

INFORMATION  
*and*  
SUGGESTIONS  
FOR

*Operation and Care of*

16MM SOUND-ON-FILM  
MOTION PICTURE EQUIPMENT.



INFORMATION and SUGGESTIONS  
for 16mm SOUND PROJECTOR OPERATORS

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The individual entrusted with operation and care of the 16 millimeter Talking Motion Picture Projector should understand that he has acquired an extremely important responsibility to which he should give his serious attention and very best efforts.

As a matter of fact, the successful application of the Talking Motion Picture Program will depend very largely upon the attitude of the operator, the skill he acquires in giving a professional type of showing and the care he gives to the operation and maintenance of his equipment.

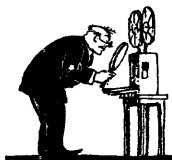
The Victor Sound Projector is so utterly simple in design, construction and manipulation that one can actually learn to run it in a few minutes and completely master its operation and care in the space of a few hours.



This does not mean, however, that one should not thoroughly understand the equipment, nor that the equipment can be neglected and continue to give satisfactory service. It does not mean that the responsibility of handling the Talking Picture Equipment can be lightly assumed with any hope of successful application.

IT IS ABSOLUTELY NECESSARY that the selected individual assume this responsibility with an open mind and with a willingness and determination to:

1. LEARN as MUCH as POSSIBLE about the equipment, its construction and the work each part does in showing the picture or reproducing the sound.



Before any attempt is made to operate the projector, the operating instructions should be studied over carefully several times with the projector close at hand, so that the various parts and operations can be identified and memorized. Threading, focusing, adjusting of sound controls, etc., should be practiced until they can be done quickly and correctly without fumbling or uncertainty.

THE INTERNAL MECHANISM, however, SHOULD NEVER BE TAMPERED WITH and UNDER NO CIRCUMSTANCES SHOULD AN ATTEMPT BE MADE TO TAKE THE PROJECTOR APART AND REASSEMBLE IT.

(See following Pages for detailed descriptions of various units and parts of Animatophone.)



2. From the very beginning ACQUIRE THE HABIT OF KEEPING THE ANIMATOPHONE PROPERLY CLEANED and OILED. All surfaces



with which the film comes in contact must always be kept free from dust and film "gum" accumulations. Clean carefully before each performance. The projection and sound lenses must be kept clean, as must also the other optical units. The film should be carefully cleaned with a good cleaning solution (never use water) after every few showings. Dirty or oily film will

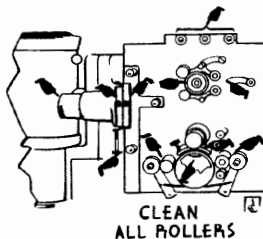
distort the sound. A DROP or TWO of OIL should be put in each of the oil holes of the equipment after every few hours of operation.

IT CANNOT BE TOO STRONGLY STRESSED that continuous perfect performance DEPENDS VERY LARGELY ON THE EQUIPMENT (and all parts) BEING KEPT SPOTLESSLY CLEAN.



Unless the habit of following a definite routine of cleaning and oiling is acquired at the beginning and constantly adhered to, PICTURE PRESENTATIONS, EQUIPMENT AND FILM ARE BOUND TO SUFFER. Therefore, it must be insisted that those entrusted with the operation and care of the Animatophone adhere strictly to this cleaning schedule:

- A. CLEAN all film sprockets, film rollers, film channels and film gate with bone scraper or sharpened softwood stick (never use metal) BEFORE EACH PERFORMANCE. Allow ample time for doing this before threading film when setting up for operation. CONSULT OPERATING INSTRUCTIONS FOR CORRECT procedure in cleaning.
- B. CLEAN Projection Lens and Sound Lens with soft cloth or chamois and clean Sound gate with sharpened match or tooth pick (never



use metal) BEFORE EACH PERFORMANCE when setting up. Consult Operating Card and Booklet for detailed instructions.

