Scotch video tape playback

VOLUME 1, NUMBER 2

TECHNICAL INFORMATION

NEWS and DEVELOPMENTS

NEW PRODUCTS and PROCEDURES

PLEASE ROUTE

Dir. of Eng.

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Asst. Ch. Eng.

VTR Supervisor

Video Eng.

Return to:

This is the second bulletin in a new series of publications provided as a service to the television industry. Many subjects of mutual interest to video tape engineers, operating personnel, sales and administrative staffs will be discussed in these pages . . . information we feel will be of benefit to those contributing to the progress of this fast moving industry. Your questions and suggestions for topics to be discussed are most welcome. Write to: "Playback", 3M Company, St. Paul, Minnesota.

in this issue . . .

Video Splicing Tape and How to Use It

No ordinary pressure-sensitive tape can be satisfactorily used to splice video tape. Video splicing tape has to be as thin as possible in order to minimize head wear and physical distortion of the video tape. A firm adhesive is needed to hold the spliced ends in place, prevent seepage or oozing of the adhesive, and the absorption of foreign matter. The base on which the adhesive is coated must further provide a static drain, and tapes designed for this purpose are aluminized to meet this requirement.

(Continued on Page 2)

Video Splicing Tape

(Continued from Page 1)

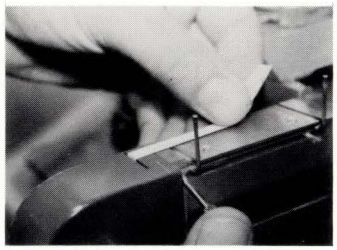
Splicing tapes 390 and 391 do fulfill the above characteristics, but this is not enough. A good application technique is equally important. All video tape operators should take every precaution or contamination problems will influence results.

The video tape itself must be free of solvent and finger marks, and the splicing tape should be pressed down with enough pressure to remove all entrapped air between the adhesive and the video tape.

If solvents are used, there is always the chance of softening the splicing tape adhesive or breaking the bond by solvent collection in voids where the tape has not been pressed down thoroughly. Very small amounts of solvent can soften adhesive to cause failure.

Stretching of the splicing tape is another consideration. If not dispensed properly from the tape splicer,* efficiency of the adhesive coating will be lessened resulting in an imperfect bond.

DISPENSE TAPE VERTICALLY...



NOT HORIZONTALLY!

The splicing tape should first be pulled straight up (vertically) approximately 3" to 3½" out of the slot from the dispensing mandrel as shown, and then placed under the hold down fingers on the saddle-bar trimming anvil. If the tape is pulled out of the slot at a 90° angle, it will stretch minimizing the effect of the adhesive coating as described.

Care should be taken, too, not to stretch the splicing tape between the hold down fingers. This would result in wrinkles on the splicing tape or curling of the video tape after the splice is completed.

Some concern has been expressed about the irregular surface or waffle pattern on the backing of the splicing tape causing imperfect splices. This general appearance has no ultimate bearing or effect upon obtaining a satisfactory splice. However, it must be remembered that this is a pressure-sensitive tape, and that in order to apply adequate pressure and assure a perfect bond, a blunt instrument or the operator's thumbnail should be used.

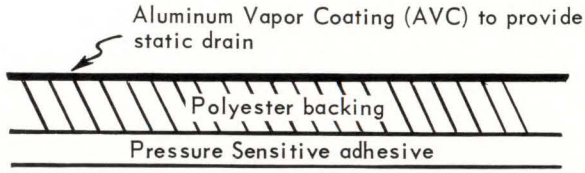
*The Smith TV Magnetic Tape Splicer is manufactured by the S&S Manufacturing Company, 9385 19th Street, Alta Loma, California. This splicer is presently being sold by television equipment manufacturers. It may be of special interest to present owners of this type splicer that the S&S Manufacturing Company has a reconditioning service and modification available for a much improved light and pressure bar.

