

Modern Sound Projection (VI)

Keeping extraneous noise out of sound-on-film, with tips on trouble shooting and patching sound film

By E. C. BRINKMEYER

THE results obtained by a projectionist, who has sufficient interest in his job to do more than act as a mere machine attendant, will not only show noticeably in the box office but ultimately in his employer's satisfaction and finally in the pay envelope itself. A projectionist will always do well to study his particular equipment; and master all its little tricks and problems before he has to meet them, rather than be bewildered when the emergency faces him. One of the things a projectionist can do, to keep his sound of the highest quality possible, is to remove, and keep removed, all extraneous noise from his reproducing equipment.

Electrical Connections

Corrosion is one of the common perpetrators of unwanted sound. Soldered joints which have not been wiped clean of flux will become corroded, and covered by a flaky insulating substance. (It might be said here that, though flux is permissible for soldering many of the connections incidental to sound projectors, it should never be used in the construction or repair of any amplifier circuit. This in itself will constitute a source of noise, no matter how carefully the joint is cleaned.) Corrosion will occur also on socket prongs, filament switches, fuse blocks, jacks, sliding contacts, such as rheostats. This may be removed by using a cloth moistened with a light oil; the oil being removed with another cloth and alcohol.

Loose connections also prove unwanted guests. Tube-socket prongs may not be making positive contact; and vibration will cause a sputtering noise or, perhaps, the sound will die away altogether or come on intermittently. Cleaning these contacts and carefully bending the socket prongs to their normal positions will eliminate this trouble.

Fuses loose in their blocks, contacts loose on switches, gain controls, fader rheostats, etc., may also cause trouble; and the little time required to clean and adjust them will never be missed.

Storage batteries that do not receive the proper attention will produce a variety of unwelcome noise. Keep your batteries scrupulously clean and constantly charged; and maintain the liquid at the proper level by regular replacement of distilled water. Keep battery connections tight. It is a good plan to smear a small amount of vaseline over storage-battery contacts. "B" and "C" batteries will cause a peculiar frying noise when they start to deteriorate; and even a new, but defective, battery may act in the same manner. Replacement is usually necessary.

The Tubes and "PEC"

Some method of testing tubes should be adopted, to see that they are functioning in the proper manner at their normal voltages. Occasionally we run across a "microphonic"

tube, which usually produces a howling or ringing noise, when subjected to physical movement such as vibration or tapping on the glass of the tube. Sometimes, however, there is no external source of vibration discernible, and the tube produces the noise

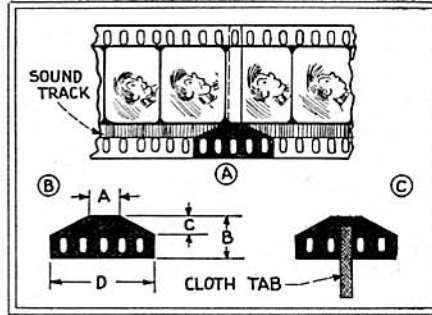


Fig. 1

The most satisfactory way of patching sound film to avoid introducing noise is shown above. Directions and dimensions are given in the text.

apparently on its own. Sometimes you may be relieved of the trouble by switching the tube to another position. In the Western Electric equipment, a microphonic "W. E. 239-A" tube, which cannot be used in the photoelectric cell amplifier, may be successfully used in the "41-A" amplifier.

The photoelectric cell, sometimes referred to as the "PEC," is the "eye" of the sound-on-film reproduction. It is necessary, of course, to have the PEC enclosed in a light-proof housing containing a window; so that the cell may collect the light variations made by the sound record on the film without interference from any other source whatsoever. If there are any holes in the housing, or if light is entering through the door glass of the sound-head, find some means to prevent the light from passing these parts.

The new Western Electric universal-base equipment is provided with a separate PEC housing (instead of the PEC being installed inside the amplifier housing, as was the practice before). The new PEC compartment contains a positive binding-post connection with a set-screw; a small round hole is left in the housing, so that a screw-driver may be inserted to tighten or loosen this set-screw. If there is any chance that any light is entering here, it would be a wise plan to insert a cork in this hole or provide other suitable means of preventing light from entering the compartment.

Miscellaneous Troubles

If you have an A.C. hum in your set and you have traced out everything else, see if some light from your booth lamps is not finding its way into the PEC.

The sound track must be perfectly in line with the optical train of your sound system, to prevent extraneous noise coming from frame lines or sprocket holes.

In some localities the voltage supply to the theatre varies and, at times, there is an excess of voltage which will affect the equipment, causing tubes (especially the A.C. heater type) to become noisy and causing a strain in general and perhaps breakdown. If you have no means of controlling such circumstances, your only alternative is to keep spare tubes and critical parts handy in case of trouble.

Grid leaks and fixed resistors are sometimes noisy. Replace defective units.

All wiring in sound reproducers should be so run that it will be impossible for current to be transferred by induction between wires running near or parallel to one another.

Patching Film

Last, but not least, of all are the patches, in sound on film. A patch on a sound film will introduce extraneous noise into the reproduced sound, unless the patch has been treated in some manner that will obscure it. The greatest of care should be exercised in the making of a "Movietone" splice. Cement smears, fingerprints, dirt spots, mutilated emulsion, poor alignment, provide effective sources of objectionable noise.

