Film-Tech

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Some Notes on Tape Splicing 35 mm Films

In the Beginning—There Was (Mending) Tape!

Tape splicing of motion picture film probably began on the day that transparent mending tape was first introduced many years ago. The fact that the tape was not intended to "mend" motion picture film did not alter its usefulness as an emergency or temporary measure. The concept of tape splicing became increasingly attractive, particularly in the amateur field, because successful cement splices were not easily accomplished by most amateurs.

The introduction of polyethylene terephthalate (Du Pont Mylar®), with its unique properties of strength and extremely low shrinkage, provided the necessary base material to manufacture a more professional tape for film splicing. Shortly after the introduction of polyester materials, various splicing tapes became available, primarily for splicing amateur 16 mm and 8 mm films. Later, Eastman Kodak Company and others, such as Hudson Photographic Industries, Inc., began manufacturing the now familiar tape tabs for splicing amateur films.

The individual tape tabs (Kodak calls them *PRESSTAPES*) consist of a short length of perforated transparent polyester tape with pressure-sensitive adhesive, about 0.002 inch thick, mounted on specially folded release paper to provide a convenient method of handling and positioning the tab over the film. Two tabs, one for each side of the film, are used to make a complete splice although some tabs provide for a single wraparound splice. The splices are usually the butt type, but in some cases, the splicer cuts the film ends incorporating a tongue, or other design, to prevent splice collapse or hinging. From the beginning, the ease and convenience of tape splicing in the amateur field has become clearly apparent, especially when using tape tabs. Although the use of polyester tape in perforated rolls is more economical, the aggravation and frustration often encountered when handling unprotected thin adhesive tape demands considerable patience and manual dexterity. Currently, there are 16 mm splicers available that use unperforated tape that is cut and perforated by the splicer as you make the splice. These devices facilitate the handling of splicing tape and they do a fine job. For the average amateur, however, who may only make a few splices in a year, such an investment is not usually practical.

Professional Uses

During this early period, very few tape splicing materials were available specifically for 35 mm films destined for theatrical projection. Single-frame (4 perforations) tabs were available for 35 mm film strips, as were the rolls of transparent 35 mm perforated tape for splicing and film repair (Figure 1). But tape splicing for 35 mm release prints had not yet gained the general acceptance that is prevalent today. In some instances, however, film exchange personnel found that 35 mm cement splices were being reinforced

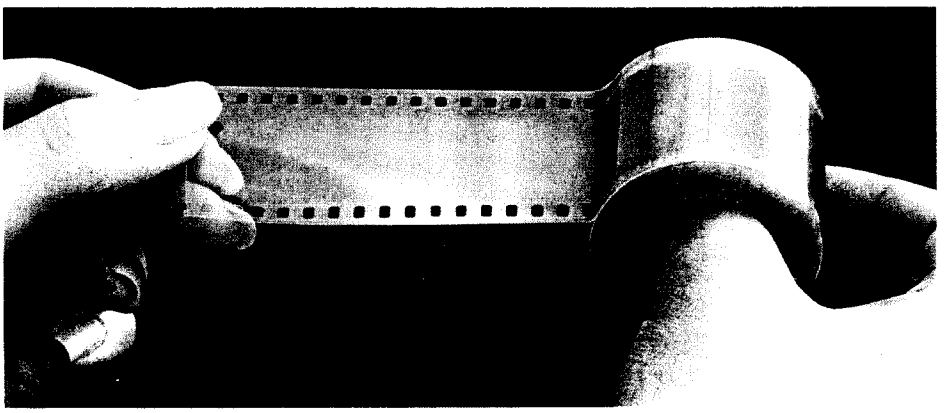


Figure 1. 35 mm Transparent splicing tape

Film Rentals to U.S. Companies (1982)
(Variety)

Domestic	*$1,600,000,000*
Foreign	*720,000,000*
TOTAL	*$2,320,000,000*

U.S. Box Office Gross (1982)—*$3,452,700,000*
(MPAA)

with regular mending tape. Often, the tape was the only agent holding the splice together. Upon instructions and because of the generally unsatisfactory quality of mending tape for splicing film, these "reinforced" splices were removed whenever found. Ordinary mending tape was never designed to bear the stresses and heat to which release print splices are subjected during projection. The performance of such splices was generally unsatisfactory because of adhesive oozing that lead to dirt buildup and eventual separation of the film. Shortly after the introduction of 70 mm film for release prints, a special 70 mm tape tab was introduced (Figure 2) for use primarily as a reinforcement for conventional overlap cement splices.

The current popularity of tape splicing for 35 mm release prints has been largely motivated by the steadily increasing trend towards large reel projection. In the makeup and breakdown of large reels and platters, many splices are necessary. During the average life of a release print, the minimum of two frames that are lost in making each conventional cement splice will, in time, account for a significant total amount of film being removed. The adverse effects on picture and sound continuity, as a result of cumulative cement splicing losses, become especially distracting as the print reaches second or third run status. Proper tape splicing prevents these losses from happening, and a correctly made tape splice can be considered permanent, although it is fairly easy to peel apart when necessary. *Furthermore, tape splicing is the only inexpensive way to splice polyester base film to itself or to acetate base film.* We do not mean to imply that other, more sophisticated splices made in polyester film by thermal fusion methods are not equally satisfactory, but the added expense and training necessary to prepare such splices may not always be practical under your operating conditions.