Splicing tapes 390 and 391 have been specifically designed to provide error-free splices. The following specifications have been adapted for the physical and adhesive properties of these tapes:

Physical and Adhesive Properties

	No. 390	No. 391
Backing	Polyester	Polyester
Nominal Thickness		
Backing	0.50 mil	0.25 mil
Adhesive	0.30 mil	0.30 mil
Overall	0.80 mil	0.55 mil
Width	15/64" 31/64"	15/64" 31/64"
Tolerance	± 1/64" ±1/64"	±1/64" ± 1/64"
Length	66 ft.	66 ft.
Tensile Strength of Splice* (lb./2" width)	16 lbs.	8.4 lbs.
Adhesive Creep Rate*	Less than 1.0 mil per 4 hours with 2½ lb. suspended weight.	
Resistance (aluminum vapor coat)	1.5-2.0 ohms/square	

*At 73°F. 50% RH



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A CASE IN POINT...

Watch Those Marking Pens

Most video tape operators use a felt marking pen to identify a segment of tape, for editing preparatory to splicing and for other uses. Caution should be taken, however, not to lay down an excessive amount of ink and to be absolutely sure the ink is dry before putting the recorder in operation.

If the thickness of the ink's pigment is appreciable, flaking or powdering of the pigments in the ink may result and the residue transferred to the oxide side of the tape. A backing deformation also can occur leading to oxide "picking" or contamination. To eliminate these problems be sure to allow 10 seconds drying time. After the ink is dry, run your finger over the ink or use a wiping cloth to rub off any flakes that might otherwise transfer to the oxide.

If this procedure is not followed prior to playback or record, head clogging will be the result in the area of ink transfer causing an intermittent loss of signal or noisy area. Furthermore, if wet ink is permitted to penetrate the oxide coating, more than likely this area of the tape will be ruined. To correct the problem, a segment of the tape will have to be cut out.

(Continued on Page 6)

The SMPTE Video Tape Recording Committee was organized for the purpose of developing "standards and good engineering practices for the construction, adjustment, operation and measurement of video tape recording and reproducing equipment, and for those video tape dimensions or other characteristics which effect performance and interchangeability." It has worked diligently in this regard since 1958 and substantial progress has been made.

With the number of machines in use increasing, and in consideration of the many variables involved in video tape recording, continuing developmental work is needed. Recommended Practice RP-6 and Proposed American Standard VTR 16.2 have been approved by the committee to further effect video tape standardization and are reproduced here in their entirety.

Current membership of the Video Tape Recording Committee:

A. H. Lind, Chairman
RCA, Bldg. 10-3, Camden, N.J.

C. E. Anderson
Ampex Corporation

G. W. Bartlett
NAB

R. J. Bowley
Westinghouse Broadcasting Co.

H. A. Chinn
CBS

P. E. Fish
CBS

W. K. Grimwood
Eastman Kodak Company

Fred Himelfarb
NBC

J. E. Landsburg
CBC

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ABC

H. W. Town
NETRC

R. A. von Behren
3M Company

PROPOSED AMERICAN STANDARD

ASA Reg. U. S. Pat. Off.

Dimensions for 2-In. Video Magnetic Tape

VTR 16.2

Oct. 19, 1960

1. Scope

1.1 This standard specifies the dimensions for the width, thickness, and curvature of 2-in. video magnetic tape.

2. Dimensions

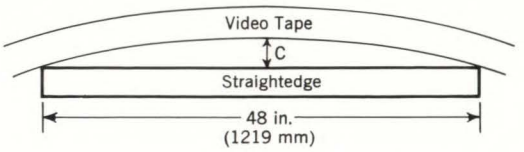
2.1 Width. The width of the tape shall be 2.000 +0.000 −0.004 in. (50.80 +0.00 −0.10mm).

2.2 Thickness. The overall thickness of the base plus coating shall not exceed 0.0015 in. (0.038mm).

3. Curvature

3.1 The curvature of the tape shall not exceed 0.0625 in. (1.59mm) in 48 in. (1219mm).

3.2 Measurement. Curvature shall be measured by constraining the tape to lie in a plane under zero tension and by positioning a 48-in. long (1219mm) straightedge as shown in the diagram. The maximum deviation, C, of the tape edge from the straightedge shall be taken as the curvature.



American Standards Association, Inc., 10 East 40 St., New York 16, N. Y.

Note: This proposal has been approved by the SMPTE Video Tape Recording and Standards Committees and will be submitted to the American Standards Association, Incorporated, for approval some time in the future.

