

Century's 70=MM=35 Projector

A Leading American Manufacturer is Introducing Interchangeable 70/35mm Projection and Sound Equipment Having Unique Features

■ THE MOTION PICTURE INDUSTRY has, for some time, observed other forms of entertainment gradually become more popular than motion pictures. Part of this depreciated popularity may have been caused by lack of foresight to continue aggressive research and development toward overcoming the physical limitations of the camera, film, and projector

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systems. The success of such new and complicated motion picture systems as Cinerama, Cinemiracle, Horizontal Vistavision, 3-D, and similar attempts has pointed the way to a

renewed vigor in the industry portending greater things to come.

Among the more recent developments which has proven its value is the use of 70mm motion picture film with its larger picture area and its expanded six channel sound reproduction. Obviously, larger films and multiple sound channels require larger, heavier equipment to project the picture satisfactorily with optimum brightness and to reproduce the sound with clarity.

To that end, Century Projector Corporation dedicated its every effort and talent to the development and manufacture of projection and sound reproducing equipment to fulfill the most exacting specifications, with the highest quality of picture and sound possible within the limitations of the art itself.

The result is the new Century Model J Projector. This projector has the familiar physical aspect of its predecessors—the well-known and proven Model C, Model CC, Model H, and Model HH 35mm Projectors. The designs are also based upon the experience gained in the design of all of the successful projection systems enumerated above, plus about three years cooperative development on wide film projectors with 20th Century-Fox Film Corporation.

The new Model J 70/35mm Projector is the only American made equipment available and follows the time proven design of having the projector mechanism, optical sound reproducer, magnetic sound reproducer, and upper and lower magazines in separate units, thereby adding strength, stability, ease of installation, simplified servicing, and the possible expansion of presently operating projection and sound equipment through modernization in progressive steps, if that appears feasible as the wider film programs enlarge their operations.

An important consideration which has been carefully thought out is the possible adaptation to other film dimensions and processes. Each part of the Model J has been designed, and conversion units are already available for, film dimensions and processes not as yet ready for theatre presentation. Century has taken a long look forward to analyze possible future requirements for projection equipment. The Model J is the answer to an equipment prepared for almost any foreseeable expansion for the present 70mm and 35mm film dimensions, as well as other possible refinements.

The Model J Mechanism

The Model J mechanism is designed to project either 70mm or standard 35mm film. Special attention has been given to make the changeover from one film dimension to the other simple. The whole change can be made within a minute or so (with experience, within seconds). This means that 35mm standard film can be projected and, from the