Making Overlap Tape Splices

An overlap tape splice is similar to a standard cement splice except that no scraping or cement is required. Many people prefer the overlap tape splice because it can be readily prepared on existing splicing equipment and prevents the occurrence of collapse or hinging during projection. All that is needed is your splicer, perforated splicing tape or tape tabs, and working knowledge of the procedure.

Overlap Splice on a Butt-Type Splicer

Many of the comments we hear in theatres indicate that projectionists are making overlap splices with newly purchased equipment designed primarily to make butt splices (Figure 3). This change in technique comes as a result of the all-too-frequent collapse of butt splices after repeated projections. Prolonged exposure to high-energy light sources and to the tension commonly encountered in professional projectors eventually causes a butt splice to separate slightly. Once this separation occurs, the thin splicing tape can hinge or collapse, and the potential for film damage becomes very great at the upper loop between the feed sprocket and the gate.

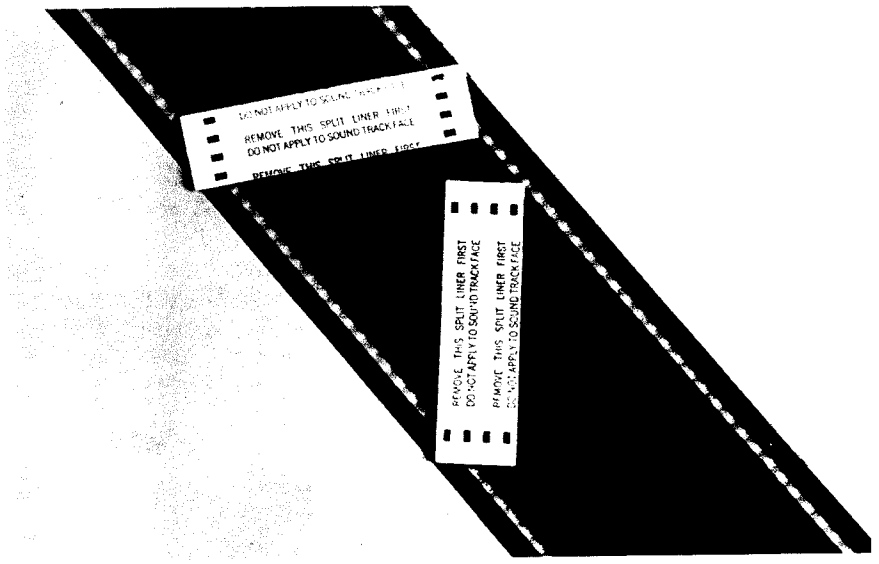


Figure 2. 70 mm splice reinforcement tabs.

Figure 3. Overlap splice on a butt-type splicer.

Splicer Courtesy of G Splicer Corp., Westbury New York

The No-Show Must Go On!

Polyester splicing tape is a unique material that possesses the necessary strength and optical clarity, and a nonoozing adhesive that minimizes dirt buildup. If a tape splice is to be virtually invisible on the screen, however, it is important that the film surfaces in the splice area also be free from dust and dirt particles. To provide for proper adhesion of the splicing tape, oily deposits on the film must be cleaned off with a suitable solvent such as 1,1,1 Trichloroethane* which is available under a variety of tradenames from most photo supply houses. Once the tape has been placed on the film, it is usually not possible to remake the splice by peeling off and reusing the tape, particularly if invisibility is important. The bubbles and ridges caused by peeling can rarely be pressed or rubbed down so they do not show when projected. It is most important, therefore, that cleanliness during splicing and other film handling operations be maintained at all times.

While there are several tape sizes for the various types of splicers available, our technicians prefer to use splicing tape that is two frames in length. They prefer the two-frame splice because it provides much more adhesive strength and because the tape ends fall on the frame lines rather than in the picture area. There are tape perforating and cutting splicers that make two-frame splices using splicing tape 1½ inches wide. Another type of splicer automatically applies to a two-frame length from a supply roll of perforated tape.

*KODAK Film Cleaner and Chlorothene NU are satisfactory proprietary solvents made respectively by Eastman Kodak Company and DOW Chemical Corporation.

Making an actual tape splice with a bench-top or a console-type automatic splicer is described in an earlier Film Notes for the *REEL PEOPLE* article entitled, *Splicing for the Professional,* (Kodak Publication No. H-50-1). Since we prefer the two-frame tape splice on the basis of strength and invisibility, our splices were made with experimental two-frame splice tabs (Figure 4). It is our understanding, however, that similar two-frame perforated splicing tabs will soon become commercially available.

Tape Up Your Differences

The requirements for splicing polyester films in special situations such as mag-sound dubbing and optical printing, or in laboratories to join lengths of raw stock, sometimes demand special techniques. In many of these special applications, the added thickness of tape, or the vulnerability of tape in certain processing solutions, creates a need for an alternative method of splicing. Currently, the only practical substitute for tape splicing polyester films is thermal fusion. There are several splicers available to make these splices, and the choice of equipment depends primarily on the special splicing requirements. These complex devices are expensive and may require that your technicians receive additional training and experience before they can make satisfactory splices with such units. In any case, when using special splicing equipment, it is important to follow the instructions carefully that accompany the unit. At the present time, dependable splices between polyester base film and acetate base film have not been consistently achieved by most existing thermal fusion splicers. One exception is a dielectric butt-type splicer that is reported to splice the two film bases satisfactorily. Except for these special situations, tape remains the most convenient and least expensive method to splice 35 mm release prints, regardless of the film base materials.

