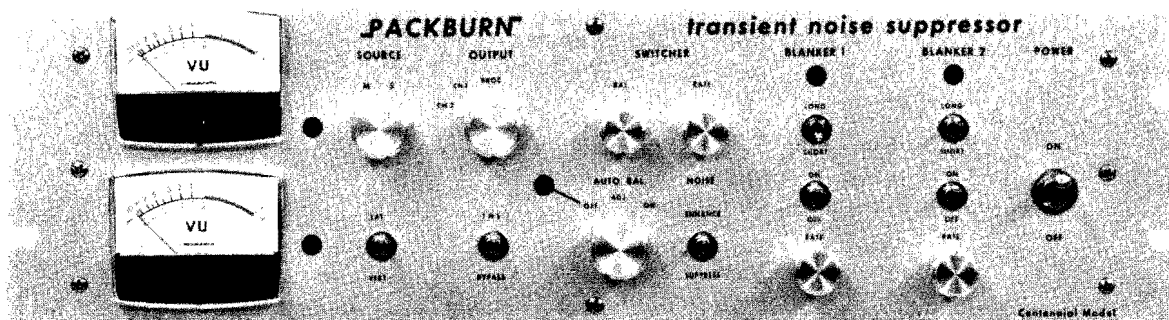


## The PACKBURN Transient Noise Suppressor

.....A new basic tool in Audio



The **PACKBURN** Transient Noise Suppressor is designed to eliminate or drastically suppress non-musical noises of a transient nature in the reproduction of phonograph recordings or other sources of sound.

This device consists of two separate processors. One, the **SWITCHER**, is applicable principally to monophonic disc (or cylinder) recordings. By utilizing a fast-acting, free-running switch, it continuously selects for reproduction the momentarily less noisy of the two side walls of the groove, when a monophonic disc (or cylinder) is played back with stereophonic equipment.

The second processor is applicable to all signals. It is a **BLANKER** that quickly and briefly operates at the onset of a noise transient.

The **PACKBURN** Transient Noise Suppressor consists of a **Switcher** plus two **Blankers**. When playing back from a monophonic source, the signal is processed first through the **Switcher** and then through the two **Blankers** in series. When playing back a two-track stereophonic signal, each channel is processed through a **Blanker**.

The **PACKBURN** Transient Noise Suppressor is devised by its inventors especially to cope with the difficult problems of reducing noises in the reproduction of "78" rpm pressings and acetates. For these, the **Switcher** and **Blanker**, in combination, suppress the transient noises caused by graininess or particulate matter in the recording medium as well as those caused by cracks, scratches, mildew and dirt. The program content of the recording will be revealed without the accompaniment of loud "ticks", "pops", and "crackle". The remaining surface noise component is, normally, a relatively steady and dull-sounding background noise, the level of which is dependent on the quality of the material of which the record is pressed.

Except for the brief moments when the **Blanker** is operating to eliminate or reduce the audibility of a noise transient, the **PACKBURN** Transient Noise Suppressor cannot cause any degradation of the frequency range of the reproduction.

In using the **PACKBURN** Transient Noise Suppressor, the suppression of loud transient noises improves one's ability to obtain optimum equalization of the processed signal. In general, the **PACKBURN** Transient Noise Suppressor supplements and improves the applicability of other signal processing devices.

For those who have to cope with old monophonic tapes in which the oxide is falling off, the **PACKBURN** Transient Noise Suppressor may be used as a dropout eliminator if the tapes are played back stereophonically and processed in the "enhance" rather than the "suppress" mode of the switcher.

## PACKBURN Transient Noise Suppressor

### Centennial Model

#### Technical Specifications

The PACKBURN Transient Noise Suppressor is designed both for professional installations and for quality home sound systems.

It is outfitted to interface with 600 ohms balanced line systems or with single-ended systems. It is provided with three-contact professional audio connectors as well as with RCA phono connectors on all signal input and output terminations.

The power transformer is designed for operation from either a 115 volt line or a 230 volt line. It is normally wired for 115 volt operation.