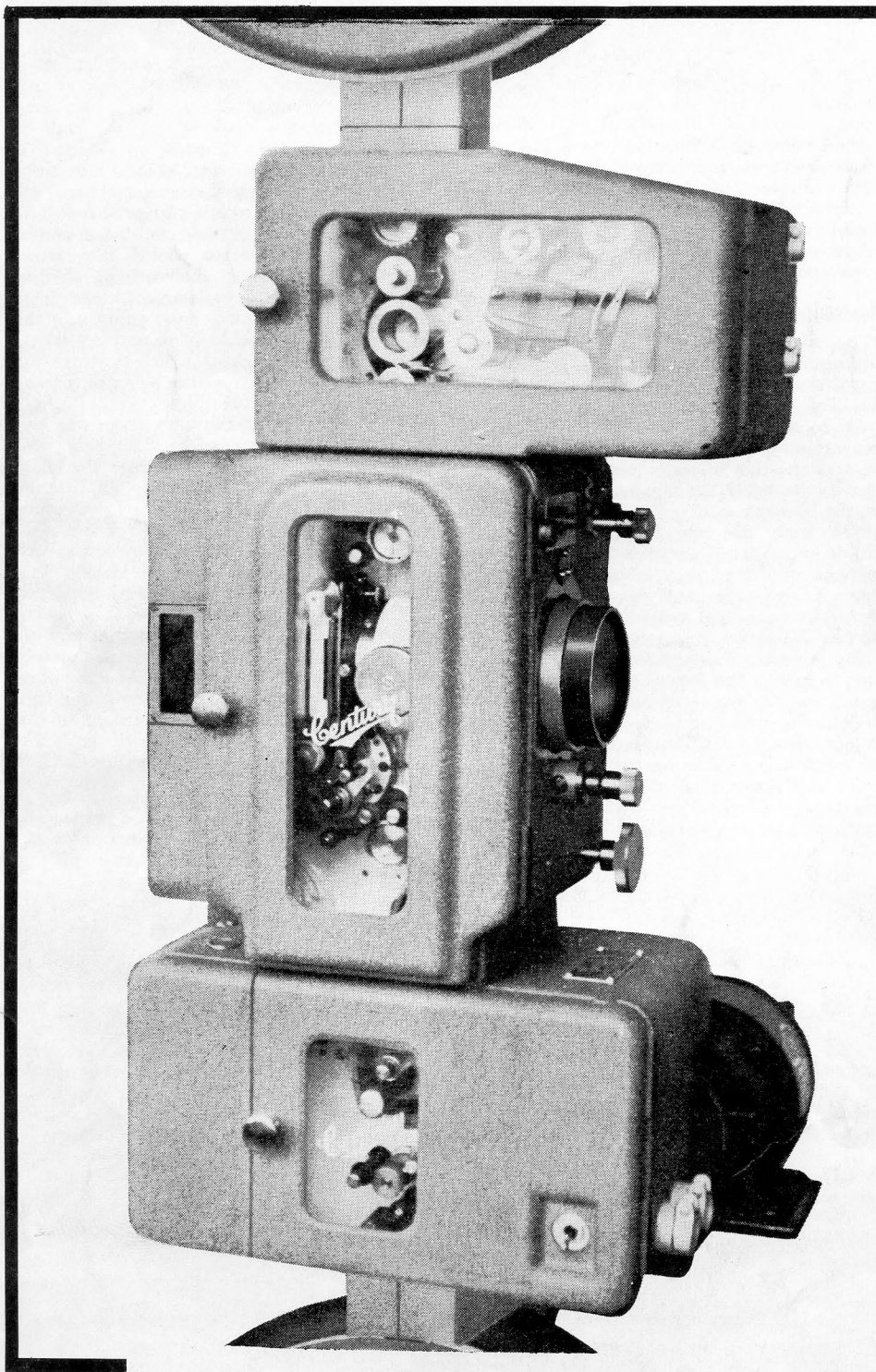


FIGURE ONE: Front view showing a model of the Century 70/35mm projector, including the J1-U-10 upper and J1-W-10 lower 24-inch magazines; R-31 70/35mm magnetic sound reproducer; Model JJ projector mechanism; and Model R-30 optical reproducer. Arc lamps and pedestal are standard.

FIGURE TWO: A front view of the Century Model R-31 70/35mm magnetic sound reproducer, showing the two reproducer heads, hydraulic flutter suppressor, and driven film sprocket.

time the tail end of this film runs out to the time of starting threading 70mm film, only seconds will elapse. It is, therefore, entirely safe and reasonable to run a 70mm feature film with 35mm news and short subjects.

The Intermittent Movement

The intermittent movement, as usual, is the heart of any motion picture projector. The Century 70/35mm intermittent movement has all of the accuracy and stamina of years of experience in the design and manufacture of such units for commercial, as well as specialized, applications.

The standard 70/35mm movement is a geneva starwheel and cam design, but of larger dimensions, larger shafts, larger cam pin, larger starwheel, and larger radii than any known projector for these applications (almost 100 percent heavier). Each part is the result of experimentation to find the right materials, weights, hardness, and finish to give undeviating steadiness to the picture with a reasonably long operating life.

The double intermittent sprocket should receive particular mention because of the exhaustive research and testing it has received. Life tests have been conducted on these sprockets for the past two and half years. They are made of special duraluminum having a hardness at the wearing surfaces harder than the steel of standard sprockets.

The sprockets are easily changed without removing the movement from the mechanism. They can be reversed, also, in the mechanism, and by a unique design of hub contour the concentricity of the rims and the positioning of the teeth are assured. Screen measurements indicate that picture steadiness is equal to, or better, than the best 35mm performance.

