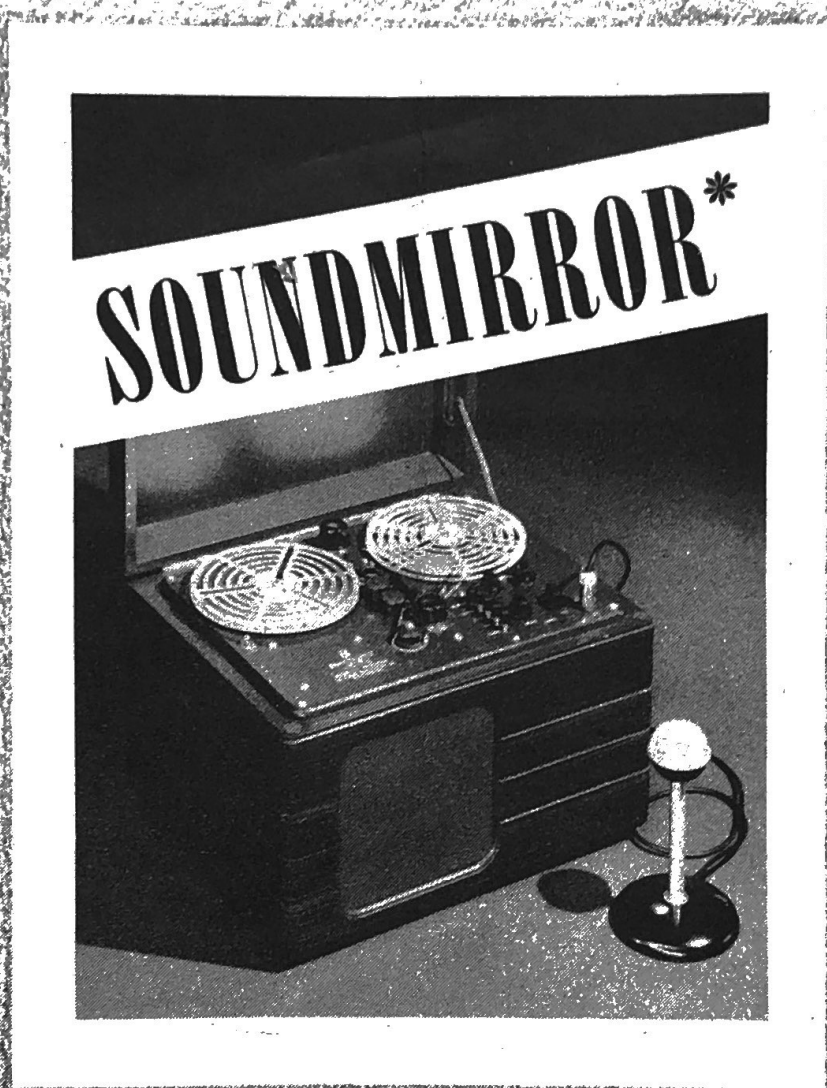


EG 460

OPERATING INSTRUCTIONS



MODEL BK-401

MAGNETIC RIBBON HOME RECORDER-REPRODUCER

THE *Brush* DEVELOPMENT COMPANY

3405 PERKINS AVENUE
CLEVELAND 14, OHIO

RETAIN THIS BOOK FOR FUTURE REFERENCE

*Trade Mark Reg. U. S. Pat. Off. Patents Pending.

