

# INSTRUCTION MANUAL

SPOTMASTER MODEL TW  
TAPE CARTRIDGE WINDERS

MARCH, 1980

IM No. 597-0100

BROADCAST ELECTRONICS, INC.



# **IMPORTANT INFORMATION**

## **EQUIPMENT LOST OR DAMAGED IN TRANSIT**

When delivering the equipment to you, the truck driver or carrier's agent will present a receipt for your signature. Do not sign it until you have (a) inspected the containers for visible signs of damage and (b) counted the containers and compared with the amount shown on the shipping papers. If a shortage or evidence of damage is noted, insist that notation to that effect be made on the shipping papers before you sign them.

Further, after receiving the equipment, unpack it and inspect thoroughly for concealed damage. If concealed damage is discovered, immediately notify the carrier, confirming the notification in writing, and secure an inspection report. This item should be unpacked and inspected for damage **WITHIN 15 DAYS** after receipt. Claims for loss or damage will not be honored without proper notification of inspection by the carrier.

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### **FOR TECHNICAL ASSISTANCE**

Phone (217) 224-9600 Customer Service

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Replacement and Warranty Parts may be ordered from the address below. Be sure to include equipment model and serial number and part description and part number.

Broadcast Electronics, Inc.  
4100 N. 24th St., P.O. Box 3606  
Quincy, Illinois 62305  
Tel: (217) 224-9600  
Telex: 25-0142  
Cable: BROADCAST  
Fax: (217) 224-9607

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TW TAPE CARTRIDGE

WINDERS

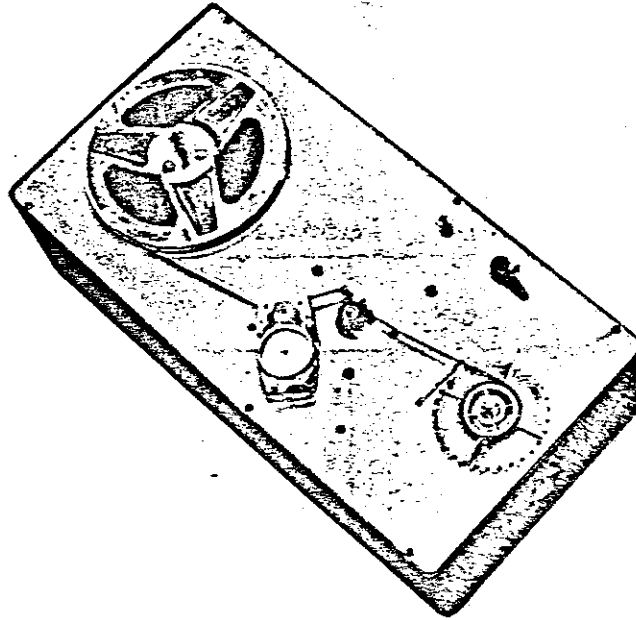
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SECTION I  
GENERAL INFORMATION

1-1. INTRODUCTION

1-2. The Spotmaster model TW-( ) tape cartridge winder is designed to facilitate the loading of tape on cartridge reels such as the reels used in NAB tape cartridge machines (see Figure 1-1).



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FIGURE 1-1. TAPE WINDER, TIMER INSTALLED

1-3. Four models of the tape winder are available. The TW-100 tape winder operates from an ac input of 115 Vac and the TW-100A tape winder operates from an ac input of 220 Vac. Both the TW-100 and the TW-100A are supplied without the optional tape timer which can be customer installed.

1-4. The TW-200 tape winder operates from an ac input of 115 Vac and the TW-200A tape winder operates from an ac input of 220 Vac. Both models are supplied with the tape timer factory installed.

1-5. The TW-100A and TW-200A models contain a transformer to step the line voltage of 220 V down to 115 Vac to power the capstan and take-up motors. The operation and maintenance of the 220 volt versions are identical to the standard versions described with the exception that a 1/2 ampere fuse is used in the 220 volt models and a 1 ampere fuse is used in the 115 volt models.

1-6. The winding speed of all models is 22.5 inches per second (57.15 cm/s). Since most tape cartridge equipment operates at 7.5 inches per second (19.05 cm/s), the timing of the tape loaded in a cartridge can be easily determined by multiplying the winding time by three. If the unit is equipped with a tape timer, then the timing of tape loaded in a cartridge can be read directly from the timer.

1-7. EQUIPMENT SPECIFICATIONS

1-8. Refer to Table 1-1 for electrical and physical specifications for all models of the cartridge tape winder.

Table 1-1. Technical Specifications

| PARAMETER   | SPECIFICATION   |
|---|---|
| Speed   | 22.5 in/sec (57.15 cm/s)  |
| Power Requirements:<br>TW-100, TW-200<br>TW-100A, TW-200A | 115 V ac, 50/60 Hz, 100 W Maximum<br>220 V ac, 50/60 Hz, 100 W Maximum                  |
| Drive Motor   | Four Pole Induction   |
| Take-Up Motor   | Shaded Pole Induction   |
| Tape Timer  | Standard in TW-200, TW-200A   |
| Capacity  | Handles Supply Reel Up to 3600 ft.<br>(1097.28 m) of 1 mil (0.025 mm) tape              |
| Take Up Reel  | Up to 7.25 inch (18.42 cm)<br>Diameter  |
| Weight  | 9.5 lbs (4.31 kg)   |
| Size  | 10 inches Wide x 20 inches Long x<br>6.75 inches High (25.4 cm x 50.8 cm x<br>17.16 cm) |

## SECTION II OPERATION

### 2-1. INTRODUCTION

2-2. Tape and cartridges will last longer and overall operation will be better if proper care is provided for all recording and playback equipment. The recorder and playback equipment heads, pressure roller, and capstan should be cleaned daily with BE903 fluid or the equivalent. Minute buildups of oxide particles on the equipment heads will cause streaking of the oxide tape surface. It is very important that the capstan spindle and the pressure roller be kept clean to prevent speed variations, wow, or flutter. When cleaning the pressure roller, use a scrubbing motion to provide a good gripping surface against the capstan.

2-3. Scotch 156 graphic lubricated tape, if not available through a local supplier, may be purchased through Broadcast Electronics, Inc. as well as empty cartridges, BE903 cleaning fluid, and recommended splicing supplies referenced.

### 2-4. OPERATION WITHOUT TAPE TIMER

2-5. The following procedure describes operation of the Broadcast Electronics models TW-100 and TW-100A tape winders.

- A. Place the slip-disc supplied with the tape winder on the supply spindle.

#### **NOTE**

USE ONLY GRAPHITE LUBRICATED TAPE SUCH AS SCOTCH BRAND NO. 156 OR AN EQUIVALENT TAPE. DO NOT USE STANDARD TAPE.

- B. Place the tape supply reel on the slip-disc with the tape end feeding from the left side. If 3600 feet (1097.28 cm) of bulk tape with an NAB hub is used, then any standard NAB hub adapter such as the adapter supplied with any conventional tape recorder to convert the hub to the correct spindle size.
- C. Operate the capstan release control to move the pressure roller away from the capstan.

- D. Thread the tape between the pressure roller and the capstan, keeping the lubricated side of the tape next to the pressure roller. Pull the tape through until the end of the tape extends approximately eight inches (20.32 cm) beyond the edge of the case.
- E. Release the capstan release control so that the pressure roller rests against the capstan.
- F. Place the cartridge reel on the winder take-up spindle and seat the reel firmly.
- G. By hand, wind clockwise approximately 1 1/2 to 2 turns of tape on the cartridge reel hub with the tape end forming the inside turn. Leave approximately 1/2 inch (1.27 cm) of tape exposed above the rim of the hub. It is not required to secure the tape end as winding pressure will hold the tape in place. The oxide coated side of the tape should be to the outside and the lubricated side should be to the inside of the reel.
- H. Rotate the reel by hand to take up all slack.
- I. Operate the power switch to ON and wind the required amount of tape on the reel. Operate the power switch to OFF.
- J. Cut the tape at a point between the reel and the capstan.
- K. Remove the cartridge reel from the winder and place the cartridge reel on a flat surface for tape splicing.
- L. Remove three or four turns of the tape from the center of the reel by pulling the exposed tape end at the hub. Enough tape turns should be removed to allow the tape to be pulled freely from the hub without crinkling or curling with sufficient tape for splicing.
- M. Allow about four inches (10.16 cm) of good tape on each end for ease in splicing and cut off any damaged tape.

- N. Splice the ends of the tape together using a good quality splicing tape on the lubricated side of the tape. Rub the splice with a smooth blunt tool to assure adhesion. Do not use excessible splicing tape. The splice should be no more than 1/2 inch (1.27 cm) long.
- O. Replace the reel in the tape cartridge and thread the tape through the tape guides with the oxide surface to the outside.
- P. If reconditioning old cartridges, ensure that all parts are clean and that the reel spindle and bearing surfaces are clean and properly lubricated. Use "Lubriplate" or a similiar lubricant to lubricate the spindle as well as the nylon washer on which the reel sets.
- Q. Work the excess tape onto the reel by hand. Loose slack in the turns will be taken-up when the cartridge is put into use.
- R. Ensure the pressure pads are parallel to the cartridge base and are pulled forward enough so that the pads will hold firmly against the heads when the cartridge is placed in the equipment. If required, use adhesive to hold the pressure pads in place.
- S. Ensure the cartridge corner post is secured in place at the proper height to guide the tape without excessive play or wrinkling.
- T. Replace the cartridge top and guide wire(s) and check for proper cartridge operation by placing the cartridge in a playback machine.