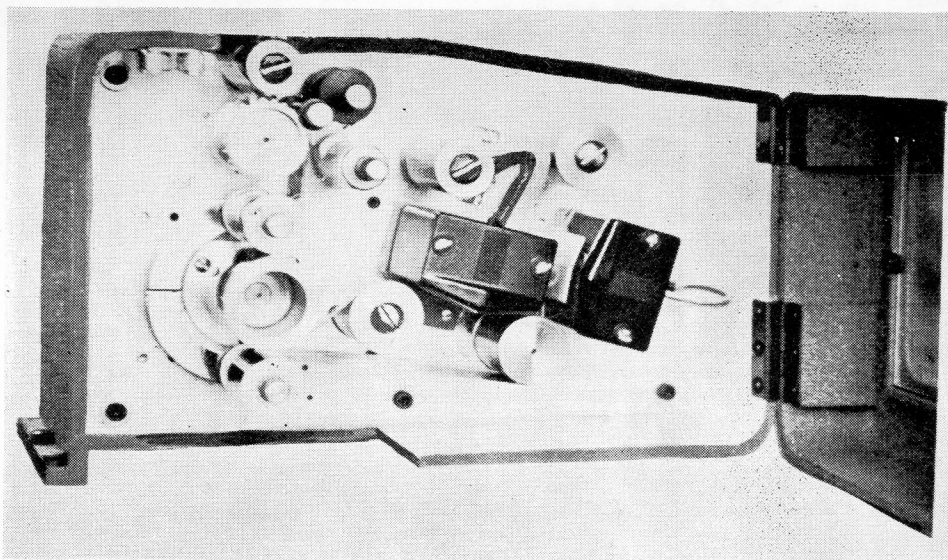
No expense has been spared in making this 70/35mm intermittent out-perform any device of its kind. It is designed specifically for use with larger films at normal and increased film speeds.

All other sprockets in this projector are double (70/35mm) and made of hardened steel. The diameter and tooth shape of each sprocket has been designed for the particular job it has to do. Each sprocket is, therefore, expected to last a long time and to contribute to long film life. There has been much discussion with many pros and cons relative to the "correct" sprocket dimensions for optimum results. Century believes, as it has for a number of years, that there is a fine balance of design practice which dictates the exact size and shape of every sprocket for the most economical service at the highest quality performance. Century sprockets are designed under the strict adherence to these principles, and any deviation from these designs could contribute nothing but depreciated results.

Pad Rollers

Each pad roller associated with each sprocket is of the double roller type, mounted and clearly marked so that the changeover from 70mm to 35mm operation is accom-

FIGURE THREE: The rear view of the Century Model R-31 70/35mm magnetic sound reproducer showing the vertical drive shaft and gear for the film sprocket, two flywheels and arm supports for the hydraulic flutter suppressor, the four-channel and six-channel terminal blocks with two cable connectors for the separate sound systems.



plished by rotating the assembly a half turn. There are three such pad rollers in the complete projector and the change can be made in less than one second per roller. A quick glance (after threading the projector) clearly indicates whether or not each roller is in proper position to run the film selected.

The Film Trap

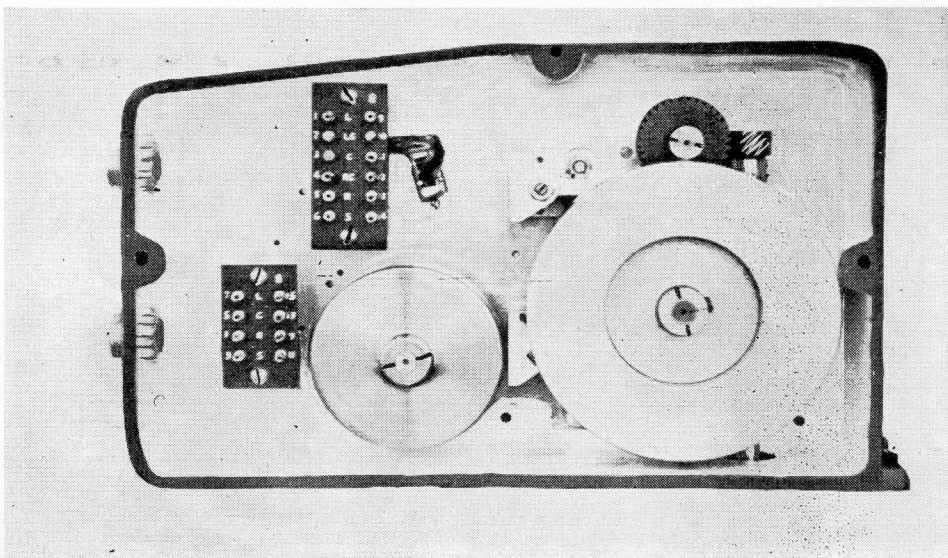
The film trap shoes are hard polished chromium permanently held in an exact contour insuring the proper curvature of the film. The complete film trap is water cooled down to the mounting of the shoes, which are insulated from the water cell to prevent the condensation of water on any metal part actually touching the film and yet providing for the absorption of all radiant heat transmitted from the arc lamp. To the most minute serration of the film trap, the design prevents unwanted light reflections from the water cell chamber and yet accepts all unwanted radiant heat without interference to the useful light at the aperture.