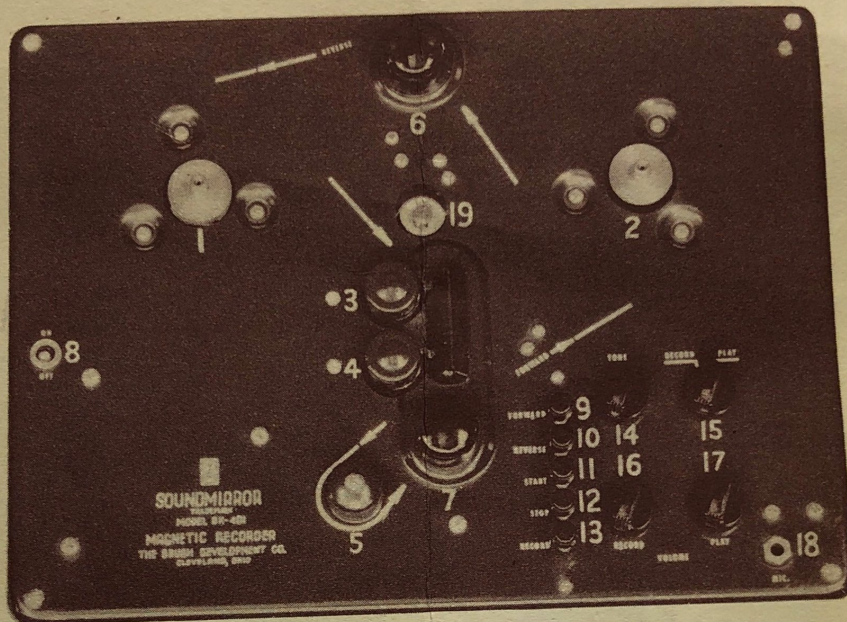


FIGURE 1

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| <ul style="list-style-type: none"> 1. Supply Reel Shaft 2. Take Up Reel Shaft 3. Erase Head 4. Record-Playback Head 5. Constant Speed Drive Capstan 6. Rewind Stopping Switch 7. Forward Stopping Switch 8. Power Switch 9. Forward Control Switch | <ul style="list-style-type: none"> 10. Reverse Control Switch 11. Start Control Switch 12. Stop Control Switch 13. Record Control Switch 14. Playback Tone Control 15. Record-Play Selector Switch 16. Record Volume Control 17. Playback Volume Control 18. Microphone Input Jack 19. Indicator for Record Volume Level |
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IMPORTANT

The BK-401 SOUNDMIRROR Magnetic Ribbon Recorder-Reproducer is designed for 105-120 VOLTS, 60 CYCLE AC power supply. **DO NOT** connect the unit to a DC power supply. The Warranty is void if this unit is connected to a power source other than specified above.

When DC power is the only source, it is necessary to install a converter to operate the SOUNDMIRROR. Check with your local radio serviceman.

When 50 cycle AC is the only power available, the BK-401-1 SOUNDMIRROR should be used. This unit has been designed for 50 cycle operation and recordings made on this unit are interchangeable with recordings made on the BK-401.

If other than 115 volts, nominal, is available, a small 200 watt transformer must be installed in the line. Check with your local radio serviceman.

Remember to turn the SOUNDMIRROR off when not in use. This is accomplished by throwing *Power Switch* (No. 8 of Fig. 1) to the OFF position.

As this unit employs motors and vacuum tubes, a considerable amount of heat is generated within the unit. Therefore, in order to provide sufficient ventilation the unit should be placed at least six inches from the nearest wall and should never be operated on top of a radiator or near a warm air outlet.

GENERAL INFORMATION

The SOUNDMIRROR magnetic ribbon recorder-reproducer is a complete unit containing all the mechanical and electrical components necessary to make and reproduce recordings.

The principle of the SOUNDMIRROR is one of changing sound into a magnetic pattern and converting the magnetic pattern back into sound. When a recording is made on the magnetic ribbon it is permanent, and under normal handling and storage conditions, should last indefinitely. At any time a recording on the ribbon is not desired, the ribbon may be placed in the recorder and a new recording made without further processing. The process of making the new recording automatically removes the old, unwanted, recording.

OPERATING INSTRUCTIONS

RECORDING

Be sure the correct power supply is available (115 volts, 60 cycles Alternating Current) and insert the line plug into a convenient wall receptacle.

MICROPHONE RECORDING

To make a microphone recording, it is necessary to proceed as follows:

(1) Turn the *Power Switch* (No. 8 of Fig. 1) to the ON position and wait approximately 1 (one) minute for the electronic tubes to reach operating temperature.

(2) Place the plug of the microphone cord in the *Microphone Input Jack* (No. 18 of Fig. 1).

(3) Place a full reel of ribbon on *Supply Reel* shaft (No. 1 of Fig. 1) and an empty reel on the take-up shaft (No. 2 of Fig. 1) making sure the three raised sections on the rim of the reels are facing upward when the reels are in position. Feed the ribbon through one of the three radial slots in the take-up reel and hold the end of the ribbon. Rotate the take-up reel in a counter-clockwise direction four or five revolutions. The ribbon should now be securely fastened to the take-up reel. The black coated surface should be towards the outside. Hold the take-up reel and pull a sufficient amount of ribbon from the supply reel to go through the heads (Nos. 3 and 4 of Fig. 1), around the capstan (No. 5 of Fig. 1), and past the *Forward Stopping Switch* (No. 7 of Fig. 1). Follow the white arrows for placing the ribbon on the **SOUND-MIRROR** for recording or reproducing. This is shown in Figures 2 and 3 below. The black coated side of the ribbon should bear against the erase and record-reproduce heads.

