



Belt Drive Programmed Turntables

# Technical Service Manual

Models 980 and 960

Our experience shows that 75% of so-called repairs can be directly attributed to improper installation or the user not being familiar with the operation of the unit.

For this reason, we have decided to reproduce the instruction book supplied with each B•I•C Model 980 and 960 Belt Drive Programmed Turntable and include this as part of the technical service manual.

We recommend that you read the instructions pertaining to set-up and operation of the unit completely prior to attempting to repair or adjust the unit.

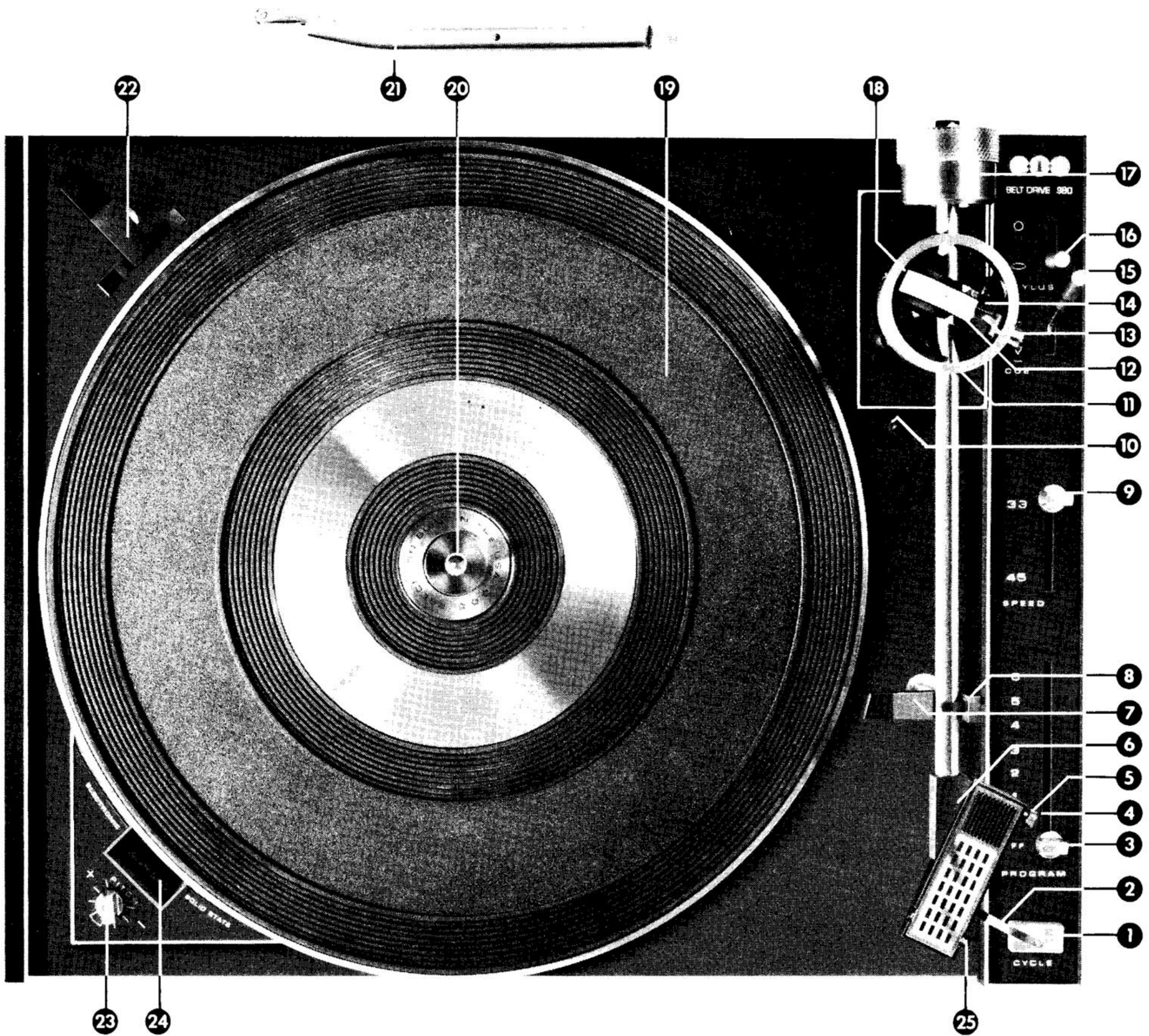
This technical service manual, of course, also contains information regarding:

1. Lubrication
2. Fault Finding
3. General Dis-assembly Instructions
4. Schematics
5. Blow-up Diagram





# Features of Models 980 and 960



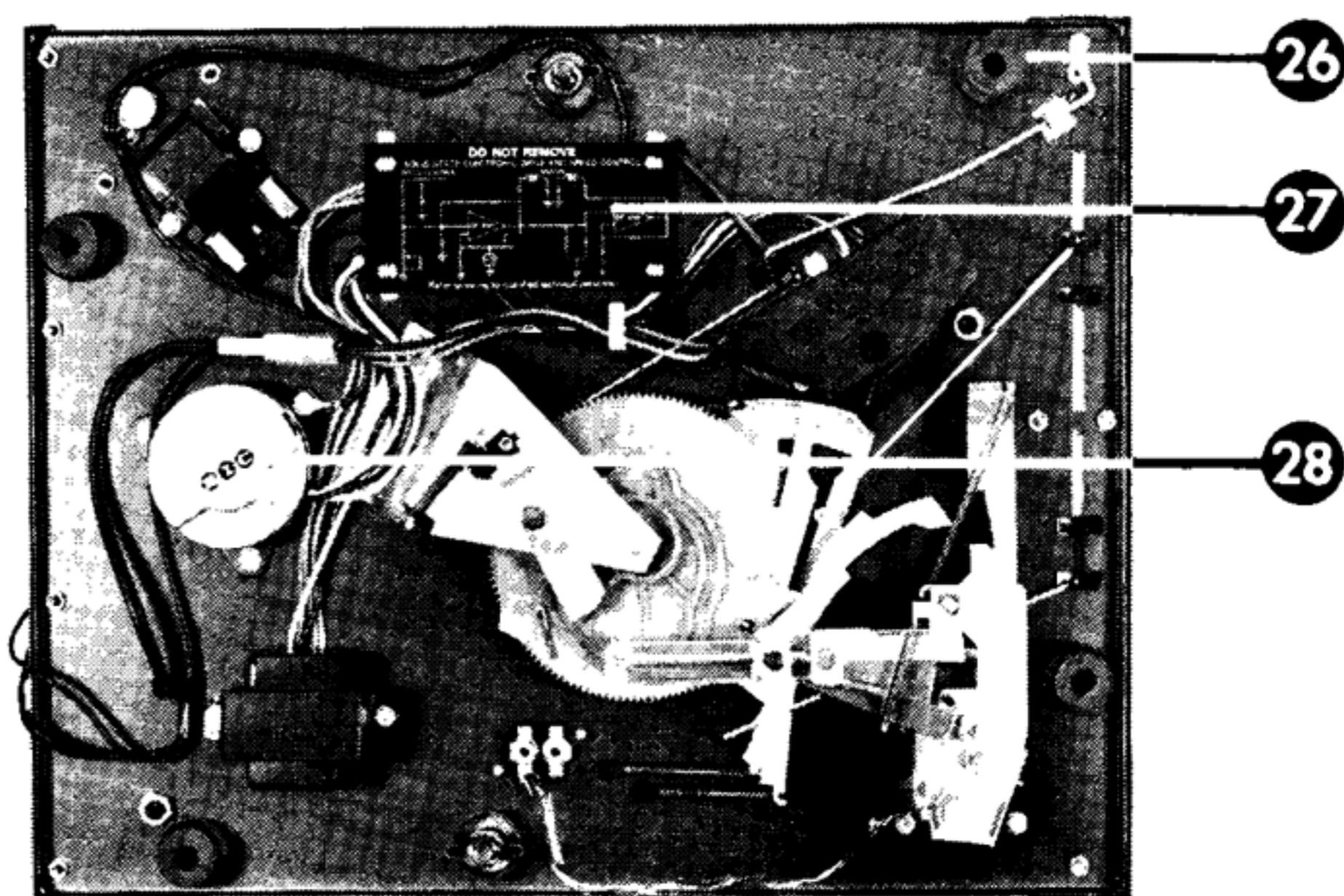
1. Cycle button—feather touch control activates all turntable functions.
2. Tone arm finger lift—human-engineered for positive, secure manual handling of tonearm.
3. Programmer selector—selects manual or automatic operation, shut-off and number of plays.
4. Initial 15 degree tracking angle adjustment—permits pivoting of entire shell for parallel alignment and 15 degree tracking angle of stylus assembly, regardless of shape or depth of cartridge.

