SHURE BROTHERS Microphone Headquarters
225 WEST HURON STREET • CHICAGO • U•S•A
TELEPHONE DELAWARE 8383 • CABLE: SHUREMICRO

DATA SHEET No. 202

DATE: March, 1941

SUBJECT: Model 994A Light Weight Crystal Record Reproducer

Model 994A Light Weight Crystal Record Reproducer

GENERAL: Model 994A Crystal Record Reproducer is intended for reproduction of 10" and 12" lateral-cut records and is designed to give high-quality frequency response with medium output and unusually low record wear. The crystal element is a Grafoil Bimorph torsion unit with special-process and moisture-proofing, completely shielded in a cast metal cartridge. The mounting is cushioned to increase isolation from the motor-board. The 994A reproducer has a base designed for single hole mounting.

Low record wear is assured by "Balanced-Tracking", (which maintains the horizontal projection of the needle closely tangent to the groove at all times), by low needle-point impedance, and the low needle pressure of 1-1/8 oz.

Model 994A Light Weight Pickup is provided with 12" leads.

APPLICATIONS: Model 994A Crystal Phonograph Pickup will give high-quality wide range reproduction with lateral-cut recordings at either 33-1/3 or 78 r.p.m. speeds.

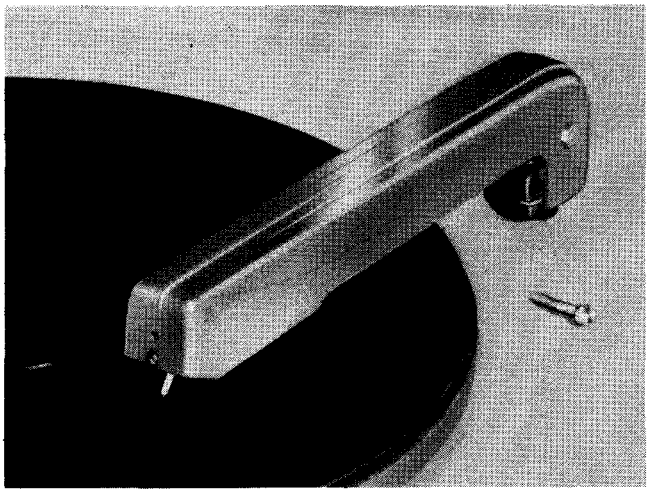
The output voltage of the pickup is approximately 1 volt for an overall groove amplitude of 0.84 mil at 1,000 cycles which is sufficient to produce full output from the audio stages of modern radio receivers and from moderate-gain audio amplifiers.

INSTALLATION: The Pickup should be mounted on the motor-board so that the arc of travel of the needle passes 1/4" from the center of the record on the far side of the tone-arm pivot. A drilling template is furnished with each pickup to facilitate motor-board layout. The motor-board should be heavy and well isolated from vibrations of the motor and the loudspeaker.

If necessary, the length of the cable can be increased considerably without excessive output loss. Low-capacity shielded single conductor cable is suitable for this purpose. Make certain that joints are well shielded to avoid hum pickup.

Nothing should interfere with the free motion of the Pickup. Leads (or cable) should be allowed to extend freely at least two inches before making connections, so that the pickup may rotate freely about its vertical axis.

Sufficient cabinet ventilation should be provided to keep the ambient temperature about the pickup at the lowest possible value. In any event the ambient temperature should not be allowed to exceed 125° Fahrenheit. (51.7° C.).



CONNECTIONS: The Pickup should be connected to the grid circuit of a vacuum tube across a load resistance of 1/2 megohm or more. The coded conductor should be connected to the "high" side of the amplifier input; the black conductor should be connected to ground or chassis.

OPERATION: The 994A Pickup may be used with any needle while still offering the advantages of a Lightweight Pickup. Satisfactory operation may be obtained with ordinary steel needles, precious metal-tipped needles or sapphire-tipped needles. Because of low needle pressure and low needle-point impedance, needles and records will last several times as long as when ordinary reproducers are used. The "High-Lift" arm provides for convenient needle changing.

Crystal Phonograph Pickups should not be kept or used in places where the temperature exceeds 125° Fahrenheit. (51.7° C.).

RECORD WEAR: Built-in "Balanced-Tracking", provided by the "needle-tilt" principle in the Model 994A Pickup, keeps the tracking angle (angle between horizontal projection of the needle and the tangent to the record groove at point of contact of needle and record) at a negligible value throughout the entire playing time of the record. A large tracking error causes rapid record wear and impairs the fidelity of reproduction, especially at the higher frequencies. The Pickup should be located in respect to the turn-table as described under "INSTALLATION", to derive the greatest benefit from this feature.

While imparting its motion to the mechanism, the needle must be relatively free to move from side to side in the groove. The low needle-point impedance of the Model 994A Pickup allows this

(over)

Printed in U.S.A.