- C. OIL projector (but not excessively) after 4 or 5 hours' operation, or after equipment has stood several days without running. Locate each of the OIL HOLES, all of which are indicated by colored dots. Check the holes while oiling to be sure none are missed. About TWO DROPS of oil in each hole will be sufficient. Use ONLY the special oil supplied with the equipment by VICTOR Animatograph Corporation.



- D. AT LEAST ONCE A WEEK give the equipment a thorough inspection and careful cleaning up. After cleaning Film Sprockets, Shoes, Rollers, Channels, etc., go over them with a cotton pad dampened with carbon tetrachloride (film cleaning solution) or alcohol. Examine Projection and Exciter Lamps and Condensers. Polish all bright metal parts with a soft cloth. See that all parts are properly adjusted and that all electrical connections are tight. Follow operating instructions carefully.



- E. CLEAN FILMS after every 12 to 15 times through the projector. Do not hurry the film cleaning process and do not rewind film onto the reel until carbon tetrachloride film cleaning solution has completely evaporated, as otherwise the film may come out streaked and spotty. Extremely dirty film may have to be cleaned twice.

Detailed instructions for care of equipment and films accompany the projector.

3. KNOW SOMETHING of the HISTORY of MOTION PICTURES and of the principles involved in the making and showing of films and in the recording and reproducing of sound. These subjects are fascinating in interest, and some familiarity with the fundamentals of sound cinematography will be helpful to a better understanding of the equipment, the functions of various parts, and the desirability of skillful operation and painstaking care in maintenance. Also, it will enable the operator to take pride in his work and to intelligently and authoritatively answer the questions of curious interrogators.

As a further aid to the individual operating and caring for the 16mm Sound Projector, the following brief articles on the three pertinent subjects heretofore mentioned have been incorporated on the following pages:

1. THE SOUND PROJECTOR -- Its parts and their functions.
2. CARE of the EQUIPMENT.
3. Brief HISTORY of MOTION PICTURE PHOTOGRAPHY and PROJECTION and of SOUND RECORDING and REPRODUCTION.

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## 16mm SOUND-on-FILM PROJECTOR

### ITS PARTS and THEIR FUNCTIONS

The 16mm Sound Projector may be thought of as a two-piece equipment (projector and speaker) but, strictly speaking, it consists of four units: Picture Projector, Sound Head, Amplifier, and Speaker. Each unit, of course, has its own integral parts, all of which are interrelated and perfectly coordinated.



#### THE PROJECTOR ....

Consists of G-E Constant-Speed Motor equipped with Speed Governor, Driving Mechanism, Intermittent Mechanism, Shutter Assembly, Hi-Power Projection Optical System and Ventilating System. The film driving mechanism embodies certain patented film protection features which are not to be had in any other equipment at any price. Complete Lubrication of all moving parts of projector is effected by dropping oil in each of the oil holes indicated by colored dots. The FILM SPROCKET, FILM CHANNEL, FILM GATE, ROLLERS AND SHOES of the projector should be carefully cleaned before every performance (see routine for care of equipment-page 2) to avoid accumulations of dust and film gum which scratch film. Use Bone Scraper and wad of cotton dampened with solution of carbon tetrachloride. (Never use metal scrapers of any kind.)



MOTOR - (Fractional H. P. Universal 100 to 125 Volts) . The Animatophone motor is a highly perfected unit which was developed jointly by General Electric and Victor Engineers after many months of experiment and research. It is equipped with a special governor which holds the speed absolutely constant for 16 frames (silent) or 24 frames per second (sound speed) projection. Motor drive shaft is equipped with multiple-blade ventilating fan for forced cooling of lamp and lamp house. Motor and Governor require no special care other than occasional oiling and protection from dust and dirt when not in use. Motor brushes may require replacement after from one-and-a-half to two years of service.

