

# INSTRUCTION MANUAL

## TAPE CARTRIDGE WINDERS

Model TW-120

Model TW-120T

Model TW-240

Model TW-240T

April, 1984

IM No. 597-0120

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.

## TECHNICAL ASSISTANCE AND REPAIR SERVICE

Technical assistance is available from Broadcast Electronics by letter or prepaid telephone or telegram. Equipment requiring repair or overhaul should be sent by common carrier, prepaid, insured and well protected. Do not mail equipment. We can assume no liability for inbound damage, and necessary repairs become the obligation of the shipper. Prior arrangement is necessary. Contact Customer Service Department for a Return Authorization.

FOR TECHNICAL ASSISTANCE  
Phone (217) 224-9600 Customer Service

## WARRANTY ADJUSTMENT

Broadcast Electronics, Inc. warranty is included in the Terms and Conditions of Sale. In the event of a warranty claim, replacement or repair parts will be supplied F.O.B. factory. At the discretion of Broadcast Electronics, the customer may be required to return the defective part or equipment to Broadcast Electronics, Inc. F.O.B. Quincy, Illinois. Warranty replacements of defective merchandise will be billed to your account. This billing will be cleared by a credit issued upon return of the defective item.

## RETURN, REPAIR AND EXCHANGES

Do not return any merchandise without our written approval and Return Authorization. We will provide special shipping instructions and a code number that will assure proper handling and prompt issuance of credit. Please furnish complete details as to circumstances and reasons when requesting return of merchandise. All returned merchandise must be sent freight prepaid and properly insured by the customer.

## REPLACEMENT PARTS

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

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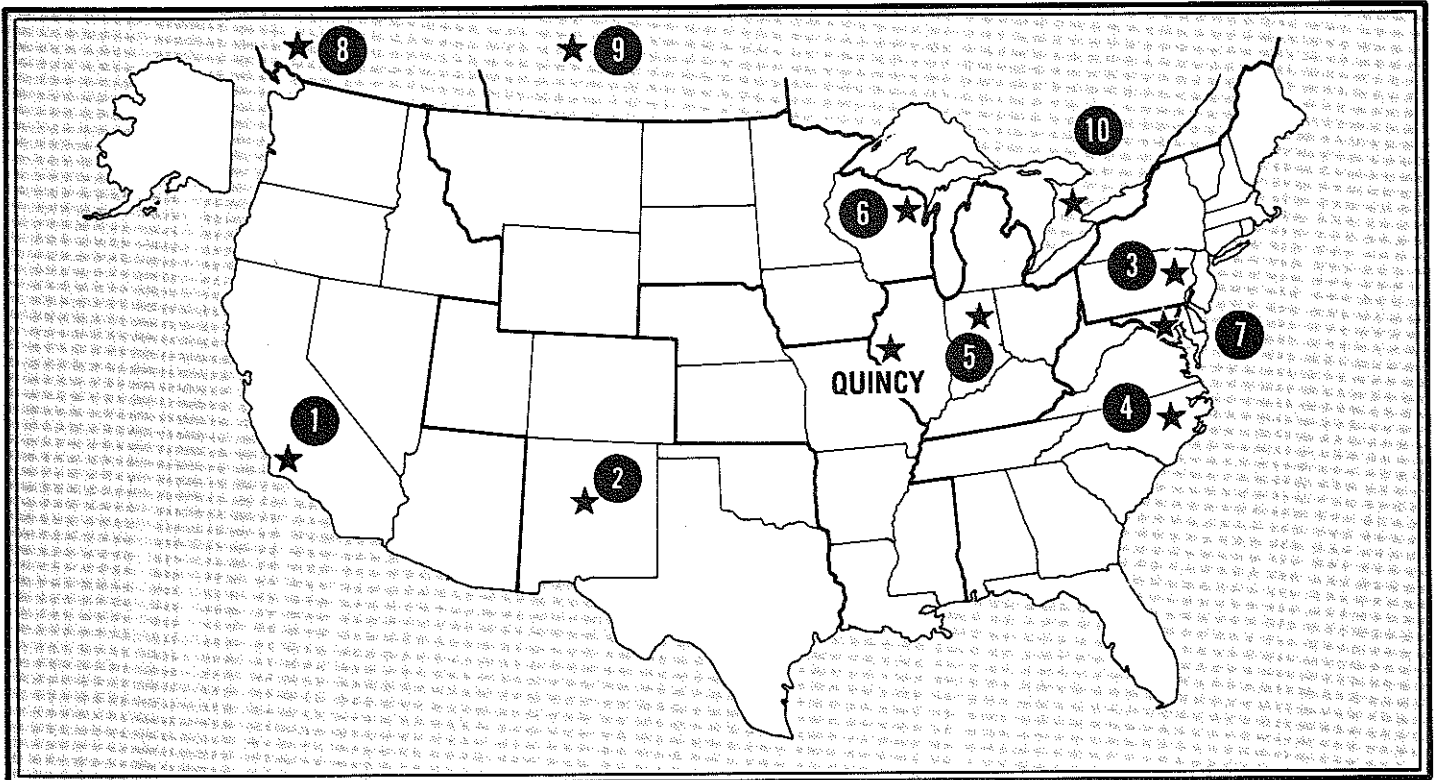
## MODIFICATIONS

Broadcast Electronics, Inc. reserves the right to modify the design and specifications of the equipment in this manual without notice. Any modifications shall not adversely affect performance of the equipment so modified.

# AUTHORIZED SERVICE CENTERS

• Equipped to serve you with Broadcast Electronics parts and repairs—both in and out of warranty

• Regional depots reduce parts delivery time and repair turn-around time



## UNITED STATES

**1. Riggins Electronics**  
3272 E. Willow Street  
Long Beach, CA 90815  
Ph: (213) 598-7007

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367 Main Street S.E.  
Box 1535  
Los Lunas, NM 87031  
Ph: (505) 867-6700

States Covered:  
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New Mexico  
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Texas  
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**3. Radio Systems Design**  
5131 West Chester Pike  
Edgmont, PA 19028  
Ph: (215) 356-4700

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Massachusetts  
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New Jersey  
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**4. Broadcast Services**  
Rt. #3, Box 45E  
Four Oaks, NC 27524  
Ph: (919) 934-6869

States Covered:  
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Florida  
Georgia  
North Carolina  
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**5. Allied Broadcasting Equipment**  
635 South E. Street  
Richmond, IN 47374  
Ph: (317) 962-8596

States Covered:  
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Kentucky  
Michigan  
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**6. Electronic Industries**  
19 East Irving Avenue  
Oshkosh, WI 54902  
Ph: (414) 235-8930

States Covered:  
Iowa  
Minnesota  
Montana  
North Dakota  
South Dakota  
Wisconsin  
Wyoming