## 2-6. OPERATION WITH TAPE TIMER

2-7. The following procedure describes operation of the Broadcast Electronics models TW-200 and TW-200A tape winders. Figure 2-1 and Table 2-1 should be referenced for an explanation of the tape timer controls and indicators.



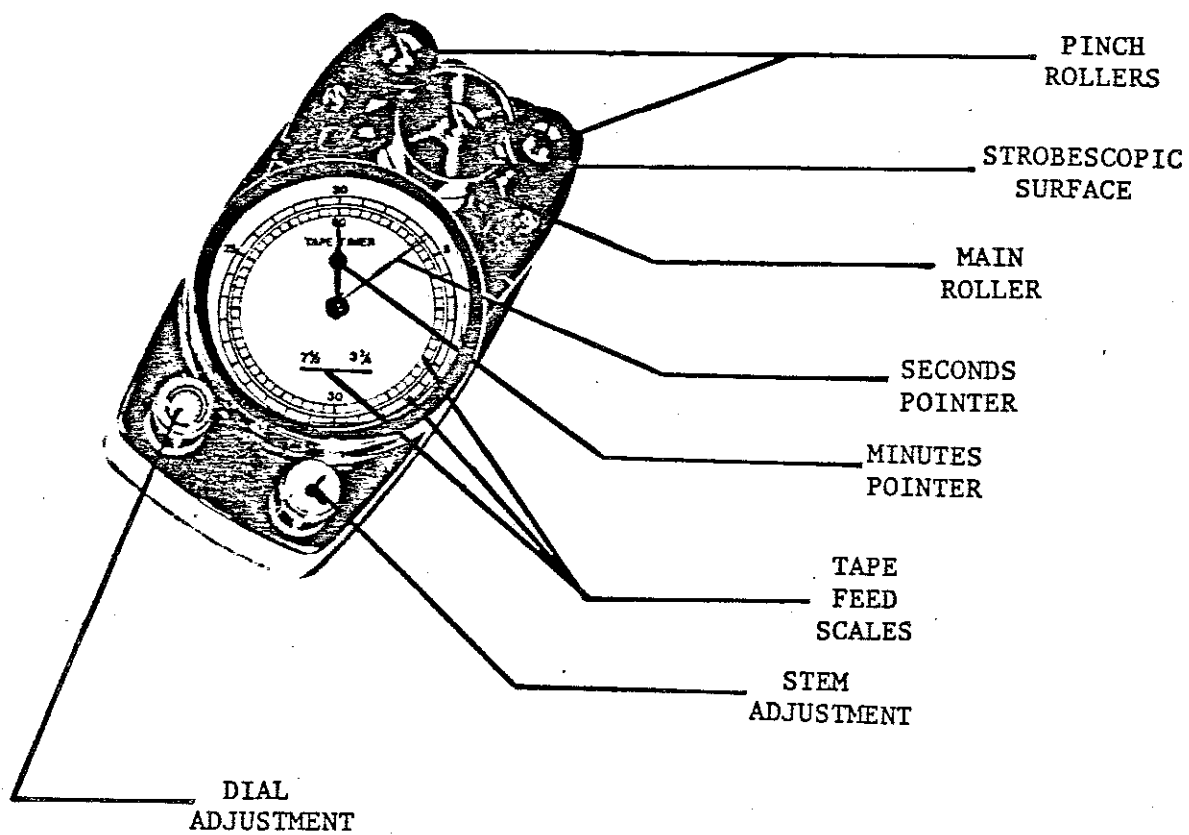


FIGURE 2-1. TI-50 TAPE TIMER

Table 2-1. Tape Timer Controls and Indicators  
(Sheet 1 of 2)

|                      |   |
|----------------------|---|
|                      |   |
| PINCH ROLLERS        | These rollers act as a press and a guide for the tape. The bearing surfaces are an oilless metal.   |
| STROBOSCOPIC SURFACE | Provides a means to confirm tape speed accuracy of the tape winder.   |
| MAIN ROLLER          | The main roller rotates with the tape travel, interlocking the gears inside which move the pointers. The bearing surface is an oilless metal.   |
| STEM ADJUST          | Adjust the minute pointer and the seconds pointer in either direction. The stem control may be adjusted while the tape is in motion.  |
| DIAL ADJUST          | Adjusts the incline of the dial plane for the best viewing angle.   |
|                      | <p>THE SPEED OF THE TAPE WINDER IS 22.5 in/s (57.15 cm/s). THEREFORE, THE TIMER DIAL INDICATION MUST BE MULTIPLIED BY THREE TO OBTAIN THE PLAYING TIME OF THE TAPE WOUND ON THE CARTRIDGE SPINDLE AT 7.5 in/s (19.05 cm/s).</p> |

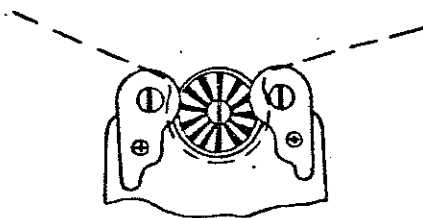
Table 2-1. Tape Timer Controls and Indicators  
(Sheet 2 of 2)

|                     |   |
|---------------------|---|
|                     |   |
| POINTERS AND SCALES | <p>When the tape is fed at a speed of 3.75 in/s (9.53 cm/s), only the red scale divisions are used. One full revolution of the seconds pointer (long pointer) takes 60 seconds, while a full revolution of the minutes pointer (short pointer) takes 60 minutes.</p> <p>When the tape is fed at a speed of 7.5 in/s (19.05 cm/s), only the black scale divisions are used. One full revolution of the seconds pointer (long pointer) takes 30 seconds, while a full revolution of the minutes pointer (short pointer) takes 30 minutes.</p> |

2-8. PROCEDURE

2-9. The procedure for operation without the tape timer may be used with the following exceptions:

AFTER STEP B: Thread the tape through the timer (see Figure 2-2). Note that the tape passes in FRONT of the pinch rollers and BEHIND the main roller. The normal tape winder threading operation should be completed.



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FIGURE 2-2. TAPE THREADING

AFTER STEP H:

**NOTE**

USE THE BLACK OUTER SCALE OF THE TAPE TIMER FOR ALL READINGS BASED ON 7 1/2 INCHES PER SECOND (19.05 cm/s) CARTRIDGE SPEED.

Set the tape timer hands to black 30 (see Figure 2-1).

AFTER STEP I:

**NOTE**

THE TAPE TIMER LARGE HANDS MEASURE SECONDS AND THE SMALL HANDS MEASURE MINUTES.

Operate the power switch to ON. When the tape timer reaches the desired indication, stop the tape winder.

## 2-10. ALTERNATE TIMER OPERATION PROCEDURE

2-11. Some users may prefer an alternate method wherein the timer is pre-set to the desired length. By reversing the threading procedure, the timer hands will run backward. When both hands reach the black 30 indication, the desired length of tape will have been run off.

## SECTION III MAINTENANCE

### 3-1. INTRODUCTION

3-2. Very little maintenance is required for trouble-free operation of the Broadcast Electronics tape winder. All routine maintenance is described by the following paragraphs.

### 3-3. LUBRICATION

3-4. Occasional cleaning of the pressure roller and capstan together with application of a few drops of No. 20 weight non-detergent oil to the front and rear motor bearings each 90 days is all that is required.

### 3-5. ADJUSTMENTS

3-6. A variable resistor in series with the take-up motor adjusts the torque applied to the take-up reel. This torque is preset at the factory to provide optimum take-up torque for the three most commonly used cartridge reel sizes (series 300, 600, and 1200). If only the size 300 cartridge is being used, the adjustment may be improved by increasing the series resistance to provide a looser wind. If only the large size 1200 cartridge is being used, the adjustment may be improved by reducing the series resistance to near zero (refer to drawing B904-0001).

### 3-7. TAPE TIMER FIELD INSTALLATION

3-8. The TI-50 tape timer is installed at the factory on TW-200 and TW-200A model tape winders. The tape timer is available separately as an option for field installations on the TW-100 and TW-100A tape winders.

### 3-9. PROCEDURE

3-10. The following procedure provides field installation procedures for the TI-50 tape timer.

#### **WARNING**

ENSURE ALL POWER IS DISCONNECTED BEFORE  
PROCEEDING.

- A. Ensure all primary ac power is disconnected.
- B. Refer to drawing B904-0001.
- C. Remove the six "A" screws and lift the deck from the chassis.

- D. Remove and retain the two "B" screws and corresponding hardware from the underside of the deck.
- E. Place the timer on the deck over the "B" holes, positioning the timer as shown in Figure 1-1. Fasten the timer to the deck with the hardware removed from the "B" holes.
- F. Replace the deck on the chassis with the six "A" screws.

#### SECTION IV PARTS LIST

##### 4-1. INTRODUCTION

4-2. This section provides descriptions and part numbers of parts and assemblies required for maintenance of all models of the Spotmaster tape winders. Each table entry in this section is indexed by the reference designators of the applicable schematic diagram.

4-3. Table 4-1 indexes all tables listing assemblies and sub-assemblies having replaceable parts, the table number listing the parts, and the page number of the applicable table.