DRIVING MECHANISM - Consists principally of a series of interrelated machine-cut gears which motivate the projection and sound film Sprockets, sound film Stabilizer, Intermittent

Film-Moving Mechanism and Light Shutter. Starting and stopping are controlled by clutch type Operating Lever protruding from slot in the shutter housing and by a clutch-release trigger. Mechanism requires no attention other than oiling. Do not attempt to dismantle projector or tamper with mechanism.

NO  
THRESHPASSING



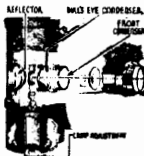
INTERMITTENT FILM MOVING MECHANISM - Consists of a cam-and-shuttle assembly which provides the up-and-down and in-and-out movement of the claw which starts and stops the film at the projection aperture back of the projection lens. Any cam operating inside a shuttle will ultimately develop a certain amount of "play" which results from normal operating wear and which causes excessive operating noise and unsteadiness in the projected image. The Victor shuttle is of a special type which insures rock-steady pictures, and maximum service before replacement. Intermittent mechanism requires no attention on the part of the operator.

WATCH  
YOUR  
STEP

SHUTTER - Is Rotary type equally divided into blades and openings. Revolves in the housing back of projection lens, and is perfectly timed with the intermittent mechanism to give proper number of light interruptions to each movement of Film. Shutter requires no attention.

AUTOMATIC FILM TRIP - This patented device (provided to protect film against damage) can be identified by the red rollers on right side of projector. In case film loop draws up tight or lens and film gate are not clear down in position, front red rollers are pulled forward. This presses an arm against the operating lever and kicks it out of operating position, stopping the film and cutting off light before film damage can occur. Requires no attention other than to see that it is functioning properly.

BIG  
SAVINGS  
today and  
EVERYDAY



HI-POWER PROJECTION OPTICAL SYSTEM - Consists of Mazda Projection Lamp with pre-focused base, large Reflector (back of lamp), Condenser assembly (between lamp and aperture opening), Aperture Opening (back of film), Film Gate (in front of film), and Projection Lens (in front of film).

Illumination is direct from lamp to screen. That is, there are no prisms or mirrors employed to change the direction of the light beam. The reflector back of the lamp picks up the light beam from the rear and throws it forward. Thus, very little of the light emitted by the source is lost. For maximum efficiency all optical units (except the lamp) are permanently centered on an optical axis and should not be moved out of position. The lamp filament must be centered on the optical axis when a new lamp is put in place (see instruction booklet for information on adjusting lamps). If lamp is not properly adjusted lighting efficiency will be impaired and yellow streaks will appear on screen. Lens elements, condenser elements, reflector and lamp bulb must be kept clean (see operating instructions).

WATCH THIS



Lamps have an average life of 25 projection hours. If bulb begins to blacken, lamp is becoming too old to give satisfactory service and should be replaced.

and THIS



In projecting, the frame lines around the picture on the film are made to coincide with the opening back of the lens by means of the framing screw which is located at the bottom of the post on which the lens mount pivots. This raises or lowers the lens mount so that the picture is properly framed. Aperture and film channel dimensions are in accordance with standards established by Society of Motion Picture Engineers.

VENTILATING SYSTEM - Fan on Motor drive shaft forces cool air into lamp house and around lamp bulb. Hot air is forced out through the louvres in lamp house.

#### THE SOUND HEAD ....

All sound parts of the Victor Sound Projector are compactly arranged in the supporting base of the projector. All parts that require cleaning or replacement are quickly accessible. SOUND SPROCKET, FILM ROLLERS AND SOUND GATE CHANNEL should be carefully cleaned after each performance to remove dust and film gum. SOUND LENS AND SOUND GATE MUST ALSO BE CLEANED. THIS IS IMPORTANT!!!! (See Operating Instructions.)