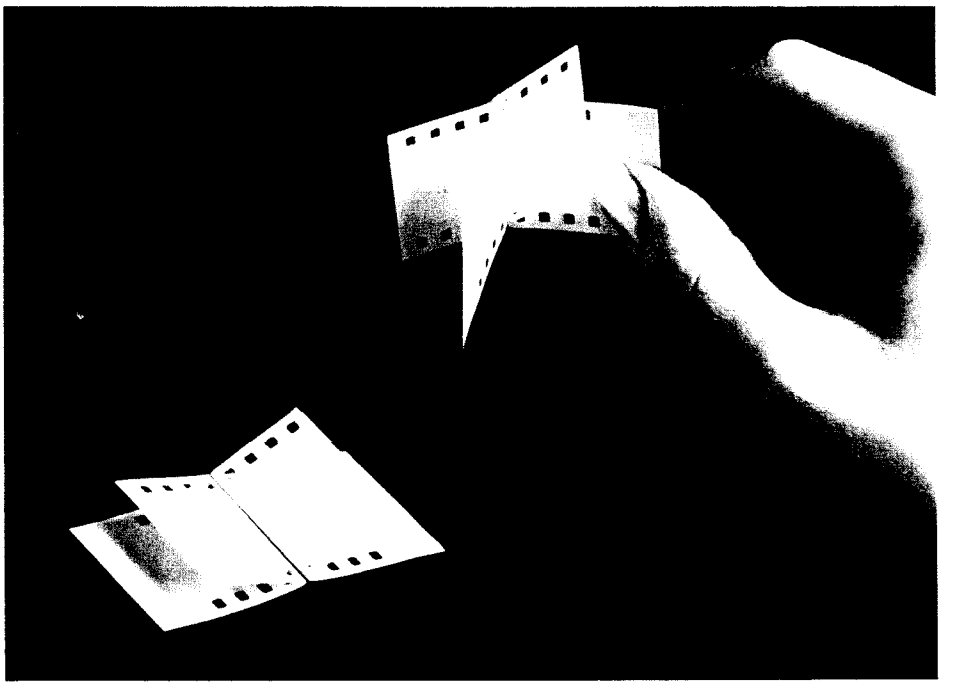
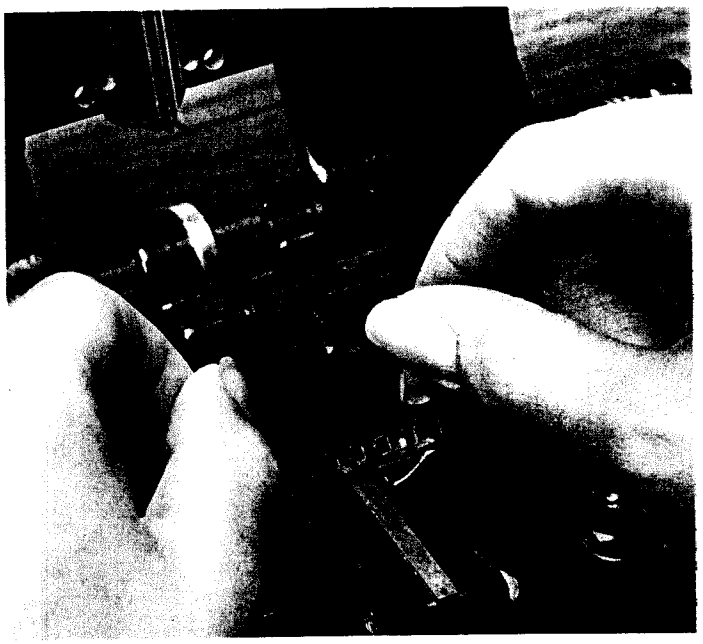


Figure 4. Experimental 35 mm two-frame splice tabs.

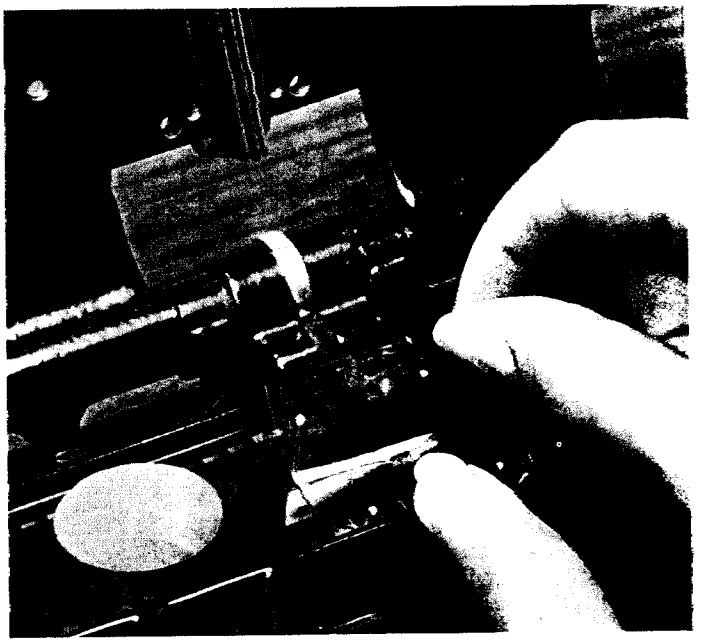
Helpful Hints—Overlap Splices

The following hints expand a few of the ideas presented in the earlier *REEL PEOPLE* article (H-50-1) on splicing and are directed particularly to users of typical bench-top splicers such as Griswold or Neumade. The comments also generally apply to splicing with automatic console-type machines.