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FIGURE 2

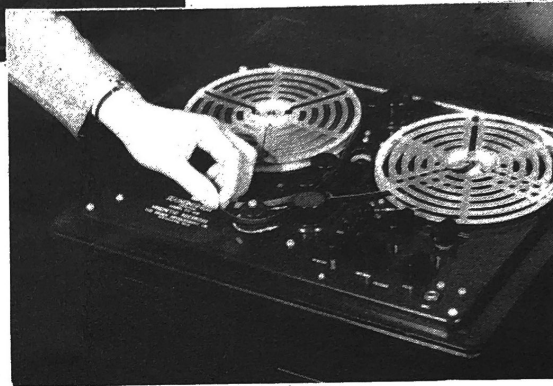


FIGURE 3

MICROPHONE RECORDING (Cont'd)

(4) Turn the *Playback Volume Control* (No. 17 of Fig. 1) to the left, which is the point of minimum volume. This is necessary in making microphone recordings because of the monitoring signal which would be present from the loudspeaker of the **SOUNDMIRROR**. If this is not done a considerable amount of "feedback" or "howling" will be produced which will interfere with the recording.

(5) Turn the *Record-Play Indicating Switch* (No. 15 of Fig. 1) to the *Record* position.

(6) Press, simultaneously, the *Forward Control Switch* (No. 9 of Fig. 1) and the *Record Control Switch* (No. 13 of Fig. 1) until these two control switches remain in the depressed position. The *Volume Indicator* (No. 19 of Fig. 1) will be lighted with only the *Record Control* switch down. However, a recording can only be made when both control switches are down. The **SOUNDMIRROR** is now ready to be used to make microphone recordings.

(7) Before starting the drive mechanism, it is recommended that the microphone be held 8 to 12 inches from the mouth and the performer speak in a natural voice. By looking at the *Volume Indicator* it will be noticed that the Indicator light starts to close the dark portion as the performer talks into the microphone, and as the Record Volume Control (No. 16 of Fig. 1) is turned in clockwise direction. On all recordings the recording level must be so adjusted that the *Volume Indicator* is never allowed to overlap, as this will cause distortion of the recorded material. If the *Volume Indicator* does not close far enough, the signal will be too low to give proper volume when the recording is played back.

To get the best results it will require some experience to adjust the volume control for the proper recording level. It is suggested that a few experimental recordings are made to gain this experience. These recordings can be erased at any time.

(8) To start the drive mechanism, push the *Start Control Switch* (No. 11 of Fig. 1) for a few seconds and then release. The *Start Control Switch* will return to its normal position. Allow about one second for the recorder to come up to speed before starting to record.

(9) Proceed with the microphone recording.

(10) To stop the SOUNDMIRROR, it is necessary to press the *Stop Control Switch* (No. 12 of Fig. 1). If further recordings are desired after the Stop Control Switch has been pressed, repeat steps (6) and (8). Before stopping the machine when a recording is being made, it is desirable to turn the record volume control to the left to avoid a sudden interruption of the material that is being recorded. This is particularly true when recordings are being made from the radio.

REWIND

When the ribbon has passed from the *Supply Reel* (No. 1 of Fig. 1) to the *Take Up Reel* (No. 2 of Fig. 1), it is necessary to rewind it back to the *Supply Reel*. This is accomplished by placing the ribbon along, and in the direction of, the rewind arrow around the *Rewind Stopping Switch* (No. 6 of Fig. 1). Be sure the ribbon is down in the slot of the *Rewind Stopping Switch* before starting to rewind. See Figure 4 at top of next page.

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FIGURE 4

(1) Fasten the ribbon to the *Supply Reel* (No. 1 of Fig. 1) by feeding the end of the ribbon through one of the radial slots in the reel and holding the end while rotating the reel counter-clockwise for four or five revolutions. The ribbon should now be securely fastened to the supply reel and the black coated surface should be towards the inside.

(2) Put the ribbon in the slot of the *Rewind Stopping Switch* (No. 6 of Fig. 1) provided for this purpose.