STOP LOOK  
and LISTEN



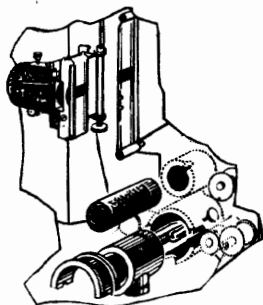
EXCITER LAMP - (Prefocused inside of Sound Drum). This is a Special General Electric 5 volt,  $6\frac{1}{2}$  ampere lamp, mounted in a prefocused base, instantly removable for replacement. (See operating instructions). The function of the exciter lamp is to throw a beam of light into the sound lens, through sound track on

TAKE CARE





film and into the photo electric cell. Be sure exciter bulb is kept clean.

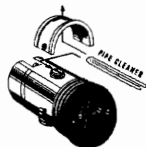


**SOUND LENS AND SOUND GATE -**  
(Mounted in top of Sound Drum.)  
The Sound Gate or Sound Channel (with light opening at top) is the outer collar which slips over the optical mount. The lens concentrates the light from exciter lamp and projects a tiny slit-beam through the sound gate onto the sound track of the film. Slit member and objective are sealed from damage or dust, after being microscopically adjusted and focused and should never be tampered with. The lens is easily and quickly removed for cleaning of exposed surfaces. **CLEAN OFTEN.** The Sound Lens is permanently focused and requires no adjustment. (DO NOT remove elements. If Sound Lens is dismantled or otherwise tampered with, guarantee becomes VOID!

**BWARE**



Accompanying sketches show ease with which all parts are made accessible for cleaning.



**PHOTO-ELECTRIC CELL** (Top unit of Sound Head) - The photo-cell can be instantly removed or replaced. Connection to the electrical circuit is automatic. No setting or adjusting required. Provision is made, however, for adjusting P. E. Cell current to meet operating conditions (See instructions). The beam of light which is projected through the sound track on film into the P. E. Cell excites an electrical current which is transmitted to the amplifier. This is the actual beginning of the process of reproducing sound from the photographic sound track.

**CONSTANT-SPEED SOUND SPROCKET AND STABILIZER** - Whereas travel of the film past the projection aperture is intermittent, passage over the sound gate is continuous. Any variation of speed or any vibration or backlash of the film would create an objectionable flutter or waver in the sound. VICTOR'S threading arrangement, specially-designed sound sprocket and perfectly balanced stabilizer (fly wheel projecting from under side of projector body) filters out all vibrations, giving freedom from "flutter".

#### THE AMPLIFIER....

This is a highly perfected unit especially designed and

constructed to function in coordination with the other sound reproducing units of the Animatophone. To better illustrate the purpose of the amplifier we might liken it to a photographic enlarger, the function of which would be to reproduce a life-size photographic print from a tiny, barely-visible negative without losing any of the sharpness or detail of the original and without introducing any distortion or fuzziness into the finished product. We will assume that, in order to effect this result, a series of enlargements and re-enlargements would have to be automatically made within the mechanism of the enlarger. Actually there is no photographic equipment capable of such efficiency, but the Animatophone amplifier in effect accomplishes that very result. The tiny electrical impulse originating in the photo-electric cell can be likened to the small original negative. This is sent to the amplifier where it is enlarged and re-enlarged until it reaches the final stage at the speaker. The marvel is that in this process of building up, none of the sharpness, clarity or tone quality is lost and no "fuzziness" is introduced.

Amplifier power should not be left on while equipment is not being operated. While no particular harm might result, it would be equivalent to leaving the motor running in a standing motor car.



The extent to which the amplifier can carry on this building up process is determined by its wattage output.

The Amplifier unit employs several radio tubes. Generally, these tubes are the only part of the unit requiring attention. Quality of sound will be affected by defective or worn out tubes. Tubes can be tested for efficiency at any radio service store.