The same careful physical design also applies to either the 70mm or the 35mm film trap. Each film trap with its properly curved shoes slides out of and into the mounting on large accurately positioned gibs and is firmly and accurately held in operating position. An interesting observation of the film trap (and film gate also) discloses that they may be changed easily to operate with almost any

film dimension.

A word regarding water cooled film traps is not amiss in this discussion. There are two kinds of water cooling in prevalent use. These should be classified as water cooled heat shields and water cooled film traps. The object of water cooled heat shields, used on most water cooled projectors, is to absorb most of the stray heat going into the projector. These shields have nothing whatever to do with the heat which destroys the motion picture film nor the operating temperature of the aperture plate.

The Century 70/35mm film traps are designed to take all possible damaging heat away from the film, allowing only that heat which is inseparable from the light to impinge on the projected picture area. Century believes that, within the limits of available air blowers or economical air velocities obtainable for motion picture projectors, that there can not be any advantage in air which may circulate past the film as it is being projected. Instead, it is believed that any air which may circulate past the aperture merely serves the purpose to cool the aperture plate and that an efficient water cooled aperture plate, as incorporated in the standard line of Century water cooled projectors, and this new 70/35mm projector, reduce the damaging heat on the film to an absolute minimum without direct mechanical contact of cooled



CENTURY PROJECTOR

surfaces with the film and, more especially, with the film emulsion itself—which, of course, mechanically is not feasible.

It is not the purpose of this presentation to go into the controversial subject of how best to operate motion picture film in a projector with minimum film damage, buckle, in and out of focus, etc. Such discussions are best isolated into technical studies of the individual heat effects on the film and methods of reducing them. Sufficient for the purpose of allowing projectionists and theatre owners to evaluate properly this new projection equipment is the substantiated statement

that Century believes that for the high light transmission obtained, that the heat causing film damage has been handled in a manner to reduce this damage to a minimum.

The curve of the film trap shoes has been designed to obtain a maximum stabilizing effect for the film during the projection cycle and at the same time to reduce the pull on the film as much as possible thus saving sprocket holes. Film stabilizers are used at the upper loop to reduce film noise and damage.

The Film Gate

The film gate follows the fundamental design of previous Century projector mechanisms. These designs give a freedom of movement to the gate shoes, allowing them to self-align with the film trap shoes and at the same time make a rigid, quiet support in the direction of film travel.

The gate shoes are, of course, curved to fit the film trap shoes. These shoes, like the film trap shoes, are heavy and solid, and have a hard polished chromium plate. Thus the film is supported in a proven design which holds it firmly but gently in position for accurate, stabilized, steady pictures.

The Lens Mount

A new lens mount has been incorporated in this 70/35mm mechanism which is patterned after the Model H mechanism. The lens mount and gate support have been separated so that not only does the gate opening knob open and close the gate smoothly and easily, but also the lens mount itself provides for shifting the center line of the lens to the center line of the film under the control of a calibrated, designated adjustment knob. This knob could, under certain circumstances, be used accurately to position the picture on the screen for certain conditions. This optical center line adjustment is necessary because of the difference in the picture center between standard 35mm film and 70mm film.

The calibrated knob adjustment incorporated into the new lens mount eliminates the need of eccentric adapter bushings which must always be rotated into proper position to compensate for the center line shift. It also places the lens into proper position without introducing "errors" in positioning the picture on the screen from lens "errors" introduced when lenses are turned in their mounts. In other words, with the Century lens mount, the lens is always in the proper position for optimum screen results.

The lens clamp makes contact with the lens barrel over a considerable portion of its length. No longer is the lens clamp merely a strap. The whole mount becomes a complete clamp insuring accurate focusing and exact picture positioning on the screen.

Shutters

The Model J Projector has double rear shutters of the disc design. Comparative measurements disclose that double rear shutters provide the highest possible light efficiency consistent with good mechanical and light practice. The shutters run at a safe, conservative speed absolutely synchronized with the intermittent movement.

Every revolution of the two shutters represents the projection of one frame of the motion picture film. There being two light openings per revolution of the shutters, the frequency of light pulse is 48 per second.

The design of the Century system of intermittent movement and shutter anticipates that development work now in progress may result in even higher efficiency operation, with an increase in the frequency of light pulses reaching the screen. In anticipation of this becoming a reality this new projector has already made provision to accept these new developments as soon as they become commercially available.

