



SHURE BROTHERS
INCORPORATED

Microphones and Acoustic Devices
225 WEST HURON STREET :: CHICAGO 10, ILLINOIS
PHONE DElaware 7-4550 :: CABLE: SHUREMICRO

DATA SHEET

DATE: MAY 1949

SUBJECT: Model 901D Vertical Drive
"Turnover" Crystal Phono-
graph Pickup

MODEL 901D Vertical Drive "Turnover" Crystal Phonograph Pickup

General: Model 901D "Turnover" Phonograph Pickup is designed to reproduce standard records and the various types of fine-groove long playing records. Model 901D uses a turn-over mechanism and the new Shure two-sided "Vertical Drive" crystal cartridge. The crystal element is a bimorph, Rochelle Salt unit.

This dual-purpose cartridge utilizes the "Vertical Drive" construction which results in a needle-point compliance in the order of 1.0×10^{-6} centimeters per dyne. By combination of this highly compliant cartridge and the Shure die-cast aluminum pickup arm, an extremely low needle force for proper record tracking has resulted. The dual purpose cartridge has a Shure Model A62A osmium tipped needle (.003" needle tip radius) for playing standard records at 78 r.p.m. and a Shure Model A65MG sapphire tipped needle (.001" tip radius) for playing Columbia, R.C.A. and similar fine-groove records at $33\frac{1}{3}$ r.p.m. or 45 r.p.m. These needles are separately replaceable. The Pickup performs equally well on the 7", 10", or 12" size records.

Model 901D will give an excellent frequency response with high output and extremely low tracking force. The design of the pickup provides record reproduction with low surface noise, low needle talk, and low needle hiss.

Low record wear is assured by the curved tone-arm (which maintains the horizontal projection of the needle closely tangent to the groove at all times), by high needle point compliance, and low needle pressure of 6 grams ($\frac{3}{8}$ ounce).

An adjustment screw is provided for the swivel to protect the needle against damage due to accidental touching of the turntable when record is removed.

Model 901D "Turnover" Pickup is provided with a 14" shielded lead. An arm rest is included for mounting on the motor-board.

Applications: Model 901D is ideally suited for the experimenter and for use in high quality home phonographs, portable equipment, and record demonstrators. This pickup is especially suited for replacement of older, heavy pickups as well as pickups used in modern installations.

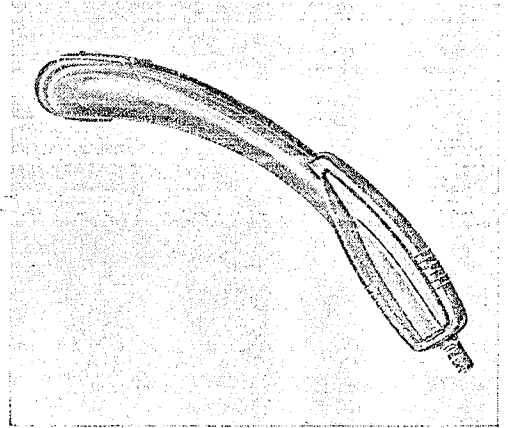
Because of low needle talk and needle hiss, the model 901D may be used with open-type phonograph players with a minimum of annoying side tone.

The output voltage of the pickup (see specifications) is sufficient to produce full output from audio stages of modern radio receivers and from moderate gain amplifiers.

Installation: The Pickup should be mounted on the motor-board so that the offset needle furnished with the pickup has an arc of travel approximately $\frac{1}{4}$ " beyond the center of the turntable spindle. (See Fig. C). The motorboard should be heavy and well isolated from vibrations of the motor and the loudspeaker.

After the pickup is securely mounted the following procedure may be followed to install and adjust the needle protection screw.

- Lift the tone arm. Assemble one hex nut on the $\frac{1}{2}$ " long needle protective screw and insert screw into the hole provided in the swivel assembly bracket with the head of the screw toward the inside of the arm. Assemble other hex nut to the portion of the screw extending through the bracket. The screw and two hex nuts are provided in the accessory box.
- With a screwdriver adjust the screw until the needle point, upon lowering the tone-arm, is maintained approximately $\frac{1}{32}$ " above the turntable surface.



c. Tighten the locking nuts securely.

The arm rest should be mounted in any convenient place on the motor-board in such a manner that it does not interfere with the playing of a 12" record.

If necessary, the length of the leads can be increased considerably without excessive output loss. Low-capacity shielded cable is suitable for this purpose.

Nothing should interfere with the free motion of the Pickup. Leads (or cable) should be allowed to extend several 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. For best results the ambient temperature should not be allowed to exceed 100° Fahrenheit, although no damage will result to the Pickup below 125° Fahrenheit.

Connections: Model 901D pickup utilizes the pin-jack method of connecting the leads to the cartridge. One side of the crystal unit is connected to ground through the shield. In this instance, the pickup may be connected directly into an amplifier of the type using a single grid input circuit. The center conductor should be connected to the grid or "hot" lead; the shield should be connected to the ground or chassis. Figure A shows the circuit. The chassis should be securely grounded to eliminate shock hazard to the user.