SMPTE Recommended Practice RP 6

This Recommended Practice originated in the Video Tape Recording Committee. The proposal, approved by the initiating committee and the Standards Committee, was published for trial and comment in the April 1960 *Journal*. The recommendation received final approval by the Society's Board of Governors on October 16, 1960.

Modulation Levels for Monochrome 2-Inch Video Magnetic-Tape Recording

Introduction. In current video-tape recording systems the playback video signal level is dependent upon two independent factors, viz., (a) adjustment of the playback video amplifier gain setting and (b) deviation of the recorded, frequency-modulated, radiofrequency carrier signal. In order to achieve uniformity of playback video signal levels without the accompanying need for readjustment of the playback video amplifier gain, it is essential that all video-tape recordings be made in accordance with the same recommended practice for carrier deviation. This is of particular importance for playback on equipment other than that used for recording, or when the playback tape consists of two or more recordings spliced together.

Recommendations

1. *Scope*

1.1 This recommended practice specifies the recorded modulation levels for monochrome television signals.

2. *Recorded Carrier Frequencies*

2.1 The recorded carrier frequencies corresponding to reference video signal levels shall be as follows:
(a) Reference White Level: 6.8 ± 0.05 mc.
(b) Blanking Level: 5.0 ± 0.05 mc.
(c) Sync Tip Level: 4.28 ± 0.05 mc.

Reprinted from: December, 1960, "Journal of the SMPTE", Volume 69.

Tape Times . . . Tape Constants

The use of Video Tape in broadcasting service often requires reference to available tape lengths and a corresponding estimate of recording times.

In response to requests that have been received, the following table is presented with time designations for standard and non-standard tape lengths. Also included is a table of "Recording Constants" pertinent to video recorder operations.

This page has been perforated for convenient tear-out and ready reference. Extra copies are also available at no charge.

TIME CHART

Time designations are based on 60 cps operation at a tape speed of 15 ips. If tape is used on equipment utilizing a speed of 7½ ips, time should be doubled.

TIME	FOOTAGE	REEL SIZE
10 Sec.	12½ Ft.	
20	25	
30	37½	
1:00 Min.	75	
5:00	375	
5:20	**400**	**6½ In.**
10:00	750	
10:40	**800**	**6½**
15:00	1,125	
16:00	**1,200**	**10½**
30:00	2,250	
32:00	**2,400**	**12½**
34:40	**2,600**	**12½**
42:40	**3,200**	**12½**
45:00	3,375	
48:00	**3,600**	**12½**
60:00	4,500	
64:00	**4,800**	**12½**
72:00	**5,400**	**12½**
90:00	6,750	
96:00	**7,200**	**14**

NOTE: Bold type indicates standard tape lengths and tape may be ordered in these sizes only. All other footages are provided for reference use.

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published by
Magnetic Products Division 3M COMPANY

VIDEO RECORDING CONSTANTS
Reference Chart

The following table should NOT be interpreted as a table of standards, but as a collection of Video Tape recording terms and figures that are being followed and used daily by the American television industry.

VIDEO TAPE

Tape Width	$2.000\ ^{+0.000}_{-0.004}$ inches
Tape Thickness	1.5 mils max.
Audio Track	70 ±4 mils
Video Track Length	$1820\ ^{+5}_{-0}$ mils (1.82 inches)
Video Track Width	10 ±0.5 mils
Video Guard Band	5.6 mils
Cue Track	20 ±3 mils
Control Track	45 ±5 mils
Guard Band (between audio and video tracks)	20 mils
Guard Band (between video and cue track)	10 mils
Guard Band (between cue and control track)	10 mils

VIDEO INFORMATION ON TAPE

One Horizontal Line (length on tape)	0.1 inch
One Horizontal Line (head travel)	Arc of 5.5°
One Head Pass (across tape)	16-17 horizontal lines
One Picture Field (60 per sec.)	16 tracks
One Picture Frame (30 per sec.)	32 tracks

(½ inch of tape measured longitudinally)