#### SECTION V DRAWINGS

##### 5-1. INTRODUCTION

5-2. This section provides assembly drawings and schematic diagrams as indexed below:

| <u>FIGURE</u> | <u>TITLE</u>                     | <u>NUMBER</u> |
|---------------|----------------------------------|---------------|
| 5-1           | Tape Winders                     | B904-0001     |
| 5-2           | Wiring Diagram TW-100, TW-200    | B904-0024     |
| 5-3           | Wiring Diagram, TW-100A, TW-200A | B904-0025     |

Table 4-1. Replaceable Parts List Index

| TABLE NO. | DESCRIPTION   | PART NO.  | PAGE |
|-----------|---|-----------|------|
| 4-2       | TW-100 TAPE CARTRIDGE WINDER,<br>115 V, 50/60 Hz          | 904-0001  |      |
| 4-3       | TW-100A TAPE CARTRIDGE WINDER,<br>220 V, 50/60 Hz         | 904-0001A |      |
| 4-4       | TW-200 TAPE CARTRIDGE WINDER<br>W/TIMER, 115 V, 50/60 Hz  | 904-0002  |      |
| 4-5       | TW-200A TAPE CARTRIDGE WINDER<br>W/TIMER, 220 V, 50/60 Hz | 904-0002A |      |
| 4-6       | TAPE WINDER DECK ASSEMBLY                                 | 492-0010  |      |
| 4-7       | TAPE WINDER CASE ASSEMBLY                                 | 935-0010  |      |



Table 4-2. TW-100 Tape Cartridge Winder, 115V, 50/60 Hz - 904-0001

| REF. DES. | DESCRIPTION   | PART NO. | QUANTITY |
|-----------|---------------|----------|----------|
|           | Deck Assembly | 492-0010 | 1        |
|           | Case Assembly | 935-0001 | 1        |

Table 4-3. TW-100A Tape Cartridge Winder, 220V, 50/60 Hz - 904-0001A

| REF. DES. | DESCRIPTION  | PART NO. | QUANTITY |
|-----------|--|----------|----------|
| T1        | Autotransformer, Step Down, 250 W,<br>220/250 V ac to 115 V ac, 50/60 Hz | 378-1555 | 1        |
|           | Deck Assembly  | 492-0010 | 1        |
|           | Case Assembly  | 935-0001 | 1        |

Table 4-4. TW-200 Tape Cartridge Winder w/Timer, 115V, 50/60 Hz - 904-0002

| REF. DES. | DESCRIPTION   | PART NO. | QUANTITY |
|-----------|---------------|----------|----------|
| TI-50     | Tape Timer    | 830-0001 | 1        |
|           | Deck Assembly | 492-0010 | 1        |
|           | Case Assembly | 935-0001 | 1        |

Table 4-5. TW-200A Tape Cartridge Winder w/Timer, 220V, 50/60 Hz - 904-0002A

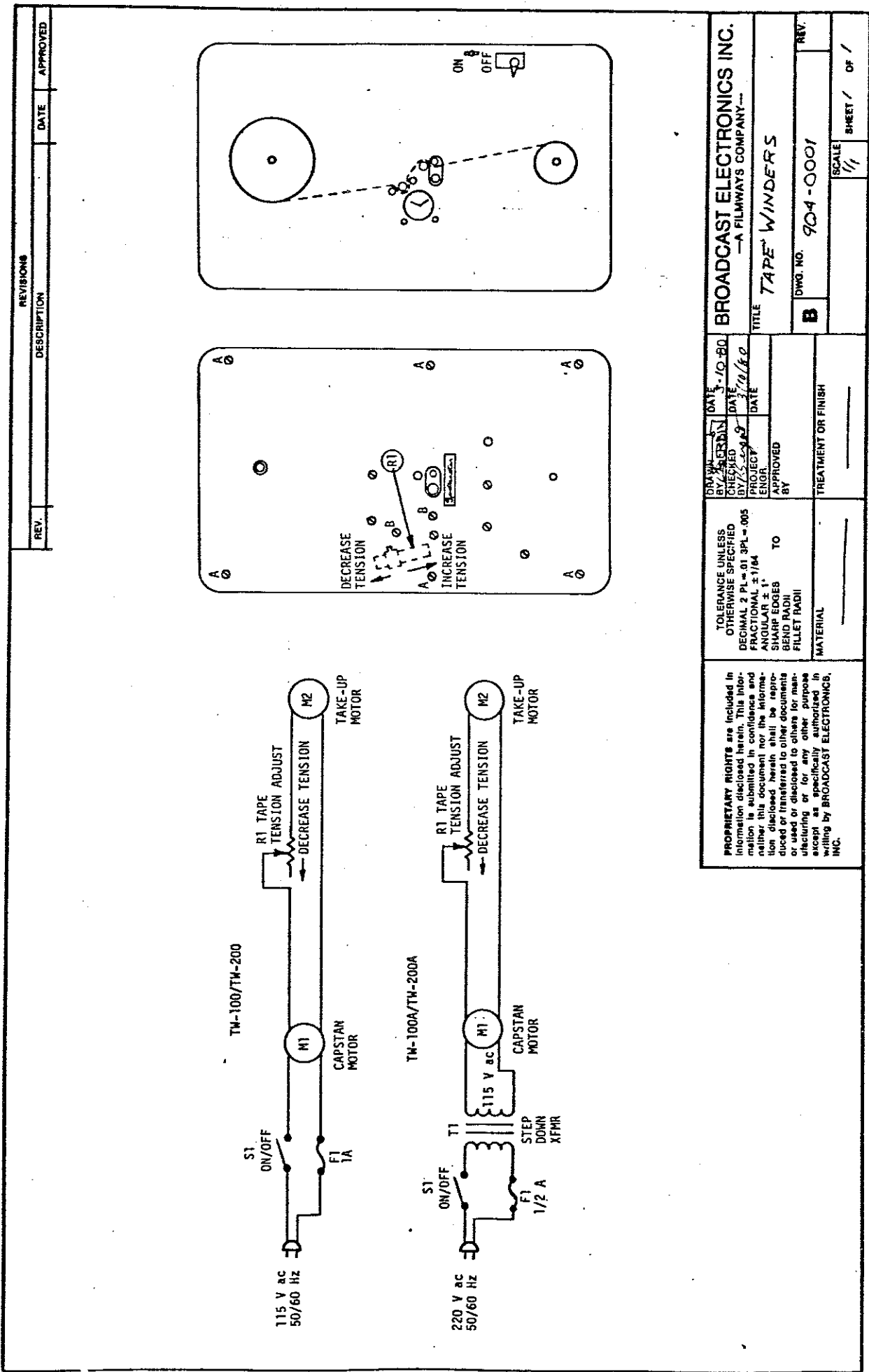
| REF. DES. | DESCRIPTION  | PART NO. | QUANTITY |
|-----------|--|----------|----------|
| T1        | Autotransformer, Step Down, 250 V,<br>220/250 V ac, 50/60 Hz | 378-1555 | 1        |
| TI-50     | Tape Timer   | 830-0001 | 1        |
|           | Deck Assembly  | 492-0010 | 1        |
|           | Case Assembly  | 935-0001 | 1        |

Table 4-6. Tape Winder Deck Assembly - 492-0010

| REF. NO. | DESCRIPTION   | PART NO.  | QUANTITY |
|----------|---|-----------|----------|
| M1       | Motor, Drive, Four Pole Induction<br>w/Mtg. Plate, 115 V 50/60 Hz, 0.42<br>Ampere, 1550 r/min | 383-0058  | 1        |
| M2       | Motor, Take Up, Shaded Pole<br>Induction, 115 V, 50/60 Hz                                     | 383-0600  | 1        |
| R1       | Resistor, 400 Ohm, 25 W, W/W,<br>Slider, w/Mtg. Brackets                                      | 180-4033  | 1        |
| S1       | Switch, Toggle w/Mtg. Hardware<br>(ON/OFF Switch)   | 348-8280  | 1        |
|          | Knob, START/STOP Lever  | 482-2232  | 1        |
|          | Pressure Roller Bar   | A479-0091 | 1        |
|          | Pressure Roller Spindle   | A449-0012 | 1        |
|          | Pressure Roller   | B404-0001 | 1        |
|          | Supply Spindle Pin  | A449-0010 | 1        |
|          | Spindle, Take-up Motor (for M2)   | A449-0023 | 1        |
|          | Fan Blade (for M1)  | 409-0469  | 1        |
|          | Tape Guide Pin  | 445-0173  | 1        |
|          | Link Release Lever  | 439-0303  | 1        |