**7. Midwest Telecommunications**  
4720-B Boston Way  
Lanham (Wash., D.C.) MD 20801  
Ph: (301) 577-4903

States Covered:  
District of Columbia  
Delaware  
Maryland

## CANADA

**8. Nortec West, Ltd.**  
325 West Fifth Avenue  
Vancouver V5Y 1J6,  
B.C., Canada  
Ph: (604) 872-8525

Provinces Covered:  
British Columbia  
Yukon Territory

**9. Nortec West, Ltd.**  
705 B Farrell Road  
Calgary, Alta., Canada  
Ph: (403) 252-8141

Provinces Covered:  
Alberta  
Manitoba  
NW Territory  
Saskatchewan

**10. J-Mar Electronics, Ltd.**  
6 Banigan Drive  
Toronto M4H 1E9,  
Ontario, Canada  
Ph: (416) 421-9080

Provinces Covered:  
New Brunswick  
Nova Scotia  
Ontario  
Quebec



4100 N. 24th ST., P.O. BOX 3606, QUINCY, IL 62305 U.S.A., TELEX: 25-0142, CABLE: BROADCAST, PHONE: (217) 224-9600

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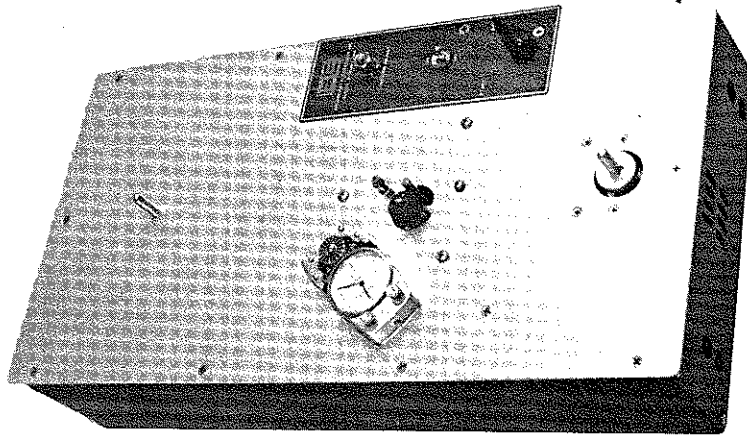
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SECTION I  
GENERAL INFORMATION

1-1. EQUIPMENT DESCRIPTION.

1-2. The Model TW-120 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-120 tape winder operates from an ac input of 115V ac and the TW-240 tape winder operates from an ac input of 230V ac. Both the TW-120 and the TW-240 are supplied without the optional tape timer which can be customer installed.

1-4. The TW-120T tape winder operates from an ac input of 115V ac and the TW-240T tape winder operates from an ac input of 230V ac. Both models are supplied with the tape timer factory installed.

1-5. The operation and maintenance of the 230 volt versions are identical to the 115 volt versions with the following exceptions:

<u>TW-120(T)</u>	<u>TW-240(T)</u>
115V motor	230V motor
1 ampere fuse	1/2 ampere fuse

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:	
TW-120, TW-120T	115V ac, 50/60 Hz, 100W Maximum
TW-240, TW-240T	230V ac, 50/60 Hz, 100W Maximum
DRIVE MOTOR	Four Pole Induction
TAKE-UP MOTOR	Shaded Pole Induction
TAPE TIMER	Standard in TW-120T, TW-240T
CAPACITY	Handles Supply Reel Up to 3600 ft. (1097.28 m) of 1 mil (0.025 mm) tape
TAKE-UP REEL	Up to 7.25 inches (18.42 cm) Diameter
WEIGHT	9.5 Pounds (4.31 kg)
SIZE	10 inches Wide X 20 inches Long X 6.75 inches High (25.4 cm X 50.8 cm X 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 head, pressure roller, and capstan should be cleaned daily with BE 903 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 graphite lubricated tape, if not available through a local supplier, may be purchased through Broadcast Electronics, Inc., as well as empty cartridges, BE 903 cleaning fluid, and recommended splicing supplies.

#### 2-4. OPERATION WITHOUT TAPE TIMER.

2-5. The following procedure describes operation of the Broadcast Electronics models TW-120 and TW-240 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 EQUIVALENT TAPE. DO NOT USE STANDARD TAPE.

#### NOTE

- 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, can be used.
- 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 excessive 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 similar 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.

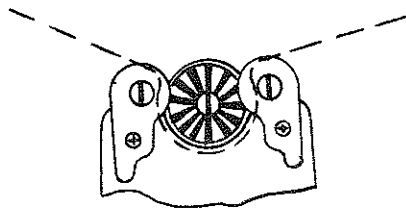
2-6. OPERATION WITH TAPE TIMER.

2-7. The following procedure describes operation of the Broadcast Electronics models TW-120T and TW-240T tape winders. Figure 2-1 and Table 2-1 should be referenced for an explanation of the tape timer controls and indicators.

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 1:

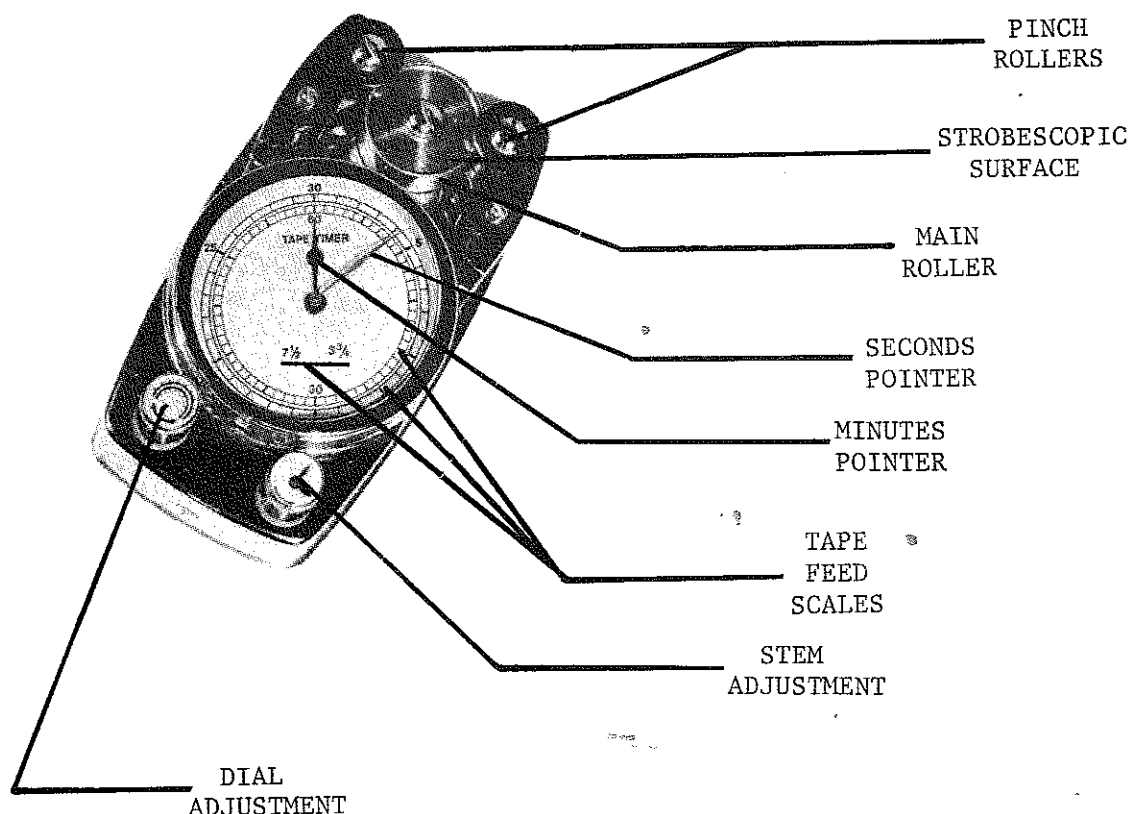
NOTE

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 preset 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.