VTR MACHINE

Tape Speed	15 ips (inches per second)
Head Wheel Rotation	14,400 rpm (240 rps)
Relative Head to Tape Speed	1560 ips
Video Head Gap Length	approx. 90μ in.
Video Head Gap Width (track width)	10 ±0.5 mils
Video Head Inductance	16μh @ 6 mc
Video Head Resonance (Record)	approx. 8 mc
Video Head Resonance (Playback)	approx. 6 mc
Distance-Video Head to Audio Record-Playback Head	9.25 ±0.10 in.
Head Wheel Radius (Reference)	1.032 in.
Vacuum Guide Curvature (RCA)	Arc of 113°
Vacuum Guide Curvature (Ampex)	Arc of 120°
Vacuum Guide Radius	$1.0334\ ^{+0.0000}_{-0.0005}$ in.
Pulse Rate (Photo Electric–Ampex, Tone Wheel–RCA)	240 per sec.
Control Track	240 cps
Head Switching Rate (Playback)	960 per sec.

SERVO SYSTEM

	Ampex	RCA
Record Mode		
Head Servo	Video Sync 240 cps (PE)	Video Sync 240 pps (Tone Wheel)
Capstan Servo	240 cps (PE)	240 pps (Tone Wheel)
Playback Mode		
Head Servo	60 cps line or Station Sync 240 cps (PE)	60 cps line or Station Sync 240 pps (Tone Wheel)
Capstan Servo	240 cps (PE) 240 cps (Control Track)	240 pps (Tone Wheel) 240 cps (Control Track)

MODULATION LEVELS (Monochrome)

	Frequency	Wavelength (λ)*
Nominal Center Frequency (Reference Black)	5.0 ±0.05 mc	0.312 mils
Tip of Sync	4.28 ±0.05 mc	0.364 mils
Reference White (Peak)	6.8 ±0.05 mc	0.230 mils
		(Color)
Nominal Center Frequency	5.7 mc	0.273 mils
Tip of Sync	5.4 mc†	0.288 mils
Reference White	6.3 mc†	0.248 mils

*Expressed as distance in mils of one cycle of recorded signal on tape.
†Also in use: 5.5 to 6.5 mc

Tear along perforation

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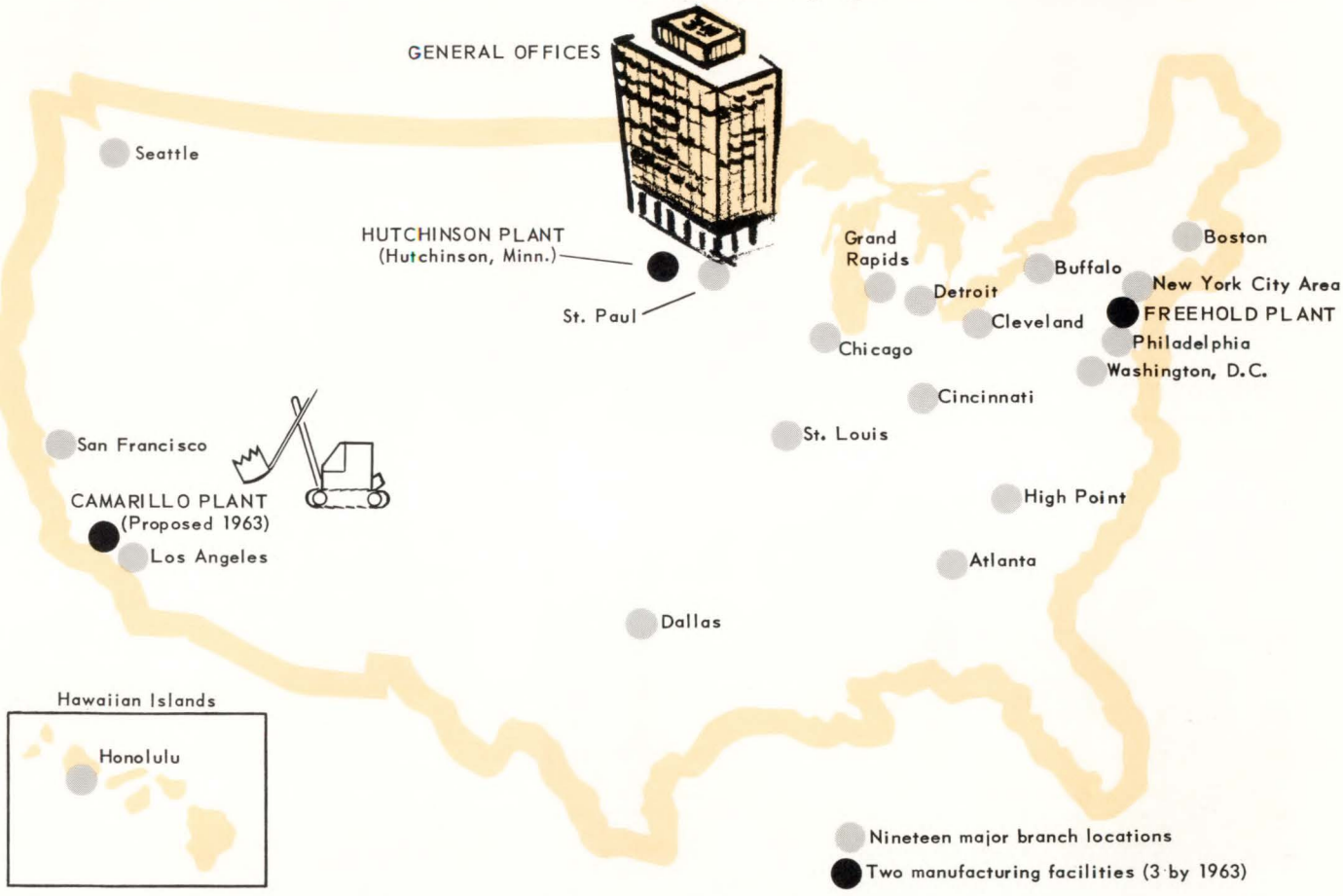
Newest addition to St. Paul's expanding skyline, the new, 14-story, 238 foot-high Administration Building of the 3M Company.