Table 4-7. Tape Winder Case Assembly - 935-0001

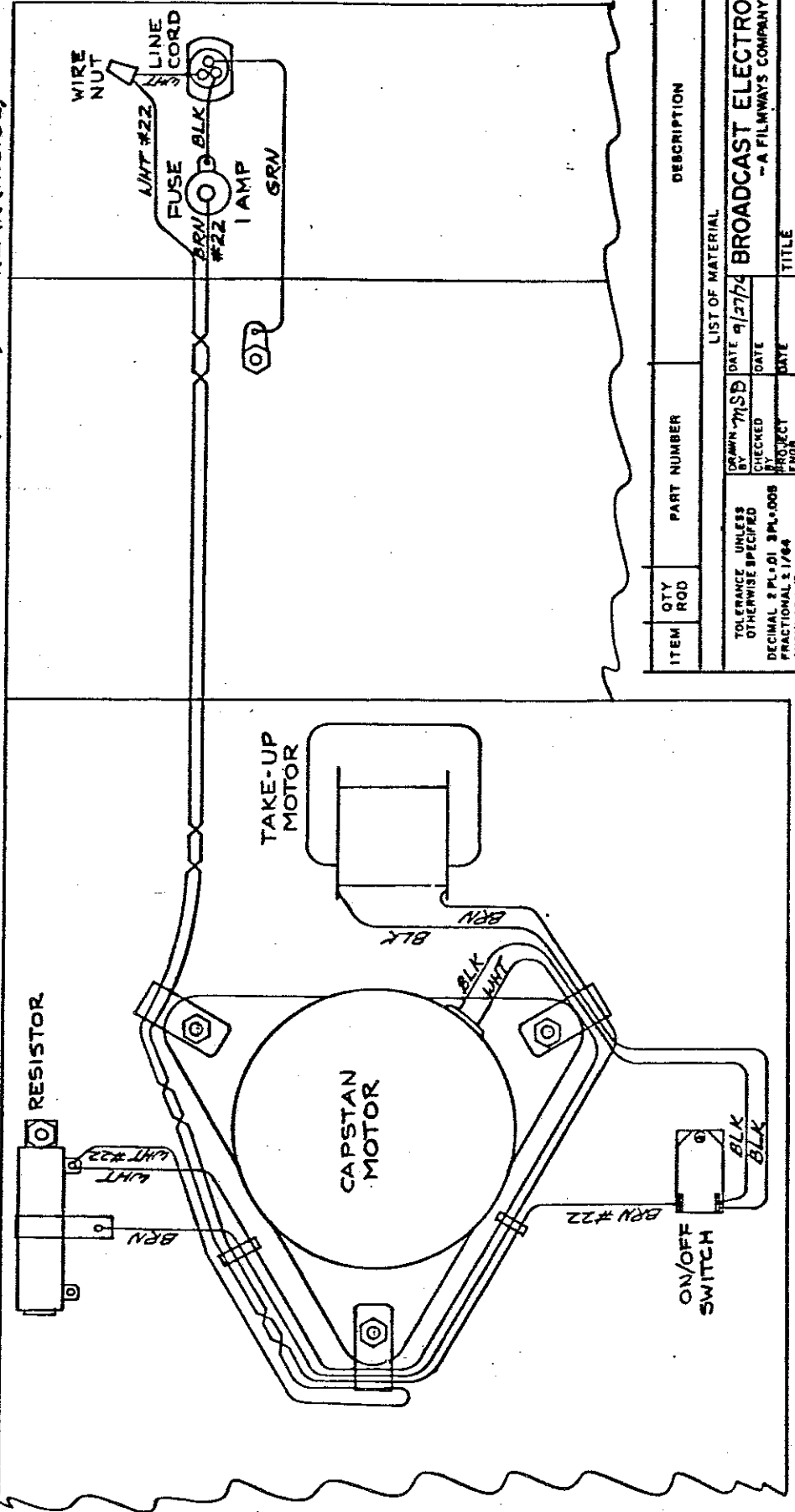
| REF. DES. | DESCRIPTION                                | PART NO. | QUANTITY |
|-----------|--|----------|----------|
| F1        | Fuse, 115 V Operation: 3 AG,<br>1 Ampere   | 330-0100 | 1        |
| F1        | Fuse, 220 V Operation: 3 AG,<br>0.5 Ampere | 334-0050 | 1        |
| XF1       | Fuse Holder w/Mtg. Hardware, 3 AG          | 415-2012 | 1        |
|           | Feet Rubber                                | 403-2194 | 1        |
|           | Snap Button, Vented                        | 450-0656 | 2        |



|   |  |   |  |
|---|--|---|--|
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| <b>TITLE</b><br>TAPE WINDERS  |  | <b>DWG. NO.</b> 904-0001  |  |
| <b>REV.</b> B   |  | <b>SCALE</b> 1/1  |  |
| <b>DATE</b> 3-10-80   |  | <b>DATE</b> 3-10-80   |  |
| <b>BY</b> J. J. J.  |  | <b>BY</b> J. J. J.  |  |
| <b>CHECKED</b>  |  | <b>APPROVED</b>   |  |
| <b>PROJECT</b>  |  | <b>TREATMENT OR FINISH</b>  |  |
| <b>ENGR.</b>  |  | <b>MATERIAL</b>   |  |
| <b>BY</b>   |  | <b>TO</b>   |  |
| <b>TOLERANCE UNLESS OTHERWISE SPECIFIED</b><br>DECIMAL 2 PL = .01 3 PL = .005<br>FRACTIONAL ± 1/64<br>ANGULAR ± 1°<br>SHARP EDGES<br>BEND RADIUS<br>FILLET RADIUS |  | <b>PROPRIETARY RIGHTS</b> are included in information disclosed herein. This information is submitted in confidence and cannot be used or disclosed to other persons or used or disclosed to other persons without the written consent of BROADCAST ELECTRONICS, INC. |  |

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| ITEM                                 | QTY | ROD | PART NUMBER | DESCRIPTION | NOTE |
|--------------------------------------|-----|-----|-------------|-------------|------|
| LIST OF MATERIAL                     |     |     |             |             |      |
| TOLERANCE UNLESS OTHERWISE SPECIFIED |     |     |             |             |      |
| DECIMAL 2 PL. 01 3 PL. 005           |     |     |             |             |      |
| FRACTIONAL 2 1/64                    |     |     |             |             |      |
| ANGULAR 2 1/2                        |     |     |             |             |      |
| SHARP EDGES TO                       |     |     |             |             |      |
| BEND RADI                            |     |     |             |             |      |
| PILLET RADI                          |     |     |             |             |      |
| MATERIAL                             |     |     |             |             |      |
| DRAWN BY MSD DATE 9/27/64            |     |     |             |             |      |
| CHECKED BY PROJECT DATE              |     |     |             |             |      |
| APPROVED BY DATE                     |     |     |             |             |      |
| BROADCAST ELECTRONICS INC.           |     |     |             |             |      |
| -A FILMWAYS COMPANY-                 |     |     |             |             |      |
| TITLE WIRING DIAGRAM                 |     |     |             |             |      |
| REV B                                |     |     |             |             |      |
| DWG NO. 904-0024                     |     |     |             |             |      |
| SCALE 1"=10"                         |     |     |             |             |      |
| SHEET 1 OF 1                         |     |     |             |             |      |

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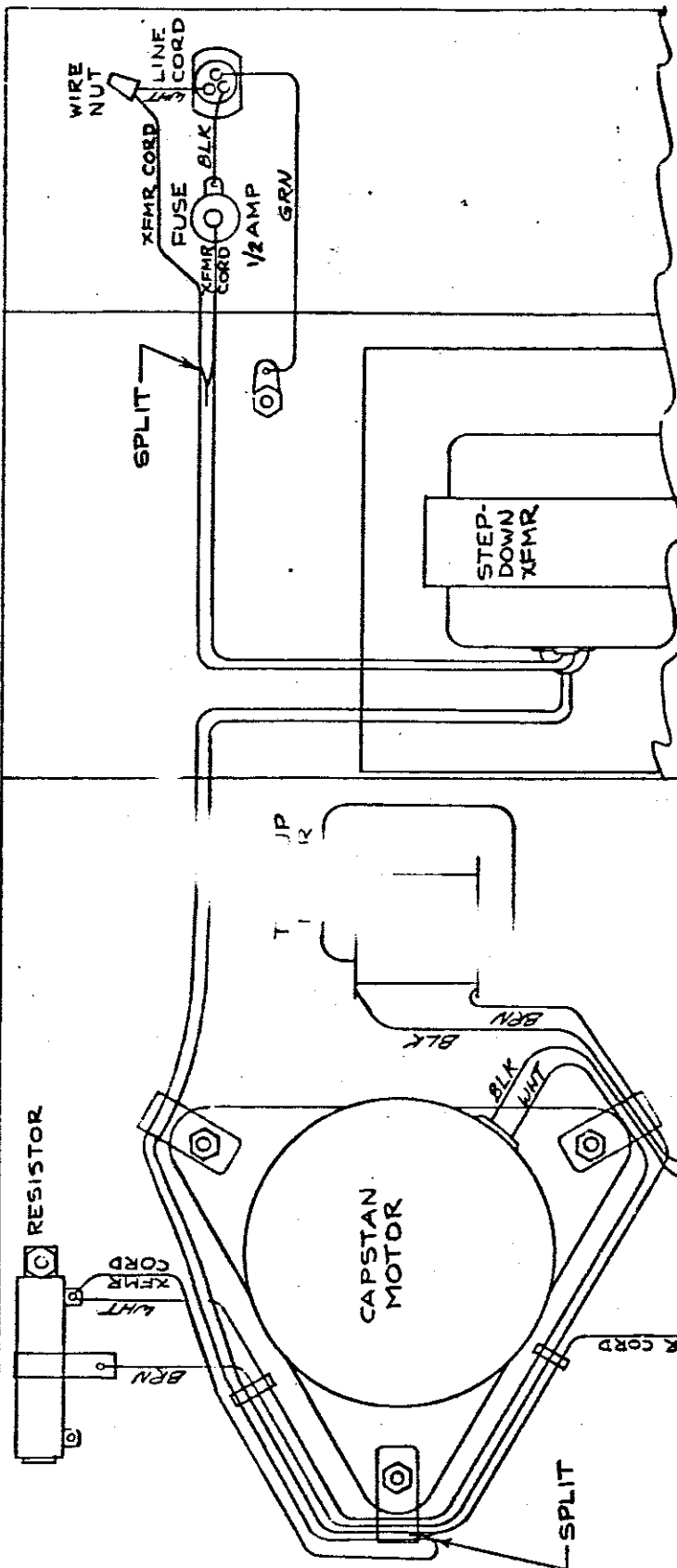


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|-----------|-------------|------|
| REV       | DESCRIPTION | DATE |
|           |             |      |
|           |             |      |
|           |             |      |

UNDERSIDE OF DECK

CHASSIS BOTTOM (INSIDE)