597-0120-3

FIGURE 2-1. TI-50A TAPE TIMER

TABLE 2-1. TAPE TIMER CONTROLS AND INDICATORS

CONTROL	INDICATOR FUNCTION
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.
POINTERS AND SCALES	<p style="text-align: center;"><u>NOTE</u></p> <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> <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 (shorter 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>

## 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 in 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 take-up reel torque. This torque is preset at the factory to provide the optimum take-up torque for series 300 cartridges. When winding alternate cartridges, the TENSION ADJUST control setting may be changed to provide a tighter or looser wind as required.

### 3-7. TAPE TIMER FIELD INSTALLATION.

3-8. The TI-50A tape timer is installed at the factory on TW-120T and TW-240T model tape winders. The tape timer is available separately as an option for field installations on the TW-120 and TW-240 tape winders.

### 3-9. PROCEDURE.

3-10. The following procedure provides for tape timer field installation:

#### WARNING

ENSURE ALL POWER IS DISCONNECTED BEFORE  
PROCEEDING.

- A. Ensure all primary ac power is disconnected.
- B. Refer to drawing B900-0102.
- C. Remove the ten "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 ten "A" screws.

# SECTION IV PARTS LIST

## 4-1. INTRODUCTION.

4-2. This section provides descriptions and part numbers for parts and assemblies required for maintenance of all models of the Broadcast Electronics 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.

TABLE 4-1. REPLACEABLE PARTS LIST INDEX

TABLE NO.	DESCRIPTION	PART NO.	PAGE
4-2	TW-120 Tape Cartridge Winder 115V, 50/60 Hz	900-0100	10
4-3	TW-120T Tape Cartridge Winder with Timer, 115V, 50/60 Hz	900-0110	10
4-4	TW-240 Tape Cartridge Winder 240V, 50/60 Hz	900-0200	11
4-5	TW-240T Tape Cartridge Winder with Timer, 240V, 50/60 Hz	900-0210	12

# SECTION V DRAWINGS

## 5-1. INTRODUCTION.

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

<u>FIGURE</u>	<u>TITLE</u>	<u>NUMBER</u>
5-1	TAPE WINDERS	B900-0102
5-2	WIRING DIAGRAM TW-120, TW120T, TW-240, TW-240T	B900-0101

TABLE 4-2. TW-120 TAPE CARTRIDGE WINDER  
115V, 50/60 Hz - 900-0100

REF. DES.	DESCRIPTION	PART NO.	QTY.
F1	Fuse, 3AG, 1 Ampere	330-0100	1
M1	Motor Drive Universal W/Mtg Plate 115V, 50/60 Hz, 0.42A, 1550 RPM	383-0058	1
M2	Motor, Take Up, 120V, 60 Hz, 32W	383-0601	1
R1	Potentiometer, 500 Ohm, 25W, W/W (TENSION ADJUST)	195-0156	1
S1	Switch, Toggle, SPST, 3A @ 250V (ON/OFF)	348-8280	1
XF1	Fuse Holder, 3AG	415-2012	1
----	Release Lever	449-0015	1
----	Pressure Roller Plate	479-0091	1
----	Pressure Roller Spindle	449-0012	1
----	Pressure Roller ID: 0.189 In + 0.000 In, - 0.001 In OD: 0.795 In ± 0.003 In WIDTH: 0.375 In + 0.000 In, -0.015 In	404-0001	1
----	Phenolic Bar Spacer	407-0907	1
----	Bar, Bushing	442-0013	1
----	Spindle, Supply	449-0010	1
----	Motor Spindle	449-0023-2	1
----	Overlay	596-0009	1
----	Feet, Rubber	403-2194	4
----	Bushing, Panel, W/Mtg Hardware	442-0119	1
----	"E" Ring for Pressure Roller	454-3318	1
----	Knob	482-2232	1
----	Washer, Nylon	423-5008	2
----	Washer, Nylatron	423-5009	1
----	"E" Ring for Release Lever Shaft	454-0500	1
----	Spring	432-0041	1
----	Tape Guide	445-0173	1
----	Fan Blade for Drive Motor	409-0469	1

TABLE 4-3. TAPE CARTRIDGE WINDER W/TIMER, 115V, 50/60 Hz  
900-0110 - (Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
F1	Fuse, 3AG, 1 Ampere	330-0100	1
M1	Motor Drive Universal W/Mtg Plate, 115V, 50/60 Hz, 0.42A, 1550 RPM	383-0058	1
M2	Motor, Take Up, 120V, 60 Hz, 32W	383-0601	1
R1	Potentiometer, 500 Ohm, 25W, W/W (TENSION ADJUST)	195-0156	1
S1	Switch, Toggle, SPST, 3A @ 250V (ON/OFF)	348-8280	1
TI-50A	Tape Timer	800-4002	1

TABLE 4-3. TAPE CARTRIDGE WINDER W/TIMER, 115V, 50/60 Hz  
900-0110 - (Sheet 2 of 2)

REF. NO.	DESCRIPTION	PART NO.	QTY.
XF1	Fuse Holder, 3AG	415-2012	1
----	Release Lever	449-0015	1
----	Pressure Roller Plate	479-0091	1
----	Pressure Roller Spindle	449-0012	1
----	Pressure Roller	404-0001	1
	ID: 0.189 In + 0.000 In, - 0.001 In		
	OD: 0.795 In ± 0.003 In		
	WIDTH: 0.375 In + 0.000 In, - 0.015 In		
----	Phenolic Bar Spacer	407-0907	1
----	Bar, Bushing	442-0013	1
----	Spindle, Supply	449-0010	1
----	Motor Spindle	449-0023-2	1
----	Overlay	596-0009	1
----	Feet, Rubber	403-2194	4
----	Bushing, Panel W/Mtg Hardware	442-0119	1
----	"E" Ring for Pressure Roller	454-3318	1
----	Knob	482-2232	1
----	Washer, Nylon	423-5008	2
----	Washer, Nylatron	423-5009	1
----	"E" Ring for Release Lever Shaft	454-0500	1
----	Spring	432-0041	1
----	Tape Guide	445-0173	1
----	Fan Blade for Drive Motor	409-0469	1

TABLE 4-4. TAPE CARTRIDGE WINDER, 240V, 50/60 Hz  
900-0200 - (Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
F1	Fuse, 3AG, 1/2 Ampere	334-0050	1
M1	Motor Drive Universal W/Mtg Plate, 230V, 50/60 Hz, 0.21A, 1550 RPM	383-0002	1
M2	Motor, Take Up, 230V, 50 Hz	383-0001	1
R1	Potentiometer, 1 k Ohm, 25W, W/W (TENSION ADJUST)	190-0158	1
S1	Switch, Toggle, SPST, 3A @ 250V (ON/OFF)	348-8280	1
XF1	Fuse Holder, 3AG	415-2012	1
----	Release Lever	449-0015	1
----	Pressure Roller Plate	479-0091	1
----	Pressure Roller Spindle	449-0012	1
----	Pressure Roller	404-0001	1
	ID: 0.189 In + 0.000 In, - 0.001 In		
	OD: 0.795 In ± 0.003 In		
	WIDTH: 0.375 In + 0.000 In, - 0.015 In		
----	Phenolic Bar Spacer	407-0907	1



