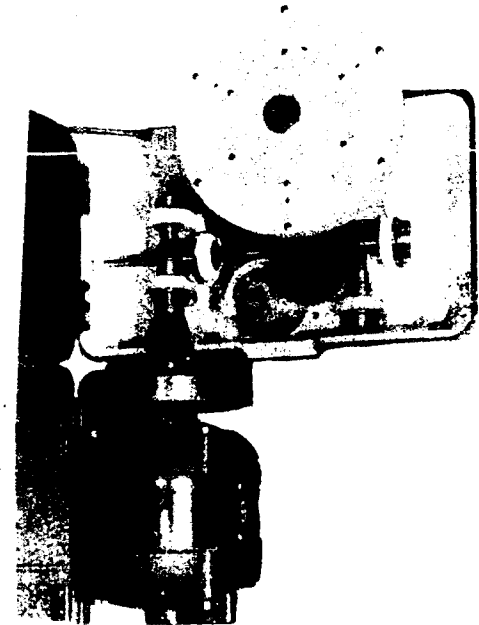
5. Ordering Information

- 5.1 One cast iron gear and clamping screw are required for each R2 Reproducer to be modified and should be ordered as

GR-67 Cast Iron Gear SC-641 Retaining Screw.

October 30, 1947

Westrex Corporation
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Photo No. 1002 - WESTREX R2 REPRODUCER
OPERATING SIDEPhoto No. 1003 - WESTREX R2 REPRODUCER
DRIVE SIDE

Westrex Corporation
NEW YORK, N. Y.
PRINTED IN U.S.A.



Westrex Ordering Number	Description	Century Part Number
R2311	Nut - Hex	NU-8
R2193	Nut - Exciter Lamp Adjusting	NU-31
R2285	Nut - Exciter Lamp Jam	NU-32
R2376	Nut - Oil Damper	NU-33
	Plate - Door Hinge (Flat)	PE-15
	Plate - Door Hinge (Bend)	PE-16
R2118	Plate - Oil Damper Cover	PE-91
R239	Plate - Impedance Flywheel Cover	PE-93
R2175, 243	Plate - Switch Mounting	PE-95
R2173	Plate - Exciter Lamp Terminal	PE-98
R2338	Plate - Cover	PE-99
R295	Plate - Motor Bracket Rubber	PE-105
R2187	Plate Exciter Lamp Retaining	PE-125
R2350	Plug	PG-13
R2309	Plug - Motor Brake Felt	PG-124
R2331, 332	Pinion - Main Drive	PI-94
R2299	Pin	PE-14
	Pin - Door Hinge	PE-17
R2369	Pin	PE-32
R2138	Pin - Pad Roller Stop	PE-36
R2190	Pin - Steel	PE-68
R2122	Pin - Oil Damper Ten. Spring	PE-94
R2224	Pin - Exciter Lamp Shield	PE-101
R2139	Pin - Taper	PE-103
	Pin	PE-104
R228	1/8" Dia. x 3/8" long - Steel Dowel Pin	PE-126
R2362	3/32" Dia. x 1/2" long - Steel Dowel Pin	PE-127
R2120	Plunger - Oil Damper	PU-90
R2310	Plunger - Motor Brake	PU-97
R299	Pulley - Belt Take Up	PT-100
R2112	Pulley - Take Up Drive	PT-102
R2305	Rod - Motor Brake Plunger	RD-39
R240	Ring - Outer Impedance	RI-35
R245	Ring - Impedance Ball Bearing - Retainer	RI-36
R237	Ring - Inner Impedance	RI-37
R2214	Ring - Relay Lens Retainer	RI-41
R2145	Sub Assembly - Pad Roller & Tube	RO-15
R2145	Roller - Pad	RO-17
R2277	Roller - Chain Idler	RO-38
R2129	Retainer - Oil	RI-40
R2234	Spacer - Motor & Horizontal Shaft Gear	SA-508
R2129	Spacer - Impedance Retainer Ring	SA-524
R250	Stop - Door Closing (Felt Plug)	SB-60
R2355	Screw - Binding Head	SC-70
R2368	Screw - Phillips Head	SC-72
R2353	Screw - Phillips Head	SC-75
R2158	Screw - Binding Head	SC-82
R2345	Screw - Phillips Head	SC-140
R2378	Screw - Binding Head	SC-7
R2363	Screw - Phillips Head	SC-81
R2313	Screw - Phillips Head	SC-83
R2	Screw - Hex Head	SC-87
R2315	Screw - Phillips Head	SC-88
R2367	Screw - Phillips Head	SC-89
R2101	Screw - Set	SC-97
R2346	Screw - Flat Point Set	SC-103
R259	Screw	SC-110
R2360	Screw - Phillips Head	SC-116
R2357	Screw - Binding Head	SC-123
R2345	Screw - Binding Head	SC-127
R2126	Screw	SC-282
R2123	Screw - Spring Adj.	SC-284
R2119	Screw - Oil Damper Ball Bearing Fastening	SC-285
R229	Screw - Collector Lens Holder - Mounting	SC-291
R2312	Screw - Pad Roller Arm Stop	SC-293
R2370	1/4" - 20 x 3/8" Allen (Socket) Head Flat Point Set Screw	SC-502
R2372	1/8" - 16 x 3/4" Hex Cap Nut - Nickel Dipped	SC-503
R2159	5-40 x 5/16" Round Head Steel Screw Dipped Nickel	SC-504
R2276	Screw - Chain Idler Roller Arm - Fast.	SC-512