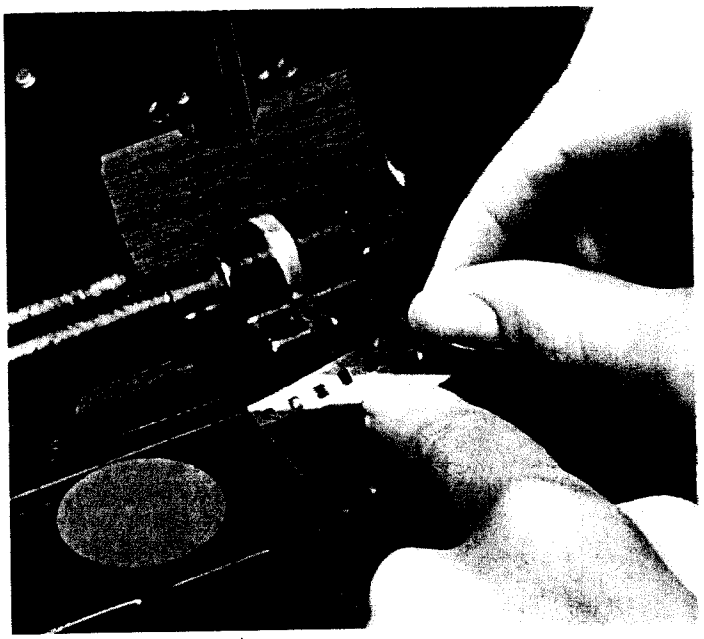
1. If you are using perforated tape from a roll, carefully lift the cut edge by a corner and unroll enough tape to conveniently cut off a two-frame (8 perforations) section. Be careful to handle the tape by the edges only so the adhesive that contacts the picture area will not be disturbed. If there is a clean edge of a drawer or shelf (within easy reach of splicer) where you can attach a corner of the cut sections of tape that will not allow the center adhesive area to come into contact with a surface, cut several sections as a convenience and to save time.



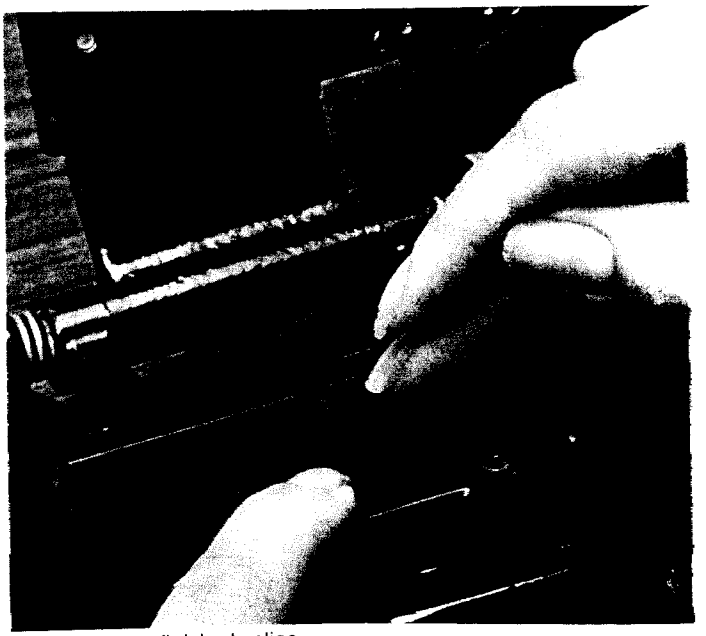
A. Position tape section over splice.



B. Start contact at front edge.



C. Work contact toward rear.



D. Smooth out finished splice.

Figure 5.

(See the sequence illustrated in Figure 5, A thru D.)

2. Use a couple of small weights to hold down the two film ends as you prepare to place the splicing tape over the overlap; almost any small, heavy object will do, but a pair of small magnets are ideal.

CAUTION: Do not use magnets near films that have a magnetic sound track because of the possible degaussing that can occur. Use small weights instead.

Whatever you use, protect the film by putting felt or some other non-abrasive material on the film-contact surface of your weights or magnets. This procedure allows the use of both hands to place the unprotected tape in registration over the splicer pins (Figure 6). Remember, if the tape is placed on the film incorrectly and then peeled off, that piece of tape should be discarded because of the tight curl and peel marks that are usually produced by the peeling process. Under certain conditions, especially when static electricity may be present on the film, placing a raw tape on the splicing area can be very frustrating. In these cases, the extra expense for splicing tabs may be justified in order to save time and effort. If you use the currently available four-perforation, or one-frame tab, make sure you shift the overlap area one pin on the splicer so the tab can be correctly indexed and aligned on the pin to cover two perforations on each side of the cut film end. (See the sequence in Figure 7, A thru D.) When applying the tab to the other side in the same manner, it will be staggered by one perforation.