TABLE 4-4. TAPE CARTRIDGE WINDER, 240V, 50/60 Hz  
900-0200 - (Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Bar, Bushing	442-0013	1
----	Spindle, Supply	449-0010	1
----	Motor Spindle	449-0023-2	1
----	Overlay	596-0009	1
----	Feet, Rubber	403-2194	4
----	Bushing, Panel W/Mtg Hardware	442-0119	1
----	"E" Ring for Pressure Roller	454-3318	1
----	Knob	482-2232	1
----	Washer, Nylon	423-5008	2
----	Washer, Nylatron	423-5009	1
----	"E" Ring for Release Lever Shaft	454-0500	1
----	Spring	432-0041	1
----	Tape Guide	445-0173	1
----	Fan Blade for Drive Motor	409-0469	1

TABLE 4-5. TAPE CARTRIDGE WINDER W/TIMER, 240V, 50/60 Hz  
900-0210 - (Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
F1	Fuse, 3AG, 1/2 Ampere	334-0050	1
M1	Motor Drive Universal W/Mtg Plate, 230V, 50/60 Hz, 0.21A, 1550 RPM	383-0002	1
M2	Motor, Take Up, 230V, 50 Hz	383-0001	1
R1	Potentiometer, 1 k Ohm, 25W, W/W (TENSION ADJUST)	190-0158	1
S1	Switch, Toggle, SPST, 3A @ 250V (ON/OFF)	348-8280	1
TI-50A	Tape Timer	800-4002	1
XF1	Fuse Holder, 3AG	415-2012	1
----	Release Lever	449-0015	1
----	Pressure Roller Plate	479-0091	1
----	Pressure Roller Spindle	449-0012	1
----	Pressure Roller	404-0001	1
	ID: 0.189 In + 0.000 In, - 0.001 In		
	OD: 0.795 In ± 0.003 In		
	WIDTH: 0.375 In + 0.000 In, - 0.015 In		
----	Phenolic Bar Spacer	407-0907	1
----	Bar, Bushing	442-0013	1
----	Spindle, Supply	449-0010	1
----	Motor Spindle	449-0023-2	1
----	Overlay	596-0009	1
----	Feet, Rubber	403-2194	4
----	Bushing, Panel W/Mtg Hardware	442-0119	1
----	"E" Ring for Pressure Roller	454-3318	1
----	Knob	482-2232	1

TABLE 4-5. TAPE CARTRIDGE WINDER W/TIMER, 240V, 50/60 Hz  
900-0210 - (Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Washer, Nylon	423-5008	2
----	Washer, Nylatron	423-5009	1
----	"E" Ring for Release Lever Shaft	454-0500	1
----	Spring	432-0041	1
----	Tape Guide	445-0173	1
----	Fan Blade for Drive Motor	409-0469	1

REV. DESCRIPTION		DATE APPROVED	

**TW-120/TW-120T**

115V AC 50/60 Hz

S1 ON/OFF

F1 1A

M1 DRIVE MOTOR

R1 TENSION ADJUST  
← DECREASE TENSION

M2 TAKE-UP MOTOR

**TW-240/TW-240T**

240V AC 50/60 Hz

S1 ON/OFF

F1 1/2A

M1 DRIVE MOTOR

R1 TENSION ADJUST  
→ DECREASE TENSION

M2 TAKE-UP MOTOR

DECREASE TENSION

TENSION ADJUST

ON

OFF

START STOP

**BROADCAST ELECTRONICS INC.**  
—A FILMWAYS COMPANY—

**TITLE** TAPE WINDERS

**DWG. NO.** 900-010Z

**REV.** B

**SCALE** TW-120/TW-120T TW-240/TW-240T

**SHEET** / OF /

**DATE** 10-19-82

**BY** JAH

**PROJECT** 10-28-82

**ENGR.** SU

**DATE** 10-27-82

**APPROVED**

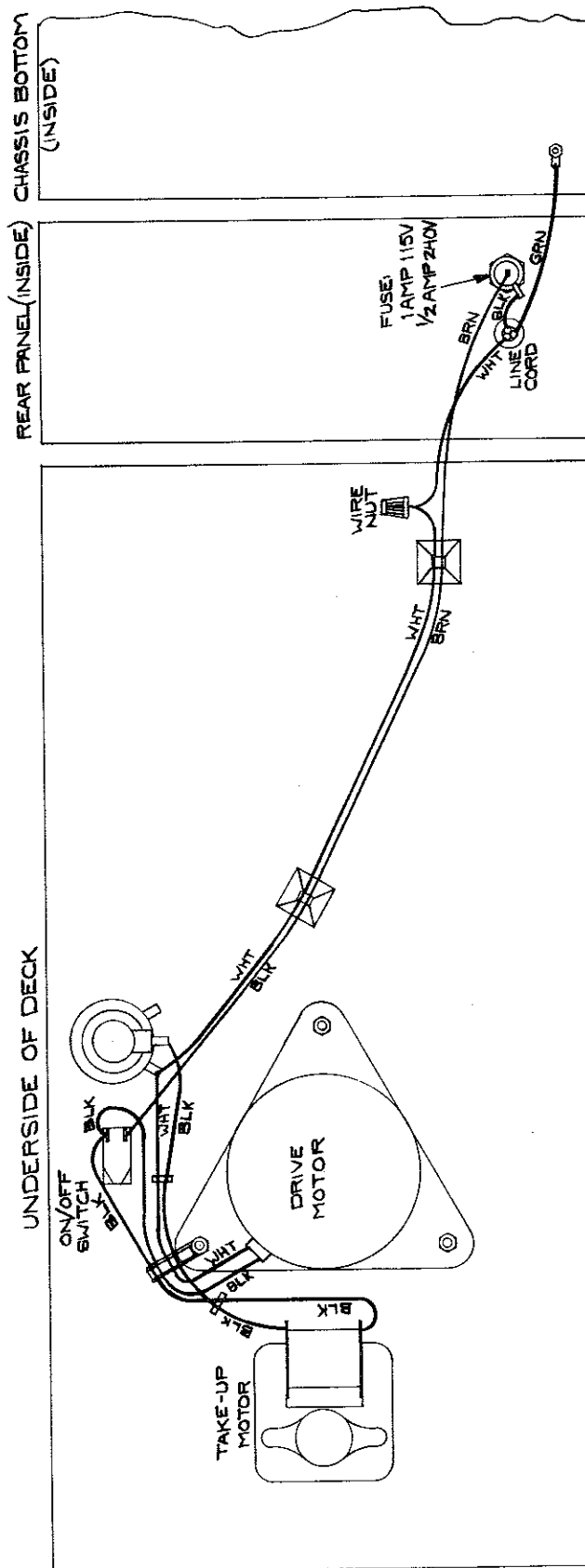
**TREATMENT OR FINISH**

**MATERIAL**

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REV. DESCRIPTION		DATE APPROVED	
REV.		DATE	APPROVED



<p>PROPRIETARY RIGHTS are included in information disclosed herein. This information is submitted in confidence and neither this document nor the information disclosed herein shall be reproduced or transferred to other documents or used or disclosed to others for manufacturing or for any purpose except as specifically authorized in writing by BROADCAST ELECTRONICS, INC.</p>				<p>TOLERANCE UNLESS OTHERWISE SPECIFIED          DECIMAL 2 PL ± 0.1 3PL ± 0.05          FRACTIONAL ± 1/64          ANGULAR ± 1°          SHARP EDGES TO          BEND RADII          FILLET RADII</p>		<p>DRAWN BY JAH DATE 10-19-62          CHECKED BY JAH DATE 10-22-62          PROJECT 54          ENGR. BY          APPROVED BY</p>		<p>BROADCAST ELECTRONICS INC.          —A FILMWAYS COMPANY—</p>	
				<p>DATE 10-22-62          TITLE WIRING DIAGRAM</p>		<p>REV. B          DWG. NO. 900-0101          SCALE TW/20/TW/20T          SHEET 1 OF 1</p>			

SECTION VI  
MANUFACTURERS DATA

6-1.        INTRODUCTION.