All orders for parts for the R2 Reproducer should give the Westrex Ordering Number obtained from hand column below. The Century and Northern Electric numbers are for reference only and should be in ordering. (For Northern Electric Numbers, refer to footnote on Page 4.)

Westrex Ordering Number	Description
R2116	Arm - Oil Damper
R2133	Arm - Upper Pad Roller
R2147	Arm - Lower Pad Roller
R2149	Arm - Impedance Roller
R228	Arm - Belt Take-up Pulley
R2274, 273	Arm - Chain Idler Roller
R2334	Attenuator - Sound Control
R2125	Base - Exciter Lamp
R2206	Bearing - Ball
R230	Bearing - Impedance Flywheel - Shaft Ball
R2253	Bearing - Oil Damper Shaft Ball
R2117	Bearing
R2339	Block - Take-up Magazine - Mounting
R2150	Ball - Pad Roller Arm
	Bracket - Vertical Shaft Bearing (Upper)
R2204	Bracket - Vertical Shaft Bearing (Lower)
	Bracket - Collector Lens Holder
R291	Bracket - Motor (60 cycle)
R2185, 244	Bracket - Exciter Lamp Base
R2132, 245	Bracket - Exciter Lamp Mounting
R2222	Bracket - Lens Tube
R2109	Bracket - Belt Take-up
R2153	Bushing - Impedance Roller Arm
R2136	Bushing - Impedance Roller Felt
R2348	Bushing - Upper Sprocket
R2110	Bushing - Take Up Drive Shaft
R2133	Bushing - Exciter Lamp Adjusting Stud
R2188	Bushing - Vibration Absorbing
R2238	Bushing - Motor Flywheel
R2345	Bushing
R294	Coupling - Motor
	Sub-Assembly - Ball Bearing Bracket
R2272	Chain - Drive (For Simplex Projector)
R2205	Collar - Thrust
R2233	Collar - Oil Protecting
R247	Collar - Impedance Flywheel - Shaft
R2209	Collar - Oil Protecting
R263	Clamp - Door Glass
R267, 263	Cover - Attenuator
R278	Cover - Photo Electric Cell
R283	Catch
R2358	Catch - Door
R2124	Cup - Oil Damper
R2322	Cup - Main Drive Oil
R252	Sub Assembly - Door Hinge & Pin
R2142	Sub Assembly - Pad Roller Shaft & Knob
R2327	Sub Assembly - Ball Bearing Bracket
R221	Assembly - Impedance Drum
R235	Sub Assembly - Inner Impedance Ring and Flywheel
R223	Sub Assembly - Condenser Lens
R222	Sub Assembly - Collector Lens Holder
R232	Sub Assembly - Impedance Flywheel Cover Plate
R231	Sub Assembly - Collector Lens Holder Bracket
R2114	Assembly - Oil Damper
R2146	Assembly - Lower Pad Roller Arm
R2135	Sub Assembly - Pad Roller Arm Stud & Flange (Lower)
	Sub Assembly - Pad Roller Stud & Knob (Lower)
	Assembly - Upper Pad Roller Arm
R2136	Sub Assembly - Pad Roller Arm Stud & Flange
R2135	Sub Assembly - Pad Roller Stud & Knob (Lower)
	Assembly - Exciter Lamp
R2171	Sub Assembly - Exciter Lamp Terminal Strip
R2172	Sub Assembly - Exciter Lamp Adjusting Stud & Bushing
R2191	Assembly - Impedance Roller
R2148	Assembly - Impedance Roller
R2315	Sub Assembly - Impedance Roller Felt Washer & Bushing