Amplifier unit also embodies amplifier and projector power switches, control knobs for adjusting volume and tone, and P.E. Cell current adjusting screw (see operating instructions). Amplifier wiring should not be tampered with. In the rare event of trouble, a reliable radio service man should be consulted. Wiring diagrams available on request.

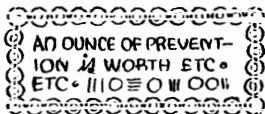


#### SPEAKER....

Animatophone Speakers are of a special type, selected especially for sound film reproduction. Carrying further the comparison to a photographic enlarger made in the preced-

ing paragraphs, the speaker would correspond to the sensitized photographic paper on which the final enlargement would appear. The speaker is connected to amplifier by an attachment cord. This wire, or cord, carries the amplified electrical impulses to the transformer and thence to the diaphragm of the speaker. Sound vibrations issue from the speaker to be interpreted as natural sounds by the human ear.

The speaker requires no attention other than to be protected from dust and dampness when not in use.



#### TURNTABLE....



This is a very valuable accessory to any sound motion picture projector. All A.C. Victor Projectors provide a phono jack to which a turntable may be attached.

A synchronous motor provides constant speed on 100-125 volt 60 cycle A.C. current. The tone arm, or pick up, is a very good crystal type. Sound from good records is handled on this pick up through Victor amplifiers with very great fidelity. The use of records for dances, entertainments and other events will be found most valuable.

#### MICROPHONE....



Inasmuch as all Victor amplifiers provide for microphone attachment, each such Victor Projector is a P.A. System in itself.

For ordinary room use a high impedance, dynamic, moving-coil microphone may be connected directly to the amplifier.

For outdoor use, on athletic fields for instance, a low impedance, velocity ribbon microphone connected to a small preamplifier, which, in turn, is connected to the projector amplifier, gives excellent heavy-duty P.A. service with any length cord on the microphone up to 500 ft.

Controls on the amplifier provide for proper modulation and volume.

## CARE OF THE EQUIPMENT

DO NOT permit inexperienced persons or salesmen for other makes of equipment to TAMPER with or make adjustments of any kind on your Victor projector.

The importance of keeping the equipment IMMACULATELY CLEANED and WELL OILED CANNOT BE over emphasized. It should be the ambition of every operator to have every program or talking picture presentation as nearly perfect as possible and to have his equipment always in first class condition. Again we repeat that this can only be accomplished through PROPER CARE.



**PROJECTOR** - Oil, as instructed, at all indicated points (use only very best grade of fine machine oils). Cheap or heavy oils will "gum up" the mechanism. Keep the optical units well cleaned and properly aligned (examine projection lamp occasionally to observe that the bulb has not blackened inside). **CLEAN THE FILM SPROCKET, FILM SHOES, ROLLERS, FILM CHANNEL and FILM GATE REGULARLY** after every performance with Bone scraper (never use knife or any other metal to clean any surface that comes in contact with film. It is recommended that surfaces contacting film also be cleaned at least once a week (preferably before each performance) with a wad of cotton dampened with a solution of carbon tet.



**SOUND HEAD** - Clean Film Sprocket, Channel of Sound Gate, and Rollers regularly before each performance with Bone scraper or soft wood stick (never use metal). Clean sound gate and surfaces of sound lens before every performance. (See routine for care of equipment - Page 2).



**AMPLIFIER** - Have tubes checked occasionally for efficiency. Check P. E. Cell current setting before each performance (see instructions).



**SPEAKER** - Keep free from dust, and keep covered in case when not in use.



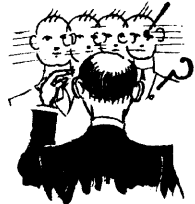
**CARE OF FILM** - Keeping the film clean and in condition is just as necessary as keeping the equipment clean. Film surface should be cleaned after every few showings to remove dust and oil. If cleaning device and film cleaning solution are not provided for this purpose, run the film between two pads of cotton saturated with a solution of carbon tetrachloride. (Use only soft cotton as a hard fibred cloth such as linen or silk will scratch the film.) Never use water for cleaning as it will remove the emulsion and ruin the film.