6-2.        This section lists data applicable to the operation and use of all models of the Broadcast Electronics tape winder. The following information is contained in this section.

- A.    The NAB Tape Cartridge and Its Maintenance.
- B.    Motor Spindle And Spindle Adaptor Installation Instructions.

BROADCAST ELECTRONICS, INC.

The NAB Tape Cartridge and Its Maintenance

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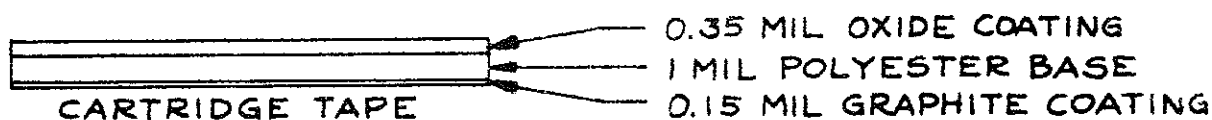
TABLE OF CONTENTS	PAGE NO.
The NAB Tape Cartridge	1
Cartridge Maintenance Tips	7
Cartridge Recording Procedure	10
Cartridges in Stereophonic Systems	11

## THE NAB TAPE CARTRIDGE

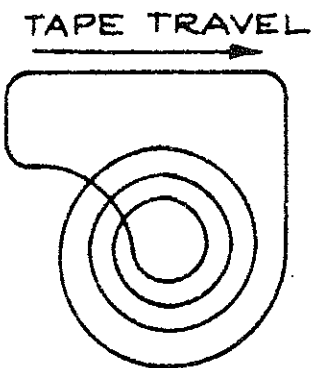
The National Association of Broadcasters (NAB) defines a cartridge as "a plastic or metal enclosure containing an endless loop of lubricated tape, wound on a rotatable hub in such a fashion as to allow continuous motion." Cartridges from the various manufacturers differ slightly in details, but all cartridges 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 0.248 (+0/-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.



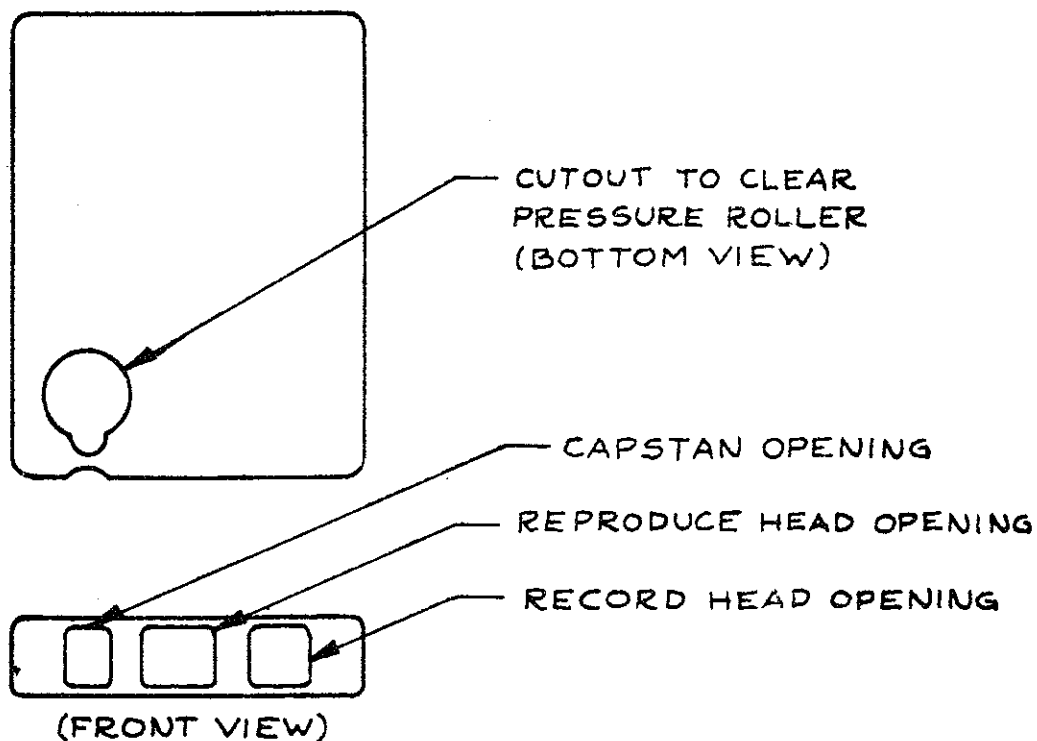
**TAPE SPIRAL**

### 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.



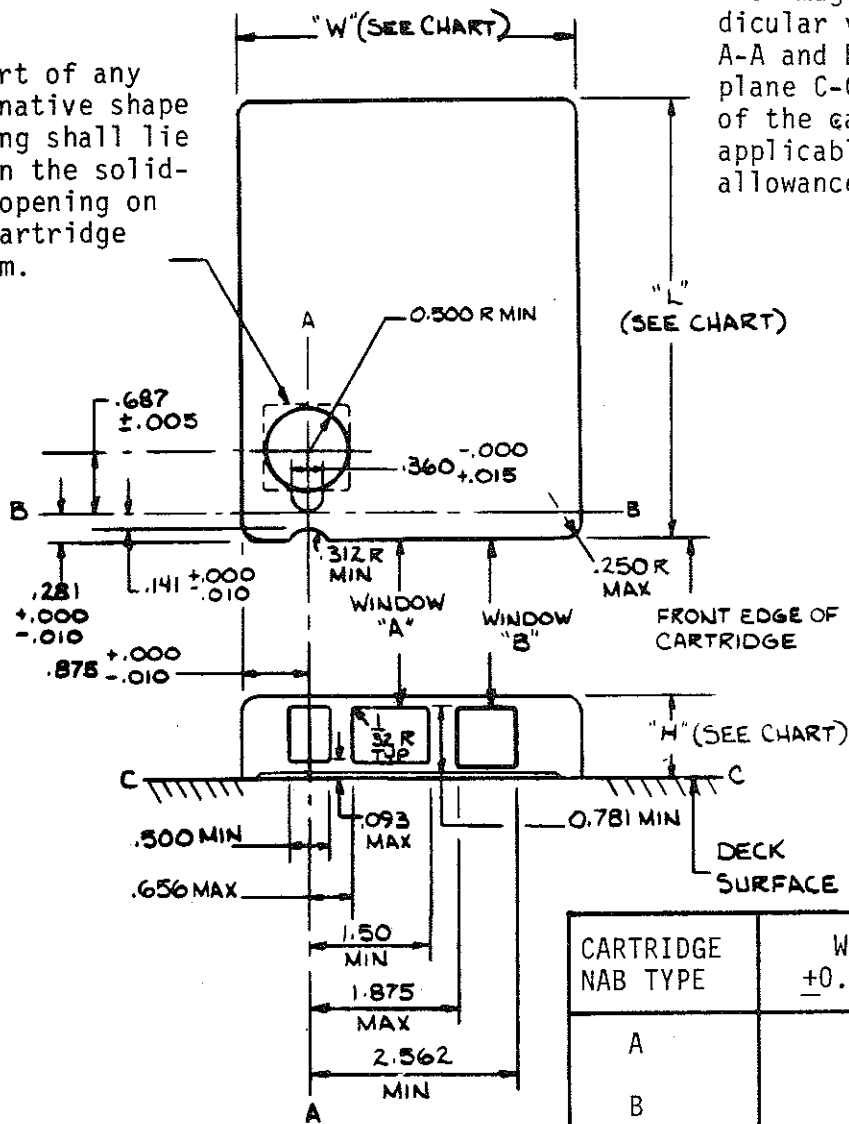
There are three openings across the front of the cartridge that allow the heads and capstan to penetrate the shell and contact the tape. In addition, there is an opening in the bottom for the pressure roller to rotate through the cartridge behind the tape. Unlike some cartridges used in consumer entertainment 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.