(3) Press the *Reverse Control Switch*. The ribbon will now rewind and stop automatically when all the ribbon is on the supply reel. If the operator desires to stop at any point along the ribbon he may do so by pressing the stop button. Allowance must be made for a certain amount of over-travel.

(4) When the ribbon has been rewound to the *Supply Reel* it is ready for playback.

PLAYBACK

After a recording has been made and the ribbon has been rewound to the *Supply Reel*, it can immediately be played back.

(1) Place the ribbon on the **SOUNDMIRROR** the same way as it is placed to make the recording. (See Figures 2 and 3).

(2) Be sure the *Record-Play Indicating Switch* (No. 15 of Fig. 1) is turned to the *Play* position.

(3) Press the *Forward Control Switch* (No. 9 of Fig. 1). This switch will remain in the depressed position.

(4) Press the *Start Control Switch* (No. 11 of Fig. 1) for a few seconds and then release. This switch will return to the normal position.

(5) Adjust the *Playback Volume Control* (No. 17 of Fig. 1) to the desired level. This control turns clockwise for increased volume and counter-clockwise for decreased volume.

(6) The *Playback Tone Control* (No. 14 of Fig. 1) may be adjusted to the desired tone by turning counter-clockwise for increased bass or clockwise for increased treble.

SPLICING THE RIBBON

The magnetic ribbon may be edited to suit your own desires. When a portion is cut out, or if by some accident the ribbon should be broken, one can splice it by placing the two ends together (Figure 5) and placing a piece of adhesive tape such as Scotch tape on the back of the coated ribbon (Figure 6). The adhesive tape should be trimmed with a scissors (Figure 7) so that it is not wider than the recording ribbon. If it is not trimmed the splice will not pass smoothly through the recording head, and will cause difficulties in recording and reproducing.

It is possible to build up a library of your favorite programs by purchasing additional reels of magnetic ribbon. Each reel will contain enough ribbon to give you a full 30 minutes of uninterrupted program.

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FIGURE 5

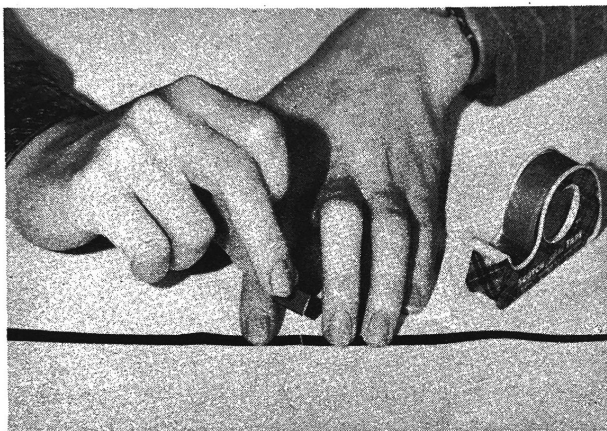
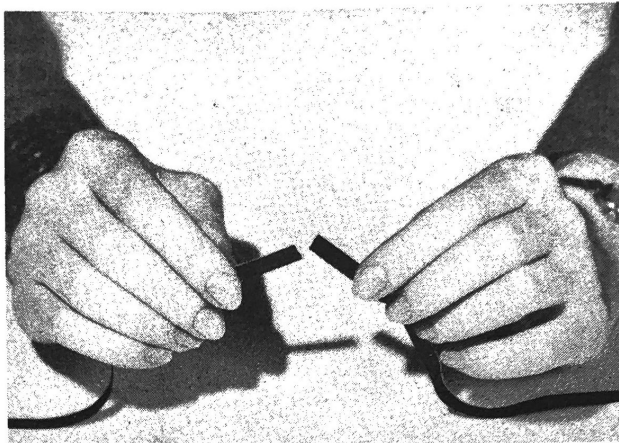
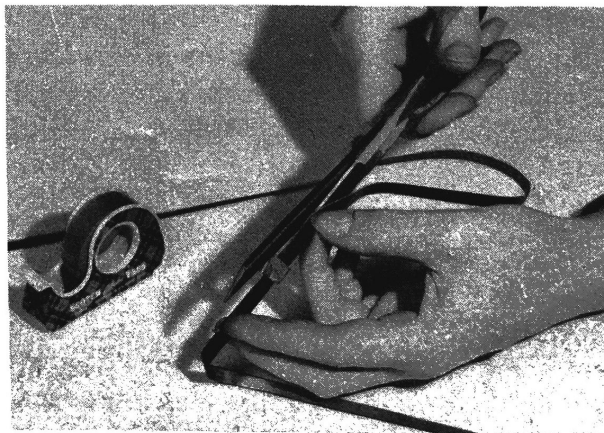