5. Knurled cartridge shell retaining nut—locks shell firmly in proper alignment.
6. Cartridge shell connector—male/female connection for positive electrical contact.
7. Tonearm rest—extended for stylus and cartridge protection.
8. Tonearm lock—prevents damage during transport or accidental jarring.
9. Speed selector—shifts drive belt for 33 $\frac{1}{3}$  rpm or 45 rpm rotation.



10. Tonearm set-down adjustment—adjusts set-down position of stylus at edge of record.
11. Cueing rate adjustment—varies cueing speed in accordance with user preference or to suit climatic conditions.
12. Force calibration scale—expanded scale for precision setting of stylus tracking and anti-skate forces.
13. Tracking force adjustment lever—sets desired tracking force from 0 to 4 grams.
14. Anti-skate force adjustment lever—sets corresponding anti-skate force—may be set in tandem with tracking force adjustment or independently.
15. Cueing lever—initiates safe, damped lowering or raising of tone arm or can be used as pause control.
16. Stylus mode selector—selects proper skating force reference for elliptical or conical styli; eliminates the need for two calibration scales.
17. Isolated tonearm counterweight permits dynamic zero balancing of entire tonearm, while insuring maximum damping.
18. Precision gimbal bearings—for minimal horizontal and vertical pivotal friction.
19. 12" diecast platter—solid, one-piece precision casting has computer optimized mass.
20. Manual spindle—rotates with platter during single-play operation.

21. Automatic spindle—supports records during automatic record play.
22. Record support—platform stabilizes records placed on spindle for safe two-point support during automatic play.
23. Solid state electronic pitch control (Model 980 only)—sets precise, unvarying turntable speed and permits  $\pm 3\%$  variation from nominal speed.
24. Illuminated stroboscope (Model 980 only)—used in conjunction with electronic pitch control. Visible during record play.
25. Auto/Manual cartridge angle selector—permits proper 15 degree compensation.



26. Elastomer suspension mounts—correlated to the mass of the turntable assembly for maximum isolation from external shock in all planes.
27. All electronic drive signal generator (Model 980 only)—modular etched circuit generates stable 60 Hz. signal to drive synchronous motor.
28. Synchronous 24 pole motor—operates at slow, vibration-free 300 rpm.



# Contents

## Index to Set-Up Procedure

By carefully installing the unit in accordance with the steps outlined below, you will be insuring the excellent performance of which this unit is capable. Installation consists of twelve steps, which should be performed in sequence. These steps and page number references are:

- 2** How to properly unpack the unit  
Note the accessories supplied
- 3** Installing the turntable on the base
- 4** Proper mounting of the cartridge in the tonearm shell  
How to properly orient and position the cartridge
- 5** Connecting the shell with the tonearm  
Installing the counterweight
- 6** Selecting proper stylus setting  
Adjusting proper tracking and anti-skate forces  
Leveling the cartridge shell
- 7** Installation of audio cable and ground connection
- 8** Connecting to AC power

## Index to Operating Procedure

There are many playing and operating options built into your B•I•C Belt Drive Programmed Turntable, plus a number of unique control features. These are summarized on this page — and specific operating instructions for the various playing options are detailed on the pages indicated. Normal maintenance procedures are also described and listed, along with a set of specifications.

- 9** Manual play of a single record
- 10** Programmed repeat play of a single record  
Automatic play of a single record  
Automatic play of multiple records
- 12** Multiple play of records plus repeat of last record  
Use of cueing and pause control  
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- 13** Adjustment of stylus set-down point
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- 15** Tips on record care  
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- 18** Fault finding chart
- 23** Lubrication instructions
- 24** Electronic speed control
- 28** General disassembly instructions
- 30** Analysis of the mechanism  
Exploded view and parts list.