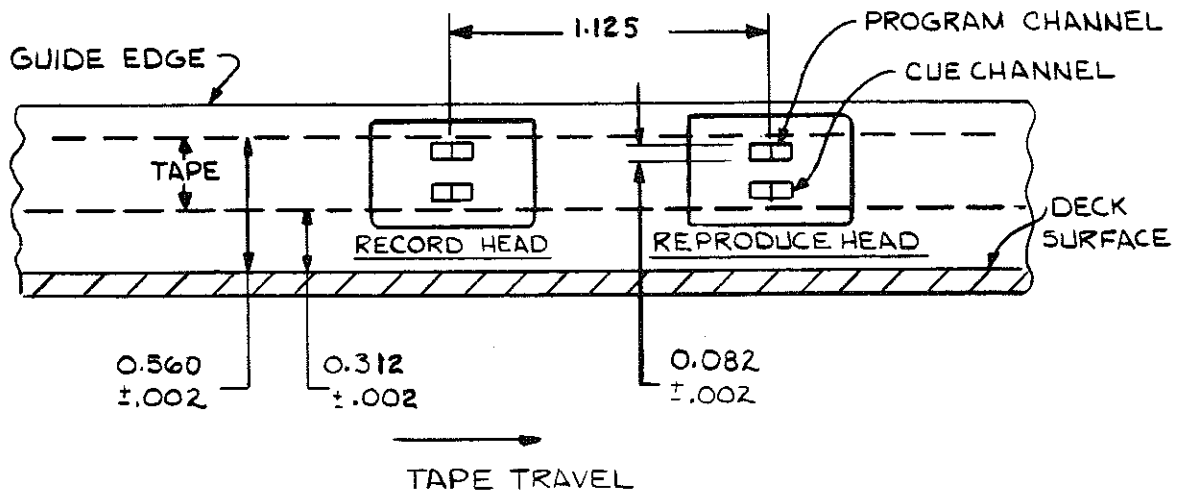
All important operating dimensions (in inches) are referenced from two imaginary mutually perpendicular vertical planes marked A-A and B-B, and a third horizontal plane C-C, representing the deck surface of the cartridge tape player. Where applicable, dimensions include draft allowances.



CARTRIDGE NAB TYPE	WIDTH $\pm 0.015625$	LENGTH MAXIMUM	HEIGHT 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

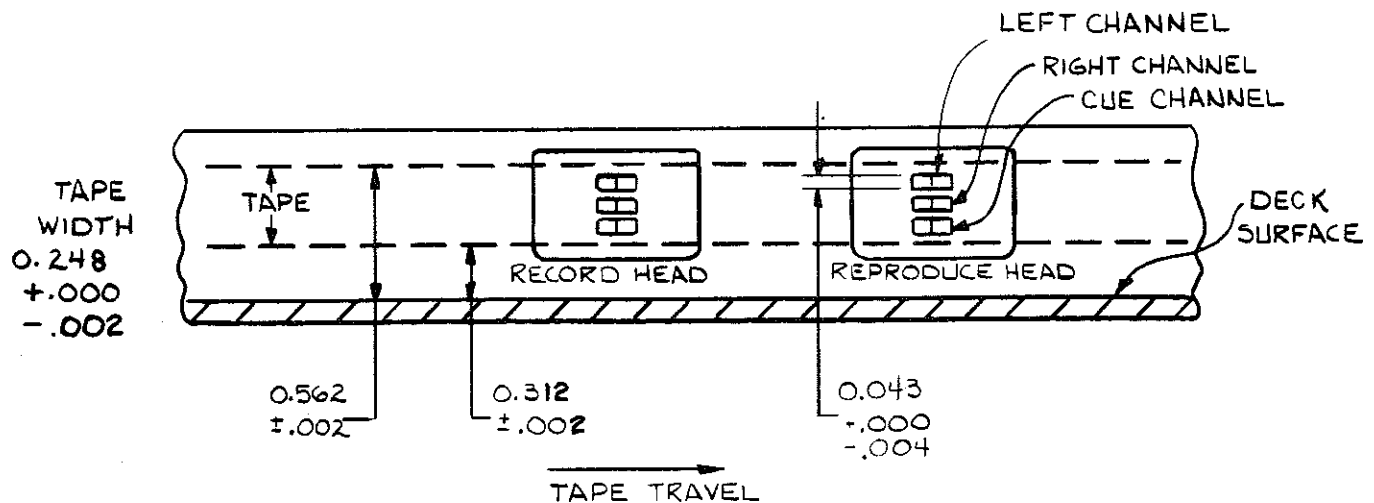
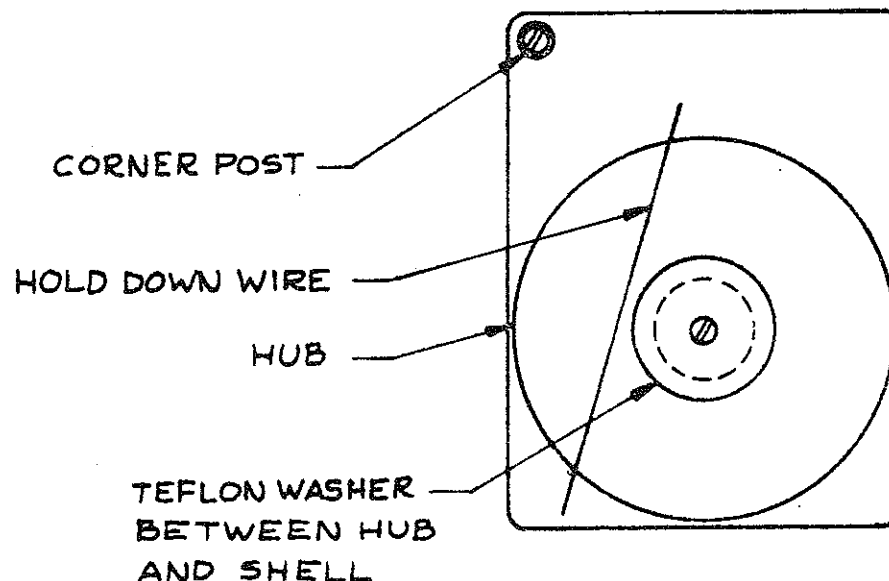