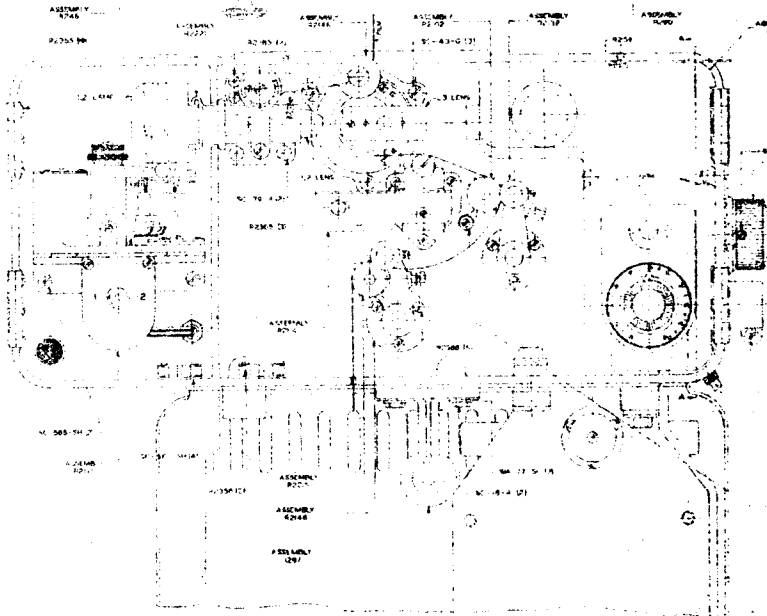
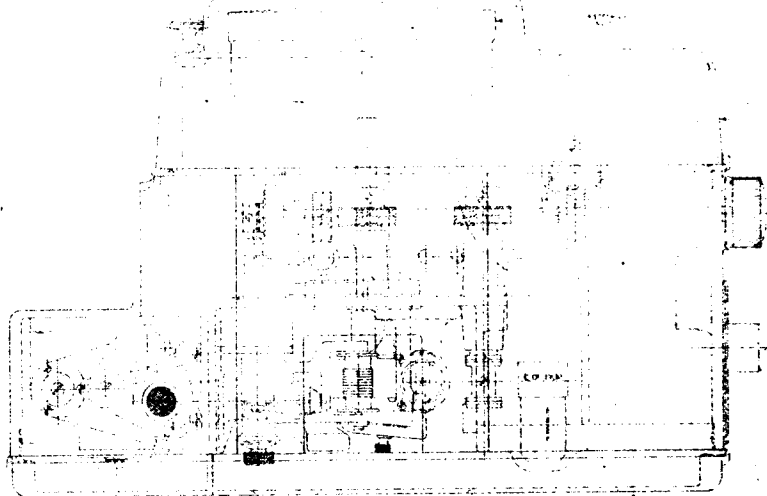