REAR (INSIDE)



| ITEM                                 | QTY | ROD | PART NUMBER | DESCRIPTION | NOTE |
|--------------------------------------|-----|-----|-------------|-------------|------|
| LIST OF MATERIAL                     |     |     |             |             |      |
| TOLERANCE UNLESS OTHERWISE SPECIFIED |     |     |             |             |      |
| DECIMAL 2 PLSDI SPL-008              |     |     |             |             |      |
| FRACTIONAL 3/16                      |     |     |             |             |      |
| ANGULAR 2°                           |     |     |             |             |      |
| SHARP EDGES TO                       |     |     |             |             |      |
| BEND RADI                            |     |     |             |             |      |
| FILLET RADI                          |     |     |             |             |      |
| MATERIAL                             |     |     |             |             |      |
| TREATMENT OR FINISH                  |     |     |             |             |      |
| DATE 9/27/74                         |     |     |             |             |      |
| BY                                   |     |     |             |             |      |
| CHECKED                              |     |     |             |             |      |
| DATE                                 |     |     |             |             |      |
| PROJECT                              |     |     |             |             |      |
| APPROVED                             |     |     |             |             |      |
| BY                                   |     |     |             |             |      |
| TITLE                                |     |     |             |             |      |
| WIRING DIAGRAM                       |     |     |             |             |      |
| DWG NO. 904-0025                     |     |     |             |             |      |
| REV                                  |     |     |             |             |      |
| B                                    |     |     |             |             |      |
| SCALE                                |     |     |             |             |      |
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| SHEET 1 OF 1                         |     |     |             |             |      |

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NOTE:  
1. CUT XFMR LINE CORD AND USE TO  
WIRE AS SHOWN.

## APPENDIX A MANUFACTURERS DATA

### A-1. INTRODUCTION

A-2. This appendix lists data applicable to the operation and use of all models of the Spotmaster tape winder. The following information is contained in this section.

#### 1. The NAB Tape Cartridge and Its Maintenance

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The NAB Tape Cartridge and Its Maintenance

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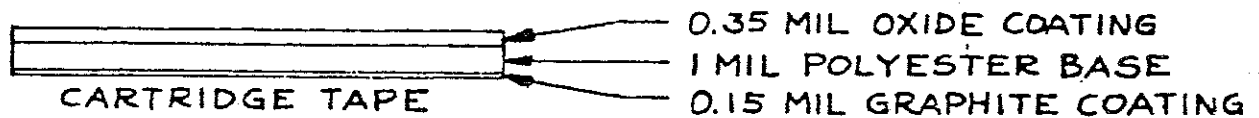
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## THE NAB TAPE CARTRIDGE

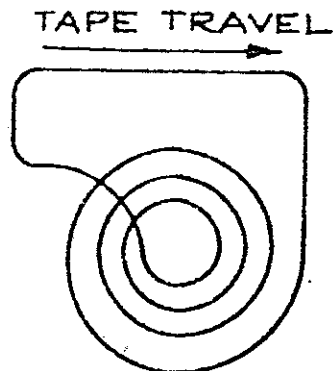
The National Association of Broadcasters (NAB) defines a cartridge as "a plastic or metal enclosure containing an endless loop of lubricated tape, wound on a rotatable hub in such a fashion as to allow continuous motion." Cartridges from the various manufacturers differ slightly in details, but all cartridges usable in NAB standardized systems fit the preceding definition.

### THE TAPE

Cartridge tape consists of a synthetic base material approximately 1 mil (0.001 inch) thick. One side of the base is coated with ferric oxide particles for magnetic recording. The other surface is coated with a graphite layer. The total thickness of the tape is approximately 1.5 mils (0.0015 inch). The tape is 0.246  $\pm$  0.002 inches wide.



The endless loop is formed by wrapping the tape with the oxide side out into a spiral. The two ends are spliced together so that as the tape is pulled from the center, it passes across the tape heads and winds back onto the outside of the tape spiral.

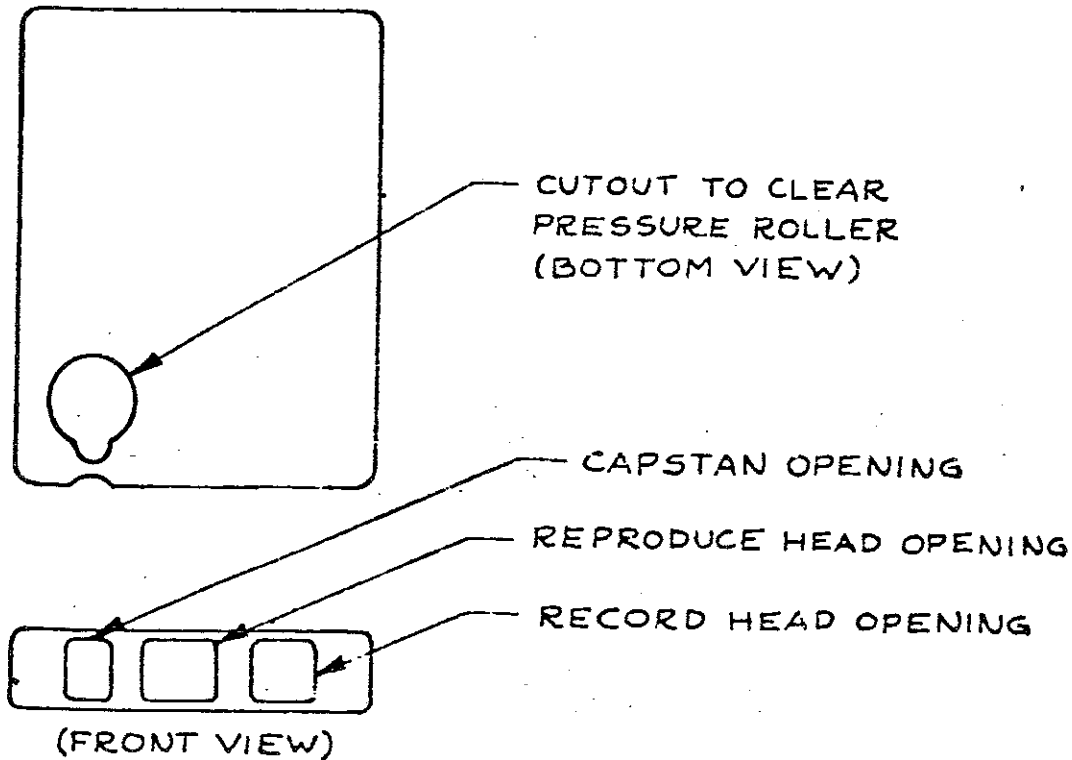


TAPE SPIRAL

### THE SHELL

The shell holds the tape and other parts. There are three standard sizes of shells: A (Broadcast Electronics 300 series), B (600 series), and C (1200 series). Assuming 1.5 mil tape, the type A cartridge can be loaded with up to 395 feet of tape, the B with up to 650 feet, and the C with up to 1250 feet.

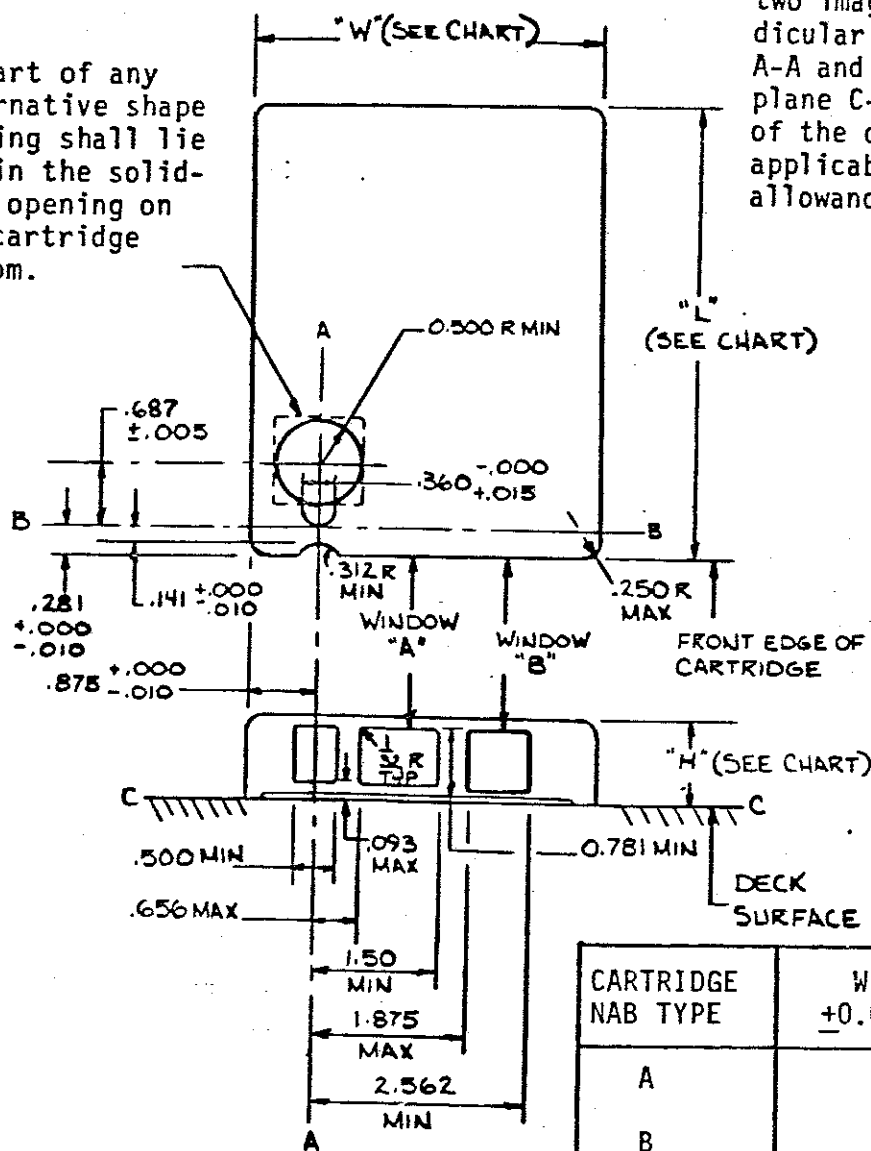
There are three openings across the front of the cartridge that allow the heads and capstan to penetrate the shell and contact the tape. In addition, there is an opening in the bottom for the pressure roller to rotate through the cartridge behind the tape. Unlike some cartridges used in consumer entertainment systems, the pressure roller (pinch roller or capstan idler) is part of the cartridge player and not the cartridge.