**SIZE:** The unit is designed for 19" wide rack mounting.  
Height is 5¼", depth 10".

**INPUTS:** 600 ohms balanced line or single-ended, high impedance, selected by a switch on the rear panel.

**OUTPUTS:** 600 ohms balanced line or single-ended, selected by the rear panel switch.

**INPUT LEVELS:** 600 ohms balanced line: to match standard Ampex output levels (0vu = 1.23v).

Single-ended: two sensitivities, selectable by rear panel switch. One matches standard Ampex output level; the other at 10db greater sensitivity for use between preamp and power amp of high efficiency Hi Fi systems.

**OUTPUT LEVEL:** The unit is approximately a unity gain device.

**FREQUENCY RESPONSE:** 10 Hz - 20 kHz  $\pm$  ¼ db.

**DISTORTION:** IM, 60 Hz & 3 kHz, 4 : 1 at 1 volt out.  
Balanced (600 ohms resistive load) .02% max.  
Single-ended (2k resistive load) .02% max.

Clipping level about 3 volts R.M.S. with loads as above.

**S/N RATIO:** At least 80 db below 1 v out. (Exceeds the range of our measuring equipment).

**WARRANTY:** Parts and labor: Three years, provided equipment not tampered with or abused.

**PRICE:** \$1,977.00 F.O.B. Syracuse, N.Y.

***PACKBURN electronics***

P. O. BOX 335

DEWITT, NEW YORK 13214

## INSTALLATION

The PACKBURN Transient Noise Suppressor is designed both for professional audio installations and for quality high fidelity systems. It is outfitted to interface with 600 ohms balanced line systems or with single-ended, high impedance input systems. It is provided with three-prong professional audio connectors as well as with RCA phono connectors on all signal input and output terminations.

The power transformer is designed for operation from either 115 volt or 230 volt power lines. It is normally wired for operation from a 115 volt power line.

The diagrams illustrate recommended methods of connecting the PACKBURN Transient Noise Suppressor into a phonograph playback system or to the output of a two-channel tape recorder. For proper functioning of the SWITCHER, the stereophonic phono reproduction system that precedes the PACKBURN in the circuit should have two channels of identical frequency response and of adjustable or fairly identical gain. The playback cartridge connections and wiring to the preamplifier should be those for stereophonic reproduction and the stylus assembly should be one designed for stereophonic reproduction.

If it is preferred to tape the recording before processing with the PACKBURN, the taping should also be of a stereophonic reproduction of the record grooves if the advantages of the Switcher are to be utilized.

The following considerations in regard to frequency response and stereo balance of the record player are to be observed:

1. For reproduction of "78" rpm records, there should be no treble rolloff. If your preamplifier does not have a 78 rpm equalization selector, you will have to find some way of defeating the RIAA rolloff. The bass turnover and shelf characteristics, on the other hand, are not critical to the operation of the PACKBURN, as the two input channels are equally mixed (in the monophonic mode) at frequencies below approximately 300 Hz.
2. Although the inventors have achieved excellent results with their personal home reproduction systems without having to trim up the frequency response of their preamplifiers, it is desirable, if you have the facilities to do so, to play frequency test records and check the frequency matching of the two channels of your system. You should find the settings of your treble tone controls that give a good match and that also yield a flat high frequency response.

As an alternative, you can listen to the two channels separately (as explained below) and determine the tone control settings that make the channels match in tone quality.

3. If you plan to use your bass tone controls to reduce rumble or other low frequency disturbances (which you may do without upsetting the operation of the PACKBURN), it is recommended that you determine how well they track with each other in the frequency response test, so that equal settings can be used with each channel.
4. Channel level balance: It is most desirable to have a preamplifier with gain controls so that the signal level to the input of the PACKBURN can be regulated in accordance with the recording level of the record that is being played. In playing a monophonic record, the preamplifier gains should be adjusted so that the meter readings are within three decibels of each other. This will assure that the signals are within the range of operation of the automatic balance control, which will accurately equate the levels to the SWITCHER.

Use switch on rear panel to select proper impedance and voltage range.

### *The signal path through the PACKBURN Transient Noise Suppressor*

When the SOURCE switch is in M position, the PACKBURN processes the monophonic program into a monophonic output signal that is applied to both CH.A and CH.B outputs.

When the SOURCE switch is in S position, the PACKBURN processes a stereo program with discrete left and right signals at CH.A and CH.B outputs. Since the SWITCHER operation cannot be applied to a stereophonic program source, the PACKBURN cannot normally be as effective in suppressing transient noises in stereophonic material as it is in monophonic material.