Ordering Number	Description	Century Part Number
40	Screw - BEC Cover Fast.	SC-521
77	10/32" x 3/8" Flat Point Headless Set Screw (Oil Damper)	SC-523
4	1/4-20 x 3/4" Flat Head Brass Screw - Cadmium	SC-525
51	4-32 x 1/4" Flat Point Headless Set Screw	SC-527
51	5/40 x 1/4" Binding Head Screw - Dip Nickel Finish	SC-529
36	10-32 x 5/8" Round Head Steel Screw - Dipped Nickel	SC-531
36	Screw - Motor Bracket Fast.	SC-533
73	3/8"-16 x 1/8" Hex Head Cap Screw - Dipped Nickel	SC-535
34	10-32 x 1/4" Head Steel Round Screw - Dipped Nickel	SC-537
36	5-40 x 1/4" Round Head Steel Screw - Dip Nickel Finish	SC-539
36	6-32 x 3/4" Binding Head - Blue Steel Screw	SC-540
37	1/4-20 x 1/4" Flat Point Set Screw	SC-562
41	Shield - Exciter Lamp	SC-520
30, 701	Socket - Exciter Lamp	ST-514
40	Spring - Pad Roller Arm	SC-281
25	Spring - Oil Damper Tension	SC-287
30	Spring - Impedance Roller Adj.	SC-289
51	Spring - Impedance Roller Ball	SC-295
3	Spring - Motor Brake Compression	SC-531
71	Sprocket - Upper Chain	SK-517
37	Sprocket - Lower Chain	SK-518
37	Sprocket - Sound and Take Up	SK-540
70, 269	Stringer - Sound Sprocket	SP-537
3	Strike	SS-528
44	Shaft - Pad Roller	ST-50
31	Shaft - Oil Damper Bearing	ST-283
32	Shaft - Impedance Roller	ST-285
37	Shaft - Impedance Flywheel	ST-292
37	Shaft - Horizontal Drive	ST-297
32	Shaft - Motor Drive	ST-298
37	Shaft - Vertical Drive	ST-505
33	Shaft - Sound Sprocket	ST-506
31	Shaft - Take Up Drive Gear	ST-507
33	Shaft - Main Drive	ST-516
3	Shaft - Take Up Sprocket Drive	ST-526
34	Stud - Impedance Roller Arm	ST-292
37	Stud - Pad Roller Arm (U & L)	ST-509
32	Stud - Exciter Lamp Adjusting	ST-510
33	Stud - Vibration Absorbing	ST-511
30	Stud - Belt Take Up Pulley	ST-513
36	Stud - Chain Idler Roller	ST-535
34	Switch - Changeover	SW-541
30	H & H Switch - Catalog #21354	TX-25
34	Terminal	TU-7
35	Tube - Pad Roller	TA-26
3	Tubing - Motor Bracket Fast. Screw Rubber	TU-27
3	Tube - Lens	TE-1
8	Ventilator	TA-3
1	Washer - Thrust	WA-10
0	Washer - Thrust	WA-14
34	Washer - Spring Thrust	WA-30
6	13/16" O.D. x 13/32" I.D. x 1/16" thick - Washer - dipped nickel	WA-63
36	Washer - Vibration Absorbing	WA-64
4	#6 Steel Lockwasher	WA-67
8	Washer - Impedance Roller Felt	WA-68
1	13/16" O.D. x 13/32" I.D. x 1/16" thick - Steel Washer	WA-69
3	Washer - Motor Bracket Fast. Screw Rubber	WA-70
4	#10 Steel Washer - Dipped Nickel	WA-75
30	Washer - 3/4" O.D. x 9/32" I.D. x 1/16" Thick - Cadmium	WH-61
3	Flywheel - Motor	WH-62
3, 344	Flywheel - Impedance Drum	WI-64
0	Should be WI-74-SH	WI-73
39	Obsolete	WI-74
31, 292	Wire - Ground Lead	

1 Northern Electric Drawing Numbers are the same as the Westrex Ordering Numbers except that the first two digits of the Westrex Number is changed from R2 to R-12800.