NAB tape cartridge dimension standards are presented in Figure 1 and NAB tape head dimension standards are presented in Figure 2.

No part of any alternative shape opening shall lie within the solid-line opening on the cartridge bottom.

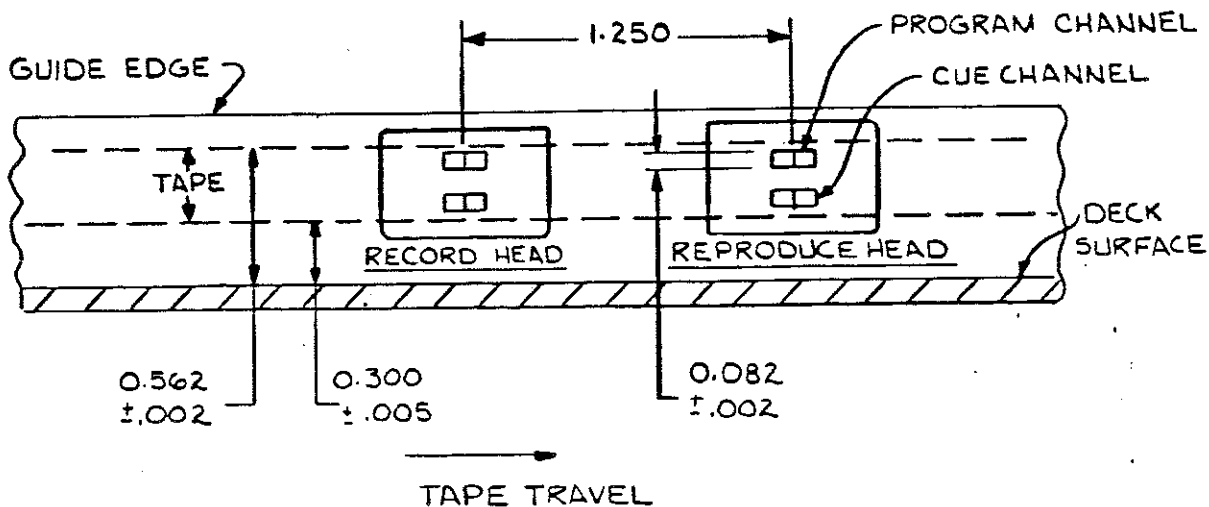
All important operating dimensions (in inches) are referenced from two imaginary mutually perpendicular vertical planes marked A-A and B-B, and a third horizontal plane C-C, representing the deck surface of the cartridge tape player. Where applicable, dimensions include draft allowances.



| CARTRIDGE<br>NAB TYPE | WIDTH<br>$\pm 0.015625$ | LENGTH<br>MAXIMUM | HEIGHT<br>MAXIMUM |
|-----------------------|-------------------------|-------------------|-------------------|
| A                     | 4"                      | 5.25              | 0.9375"           |
| B                     | 6"                      | 7"                | 0.9375"           |
| C                     | 7.625                   | 8.5               | 0.9375"           |

Figure 1. NAB CARTRIDGE DIMENSION STANDARDS

## MONOPHONIC STANDARD



## STEREOPHONIC STANDARD

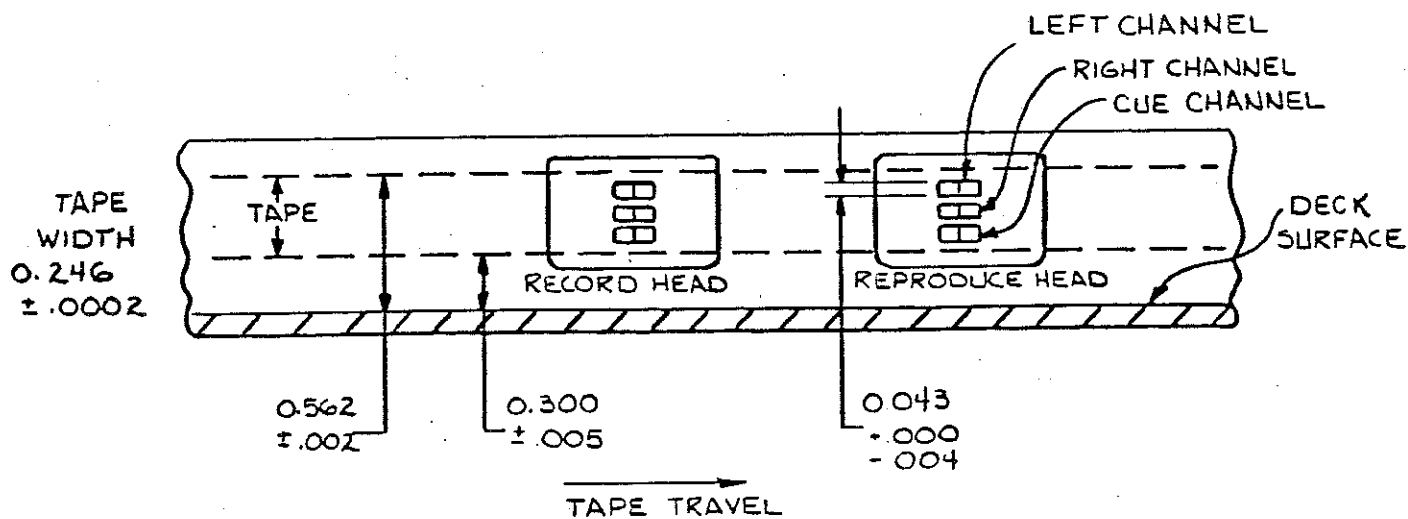
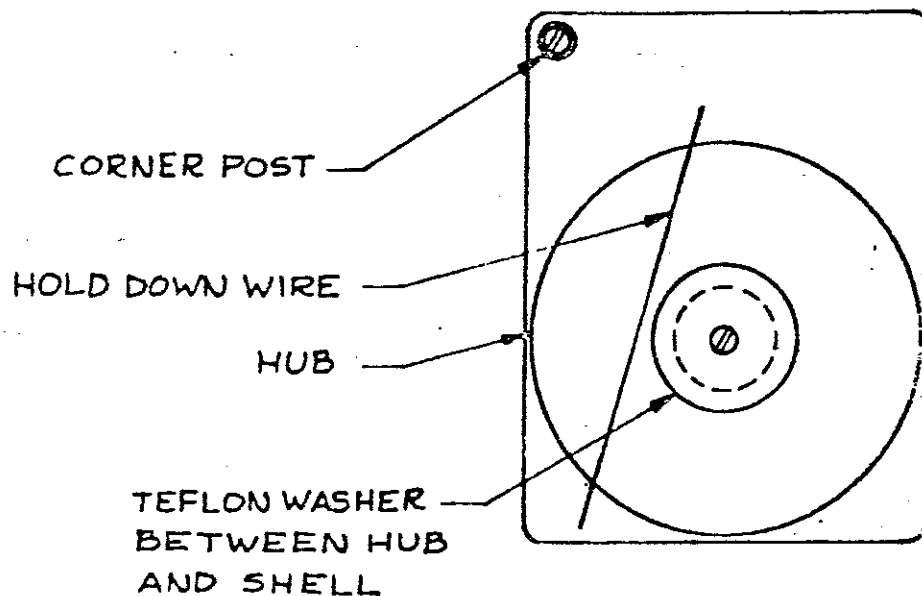


Figure 2. NAB TAPE HEAD DIMENSION STANDARDS

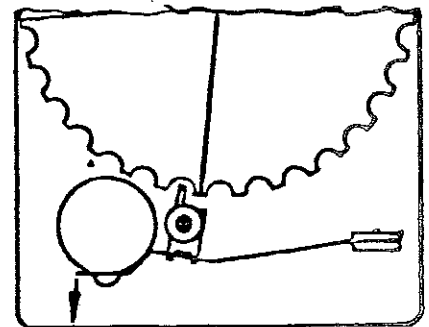
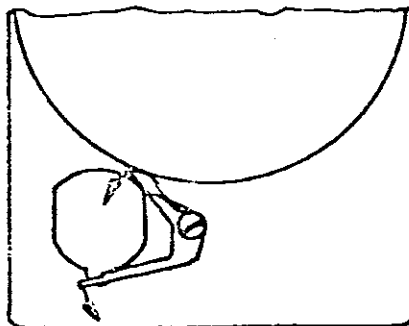
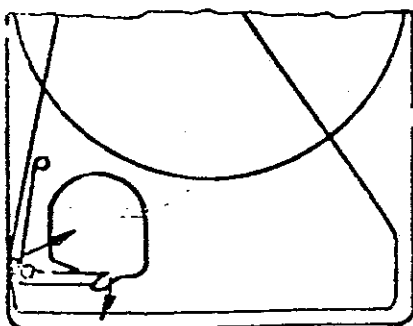
## TAPE HUB, TEFLON WASHER, AND CENTER POST

The tape hub stores the tape which is not passing by the cartridge openings. The hub is free to rotate around the center post. To allow free rotation, a teflon washer is used between the hub and the shell. Some means must be provided to keep the tape flat on the hub. A separate cover may fit over the hub, the top may be molded so that the clearance between the hub and the shell is just greater than the tape width, or a hold-down wire may be placed so that it passes above one side of the hub.