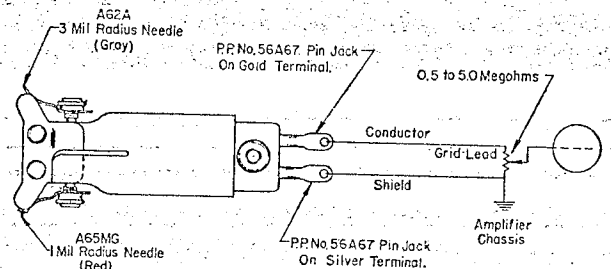


Fig. A. For Amplifiers Using a Single Grid Input.

Operation: To play standard (78 r.p.m.) records, set the knob at the front of the pickup so that the letters STD are at the top. To play microgroove and R.C.A. slow speed records, turn knob in the direction of the arrow until the letters MG are

at the top. The knob may be used as a convenient handle to set the pickup on the record.

The needles may be removed by loosening the knurled nut (which holds the needle) $\frac{1}{2}$ turn. A new needle should be inserted in the hole provided and the knurled nut tightened securely using the thumb and fore-finger. Care should be taken to deform the contour of the needle when the knurled nut is tightened.

Model 901D uses the Shure "Muted Stylus" needles which may be procured in any record shop throughout the country or at any Shure distributor. The pickup is supplied with the A62A (.003" tip radius) precious metal tip needle which is of natural stainless steel color and the A65MG (.001" tip radius) sapphire tip needle which is dyed red. Instead of A62A, an A61A sapphire tip needle may be used for longer life. In portable phonographs, when pickup is not in use needles can be protected against accidental damage by rotating the turnover mechanism 90° .

Record Wear: Low needle pressure and low needle point impedance (resistance to side-to-side motion of the needle) are achieved through an unique system of mounting and coupling the crystal unit. These features permit the needle to ride through the record-groove with a minimum of thrust and wear on the side walls. Record wear is still further reduced by the off-set head of the pickup, which keeps the normal axis of rotation of the needle closely tangential to the record grooves throughout the playing time of the record. This results in low tracking error, and in maximum fidelity of reproduction at all frequencies. The pickup should be carefully located as specified under "Installation" to derive full benefit from this feature.

Frequency Response: The frequency response curves of the model 901D obtained on Columbia micro-groove test record No. 281 and Audiotone test record No. 1 are shown in figure B. This type of response is very satisfactory for high quality reproduction of records without the use of compensating circuits. Tone controls provided in the majority of amplifiers and radio receivers may be employed to alter this frequency response to suit the individual listener.

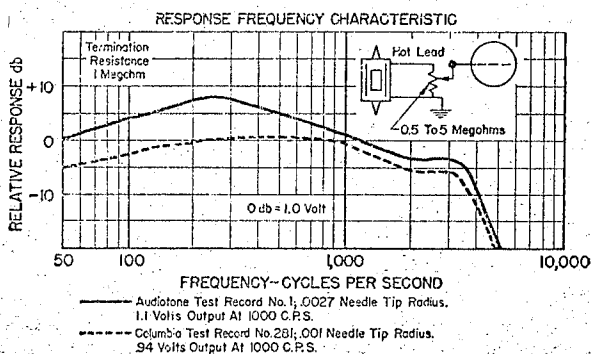


Fig. B. Typical Response Characteristics of 901D.

The low-frequency response below approximately 500 cycles depends upon the termination resistance. 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 to 2 megohms will be satisfactory in most cases. The high frequency response is not affected by the value of the termination resistance.

27A42 (5-49)

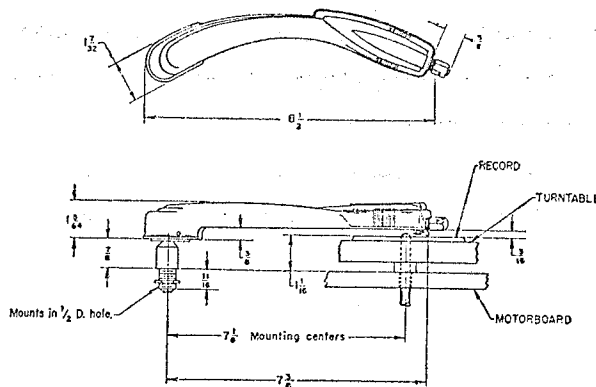


Fig. C. Physical Dimensions of Model 901D.

SPECIFICATIONS

Voltage Sensitivity: The output voltage depends upon the individual recording, etc. Model 901D has an output of approximately .94 volt at 1000 cycles on Columbia test record No. 281 and 1.1 volts on Audiotone test record. Peak voltage output on commercial records may reach 10 volts.

Internal Impedance: Equivalent to 650 mmf condenser.

Recommended Load Impedance: $\frac{1}{2}$ megohm or more, depending upon the response curve desired.

MODEL 901D	
FINISH	GRAY HAMMER ENAMEL
CODE WORD	RUZEL
LEAD LENGTH	14"
ARM REST	INCLUDED
NET WEIGHT	4 OZ.
NEEDLES	REPLACEABLE, LONG-LIFE, INCLUDED
SHIPPING WEIGHT	12 OZ.

Guarantee: Every Shure Pickup is guaranteed to be free from electrical and mechanical defects for one year from date of shipment from the factory, provided all instructions are complied with fully.

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