SHURE BROTHERS Microphone Headquarters
225 WEST HURON STREET • CHICAGO • U•S•A

free motion, eliminating excessive thrust and wear on the sides of the grooves. The needle pressure is only 1-1/8 ozs., insuring maximum record life.

FREQUENCY RESPONSE: Frequency response curves of the 994A Record Reproducers obtained on standard test records are shown in Fig.A. This type of response is very satisfactory for high-quality reproduction of records without the use of compensating circuits.

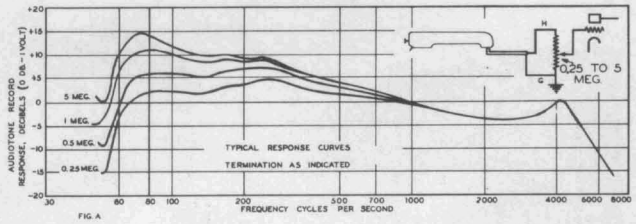


FIG. A

The low frequency response below approximately 500 cycles depends upon the terminal resistance as shown in Figure A. The user can thus adjust the low-frequency response over wide limits by proper choice of resistance of the input potentiometer or grid resistor. A value of 1/2 to 1 megohm will be satisfactory in most cases. The high frequency response is not affected by the value of the terminal resistance.

For more uniform overall response, the low frequency equalizer circuit shown in Fig. B, below, may be used, although it is not necessary or desirable for most applications.

SURFACE NOISE: Surface noise or "needle scratch" is produced by the passage of the needle over the minute irregularities in the surface of the record groove. In the

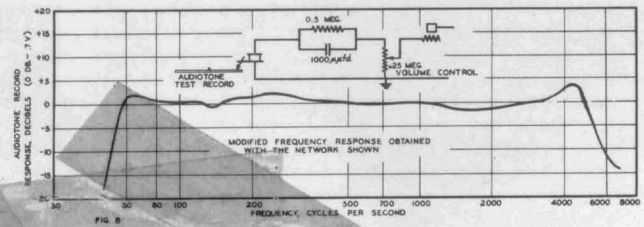


FIG. B

994A Pickup, with low needle pressure, low needle-point impedance, and low tracking error, there is a minimum of surface noise from the record. However, due to the wide range frequency response (necessary for life-like reproduction) some residual surface noise may be noticed, depending on the condition of the record.

Where maximum fidelity is not important, it is possible to decrease the audible needle-scratch level by using the circuit shown in Fig. C below. This will give a tone control effect similar to that found in most radio receivers and amplifiers. If the amplifier or receiver used with the pickup has a tone control for attenuation of higher frequencies, the above circuit becomes unnecessary.

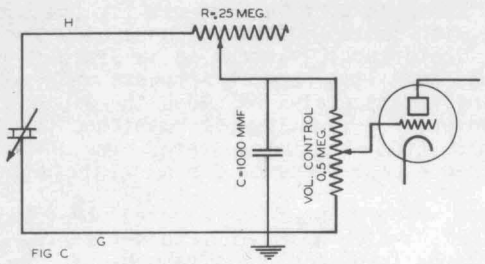


FIG C

SCRATCH ATTENUATOR CIRCUIT

SPECIFICATIONS

Voltage Sensivity: The output level depends upon individual recording, etc. With a standard recording the Model 994A has an output of approximately 1 volt for 0.84 mil double displacement at 1,000 cycles.

Internal Impedance: Equivalent to 1,500 mmf condenser.

Recommended Load Impedance: 1/2 megohm or more depending upon the response curve desired. See Fig. A.

Model No.	994A
Finish:	Bronze
Code Word:	RUZAL
Cable Length:	12"
Shipping Weight	13 oz.

License Notice: Shure Crystal Record Reproducers are licensed under patents of the Brush Development Company. Shure patents pending.

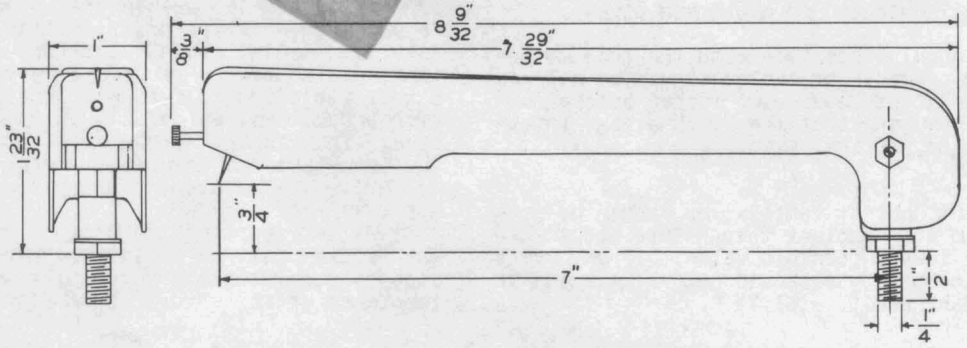


FIG. D. PHYSICAL DIMENSIONS OF MODEL 994A