## CLUTCH SPRING OR HUB BRAKE (SPRING ACTION DEVICE)

The clutch spring or hub brake keeps the tape from moving when the cartridge is not in place in a machine. This is done either by applying a brake to the hub or by pressing the tape against the shell. The clutch or brake is released by the shaft of the pressure roller when the roller is in the vertical position.

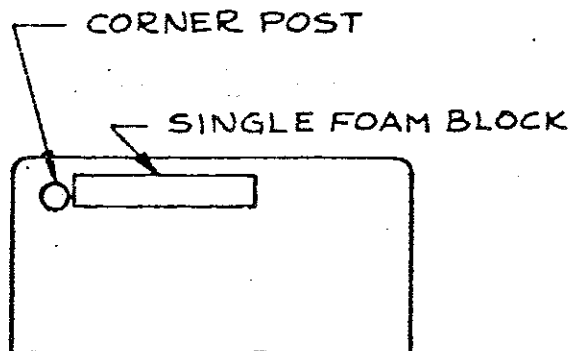
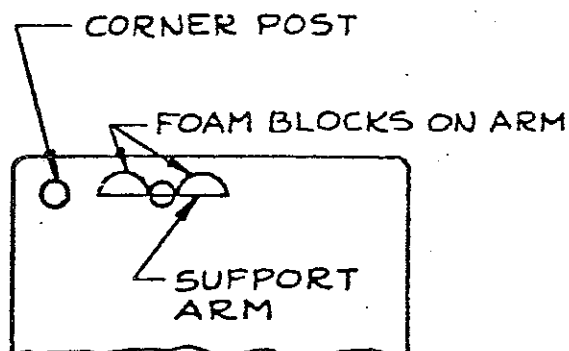
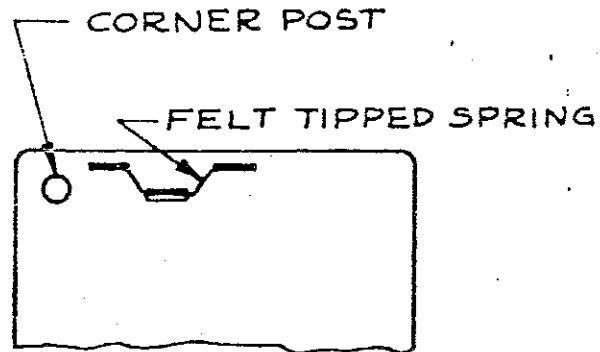
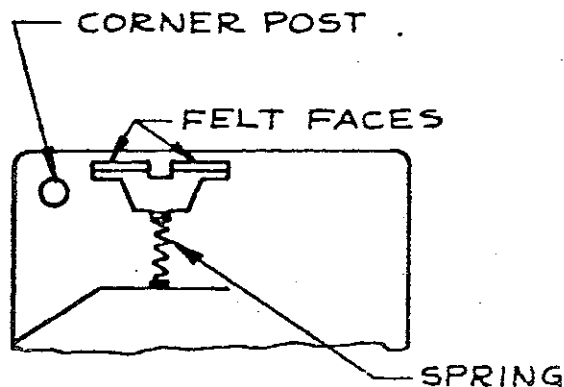




## PRESSURE PADS

The pressure pads ensure the tape remains in contact with the heads. A foam plastic is the most commonly used material for the pressure pads. The compression of the foam provides pressure to wrap the tape slightly around the heads. Felt is less frequently used. To provide pressure on the tape, the felt is mounted on a phosphor bronze arm or a spring-loaded plastic block.

The foam may be a single block mounted behind the two openings for the record and reproduce heads and held in place by ridges cast into the shell. Alternately, the foam may be in two separate pieces fastened to a metal or plastic arm. A third type mounts the foam on a spring-loaded plastic block. To ensure smooth tape travel, teflon is usually applied to the face of the foam.



## TAPE GUIDANCE

Primary control of the tape as it moves across the heads is maintained by external guides in the head bracket. Guidance is provided within the cartridge to keep the tape traveling the same path. This is generally accomplished with tabs and grooves molded into the shell. Of primary importance is the corner post which must straighten the tape before it passes across the front openings of the shell. This post may be molded into the shell or a separate piece glued into a dimple in the shell.

## CARTRIDGE MAINTENANCE TIPS

The cartridge is the second half of the tape cartridge system. The cartridge needs regular care just like the cartridge recorder or reproducer. The service department of Broadcast Electronics has developed over the years a rule of thumb for trouble-shooting. Check the cartridge before adjusting the machine.

## TAPE

For maximum performance, the tape must be in good condition. The tape in cartridges wears rapidly, particularly in short length cartridges (70 seconds or less) and cartridges that are used frequently. The tape should be inspected regularly and frequently for obvious signs of wear.

Cartridges should be rewound or replaced when the oxide side of the tape is shiny. Likewise the tape should be discarded if it is wrinkled, or contaminated with fingerprints, grease, or dirt. Less obvious are drop-outs or areas where the iron oxide particles have come loose from the base of the tape. Drop-outs may not be visible, but will show up as a loss of audio signal.

If possible only one type of tape should be used in a single installation. Different brands, and even different types of the same brand of tape require different bias recording levels for optimum response.

When rewinding cartridges use only a graphite lubricated tape. Silicone lubricated tapes cannot stand up to the rugged service in a cartridge.

Every cartridge tape must have one splice, but multiple splices can cause problems. If the top tape ends overlap at the splice or do not meet squarely, the audio may dropout. In addition, a poor splice will catch on the cartridge or the hub. After a splice has been in use for some time, the tape tension may pull the two ends of the tape apart, slightly opening splice.

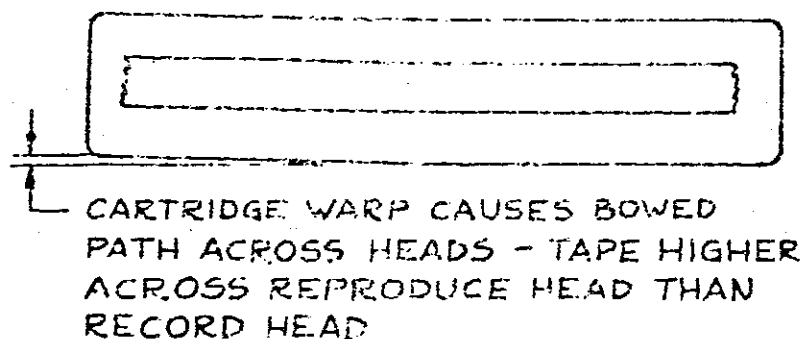
Proper tape tension is most critical. If the tension is too great, the tape will wear rapidly as it is squeezed against the hub, the pressure pads, the corner post, and the tape on the hub. If the tension is too light, the tape will not be pulled back into the hub.

The NAB specifies that tape tension at the capstan should not exceed 6 ounces. Cartridges over 70 seconds in length tend to have too little tension, while those less than 70 seconds tend to have too much. When running, a properly wound cartridge moves tape freely with no reluctance to wind onto the hub. To increase the tension in a cartridge, open up the splice and gently pull on the tape as it wraps onto the hub. To decrease the tension, open up the splice and gently pull out several loops from the center of the hub. Trim off the excess and resplice the tape.

#### THE SHELL

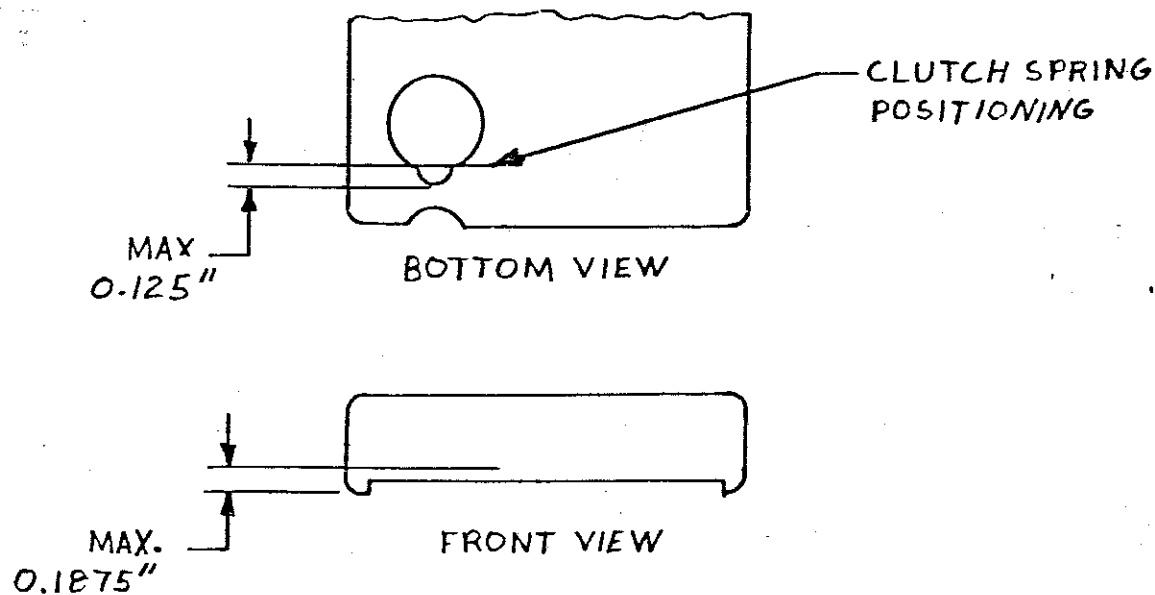
A deformed shell can adversely affect frequency response by distorting the tape path. In particular, a warped cartridge may cause the tape to traverse the head openings in an arc or bowed path rather than a straight line. Sometimes an ill-fitting top can spread the sides of the cartridge enough to cause this same bowing. Check suspect cartridges on a flat surface.