All heat shields, shutter guards, etc., are capable of being used with light paths having a speed of F 1.5 to F 1.6. It is believed by the best authorities in the optical companies that such high speed operation of arc lamps and lenses is difficult to attain while maintaining the optimum in light efficiency, resolving power, minimum aberration, and definition. This is especially true when projecting 70mm film. Without reservation, Century claims that the Model J mechanism has provided for the highest transmission of light (screen brightness) with the minimum amount of flicker possible within the known factors of motion picture engineering at this time.

A unique design of the shutter guard employs the air circulating power of the shutter blades (otherwise thrown away) to circulate a large volume of air around the non water cooled shields and heat absorbing filters to carry away any excess of heat developed by the arc lamp in these units.

The heat shields used in all Century projectors are designed scientifically to allow the full passage of unobstructed light and to prevent unwanted radiant heat being trapped before it reaches the aperture or film.

In considering any problem relating to heat and projector operation it is necessary to recognize the definite difference between the terms heat and temperature. When we say something is hot, we actually mean the temperature is high. Heat on the other hand is a measure of the quantity of that which can make something hot if it is not removed. In analyzing a Century projector, recognition of the devices used to remove the heat will explain why the Model J mechanism, without auxiliary air blowers, remains cool and operates with lower film temperatures. If there is any doubt, a simple test by feeling the take up reel of film after a run is most convincing because its temperature is lower and therefore it feels cooler.

The Optical Reproducer

The optical reproducer is essentially a standard, proven, Century design modified to bypass the 70mm film. The film stabilization used in this reproducer won an Academy of Arts and Sciences Award for "Improved Reproduction for Motion Picture Theatres and Studios." It is the basis of practically every good recording or rerecording system in use in the major studios of Hollywood. Since this Award was made, there has been no sound reproducer designed or built with an improved operating result as to warrant further recognition by any qualified engineering organization such, for example, as the Academy, or the Society of Motion Picture and Television Engineers.

Attention should be called to the universal adaption of the Model J Projector for mounting to existing standard pedestals. When supplied as a complete projector, Century recommends the Model C pedestal or the heavier special Delux pedestal, which is designed for the new special arc lamps now being used in critical locations.

The Magnetic Reproducer

The magnetic reproducer follows the same design methods as the optical reproducer. The film paths are simple and direct and leave plenty of room for handling the wider 70mm film.

There are two magnetic clusters (heads) incorporated in the reproducer. One provides reproduction for 35mm magnetic Cinemascope sound tracks (four channel or single channel), and a second provides for the reproduction from the six channel 70mm film. Century believes that the added cost of providing two pick up heads (one for 35mm and one for 70mm) is justified in the long run because of the probable unequal projection time of 35mm and 70mm films. Thus, when worn heads need to be replaced, only that head which has worn will require replacement.

In addition, there are two separate film paths (one for 35mm and one for 70mm). Thus, the projectionist can easily recognize, by looking at the film, whether it has been threaded correctly past the right pick up

head. The film stabilization being of the tight loop design, controlled by accurately designed spring tensions, the optimum film pressure against the pick up heads is assured by checking the loop size gauge, which is large and prominently marked with a red line which cannot be missed even in the reduced illumination of the average theatre booth.

This magnetic reproducer is driven from a direct extension of a vertical shaft from the projector mechanism. The film is under no greater tension or pull than in any standard projector and it is under even less than in many 35mm projectors. The driven sprocket in this reproducer insures also that the film is pulled from the feed magazine in a smooth, even manner minimizing variations in film motion which might cause flutter or wows. Two separate solder terminal strips are provided with substantial lugs for the serviceman to connect cables to the 35mm four track and the 70mm six track heads.

Each pick up head has its own plug arrangement so that a head may be easily changed. Each head is pre-aligned and preset, so that no additional alignment adjustments need be made if by chance a head is replaced. All of these refinements are necessarily costly, but have been included because they contribute to ease of installation and service.

Magazines

The film magazines are 24 inches in diameter to take 22 or 23 inch reels. The spindles are one-half inch in diameter and drive the reels through pins. Both 35mm and 70mm reels may be used in the magazines. If one-half inch spindles are used for the 70mm reels, then special 35mm reels are required, providing fast changes (30 seconds) are to be made from one film dimension to the other.

