

'Eastman' Television Recording Film

Type 5394 (36mm coated on clear base)

Type 7374 (16mm coated on grey base)

General properties

These films are designed for photographing television picture tube images so as to provide a motion picture record of television programmes. Such records are known by various names, such as telerecordings, telctranscriptions and kinescope recordings. They are used for various purposes including programmes for delayed broadcast or syndication, sponsor's records, records of programmes for legal protection, future production planning, etc.

Picture tubes having either P-11 (blue) or P-16 (ultra-violet) type phosphors may be photographed satisfactorily using this film. The sensitivity of the film is high, so that satisfactory exposure can be obtained while operating the tube at a voltage that will minimise scatter on the phosphor screen. This results in improved sharpness, definition and tone reproduction on recordings. The grain of this film is also lower than that of previously available telerecording films of comparable speed.

When photographing positive tube images on this film, a negative image results after processing. The processed negative may be used for immediate transmission by reversal of polarity and other circuit changes in the scanning system, such as is often done for news programmes. Prints can be made from the negatives in the conventional manner whenever time allows.

The film also finds application in making low-contrast prints from telerecordings.

Exposure and processing for telerecording

Tests should be made using the particular equipment intended for routine operation in order to establish the proper conditions for exposure and processing of the film.

The first tests required are those for determining the proper development conditions. Strips should be exposed in a sensitometer to tungsten illumination of any suitable colour temperature, say 2800° K. These strips should then be processed in a negative type developer, such as 'Kodak' D-76 for a series of times at 68°F. The densities of the processed strips should be measured on a densitometer and the respective curves plotted. From these curves, the gamma

values for each time of development should be determined and time-gamma curves similar to those shown on page 5 should be plotted. The development time for any specified gamma can then be determined from this curve.

The particular control gamma to which the negative is developed will be dependent on whether the negative is to be transmitted directly with reversed polarity or if prints are to be made, what particular sensitometric exposure conditions are employed, what limitations are imposed by the type of developer used, what contrast control is exercised by alteration of the vision signal drive voltage on the tube, and, finally, what contrast control is exercised in making the print. Some suggested values are given in the table below.

It is then necessary to determine the relationship between tube brightness and negative density when the film is processed to a particular control gamma. To do this, one may photograph a plain raster at various tube brightnesses (by varying the bias voltage in suitable steps) or photograph the image produced on the tube by a staircase-wedge generator. These exposure tests should be made at a fixed aperture setting, say $f/2.8$. The densities of the processed negative are measured and plotted against the bias voltage.

On the density- E_g curve, one then locates the bias voltage corresponding to the density which will be appropriate for the "black" level. This should be about 0.15 to 0.20 including base density as noted below.

| | Negative control gamma | Negative density* for black level | Negative density* for white level | Negative density range | Release print film type No. | Release print control gamma | Release print high-light density* | Release print shadow density* | Release print density range |
|--|------------------------|-----------------------------------|-----------------------------------|------------------------|------------------------------|-----------------------------|-----------------------------------|-------------------------------|-----------------------------|
| Procedure where negatives are used for either direct transmission or for making release prints | 1.2 to 1.4 | 0.15 to 0.20 | 1.45 to 1.75 | 1.30 to 1.60 | 5394 or 7374 | See note 1 | 0.20 to 0.25 | 1.60 to 1.90 | 1.40 to 1.70 |
| | | | | | 5302 or 7302 or 5394 or 7374 | | 1.9 to 2.1 | 0.20 to 0.25 | 1.60 to 1.90 |

Because of the curve shape of Types 5394 and 7374, the slope of the straight line portion of the curve may be somewhat difficult to measure. In this case, one may use Type 5302 or 7302 as a material for the control strips and determine the proper control gamma by test.

* Density values include base density.

The bias voltage corresponding to the density which is appropriate for the "white" level should then be determined. The particular density value chosen will depend upon how the negative is to be used. In some cases, the negative will be used initially for direct transmission by reversal of polarity but prints may be wanted at a later time. In other cases, the negative may be intended only for making prints. In the former instance, the density range of the

negative may be higher than in the latter in order to suit the requirements for direct transmission. The density of the "white" point will in these circumstances be higher than in the latter case. When prints are later required, they can be made on a material having lower contrast characteristics than regular release positive stock to yield a print having the appropriate density range. As noted later, 'Eastman' Telerecording Film may be used as a print material for this purpose.

For negatives intended only for making release prints, the density range and the density of the "white" point should be as shown in the table on page 2. Release prints are made on 'Eastman' Fine Grain Release Positive Film, Type 5302 or 7302 but it is also possible to use 'Eastman' Television Recording Film for this.

Vision signal drive voltage

Having determined the bias voltages to be used for obtaining the proper negative densities for the "black" and "white" levels, the difference in these voltages then represents the correct vision signal drive voltage to be used on the display tube.