Film should not be left lying around in the open as it will become dry and brittle and will accumulate dust. If film humidors are not provided, it would be advisable to rig up some sort of a cabinet or container (air tight if possible) to hold the reels. Blotter pad or humidor pad of some kind should be incorporated and kept damp for the purpose of keeping film humidified and in soft, pliable condition. Too much moisture, however, is not desirable, as a matter of fact, would be harmful. Water must not be permitted to come into contact with the film. Do not humidify Kodachrome except under advice of film manufacturer.

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BRIEF HISTORY of MOTION PICTURES  
PHOTOGRAPHY and PROJECTION  
and SOUND RECORDING & REPRODUCTION

Actually there is no such thing as a "moving picture". The motion picture is purely an optical illusion. PERSISTENCY OF VISION, a peculiarity of eyesight common to everyone, causes the eye to "see" an object for a fraction of a second after it has in reality disappeared. "MOVIES" are actually nothing more than still pictures. The illusion of motion is obtained by photographing a series of "stills" in rapid succession on a strip of film--and projecting them (greatly enlarged) onto a screen at the rate of 960 (silent) or 1440 (sound) pictures a minute. Persistency of Vision causes these individual pictures to merge imperceptibly, and deludes the mind into accepting the reality of motion.



An intermittent mechanism in the projector starts and stops the film at the aperture back of the projection lens at the rate of sixteen pictures per second for silent films and twenty-four pictures per second for sound films. A system of light interruptions, which employs a revolving shutter, cuts off the passage of light at definite intervals, making it possible to project a picture that is sharp and clear and free from "rain" and flicker. Obviously, an instrument that must start and stop the film and control the passage of light in this manner for the individual exposure or projection of each picture must be highly perfected and timed in order to produce a flawless illusion on the screen.

Comparatively speaking, motion pictures are very young. Although a number of experimental films were made in the "nineties", motion picture theatres (known in the old days as "Nickel Shows") did not come into existence until after the beginning of this century. Needless to say, the first movies were extremely crude. As a matter of fact, the last ten years have seen tremendous advancement in the art of making and showing motion pictures. The Synchronized "Talking" Motion Picture was introduced in the theatre less than a decade ago.



Various sizes of film have been employed in the making of motion pictures. The size finally adopted as standard for theatrical use was (and is) 35 millimeters wide and is

known as 35mm film. The pictures or frames in the center of film are flanked on both sides by perforations (square holes) which engage the sprocket teeth and film-moving claws of the projector. With the introduction of sound-on-film, the pictures were narrowed in width and the sound track (a photographic reproduction of sound waves or vibrations) was printed photographically between the pictures and one row of perforations. (Sound recording and projection are explained in greater detail in later paragraphs.)



While entirely practical for theatrical use, the 35mm. film (and equipment) greatly restricted the use of motion pictures for non-theatrical purposes. Equipment costs, picture production costs, size, weight and intricacy of equipment, film fire hazards, need for fire-proof booths and trained operators, etc., were some of the facts which rendered 35mm movies impractical for use on a large scale outside the theatre.

Prior to 1923, a number of attempts were made to popularize non-inflammable films of various widths (and the equipment to accommodate them) for non-professional use. Most successful of these was a 28mm film and projector introduced by Victor. Acceptance, however, was by no means universal and prospective non-theatrical motion picture users still had no definite standard to go by.



In 1923 a new size of non-inflammable film was introduced. Although less than half as wide, in proportions and appearance it was the same as 35mm film. (Pictures down the center with perforations on both sides. Later, with the introduction of sound-on-film, one row of perforations was eliminated on film for sound use to accommo-

date the photographic sound track.) Alexander F. Victor, president of Victor Animatograph Corporation, believed that this size of film offered the long-sought solution to the non-theatrical film and equipment problem and, as a result, built and placed on the market the world's first 16mm cameras and projectors. This was the real advent of non-professional motion pictures.