*Equipment following the PACKBURN Transient Noise Suppressor*

Such signal processing devices as octave equalizers, filters, dynamic noise suppressors, etc. may be connected to the output of the PACKBURN for further improvement of the signal that is being reproduced. For processing monophonic recordings a single channel system only is required and it may be connected to either of the output terminals of the PACKBURN.

In adjustment of equalizers, high frequency boost is now typically limited only by hiss content. High frequency content of the program material will be revealed without the accompaniment of loud ticks, pops or crackle.

## OPERATION

### *General principles*

Observe the controls on the front panel. These are in three groups.

The first group, to the left, has a switch to select between Mono and Stereo source material. When it is in the S position the SWITCHER is disengaged and a BLANKER is provided for each channel. The M position is for monophonic recordings, whether vertical-cut or lateral-cut. Monophonic recordings are first processed through the SWITCHER and then through the two BLANKERS in series.

Below the SOURCE switch is a toggle switch to select for Vertical or Lateral recordings when the SOURCE switch is in the M position.

The OUTPUT switch enables you to audition input channels 1 and 2 separately, or to audition the processed result. The TNS/BYPASS switch operates a relay that puts the Transient Noise Suppressor in the circuit or removes it. The same relay also functions automatically to remove the Transient Noise Suppressor from the circuit when the power is off.

The group of controls in the center of the panel are the SWITCHER controls. The balance control system for the SWITCHER consists of a potentiometer labeled BAL. and an AUTOMATIC BALANCE switch. The ENHANCE/SUPPRESS switch selects whether the "noisier" or "quieter" channel is to be chosen for reproduction. For suppressing noise transients it should be in the SUPPRESS position.

The RATE potentiometer adjusts the threshold sensitivity of the SWITCHER. The operation of the SWITCHER is visible in the blinking of the lights adjacent to the meters.

The right hand group of controls adjusts the operation of the two BLANKERS.

### *Processing of a monophonic "78" rpm record*

1. Make the following switch settings:
  - a) TNS/BYPASS switch in BYPASS
  - b) POWER switch ON
2. The CH. 1 and CH. 2 panel meters should immediately register the input signal. Select the setting of the rear panel rotary switch and of the volume controls of the preamplifier that provide proper meter reading and that cause the meter indications to track within three decibels of each other.
3. Make the following switch settings:
  - a) SOURCE switch in M position
  - b) TNS/BYPASS switch in TNS position
  - c) LATERAL/VERTICAL switch in proper position for the record
  - d) AUTO. BAL. switch in OFF
  - e) ENHANCE/SUPPRESS switch in SUPPRESS
4. Using the OUTPUT switch, audition channel 1 and channel 2 and adjust the BAL. control so that the two channels sound equal in volume level (the BAL. control adjusts the gain of Channel 1).
5. Make the following switch settings:
  - a) OUTPUT selector in PROC.
  - b) AUTO. BAL. in ON
  - c) BLANKER 1 and BLANKER 2 switches OFF
6. Rotate the SWITCHER RATE control clockwise. Pops and crackle caused by graininess and particulate matter in the recording medium and by record wear (if the damage happens to favor one groove wall) should be noticeably reduced as judged by comparative audition in the two positions of the TNS/BYPASS switch. The RATE potentiometer should be left in the lowest position that gives optimum noise reduction.
7. Adjustment of BLANKER 1:
  - a) Turn on BLANKER 1
  - b) Put the SHORT/LONG switch in SHORT
  - c) Rotate the BLANKER 1 RATE control for a possible further reduction in high frequency crackle. The RATE control should be left in the lowest position that gives optimum noise reduction.

#### 8.. Adjustment of BLANKER 2:

- a) Turn on BLANKER 2 switch
- b) Put the SHORT/LONG switch in LONG
- c) Adjust the BLANKER 2 RATE control for a reduction in low frequency transient noises, as caused by scratches, cracks and mildew. A slight risk accompanies the LONG setting, as a slight garbling may be evident in loud musical passages if the RATE control is set too high. Use the blanking indicator lamp as a guide. Normally the lamp of BLANKER 2 should operate with less frequency than the lamp of BLANKER 1.

#### *Monophonic LP records*

The RIAA and kindred equalizations reduce the ability of the blanker to discriminate between signal and noise. The circuit parameters of the PACKBURN have been selected to cope as well with LPs as the principles of operation of the device allow.