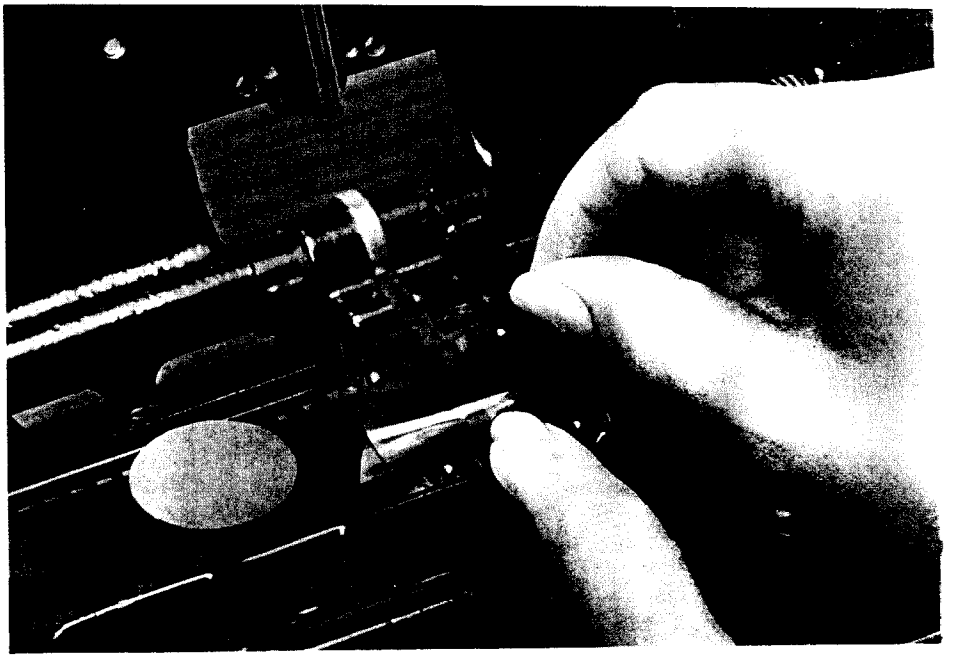


Figure 6. Small weights or magnets permit two-hand operation.

3. Use a film cleaner, such as *KODAK* Film Cleaner or Chlorothene-NU® (never use alcohol on acetate base film) on a small piece of cloth to clean the film ends prior to placing the tape on the film. Remember, a properly made tape splice can be considered permanent, so keep it free from air bubbles and other visually distracting marks.

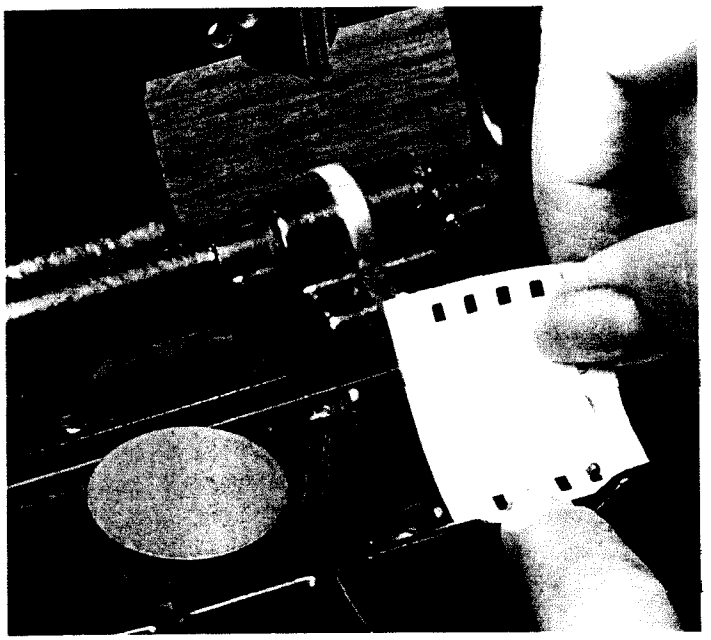
4. Rub down the completed splice on a clean, flat surface. A small, round plastic rod can sometimes iron out minor irregularities that cannot be smoothed easily with your finger.

5. In the event that a tape splice must be disassembled, use a razor blade or one of the razor knives that are available at hobby shops to gently lift up the corner of the tape to facilitate peeling. To prevent the possible tearing of the film or tape, hold the film down with your finger at the corner where the tape was lifted and peel the tape slowly away from that area. The tape remaining on the other side can be removed by repeating the same procedure or by carefully twisting the film ends and peeling the film away from the tape.

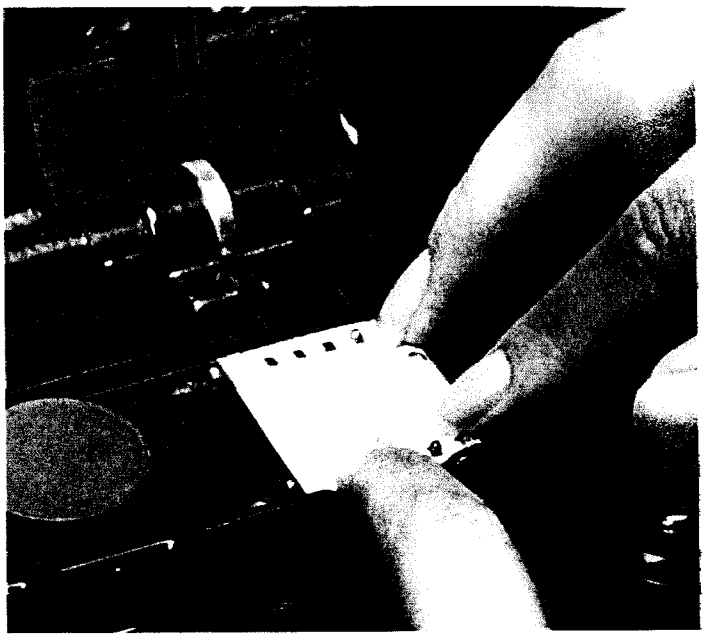
6. Although scraping the emulsion is not necessary when making an overlap tape splice, it will make the splice a little less noticeable on the screen. If you do scrape, make sure there are no emulsion particles on the film surface when you apply the tape.