To explain why 16mm film popularized cinematography for all purposes other than theatrical, it is but necessary to compare the professional 35mm standard film and equipment with the now internationally adopted 16mm non-theatrical standard.

#### THE MEANING of "35mm" and "16mm"

"Mm" is the symbol for "millimeters". Film standards are gauged by the width of the film in millimeters--25 millimeters equalling one inch.

Film of 35 millimeters width is approximately 1-2/5 inches wide. There are 16 pictures - called "frames" - to the foot of film; 1,000 feet to the standard reel. Reel size (1,000 feet): Diameter, 10 inches, Thickness 1-5/8 inch; Weight 6 pounds. Showing time for a 1,000 foot reel is approximately 15 minutes (Silent) 11 minutes (Sound).



The greater part of 35mm film is highly inflammable, being printed on nitro-cellulose base. There are many just restrictions and local and state regulations require proper safeguards involving fire-proof projection booths and many safety devices. Only licensed operators are permitted to do the projecting. Interstate commerce regulations are strict concerning shipment.



16mm FILM is NON-INFLAMMABLE. It is supplied only on cellulose-acetate base, approved by fire underwriters as safe for use and handling anywhere at any time. There are positively no risks and no restrictions. Fire-proof booths are NOT required. All 16mm film is SAFE FILM.

16mm film is approximately 3/5 inches in width. It has 40 pictures or frames to the foot (two and one-half times as many as 35mm film). The standard reel is 400 feet and requires 15 minutes (silent), 11 minutes (sound) for showing-equivalent in picture value to 1,000 feet of 35mm film. Reel size (400 feet): Diameter, 7 inches, Thickness 3/4 inch; Weight, 1 pound. Contrast this with the 10-inch, 6 pound, 35mm reel.



#### REDUCTION PRINTING - 35mm to 16mm

The proportions of the 16mm frame or picture are exactly the same as those of the 35mm. By optical printing the 35mm picture may be reduced to 16 millimeters. Thus, it is possible to secure 16mm prints of any motion picture (silent or sound) originally produced on 35mm film.



## EQUIPMENTS

16mm Motion Picture Camera development has progressed to a point where it is now possible to secure with a 16mm camera every effect practicable outside the professional studio. Trick work of all kinds, slow motion, quick action, titles of every description, animated graphs and cartoons and pictures in natural color may be made with a Victor camera

The 16mm Projector likewise has many advantages over the 35mm for non-theatrical use. Chief among these are: Cost, size, weight, portability, and easy manipulation. Many people have the mistaken idea that it is not possible to satisfactorily throw a picture a long distance or secure a large image with 16mm equipment. Quite to the contrary, a clear, clean-cut image of exceptional depth and brilliancy may be had up to 12 feet or even larger in size, and a "throw" of any distance up to 100 feet or even more may be made with the proper Victor Equipment. The Victor Projector possesses every requisite for the flawless projection of motion pictures for every non-theatrical use.

SOUND Reproduction (see later paragraphs on this subject) is as practical for 16mm projection as for 35mm and considerably more economical. The ANIMATOPHONE Talking Projector (A Victor Product) is one of the outstanding achievements of the industry.

It is therefore, evident that 16mm motion picture equipment is not only appropriate, but that it is the only logical choice of the non-theatrical user.



### SOUND RECORDING.

There are two types of Sound Recordings: Those in which the Sound is synchronized throughout with the movement in the film; and those in which the Sound is supplementary, in the form of a running comment or a musical background.

Synchronized Sound is recorded at the same time the picture is filmed, the camera being connected and synchronized with the Sound Recording Equipment.