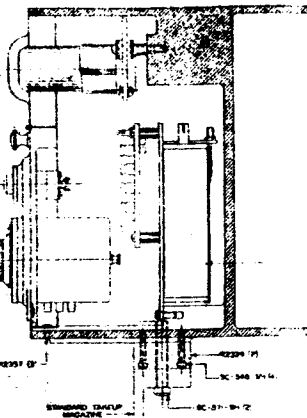


Westrex Ordering Number	Description	Century Part Number
R2155	Sub Assembly - Impedance Roller	R
R2161	Sub Assembly - Impedance Roller Shaft & Knob	R
R2152	Sub Assembly - Impedance Roller Stud & Bushing	R
R2221	Assembly - Lens Tube Bracket	R
R2226	Assembly - Horizontal Drive Shaft	F
R2231	Assembly - Motor Drive Shaft	R
R2202	Assembly - Vertical Drive Shaft	R
R2102	Assembly - Sound Sprocket Shaft	R
R2215	Assembly - Take Up Sprocket Shaft	R
R2108	Assembly - Take Up Drive	R
R297	Assembly - Belt Take-Up	R
R285	Assembly - Motor Bracket	R
R286	Sub Assembly - Motor Brake	R
R253	Assembly - Non-operating Side Door	R
R260	Assembly - Right Front Door (Operating Side)	R
R248	Assembly - Left Front Door (Operating Side)	R
R266	Assembly - Attenuator Cover	R
R2380	ETC Amplifier - Drawing WEX-127	R
R2275	Assembly - Chain Idler Roller	R
R2323	Assembly - Chain Drive	R
R2330	Sub Assembly - Pinion & Chain Sprocket	R
R277	Assembly - BEC Cover	R
R2320	Assembly - Motor Housing & Door	R
	Assembly - Sound Head	R
R2335	Dial - Attenuator	DU
R254	Door - Non-Operating Side	DX
R249	Door - Left Front (Operating Side)	DX
R261	Door - Right Front (Operating Side)	DX
R2256, 255	Door - Motor Housing	DX
R233	Drum - Impedance	DU
R2175	Eyelet - Exciter Lamp Terminal Strip	E
R2176	Eyelet - Exciter Lamp Terminal Strip	E
R2167	Flange - Impedance Roller Guide	FI
R2134	Flange - Pad Roller Arm (U & L)	FI
R2212, 258	Frame - Main	FI
R262	Glass - Right Front Door	GI
R2228, 229	Gear - Vertical Shaft Drive	GI
R2208, 303	Gear - Vertical Shaft Driven	GI
R2104, 105, 106	Gear - Motor & Sound Sprocket Driven	GI
R2230, 301	Gear - Motor & Sprocket Drive	GI
R2113, 302	Gear - Take Up Drive	GI
R2218, 219, 220	Gear - Take Up Sprocket Driven	GI
R2307, 308	Gear - 50 and 25 cycle motor drive	GI
R2319	Hinge - Attenuator Cover	HI
R2352	Hinge - Motor Housing Door	HI
R287	Holder - Collector Lens	HC
R2115	Housing - Oil Damper (Sound Head)	HC
R232	Housing - Impedance Flywheel	HC
R267, 328	Housing - Motor Brake	HC
R2280, 279	Housing - Motor	HC
R2136	Knob - Pad Roller (Lower)	KI
R256	Knob - Door	KI
R2143	Knob - Pad Roller Shaft (U & L)	KI
R2157	Knob - Impedance Roller Adj.	KI
R2163	Knob - Impedance Roller Shaft	KI
R273	Knob - Horizontal Shaft	KI
R2197	Knob - Exciter Lamp Base	KI
R288	Knob - Motor Brake	KI
R2297	Knob - Pad Roller (Upper)	KI
R2317	Knob - Attenuator Cover	KI
R2336	Knob - Attenuator	KI
R256	Link - Door Stop	LI
R2375	4 Ampere, 9 Volt Exciter Lamp, Pre-Focus Base	LE
R2130	Lens - Relay	LS
R2293	Stimpson D1714 Terminal	LU
R241	Magnet - Impedance Flywheel	MG
R292	Motor - Sound Head Drive - 60 Cycles	MC
R293	Motor Flywheel	MF