Nineteen major branch locations--two manufacturing facilities (three by 1963)--plants specifically designed for the manufacture of magnetic tape--direct sales through trained and experienced sales engineers in principle cities throughout the U.S.--over 50 years' experience in coating technology--pioneering development and commercial production of Video Tape for six years! This is the experience and capability 3M brings to you.

To provide a tape that consistently meets the demanding requirements of video recording, both for commercial and instrumentation applications, 3M manufactures its own backing to meet its own hypercritical quality control specifications. 3M also manufactures and controls the quality of the oxide and binder formulation designed specifically for Video Tape . . . and coats and slits this tape on precision equipment specially designed and built for this purpose.

ATLANTA
5925 Peachtree Ind. Boulevard
Chamblee, Georgia
(451-1661)

BOSTON
155 4th Avenue
Needham Heights 94, Mass.
(HI 9-0300)

BUFFALO
330 Greene St., All Mail:
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Buffalo 6, New York
(TX 4-5214)

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(GL 8-2200) (Chic. LU 5-7800)

CINCINNATI
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Cincinnati 37, Ohio
(EL 1-2313)

CLEVELAND
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Cleveland 30, Ohio
(CL 2-4300)

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(733-1110)

Marking Pens

(Continued from Page 2)

In any event, if the necessary precautions are exercised, no difficulty should be experienced when using a marking pen. FLO-MASTER's transparent black ink is probably preferred. (Cushman and Dension Mfg. Co., Carlstadt, N. J.) It has a pure dye, versus pigment in their opaque ink, and is "instant" drying. MAGIC MARKER has a mineral spirit vehicle with very short drying time. (Speed-Dry Products Inc., Richmond Hills 18, New York.) These two companies, as well as others, also market suitable felt pens.

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For More Information refer to . . .

VIDEO TAPE RECORDING by Julian L. Bernstein, John F. Rider Inc., New York--Copyright 1960.

"Television Tape Fundamentals" by Harold E. Ennes, WTAE, Pittsburgh, Pa. (Article reprints available from 3M--book to be published in 1962 by Broadcast Engineering Notebooks, P. O. Box 10682, Pittsburgh 35, Pa.)

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- ☐ VIDEO TALK Bulletin No. 5 on "Video Tape Splicing"
- ☐ VIDEO TAPE FUNDAMENTALS by Harold E. Ennes--a series of six articles (excerpted from a forthcoming book) reprinted from "Broadcast Engineering"
- ☐ VIDEO TAPE PHYSICAL and MAGNETIC SPECIFICATIONS
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