7. Never allow any part of the tape section to hang over the edge of the film. Trimming the excess tape will do little good because the overhang signifies misalignment at the perforations. Remove the tape and replace correctly with a new, properly aligned tape.

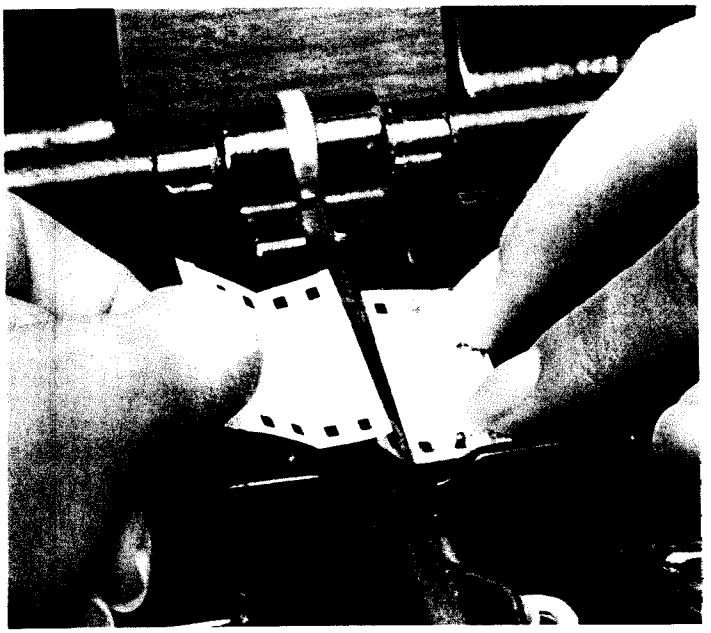
8. If your splicer contains the small pins designed to accommodate CinemaScope-type perforations, make sure the film ends of regular perforated film are correctly aligned before you apply the tape.



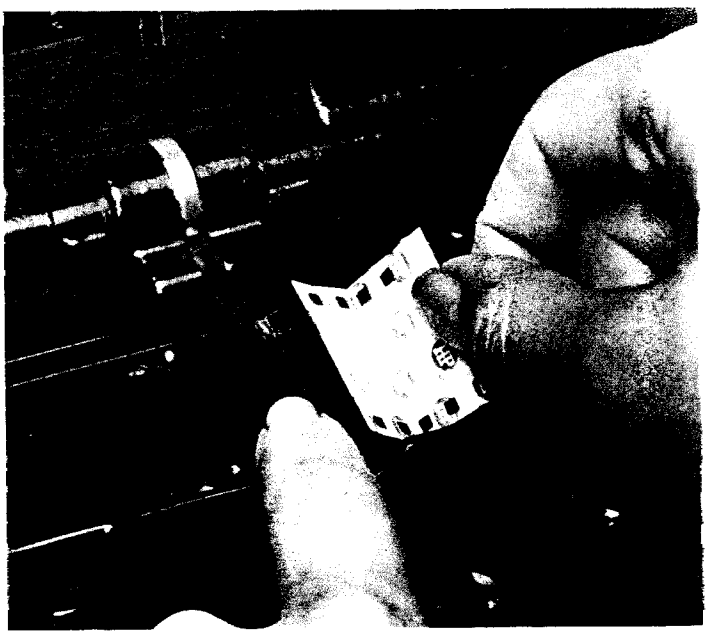
A. Align tab over splice area.



B. Push tab over splicer register pins.



C. Remove half of release paper and press splicing tape to film.



D. Remove remaining half of release paper and complete splice.

Figure 7.

Helpful Hints—Butt Splices

1. Do not attempt to make a butt splice on ordinary overlap-cement splicers. They neither cut precisely enough nor can they hold the film ends in close contact. Use only splicers designed for butt splicing, such as the one shown in the following illustrations. (See Figure 8 sequence, A thru E.)

2. Be sure to flex the splice area carefully after making the splice to determine if hinging or collapse is apparent. If the smooth curve (Figure 9) breaks into an angle (Figure 10), remake the splice. For those who insist on a butt splice, it is our understanding that at least one splicer is available that makes a diagonal cut, thus minimizing the chance of collapse. The tape for a splice should be wide enough to cover two frames of film.