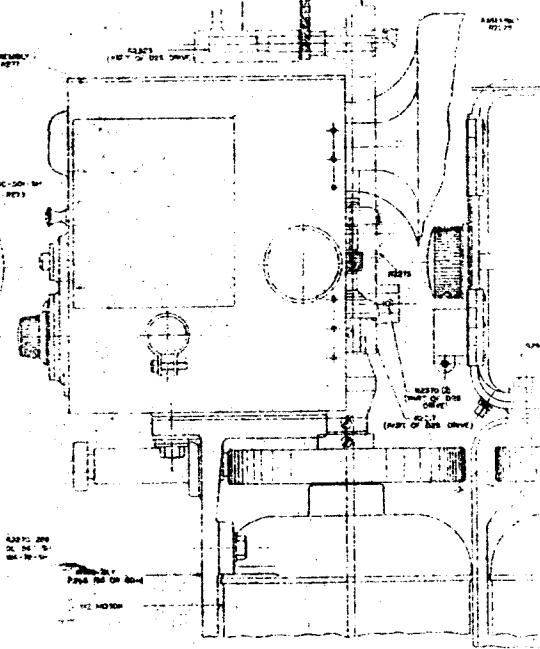


WEX-211

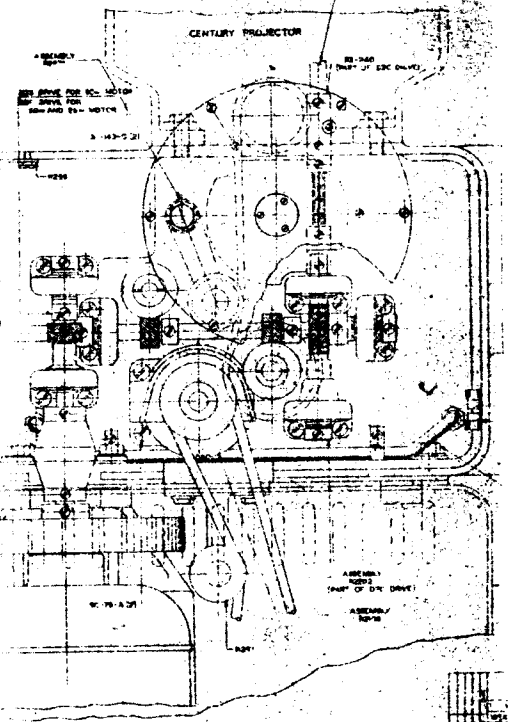
OPERATING SIDE VIEW



SECTION A-A



FRONT VIEW



DRIVE SIDE VIEW

LIST OF COMMERCIAL PARTS

PART NO.	DESCRIPTION	QTY.	REF.	UNIT
12288	DOOR PIN	1	1	EA.
12289	DOOR PIN	1	1	EA.
12290	DOOR PIN	1	1	EA.
12291	DOOR PIN	1	1	EA.
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12398	DOOR PIN	1	1	EA.
12399	DOOR PIN	1	1	EA.
12400	DOOR PIN	1	1	EA.

NOTE

1. FOR CENTURY ADAPTION PARTS USE DEC. 1937 FOR DETAILS AND DIMENSIONS. PRODUCTION USE THE DATE DEC. 1937. PARTS OF DRIVE DEC. 1937. PARTS OF BODY 1937.

2. FOR CENTURY MOTOR'S POINT SUPPORTS REFER TO STANDARD REPORT "1-255-1" FOR CENTURY MOTOR'S USE. FOR CENTURY MOTOR'S USE. FOR CENTURY MOTOR'S USE. FOR CENTURY MOTOR'S USE.

3. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

4. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.

5. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.

6. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.

7. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.

8. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.

9. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.

10. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.

WESTINGHOUSE
NEW YORK, N. Y.
MADE IN U. S. A.



All Prices Net
No Discount

1/4" Drill for drilling hole for installing B-262-0 bushing prior to finishing with reamer (#29).	\$ 2.25
antebore for BB-21 cam bearing for converting case for a felt washer.	6.00
-L-30 Alignment Gauge for Model "C" and Model "CC" film trap. Used to properly align film trap side guides and upper guide roller with the Intermittent Sprocket.	22.00
o and holder for cleaning threads in S-309-E film trap shoes.	2.25
starwheel Ejector (Heavy duty bench type). Used for pushing star wheel shaft thru Intermittent Sprocket.	16.50
starwheel Ejector (Light type). Used for same purpose as (#34).	5.50
star wheel lapping block. Used for lapping the slots of hardened star-wheels.	16.50
Extra laps - each.	2.25
16" Face mill and arbor. Used for facing surfaces which have a 5/16" hole (B-247-BB and B-197-0).	9.00
Arbor only.	3.50
16" and 5/16" Face mill and arbor. One end used for facing surfaces which have a 7/16" hole, and other end for facing surfaces which have a 5/16" hole. (B-246-BB and B-197-0).	9.75
Arbor only.	4.25
Tool for adjusting cam pins.	6.45
Wrench for tightening KN-204-BB and B-444-BB cam shaft bearing.	21.70
Wrench for N-204-BB Nut.	16.40
Tap for S-725-BB screw in BB-30.	.35
Tap for BB-27 thread in BB-30.	3.40
Rotten Stone - per lb.	.50
Arkansas Powder - per lb.	.50
Grease (Rear Shutter) - per tube	.50



BULLETIN #13