If a decision is made to operate for a period of time running only 35mm film, a simple change of the operating side spindle can be made. Thereafter, standard 35mm film reels can be used until the next 70mm show is scheduled. The spindle can then be changed to one-half inch. It is recommended that whenever 70mm film is projected that the one-half inch spindles are used.

The new and larger magazines contain ball

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bearings throughout and a new proven system of tension devices. The take-up has been designed to handle the increased size and weight of the 70mm reels, at the same time being entirely satisfactory for the 35mm film. At no time while the film is in motion is the entire pulling tension of the upper magazine plus the reproducer or the hold back tension of the lower magazine plus its reproducer assumed by the sprocket holes of the film. Part of this load is compensated for by the tight loop tension of the film stabilizer. Because of this feature, film breakage is practically eliminated and longer film life assured.

The Gear Drive

The gear drive, except for the extension of the vertical shaft to the magnetic reproducer, is the same heavy construction which has been used for years in the standard 35mm equipment, modified where necessary for the running of 70mm film. By using these designs, replacement parts are assured at every servicing depot handling Century equipment. Naturally, the availability of such items applies to the gear train and drive shafts only, and not to the expanded sprockets, etc., pertaining to direct contact with the 70mm film.

Film Traps and Rollers

The 35mm fire traps are removable when running 70mm film. Both the upper fire trap and lower fire trap are interchangeable so that there is no chance of a mixup when making a fast change to 35mm operation.

Film Speeds

At one time it was thought desirable to run film at 30 frames per second. Since then, however, the industry has accepted a standard 24 frames per second as the most economical and feasible. The standard Century 70mm/35mm projector will run at 24 frames per second. If, by chance, a picture having 30 frames per second speed is programmed, the projector easily can be changed to the now obsolete speed.

Changeover Operation

Turn over three pad rollers from 70 to 35mm designation, slide out the film trap and gate; slide in the 35mm film trap and gate, and the projectionist is ready to thread 35mm film. To change from 35mm back to 70mm, the same operation is followed, sliding in 35mm film traps and gates. The whole operation should not take longer than 30 seconds.

Installation

The installation of the Model J projector is not unlike that of a standard 35mm projector. Each unit may be shipped and installed separately. Each unit is replaceable for servicing and/or repair. As a matter of fact, the projector mechanism itself can be installed and operated on a standard 35mm optical reproducer and with a standard 35mm penthouse reproducer with standard 35mm magazines, pending full modernization to 70mm operation. Thus, only a fraction of an original investment need be made until such time as a 70mm program is actually scheduled; then further investment can be made to prepare fully for running large film widths.

Century

PROJECTION AND SOUND SYSTEMS

... you will be ahead with CENTURY for years to come!

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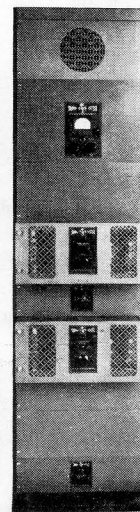
... designed to meet your needs—present and future.
They give you the best that modern science can offer.

UNIT PRINCIPLE DESIGN. Each CENTURY installation can be selected to meet the physical or financial requirements of any theatre or drive-in.

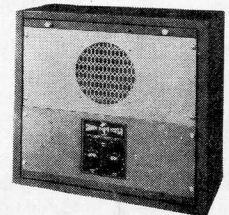
AWARD-WINNING SOUND QUALITY. CENTURY sound reproducers feature the famous *hydro-flutter suppressor*, exclusively—winner of an Academy Award because it is a "fundamental improvement in film drive" and "results in improved quality in the theatre". (Citation of the Academy of Motion Picture Arts and Sciences). CENTURY sound has unusually high fidelity due to the low flutter obtainable with CENTURY sound reproducers.

SIMPLIFIED OPTICAL SYSTEM. CENTURY sound reproducers employ a high-efficiency straight-through optical system. No mirrors or prisms to fog or tarnish. Amplification requirements and noise interference are reduced.

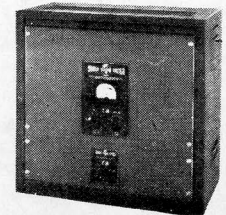
MECHANICAL ADVANTAGES. Quick threading; oil-less bearings; interchangeable unit construction, simplified service; standardized design for use with any standard make of projector or pedestal.



CENTURY Amplification System — 200 — 400 watts
(Duo power Amplifiers Rack Mounted)



CENTURY Amplification System with A.C. Exciter Supply



CENTURY Amplification System with D.C. Exciter Supply

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