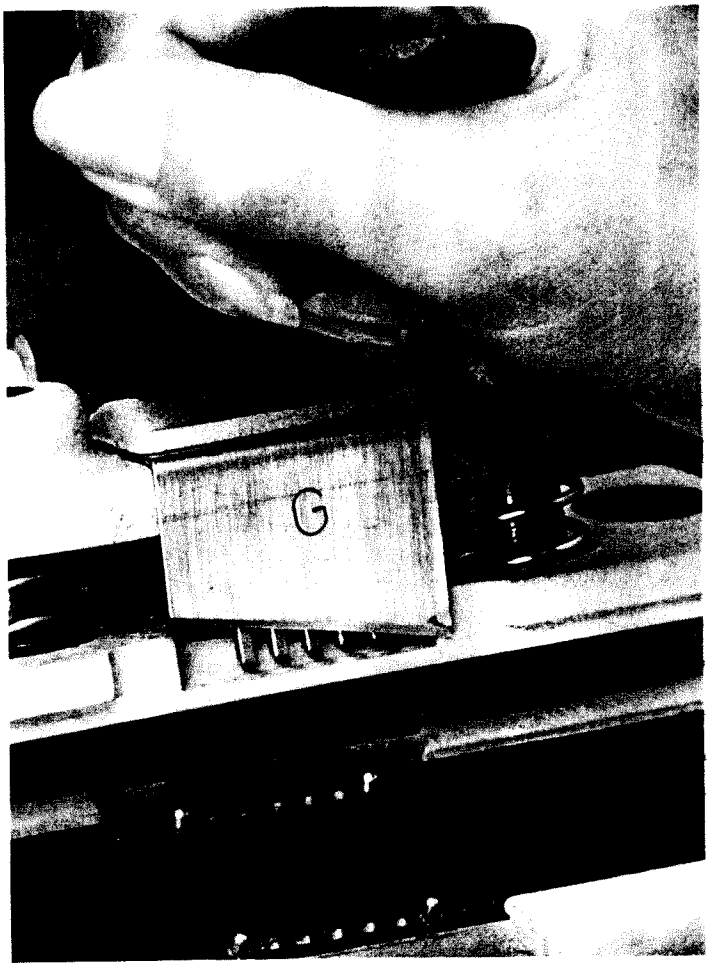
A. Position tape between pins.

B. Press into place over splice area.

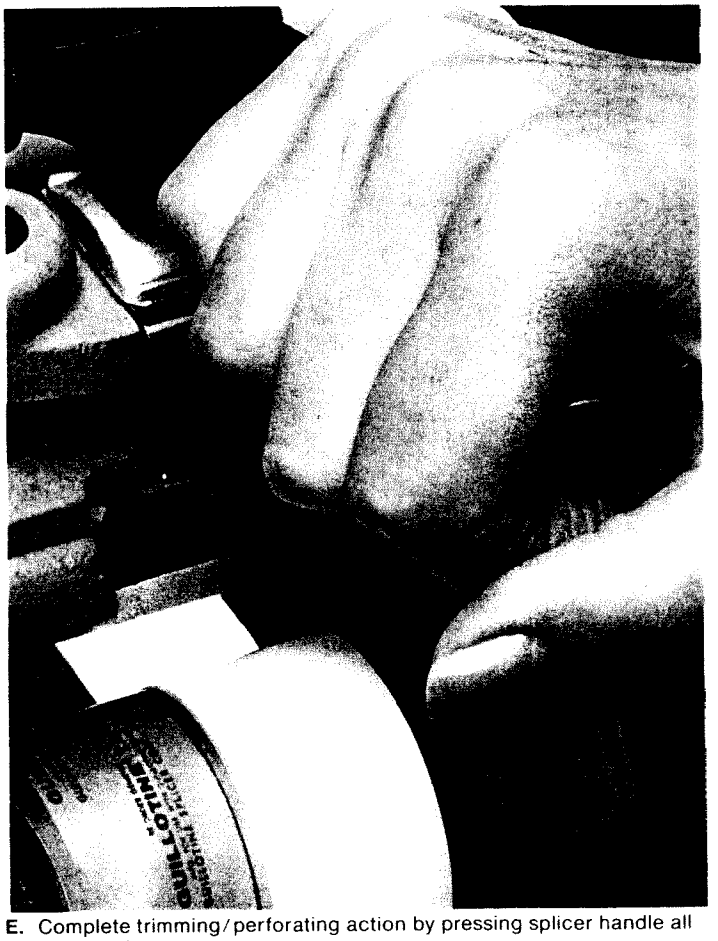
C. Smooth out tape carefully.

Figure 8.

Splicer Courtesy of G Splicer Corp., Westbury New York.



D. Lower cutter assembly to trim and perforate splicing tape.



E. Complete trimming/perforating action by pressing splicer handle all the way down.

3. If you are using single-frame (4 perforations) tape tabs, they need not be staggered as recommended for making overlap tape splices. Most butt-type splicers use one-inch unperforated tape and place it to cover two perforations on one side of the splice, and three perforations on the other side. For maximum splice strength with this type of splicing tape, no less than two perforations (half frame) of film should be in contact with the tape on either side of the splice.

4. Different types of cuts from various splicers can cause splicing incompatability as release prints move from one theatre to the next. Before cutting out what seems to you a "strange" tape splice, check to see if you can make up your reels or platter using the existing cuts. Remember, the name of the game is, *preserve the program continuity.*

5. Using an appropriate solvent-type film cleaner, as mentioned earlier, and a piece of soft cloth, keep the punch, die, cutters, and platen areas of the splicer clean. The die can usually be cleaned with a toothpick or other non-metallic probe.