Figure 2. NAB TAPE HEAD DIMENSION STANDARDS

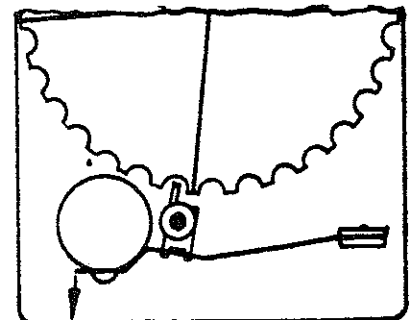
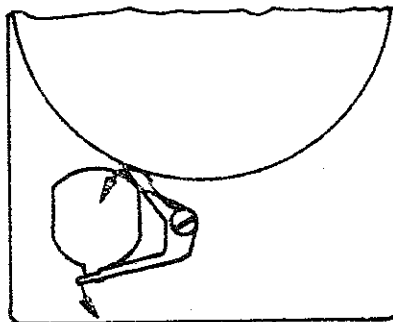
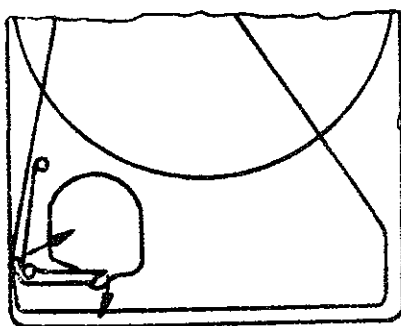
## TAPE HUB, TEFLON WASHER, AND CENTER POST

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)

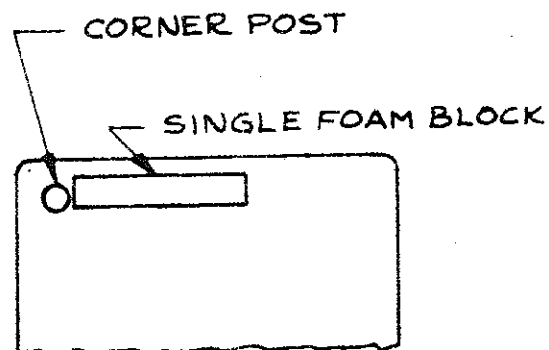
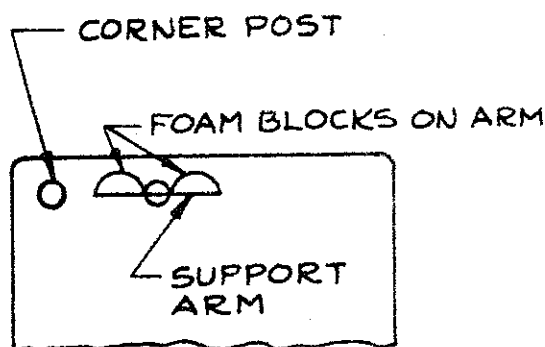
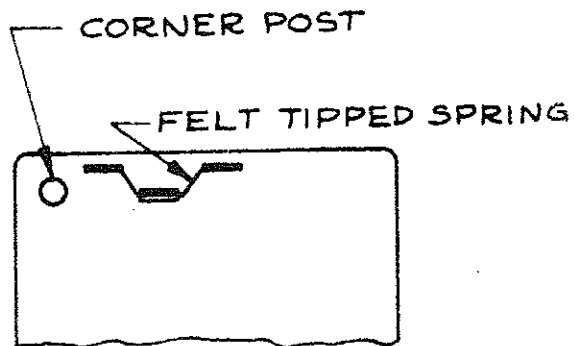
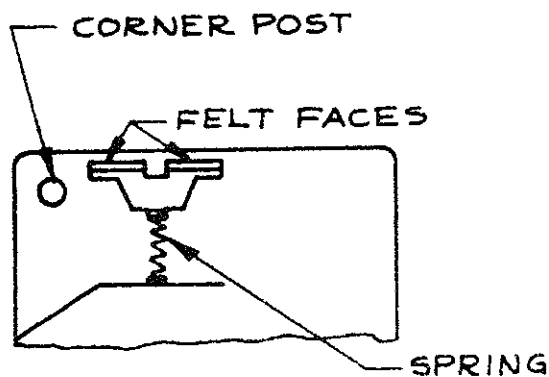
The clutch spring or hub brake keeps the tape from moving when the cartridge is not in place in a machine. This is done either by applying a brake to the hub or by pressing the tape against the shell. The clutch or brake is released by the shaft of the pressure roller when the roller is in the vertical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

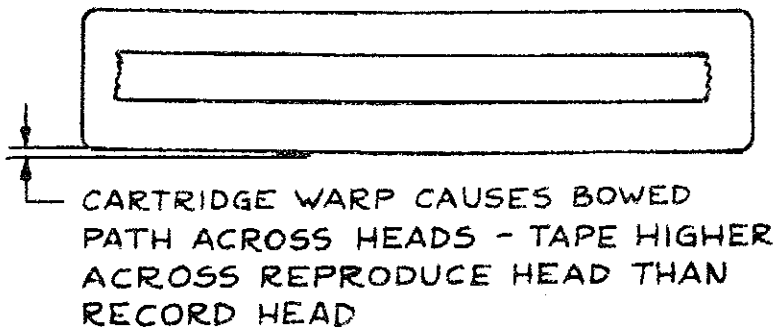
Proper tape tension is most critical. If the tension is too great, the tape will wear rapidly as it is squeezed against the hub, the pressure pads, the corner post, and the tape on the hub. If the tension is too light, the tape will not be pulled back into the hub.

The NAB specifies that tape tension at the capstan should not exceed 3 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.

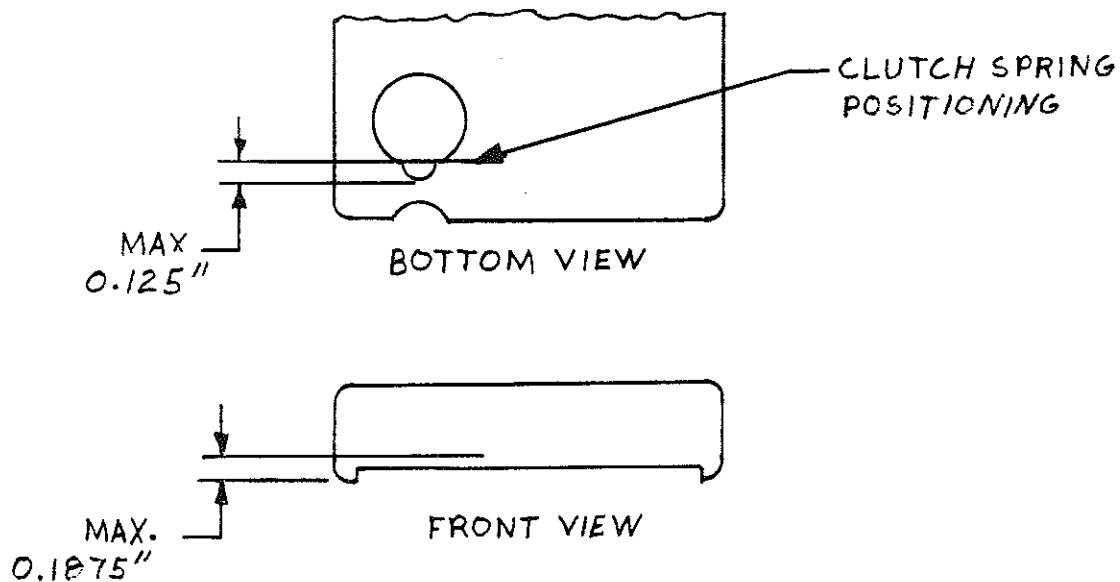
Periodically the cartridge center post should be cleaned. Gummy deposits on the post increase tape tension by not allowing the tape hub to turn freely. Equally important to free movement of the hub is the washer. This washer should always be in place underneath the tape hub, between the hub and the shell.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





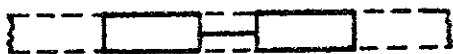
## CLUTCH SPRING OR HUB BRAKE

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.