FIGURE 6

FIGURE 7



FAST SPEED FORWARD

The SOUNDMIRROR has an arrangement whereby the operator may go to an advanced position on the ribbon reel at high speed. To accomplish this, the ribbon is put directly from the *Supply Reel* to the *Take Up Reel*. The *Forward Control Switch* is pushed down and the *Start Control Switch* is pushed and held down until the approximate position is reached. Allow sufficient time for over-travel. Push the *Reverse Control Switch* and allow the reels to come to a stop. Then push the *Stop Control Switch*. *Never try to stop fast moving reels by hand.*

ERASING

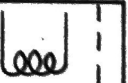
The SOUNDMIRROR is constructed so that, when a recording is being made, the previous recording is erased. The *Erase Head* (No. 3 of Fig. 1) is ahead of the *Record-Playback Head* (No. 4 of Fig. 1). No special operation is required to eliminate a program from the ribbon before placing a new recorded program on the ribbon.

If it is desirable to erase a program and not record a new program at the same time, it is possible to do so by setting the SOUND-MIRROR up for a recording and removing the microphone-plug from the jack. Allow the ribbon to pass through the heads as if a recording were being made. Turn the *Record Volume Control* to the extreme counter-clockwise position when performing this operation, otherwise an undesired recording might be made.

RECORDING RADIO PROGRAMS

The SOUNDMIRROR may be connected to the radio receiver and recordings made of your favorite radio programs. It is recommended that your local radio serviceman make the connection so that the SOUNDMIRROR will be connected to a point in the radio receiver not affected by the radio volume control. (See Figure 8). By connecting the SOUNDMIRROR at this point in the radio receiver, the best results will be obtained.

As an alternative, it is possible to make radio recordings by connecting the SOUNDMIRROR to the voice coil leads of the radio receiver's speaker. (See Figure 9). This method, however, will record the deficiencies of the audio system which are inherent in most radio receivers.