Periodically the cartridge center post should be cleaned. Gummy deposits on the post increase tape tension by not allowing the tape hub to turn freely. Equally important to free movement of the hub is the washer. This washer should always be in place underneath the tape hub, between the hub and the shell. This washer is easily misplaced when the cartridge is opened and the hub removed.



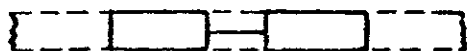
## CLUTCH SPRING OR HUB BRAKE

The clutch spring or hub brake should completely release when the pressure roller is in the vertical position. This allows the hub, and the tape, to move freely. An improperly adjusted clutch spring or defective hub brake may prevent the roller from engaging or disengaging. The clutch should be parallel to the bottom of the shell and no more than 0.1875 inch above the surface of the tape deck. The clutch must not protrude more than 0.125 inch into the opening for the pressure roller. Less than 8 ounces should be required to release the clutch.

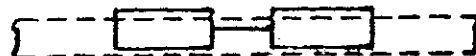


## PRESSURE PADS

The pressure pads must wrap the tape around the face of the heads. The pressure applied must be uniform across the tape as it is in contact with the head. Periodically check the pads to see that they are lined up squarely with the tape. If one portion of the tape is not in contact with the pads, that portion of the tape will make poor contact with the head. This may show up as poor frequency response from an individual cartridge.



PROPER ALIGNMENT



PADS TOO HIGH



PADS SKEWED

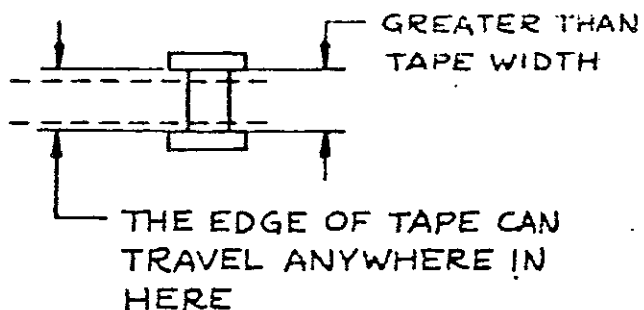


PADS TOO LOW

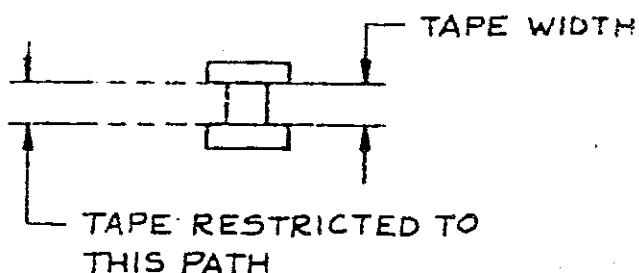
## THE TAPE PATH

The most frequent cause of distortion of the tape path in the cartridge is a loose corner post. The post should always be glued down so that there is 0.250 inch between the shoulder of the post and the shell. If the post is high, the tape will not run straight across the heads. A loose post frequently causes muffled-sounding audio when the cartridge unit starts.

### LOOSE CORNER POST



### PROPER CORNER POST



The hold-down wire used in many cartridges is important in maintaining proper tape travel. This wire keeps the tape flat on the hub as tape is pulled from the center and returned to the outside. The wire must not exert any pressure on the stored tape or the tape may wrinkle and jam. If a cartridge is dropped this hold-down wire may unseat.

## CARTRIDGE STORAGE

The cartridges should be stored away from direct sunlight, or heat from electronic equipment, radiators, etc. Ideal conditions are a temperature of 70° and a relative humidity of 50%. The cartridges storage area should be as free from dust as possible.

## CARTRIDGE RECORDING PROCEDURE

The following procedure is particularly important when recording cartridges. When the cartridge is first inserted into the machine, put the tape in motion in playback for several seconds. This allows the tape to seat properly in the tape guides and across the heads.

Stop the tape. Do not remove the cartridge after the initial run-in. Ensure the tape splice is positioned in an unrecorded portion of the tape between the end and the beginning of the program material.

The tape may now be recorded with satisfactory results.

## CARTRIDGES IN STEREOPHONIC SYSTEMS

### MAINTENANCE

Rigorous maintenance is a must for cartridges used in a stereophonic system, since any distortion of the tape path can cause phase differences between the program material on the two tracks. When the program material is mixed, phase differences cause degradation of the frequency response.

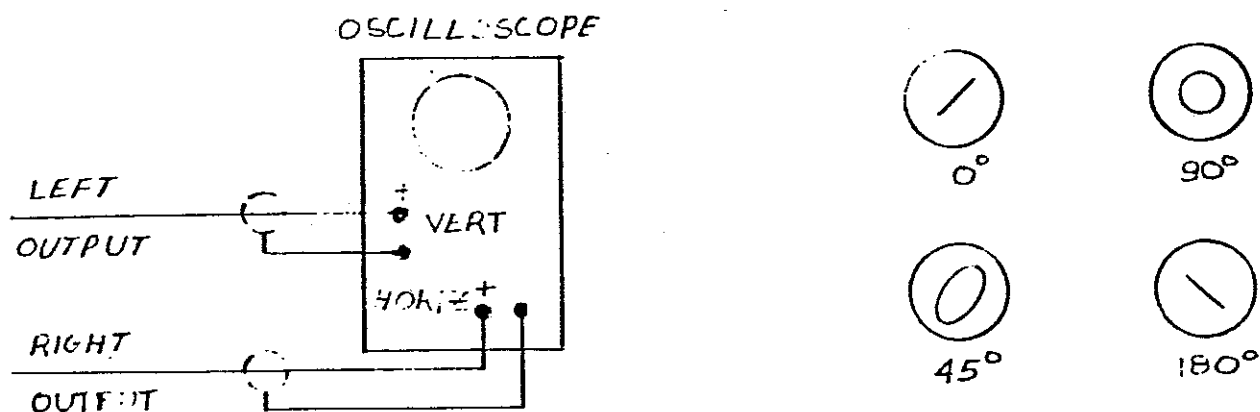
The most important characteristic of a cartridge for stereophonic use is the ability to consistently maintain the identical tape path each time the cartridge is inserted in the player. This allows reliable recording and subsequent accurate reproduction.

Cartridges used in a stereophonic system should initially be selected for phase repeatability using the phasing test outlined below. This test should be repeated on a regular basis throughout the life of the cartridge. A cartridge which fails this test should be discarded.

To provide better guidance within the cartridge, several manufacturers have introduced cartridges with an adjustable corner post. The post is threaded into the shell so that the precise post height may be maintained. These and other cartridges designed to improve performance should be considered for use in a stereophonic system.

### STEREO PHASING TEST

Connect the output of a record/playback unit to an oscilloscope as shown. Connect an audio signal generator to both inputs of the recorder. While recording observe the phase of the reproduce signals. Remove and re-insert the cartridge several times. Cartridges which exhibit poor phase repeatability or stability should be discarded. Do not test only for the higher frequencies, but check selected frequencies across the audio band.



## PRODUCT WARRANTY

LIMITED ONE YEAR

While this warranty gives you specific legal rights, which terminate one (1) year (6 months on turntable motors) from the date of shipment, you may also have other rights which vary from state to state.

Broadcast Electronics, Inc. ("BE"), 4100 North 24th Street, P. O. Box 3606, Quincy, Illinois 62305, hereby warrants cartridge machines, consoles, transmitters and other new Equipment manufactured by BE against any defects in material or workmanship at the time of delivery thereof, that develop under normal use within a period of one (1) year (6 months for turntable motors) from the date of shipment. Other manufacturers' Equipment, if any, shall carry only such manufacturers' standard warranty. This warranty extends to the original user and any subsequent purchaser during the warranty period. BE's sole responsibility with respect to any Equipment or parts not conforming to this warranty is to replace such equipment or parts upon the return thereof F.O.B. BE's factory or authorized repair depot within the period aforesaid.

In the event of replacement pursuant to the foregoing warranty, only the unexpired portion of the warranty from the time of the original purchase will remain in effect for any such replacement. However, the warranty period will be extended for the length of time that the original user is without the services of the Equipment due to its being serviced pursuant to this warranty. The terms of the foregoing warranty shall be null and void if the Equipment has been altered or repaired without specific written authorization of BE, or if Equipment is operated under environmental conditions or circumstances other than those specifically described in BE's product literature or instruction manual which accompany the Equipment purchased. BE shall not be liable for any expense of any nature whatsoever incurred by the original user without prior written consent of BE.

BE shall not be liable to the original user for any and all incidental or consequential damages for breach of either expressed or implied warranties. However, some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. All express and implied warranties shall terminate at the conclusion of the period set forth herein.

Except as set forth herein, and except as to title, there are no warranties, or any affirmations of fact or promises by BE, with reference to the Equipment, or to merchantability, fitness for a particular application, signal coverage, infringement, or otherwise, which extend beyond the description of the Equipment in BE's product literature or instruction manual which accompany the Equipment. Any card which is enclosed with the Equipment will be used by BE for survey purposes only.

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