Where absolute synchronization is unnecessary, the Silent picture may first be filmed and the Sound recorded later. In such cases, it is, of course, necessary that a recording script be carefully prepared in advance and timed with the picture. Usually the subject for which the Sound is being recorded is projected in the studio during the recording.

There are two methods of Recording Sound: The Direct Sound-on-Disc Scoring and the Sound-on-Film process. It is possible to transfer Sound-on-Film to Sound-on-Disc and vice versa. This process is known as "dubbing".

Sound-on-Disc recordings are almost entirely limited to a studio, whereas it is possible with portable Sound-on-Film apparatus to make the recording at any desired location.

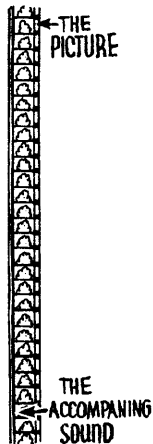


Although Sound-on-Disc was the original and, for some time, the only method of recording and reproducing used, the majority of Sound Pictures made today are produced and reproduced by Sound-on-Film method....disc being now virtually obsolete.

In reproducing sound by the sound-on-film method, sound is first recorded on the edge of the film in the form of a narrow band consisting of a tiny zig-zag track (variable area recording) or of short, straight lines varying in width and density (variable density recording). This track is, in reality, a photographic reproduction of original sound waves or vibrations.



In the final print intended for projection, the sound track is not, as one might suppose, directly opposite the picture for which it is the accompaniment. On 16mm film the sound recording is actually twenty-five frames or pictures ahead of its companion picture. The reason for this is quite simple. Projection of the picture and reproduction of the sound must be simultaneous. That is, they must both occur at the same time, reproduction in both cases being absolutely instantaneous. Two optical systems are required for the two types of reproduction (optical and phonetic). Because of essentially different characteristics and purposes, these optical systems must be separate individual units. Difference in location of the two optical systems is compensated for by the displacement of the sound track and the two processes of reproduction can thus be taken care of at the same time, making it possible for the picture and sound to be synchronized or perfectly timed together.



At the same time the picture is being projected onto the screen, a small slit of light is projected through the sound track twenty-five frames ahead. The light source is a small exciter lamp just below a small sealed lens at the top of which is a slit-



opening so small as to be scarcely visible. This projects through the sound track of the film onto a very small diaphragm or shield in a small photo electric cell. Constant change of size and position or density of the light beam on the photo electric shield sets up a minute electrical current or vibration which is transmitted to the amplifier where it is preamplified and again amplified until its strength is multiplied many thousands of times. The artificial vibrations, after amplification, issue from the dynamic speaker as sounds imitative of those from which the recording was made. Their degree of fidelity to the original, their tonal quality, clarity and naturalness (assuming that the recording is good) are entirely governed by the design and construction of the reproducing equipment and by the quality of its component units, and last but not least, by the condition of equipment.

The slightest error in design or construction, or the smallest sacrifice in quality of materials or accessories would instantly prove fatal to the quality of the reproduction. This is even more true of 16mm than 35mm for the simple reason that the sound track on the film is infinitely smaller and that the passage of the film (which effects frequency range) is very much slower. From this, it can also be easily understood why good results demand good care of the equipment.

At the present time practically all sound pictures are originally filmed and recorded on 35mm standard film. 16mm prints are then made from the original 35mm negatives by reduction printing. Direct-on-16mm recording by professionals is rapidly gaining in popularity, however.

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The preceding paragraphs, of course, merely touch the "high spots" of motion picture history. If further, more detailed information is desired, there are a number of books and good magazines pertaining to professional and non-theatrical motion pictures which afford interesting reading. In this connection, Victor Animatograph Corporation will, on request, be glad to make recommendations. Copies of such magazines may be obtained singly or by subscriptions. Some of the publishers may be glad to send sample copies on request.

VICTOR will gladly answer any questions of a technical or non-technical nature concerning equipment and its uses. For further information or advice on any points not made entirely clear in instructions, address:

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