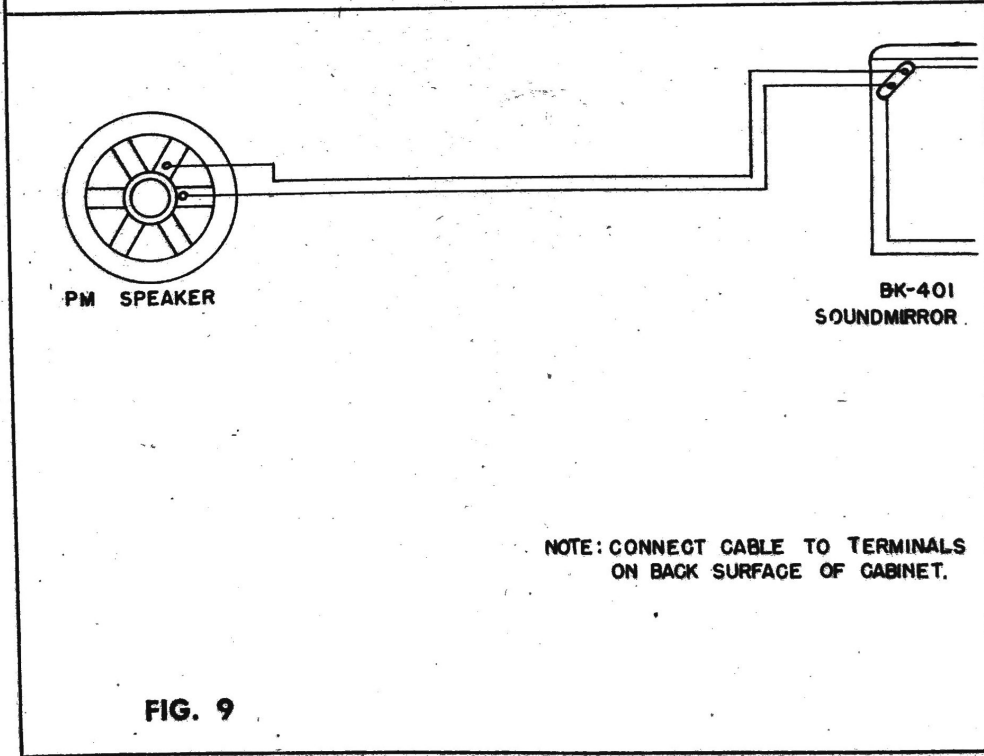
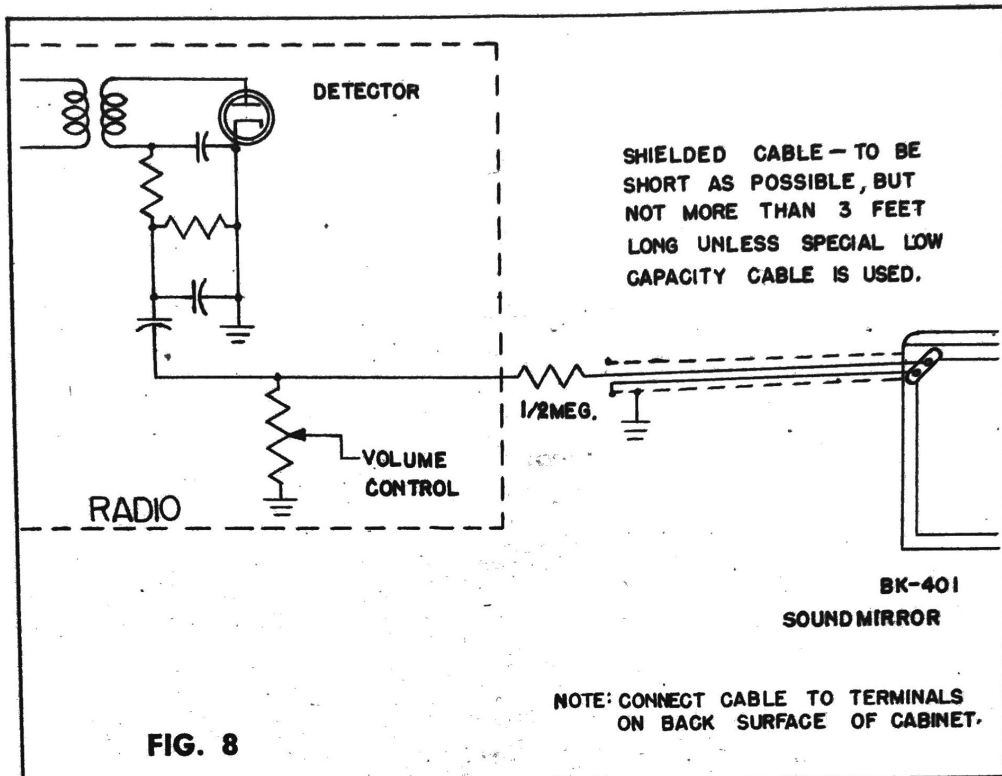


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In an emergency, the microphone may be placed about 6 inches to 24 inches in front of the radio receiver's speaker. Results may not be satisfactory and this method is not recommended for use when good quality recordings are required.



MICROPHONE

The *Microphone* supplied with your SOUNDMIRROR is a Brush Crystal Microphone, Model BA-106. This is a high quality microphone and will give very satisfactory results when used correctly.

USE OF MICROPHONE

The microphone is equipped with an 8-foot cord, which allows sufficient length for most purposes. If more length is needed an extension cord may be purchased for the desired length. When voice recordings are made, it is recommended that the microphone be held 8 to 12 inches from the mouth.

When a group discussion or "sing-fest" is being recorded, it is best to place the microphone in the center of the group and adjust the recording level on the recorder so that the tuning eye just closes on the greatest volume passages.

The results one obtains when making a microphone recording depend to a major degree upon the room in which the recording is made. Particularly, if such a room has hard walls and little furniture, voice and music will be reflected from the walls, causing a very reverberant and sometimes undesirable sound. It is therefore always desirable to record in a room with carpets, curtains and overstuffed furniture.

EDITING

At times it may be found desirable to remove a small section of ribbon from a fully recorded reel. These sections might consist of poor reception in the case of radio broadcast recordings, or long silent sections or poor microphone technique in the case of microphone recordings.