It is possible to eliminate splice noises by applying some opaque coating over the splice, in such a manner that it shuts off, and turns back on, gradually, the light entering the PEC. This requires, however, extreme care and patience as well as time; as it is usual to "paint out" with an opaque lacquer or india ink. This method worked

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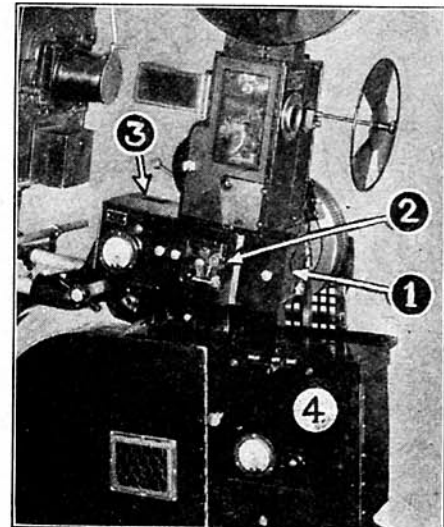


Fig. A

The Western Electric universal-base equipment mentioned: 1, "PEC" house; 2, sound-film feed (improved type); 3, lamp house, with meter; 4, amplifier for "PEC" pick-up.

(Photo Courtesy Bell Telephone Laboratories)

Men Who Have Made Radio

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advice and assistance. In this year, as the result of his experiments, he brought out the electrolytic detector, superior to any previous form of receiving device.

The new art was in a highly experimental condition. It had speedily become apparent, as soon as radio moved out of the laboratory, that its waves were capricious—or subject at least to capricious influences. What direction did the waves of a transmitter take? Ferrié obtained a military balloon, put a receiver in it, and moved it around and around a transmitter to measure the strength of the signal at every angle. The practical results of this work are still bearing fruit in our short-wave developments.

In 1902 the destruction of St. Pierre, in Martinique, by the eruption of Mt. Pelee ruptured communications to the neighboring French island of Guadeloupe. Ferrié restored them by installing radio equipment on the islands—the forerunner of many an emergency use of radio in great disasters.

His work of experiment was steadily prosecuted along the line of directional radio and the use of the loop, to study the manner of wave propagation. In 1904 he was awarded a prize offered for scientific research, and in 1912 another; while a doctorate of science from Oxford University and a laureateship from the French Academy of Science bear witness to the recognition of his work by other savants.

In 1909 the great Eiffel Tower station in Paris was installed, under his direction; and he turned it to account by the transmission of time signals, which serve not merely to regulate clocks, but also to determine positions on the earth's surface for more accurate surveying. He later served as secre-

tary of the international time conference.

In 1911 he organized the radio section of the Ecole Superieure; and later his influence led to the foundation of the national radio laboratory of France.

In 1908, when Morocco broke out into actual war, Captain Ferrié had brought portable radio equipment into the field of actual warfare. In the following year, he installed transmitters on a dirigible and on airplanes. In 1914, having reached the rank of colonel, he was called upon to meet such problems as never before had been put upon a radio technician. He met the demands of four years of war, expanding his organization to meet the needs of war, and the development of practical radio under the exigencies of the unusual conditions encountered. In 1915 he introduced the use of ground telegraphy with equipment of low power, for short-distance communication without aerials. The development to a high degree of the vacuum-tube receiver, also, marked this period.

Since the war General Ferrié, Commander of the Legion of Honor, and with the Distinguished Service Medal of the American military forces among his almost innumerable decorations, has devoted his principal efforts to practical application of those principles of radio which he has done so much to develop, in the extension of the great network of radio communications which links France to her colonial possessions and to the rest of the world. He has, however, taken time often to write for the radio press, in France and abroad, in the interests of furthering radio science and encouraging the solidarity among radio devotees throughout the world which he hails as one of the strongest forces working for the furtherance of international understanding and peace.

Keeping Extraneous Noise Out of Sound-on-Film

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out nicely in the studios, where the splicer made hundreds of patches per day and became very adept in his work. In the booth, however, it has not been so successful because, in most cases, the film must necessarily be patched in a minimum of time. Then, too, the number of experiences could not be compared to those of the professional patcher and therefore the degree of skill was lacking.

A new method, devised by the research laboratories of the Eastman Kodak Company, to block out the splices in sound film, is very effective and easy to follow. It consists of cutting a piece of black (opaque) film as shown in Fig. 1 and cementing it directly over the splice, as at A. The dimensions found most suitable for the patch are indicated at B; here A should be slightly under 1/4-inch; B, 5/16-inch; C, 1/8-inch; and D 1 inch. These patches may be made in quantity, for use when needed, and easily and quickly applied. It will be more convenient to handle them if a small cloth finger tab is attached to each by means of adhesive tape, as shown at C. The patch should cover the splice at its widest point;

it is best when the sound track is completely obscured for a distance of .098-inch each way from the center line of the perforation. This allows for a standard "full-hole" splice. It is advisable to have the patch extend inward almost to the picture frame. Then there is no danger of leaving part of the splice uncovered, by inaccuracy in mounting the patch.

Automotive Installation

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radio, on the ground that it may distract the attention of the driver of the automobile. However, certain investigators have offered figures which would indicate that a car with a radio is driven more alertly and carefully than one without.

To return a moment to the tuning mechanism—attention should be given to the successful manner in which a major problem has been mastered. All set owners are familiar with the difficulty which may be experienced in trying to tune in stations, due to inexperience, or to vibration of the

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