Obviously, it is important to provide some arrangement for checking the brightness of the display tube at frequent intervals, either photometrically or photoelectrically to be certain that the original calibration is maintained.

The above data assumes that no gamma correction or "stretch" is employed in operation of the display tube. If this procedure is used, other values may be required.

Exposure and processing for television release prints

This film may be exposed in any standard motion picture printer employing a tungsten light source. Depending upon the particular processing conditions, the speed of this material is about five to ten times greater than that of 'Eastman' Fine Grain Release Positive Film, Type 5302 or 7302.

Processing is carried out in a positive type developer, such as 'Kodak' D-16. The time of development for a given temperature should be determined by test, using the data given in the table on page 2 as a guide.

As indicated above, and by reference to the curves on page 5, it should be noted that the measurement of the gamma values for development in 'Kodak' D-16 Developer is rather difficult because the straight line portion of the curves is restricted to the higher densities. However, once the processing conditions have been determined for Television Recording Film so as to yield the correct release print density range, it is reasonably satisfactory to use another material processed in exactly the same manner as a means to ensure that the processing remains unchanged. 'Eastman' Fine Grain Release Positive Film, Type 5302 or 7302 is a suitable material for this purpose since the gamma measurement is somewhat easier.

Alternatively, the average slope of the characteristic curve over a suitable density range, such as 0.3 to 1.7, may be measured and used for control purposes.

The high processing contrast obtained in 'Kodak' D-16 Developer is occasionally employed in the production of positive recordings from negative tube images, where a film record is required only for immediate re-transmission.

Colour sensitivity

Blue and ultra-violet.

Base

Clear safety.

Safelight

'Kodak' Safelight Filter, 'Wratten' Series 0B (amber-yellow).

Perforations

35 mm British Standard Positive, B.S. 677: part 1: 1958; 35 mm British Standard Negative, *B.S. 677: part 1: 1958 (short pitch); 16 mm British Standard Silent* or Sound (perforated one side) B.S. 677: part 2: 1958, except dimension D, 0.2994 ± 0.0005 in. and dimension L, 29.94 ± 0.015 in; 16 mm British Standard Sound (perforated one side) B.S. 677: part 2: 1958.

Rolls available

35 mm \times 1,000 ft (footage numbered); 16 mm \times 1,200 ft or 2,400 ft (footage numbered).

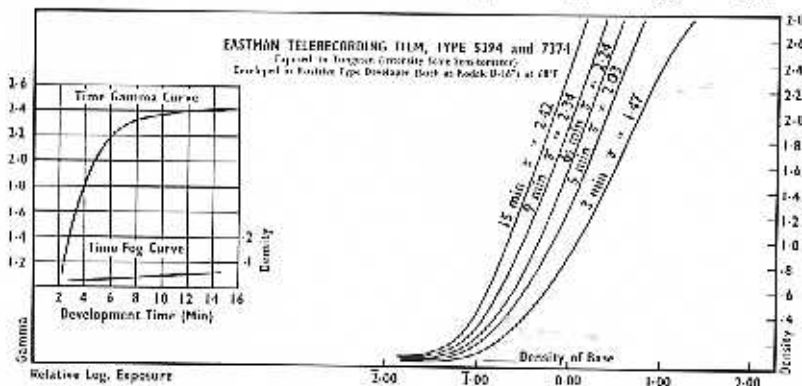
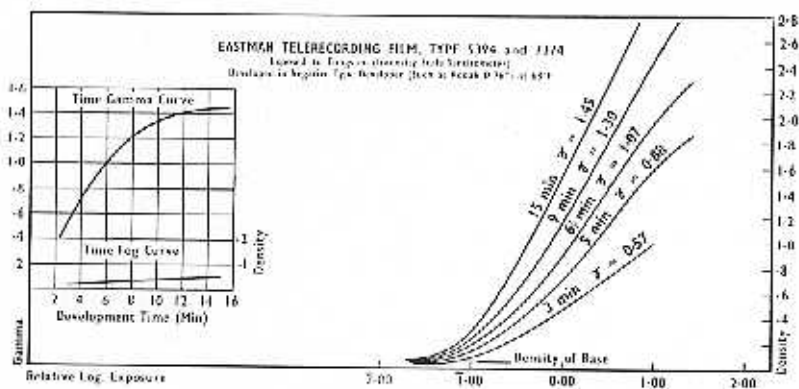
Cores and windings

35 mm on Type R core, wound on, 16 mm on Type T core, wound on. When ordering 16 mm film perforated one side, specify whether winding A or B is required.

Sensitometric curves

Following are sensitometric curves obtained for exposure to tungsten illumination in an intensity-scale type sensitometer. Curves obtained using time-scale instruments will be somewhat different from these as will also curves obtained by exposure to display tube staircase-wedge images.

*Special order item



*Some modification in the formula is usually needed for each type of processing installation and mode of operation.

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