If you adjust the BLANKER rate controls to the maximum, it is advised that you listen critically for a slight garbling that can be caused by excessive blanking of musical transients.

Some improvement of performance may be achieved if you can play back LPs into the PACKBURN with a flat high frequency characteristic (as for 78s) and achieve the RIAA (or other) rolloff after processing through the PACKBURN.

The SWITCHER is effective in coping with the high frequency component of scratches, fingerprints and dirt. In regard to LPs in good condition, there is much less that the SWITCHER can achieve, as the rolloff copes quite successfully with the higher frequencies in the built-in surface defects.

#### *Processing of a stereophonic record*

The observations made above in regard to processing of LP records apply also to stereophonic records with the additional disadvantage that the SWITCHER cannot be applied to stereophonic records. The processing procedure is as follows:

1. Follow instructions 1 and 2 for monophonic records (i.e. TNS/BYPASS switch in BYPASS, power ON, adjustment of meter readings)
2. Make the following switch settings:
  - a) SOURCE switch in S position
  - b) TNS/BYPASS switch in TNS position
  - c) LAT/VERT switch in LAT. position if in-phase listening is desired. Out-of-phase records may be corrected by putting the LAT/VERT switch in VERT position
  - d) OUTPUT switch in PROC
  - e) AUTO. BAL. switch in OFF
3. With these switch adjustments, the PACKBURN now provides a Blanker in each signal path. Behavior of the Blanker is the same as described previously.

#### *Monophonic tape processing*

Full-width monophonic tapes with random dropouts may be processed by playing back the tape with two-track stereophonic equipment as follows:

1. Make the following switch settings:
  - a) POWER in ON
  - b) SOURCE switch in M position
  - c) TNS/BYPASS switch in TNS position
  - d) LATERAL/VERTICAL switch in LATERAL position
  - e) AUTO. BAL. switch in OFF
  - f) ENHANCE/SUPPRESS switch in ENHANCE.
2. Using the OUTPUT switch, audition Channel 1 and Channel 2 and adjust the BAL. control so that the two channels sound equal in volume level (The BAL. control adjusts the gain of Channel 1)
3. After the conclusion of step 2, put the OUTPUT switch in PROC. position.

4) Rotate the SWITCHER RATE control clockwise for a noticeable reduction in tape dropouts

5) The signal processed for dropout reduction may also be processed for reduction of transient noise, if desired. Behavior of the Blankers is the same as described in "Processing of a monophonic record".

#### *Adjustment of the Automatic Volume Control setting*

Adjustment of the Automatic Volume Control is part of the final test procedure of the PACKBURN Transient Noise Suppressor. It should be in proper adjustment on your receipt of the unit. Its operation may be checked as an adjunct to step 5 of *Processing of a monophonic "78" rpm record*. Having completed step 5, audition Channel 1 by means of the OUTPUT switch. With the AUTO. BAL. in ON, rotation of the BAL. control from one extreme to the other should not cause any change in the loudness of the PACKBURN output.

In the event that the Automatic Balance Control should get out of adjustment, the following is the procedure for re-adjusting it:

1. The adjustment is made with the AUTO. BAL. ADJ. potentiometer behind the hole so labeled. The potentiometer has a slotted shaft that may be turned by insertion of a screwdriver in the hole. The adjustment is made while playing a record. The record chosen should have a low signal level and little transient noise (An LP will do nicely).
2. Make the following switch settings:
  - a) AUTO. BAL. control to ON
  - b) TNS/BYPASS switch in TNS position
3. Rotate the BAL. potentiometer on the front panel to its extreme counter-clockwise position
4. Adjust the potentiometer on the rear panel while auditing Channels 1 and 2 (using the OUTPUT switch) for equal loudness of the two channels. (The potentiometer adjusts the level of Channel 1).
5. Rotate the BAL. control to its extreme clockwise position and continue adjusting the rear panel potentiometer, if necessary.

## SUGGESTIONS FOR OPTIMUM REPROCESSING OF DISC RECORDINGS

### *Geometrical alignment*

The playback arm, cartridge and turntable should be in correct alignment. The turntable should be level. Mounting of the arm should be in accordance with manufacturer's recommendations. Vertical pivot of arm should be perpendicular to turntable. Cartridge should be parallel to disc both along radius of and tangent to grooves.