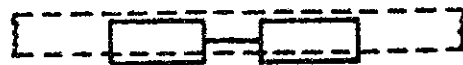
**PROPER ALIGNMENT**



**PADS TOO HIGH**



**PADS SKEWED**

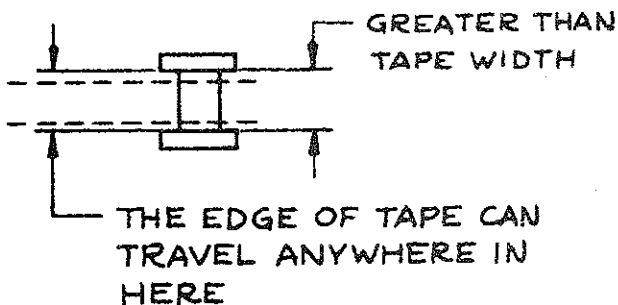


**PADS TOO LOW**

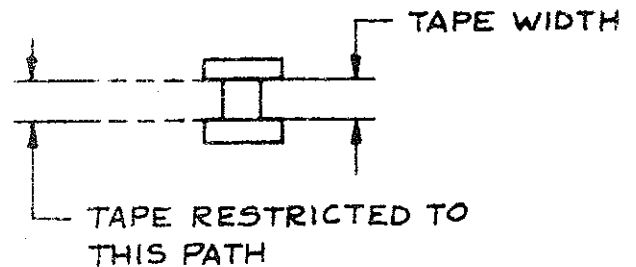
## THE TAPE PATH

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 STEREOGRAPHIC 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.

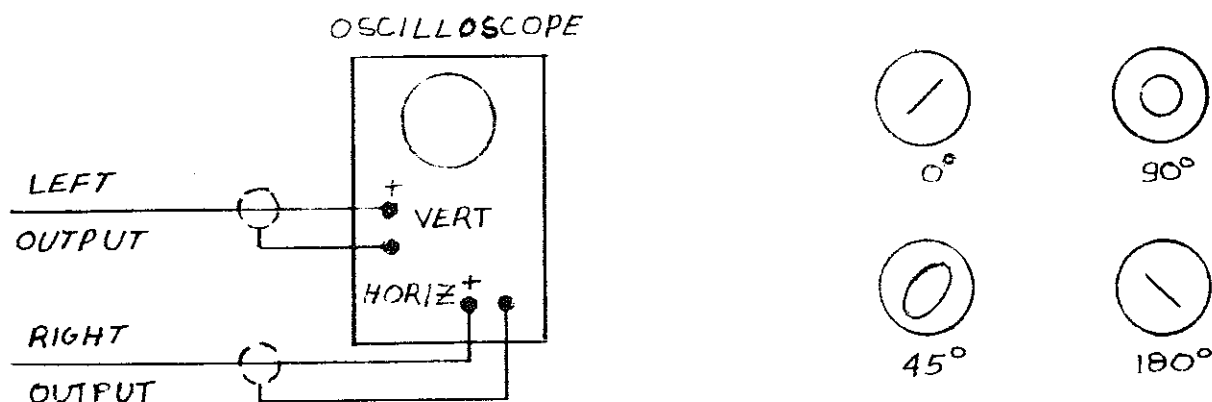
The most important characteristic of a cartridge for stereophonic use is the ability to consistently maintain the identical tape path each time the cartridge is inserted in the player. This allows reliable recording and subsequent accurate reproduction.

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.



## APPENDIX B

### MOTOR SPINDLE AND SPINDLE ADAPTOR INSTALLATION INSTRUCTIONS

The motor spindle installed on the tape winder at the factory (BE P/N 449-0023-2) can be used with any of the following kinds of tape cartridge:

Fidelpac 300  
Fidelpac 350  
Audiopak

The white plastic ScotchCart Tape Winding Adaptor (BE P/N 467-0111) also fits over the factory installed spindle. Refer to the second page of this notice for information pertaining to the use of the ScotchCart adaptor.

Also included with the tape winder is a spindle (BE P/N 449-0023-001) and installation hardware: 6-32 x 1/4 inch set screw and a 1/16 inch hex wrench, which allows Fidelpac MasterCart II tape cartridges to be wound on this tape winder unit.

The following is the installation procedure for the Fidelpac MasterCart II motor spindle:

1. Disconnect primary power.
2. Loosen the set screw in the skirt of the motor spindle (refer to Figure 1) until the spindle can be slipped off the take-up motor.
3. Place the MasterCart II spindle on the take-up motor. Adjust the spindle so that the top face of the spindle skirt is 0.2 inch (5 mm) above the deck of the tape winder (refer to Figure 1). Tighten the set screw.
4. Recheck the distance between the deck and the top of the spindle skirt.
5. Reconnect ac power.

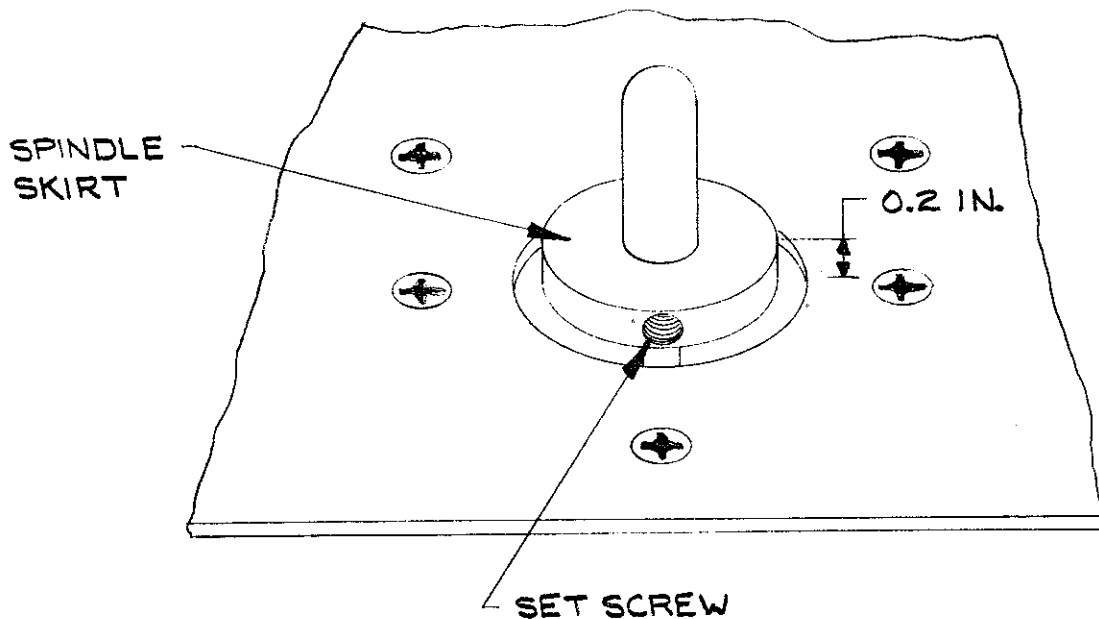


FIGURE 1

A spindle for winding Aristocart tape cartridges (P/N 449-0023-1) is available from Broadcast Electronics Inc.

## 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.

**BROADCAST ELECTRONICS, INC.**  
4100 North 24th Street, P. O. Box 3606, Quincy, Illinois 62305