Here's to Good (Tape) Splicing

Regardless of the tape splicing method you use, and although the splice appears on the screen for only a fraction of a second, a poorly made tape splice when viewed on a wide screen can be extremely distracting. Poorly made tape splices also can increase the potential for severe film damage if any exposed adhesive sticks to the adjacent film convolution, particularly in platter systems. The few extra moments you spend making a proper tape splice will be more than compensated for by the prevention of film damage, a decreased need for splice replacement, and the uninterrupted visual concentration of your patrons.

igure 9. Completed splice should form smooth curve hen tested.

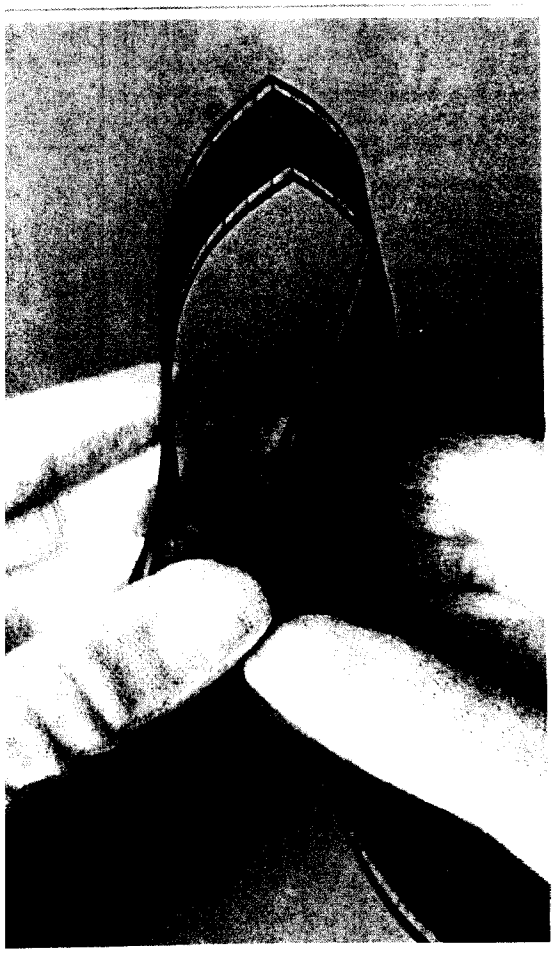
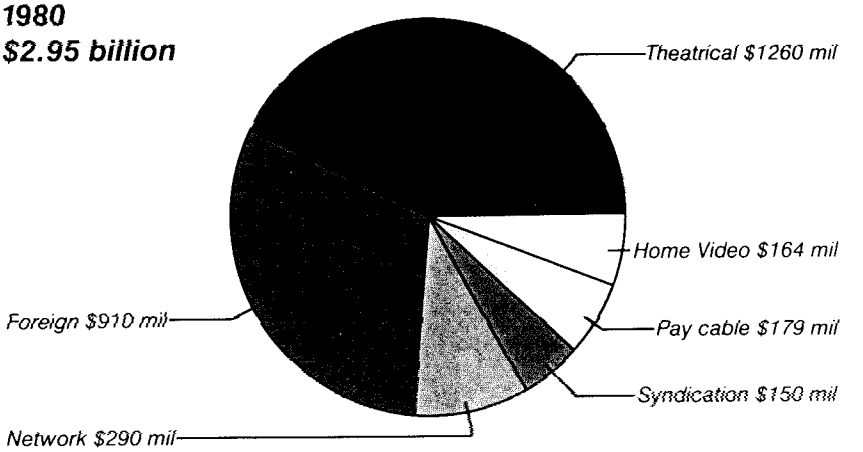


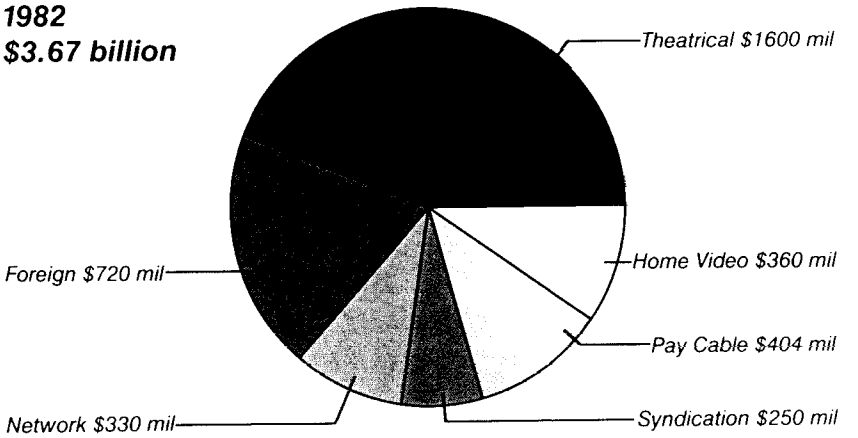
Figure 10. Remake splices that look like this.

Feature Film Revenue by Market

Aftertheatrical Market Revenues From U.S. Feature Films: 1980 $2.95 billion



Aftertheatrical Market Revenues From U.S. Feature Films: 1982 $3.67 billion



Aftertheatrical Market Revenues From U.S. Feature Films: 1984 (Estimated) $4.464 billion