### *Stylus attack angle*

Stereo records are recorded with a standardized attack angle of 15 degrees. Monophonic recordings, however, were normally made with the cutting stylus within a few degrees of vertical.

The playback stylus of the standard stereo phono cartridge, thus, is at a 15 degrees angle of attack. It has been our experience with some acetates that hiss is significantly reduced by the readjusting of the stylus cantilever so that the stylus is vertical. This effect has been observed both with and without lubrication of the disc.

### *Centering and flatness*

It has been our experience that most of the low-frequency thumps in the reproduction of 78s are due to warped or off-center records. Centering and flattening of the disc are recommended for the elimination of these noises. Off-center discs also, sometimes, have a once-per-revolution swish.

The PACKBURN has been designed so that its operation will not be upset by low frequency thumps. It will, however, not reduce these thumps beyond the point that they are reduced by normal monophonic playback.

The PACKBURN usually will respond favorably to the elimination of the swish.

### *Lubrication of records*

Lubrication reduces the surface noise of some records. Two types of lubricants are in use: permanent lubricants that, upon drying, leave a lubricating deposit in the groove and temporary lubricants, such as distilled water, that are applied during the playback process and, it is hoped, leave no residue after evaporation. In both cases, it is advisable first to clean the record.

### *Choice of optimum stylus*

The stylus should be chosen that gives the minimum noise and clearest sound with the PACKBURN in operation. It has been our experience that conical styli reproduce some records with less hiss than do elliptical styli, although with louder reproduction of ticks. Due to the tick-suppressing action of the PACKBURN, therefore, the conical stylus is likely to be preferable to the elliptical, in those cases (acoustical recordings, for example) where there are no audio frequencies on the disc high enough to make the superior resolving power of the elliptical stylus desirable.

It is also advisable to audition the two side walls of the groove to determine that they sound alike. If one side wall sounds hissier than the other, try changing styli. It has been our experience that the hiss of the two channels can be equated, in most cases, by a proper choice of stylus.

We have encountered cases, especially with acetate discs, where one side wall of the groove reproduces with more hiss than the other side wall, regardless of stylus choice. Sometimes the hiss even shifts from one side wall to the other. In such cases, the PACKBURN will tend to favor reproduction of the quieter side wall. It is advisable, for these, to experiment to find the optimum switching rate.

### *Reproduction of worn records*

Worn records frequently can be considerably improved in reproduction if one has a truncated stylus of small enough tip radius to ride below the zone of maximum groove wear.

If you have ever taped a worn passage and then slowly moved the tape past the head, as in editing, you may have discovered that worn spots usually also have developed some fairly loud ticks. If you have ever edited out these ticks, you will have discovered an audible reduction in the distortion. The ticks are part of the wear noise! In suppressing these ticks, the PACKBURN will improve the reproduction of worn records.



### *The ENHANCE position of the ENHANCE/SUPPRESS switch*

This is useful for diagnosing what the PACKBURN is achieving, as it will allow you to audition the "noisier" groove wall.

You will have to adjust the balance manually when using the ENHANCE position, as the automatic balance feature does not function when the ENHANCE mode is in use.

### *The Automatic Balance Control*

The Automatic Balance Control is devised chiefly as a convenience for playing records for pleasure. For optimum processing of a recording it is advisable to adjust the balance manually, as there are some circumstances in which the action of the Automatic Balance Control can be upset.

### *The vertical component*

In monophonic lateral recordings, the vertical component of stylus motion is caused by noise components, such as surface noises of all kinds, turntable rumble, record warpage, off-center playback, surface unevenness ("orange peel") and by signal components introduced by tracking error and tracing error, including the "pinch effect".

Audition of the vertical component can be a valuable diagnostic procedure. A distorted but useful version of this can be heard by putting the AUTO. BAL. switch into the ADJ. position. If your playback equipment is in proper alignment and you are using the PACKBURN according to instructions, the vertical output of any reasonably noisy record should consist almost entirely of noise. By rotating the BAL. potentiometer, one should be able to find a position in which the music achieves a null. In fact, that is where the BAL. potentiometer should normally be set (see *Adjustment of automatic balance*). With the signal thus balanced out, it is possible to audition the vertical component and determine the nature of the surface noise as well as difficulties such as may be caused by record wear.