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With a little practice, it will be found quite possible to edit to the point of deleting a single word or assembling a group of musical selections on separate reels into a single, smooth-flowing program. The splicing operation is similar to that illustrated in Figures 5, 6 and 7, with the few simple refinements as noted below.

The following procedure is recommended:

- (1) Locate approximate section of ribbon to be removed.
- (2) Play through this section, at the end of which the ribbon is stopped instantly by placing a hand on the take-up reel.
- (3) Cut the ribbon between the capstan and the playback head about 1" from the center of the playback head.
- (4) Remove supply reel and place to one side.
- (5) Unwind the section to be deleted, letting it hang over the left-hand side of the recorder, to a point just ahead of the section to be taken out.
- (6) Again start the machine, listening carefully for the end of the portion you desire to keep, at which point the machine is stopped, as before, and the ribbon again cut.
- (7) Replace the supply reel, and splice the ends of the ribbon as outlined on Page 8.

A little practice will enable you to discover the exact distance from the recording head at which to cut the ribbon. This distance is dependent upon the quickness with which you stop the machine after hearing the end of the section to be deleted or the end of the section to be kept.

SUPERIMPOSING RECORDINGS

Sometimes it is desired to record some program material or voice on ribbon without erasing a previous recording, so that both may be heard at one time.

This process is known as "superimposing", and is done very easily. Thread the ribbon to pass *behind* (instead of through) the erase head, and then through the play or record head. No other departure from regular recording procedure is necessary.

When recording music and voice at different times and either one or the other is to be "superimposed", it is best to record the music first in the usual manner, then "superimpose" the voice in the manner outlined above.

VIBROMIKE*

When it is desired to record a musical selection played upon a piano, guitar, or some other stringed instrument, the use of a vibration microphone such as the VIBROMIKE, a product of the Brush Development Co., will exclude all room noise and other undesirable acoustic effects.

However, the VIBROMIKE should be connected to the radio input terminals on the rear of the SOUNDMIRROR; instead of the MIKE jack on the top panel.

*TRADE MARK

MAINTENANCE OF HEADS

During the normal usage of the machine some of the magnetic coating will be scraped off the ribbon and will be deposited in the recording, playback and erase heads. (Nos. 3 and 4 of Fig. 1). This will tend to cut the treble response, reduce the efficiency in erasing, and may produce a squeaking noise as the ribbon travels through the heads. The following procedure is recommended for cleaning the heads:

Use a small cotton swab on the end of a toothpick. These can be procured at any drug store under the trade name of "Q-TIPS".

Saturate the swab with either acetone or nail polish remover and thoroughly clean the surface portions of the heads with which the coated side of the ribbon is in intimate contact. This will dissolve any coating that may have deposited in the head slots. When properly cleaned, the metal portions in the slot exhibit a bright, polished surface, and the plastic ribbon guide on the record-play head should also be free of coating. Do not allow the cleaning fluid to come in contact with the top panel as it may destroy the finish. Allow the cleaning fluid to evaporate for four or five minutes before using the machine after this operation.

LICENSE NOTICE

The model BK-401 SOUNDMIRROR Recorder-Reproducer is covered by pending patents of and is licensed under United States patent rights of The Brush Development Company and Magnetone, Inc. It is licensed under United States patents of American Telephone and Telegraph Company and Western Electric Company, Inc., but not for use (a) interlocked with apparatus for the taking or projection of pictures; or (b) in connection with transmitting apparatus for wire program or radio broadcast purposes; or (c) directly, indirectly or acoustically connected to a telephone line accessible to the public through a telephone exchange or a toll telephone system.



Warranty

We warrant each new Brush SOUNDMIRROR to be free from defects in factory workmanship or material under normal use and service. Our obligation under this warranty is limited to repairing or exchanging any defective part of the SOUNDMIRROR, if the part is returned through our distributor, transportation prepaid to factory, within 90 days from the date of sale to the original purchaser.

If the SOUNDMIRROR does not operate properly, immediately contact the dealer from whom it was purchased, and request repairs within the terms of this warranty.

Our obligation is limited to repairing or exchanging parts; thus we do not obligate ourselves to replace the complete SOUNDMIRROR. This warranty is void on any SOUNDMIRROR which has been tampered with or which has been subject to misuse, negligence or accident.

This warranty is in lieu of all other warranties, expressed or implied, and no representative or person is authorized to assume for us any other liability in connection with the sale of Brush products.

THE *Brush* DEVELOPMENT CO.

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