### *Vertical noise*

The PACKBURN, when operated in the monophonic mode, mixes the lower frequencies of the two input channels equally before switching, as switching of the lower frequencies (the crossover point is about 300 Hz) accomplishes no transient noise reduction and can cause audible problems with some recordings. Such mixing also cancels out the low frequency vertical components of turntable rumble and other similar disturbances.

One occasionally encounters a record with an audible vertical component of a non-transient nature above this 300 Hz crossover frequency. When a record is played back with the right and left channels equally mixed over the entire audio spectrum, the vertical components are cancelled out and, thus, vertical noise of all frequencies is eliminated. Obviously, in playing back from one side wall or the other, it is not possible to take advantage of this cancellation effect. Therefore, in the case of some records, comparison of the surface noise level in the two positions of the TNS/BYPASS switch reveals slightly less steady noise with the PACKBURN out than with it in. (This is noticeable only with the amplifier following the PACKBURN in the monophonic mode, in which the two channels of the amplifier are equally mixed. In the stereo mode, the reproduction in BYPASS will display the vertical components). If the record has very little in the way of crackle or ticks, it may sound better in the BYPASS position. In such cases, you may prefer to put the M/S switch into the S position and process the record like a stereo record, using the blankers only. The two channels can then be mixed after the signals emerge from the PACKBURN.

### *Vertical recordings*

Surface noise, tracking error and tracing error cause lateral movement of the stylus in vertical recording. With the PACKBURN adjusted to suppress transient noises in vertical recordings, the lateral output will be audited with the AUTO.BAL. switch in the ADJ. position.

As the signals being fed into the PACKBURN are applied directly to the output receptacles with the TNS/BYPASS switch in BYPASS, this results, in the case of a vertical recording, that auditioning of the unprocessed signal will be "out-of-phase" if the equipment following the PACKBURN is in the stereo mode. This is not unacceptable, but you will observe a strange "spatial" effect.

If you want to compare the action of the PACKBURN with a monophonic reproduction of the vertical recording, you have the following options:

1. Reverse the polarity of one of the signals before it goes to the PACKBURN. This may be accomplished either by reversing the polarity of one of the playback cartridge channels before the preamplifier or by using the "Phase reversal" switch of the preamplifier if it is provided with one. Then, process the recording through the PACKBURN with the LATERAL/VERTICAL switch in LATERAL.
2. Alternatively, if you have facilities for reversing the polarity of one of the signals after it emerges from the PACKBURN, you can do it at that point. However, when auditioning the *processed* signal, you will have to change the setting of the "Phase reversal" switch back to normal.
3. If you are using the 600 ohm line input and output, you simply have to reverse the polarity of one of the 600 ohm line inputs and then process the recording through the PACKBURN as if were a lateral recording.

### *Taping of perishable recordings*

In the case of recordings in a fragile medium or of anticipated limited life, it is our recommendation that the PACKBURN be used to determine the optimum conditions of playback. Then a stereophonic taping of the recording should be made for permanent storage. This stereophonic tape is then available for processing through the PACKBURN or through improved devices that the future of audio technology should bring.

The tape recorder should be adjusted so that the playback response curves and the overall response curves match within a close tolerance.

The tape recorder should be adjusted so that the playback response curves and the overall response curves match within

The tape recorder should be adjusted so that the playback response curves and the overall response curves match within a close tolerance.

### *Playing tapes backwards*

Tapes recorded as above may be processed backwards through the PACKBURN for even better operation of the Blankers than can be achieved in the forward direction, as the attack of a noise transient is usually about the same in either direction, whereas the attack of music or speech, in reverse, consists of more gradually rising wave fronts than in the forward direction. Thus, the blanker will be better able to discriminate between noise transients and program material and it may be turned up to a higher setting before it starts mistaking program transients for noise transients.

### *Taping records at half speed*

If you have to tape a record at half speed or at some other speed far removed from normal, it may be advisable that you make a "stereo" tape of the record grooves first and apply the PACKBURN after you have put the tape playback on pitch. Otherwise, you will not be taking advantage of the optimization of the time constants in the Switcher and Blanker circuits. Before taping, the PACKBURN may profitably be used to audition the two groove walls in order to determine the optimum stylus to use.