# Set-Up Procedure

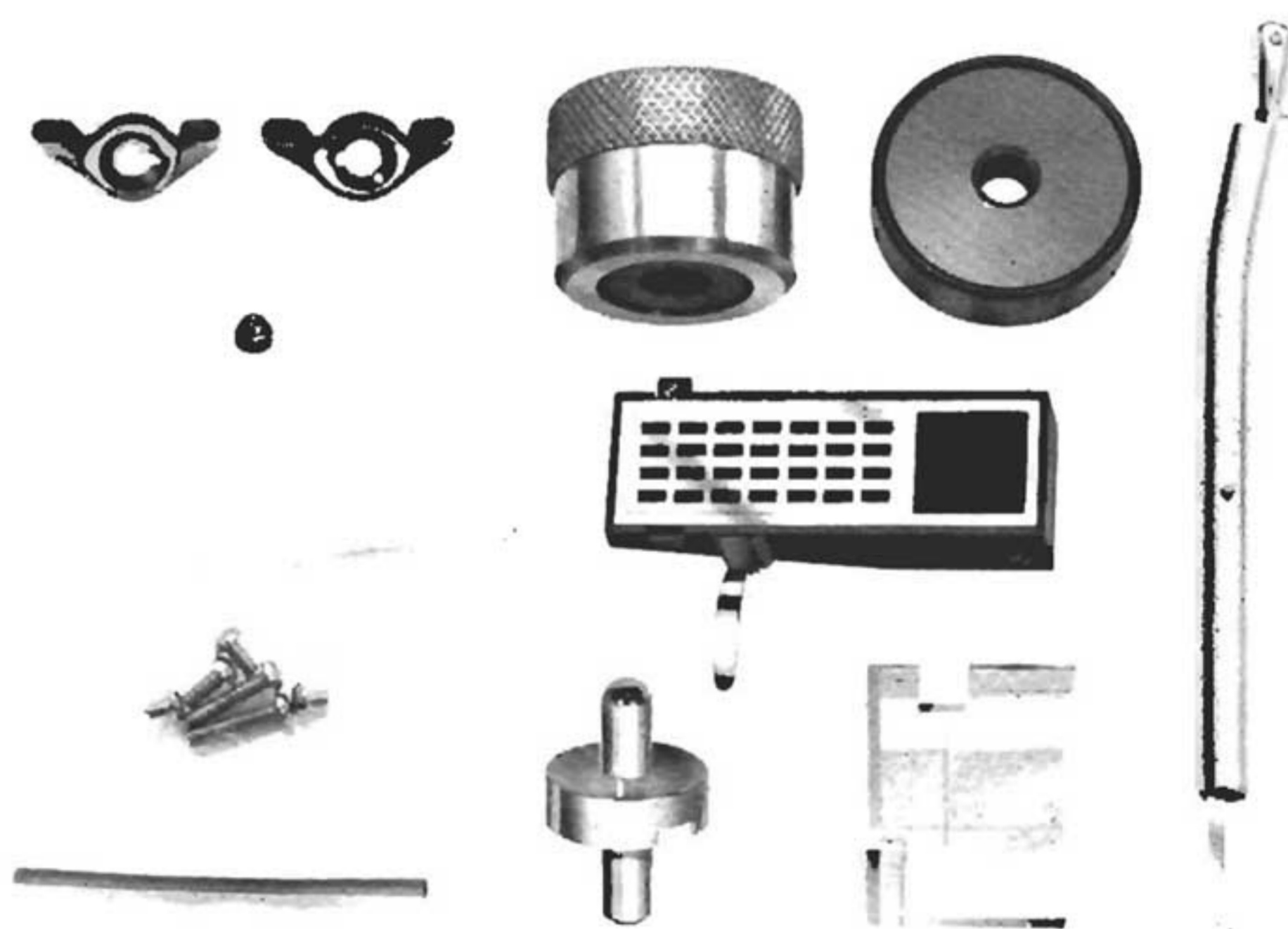
## Unpacking the Unit

Remove the unit from the bottom styrofoam filler by grasping the unit plate at the points indicated on the top cardboard packing piece. DO NOT lift the unit by grasping the tonearm. Whenever possible, the packing material should be retained in the event reshipment is necessary. In any event, do not discard the packing material until all of the accessories described below are accounted for. The top styrofoam filler contains the following:

1. A short manual spindle for playing single records.
2. A long automatic spindle for playing up to six records automatically.
3. Tonearm counterbalance weight.
4. A manual 45 rpm adaptor for playing large hole records, one at a time.
5. Cartridge mounting hardware; this contains the various screws that are needed for mounting the cartridge in the pickup head.
6. A combination gauge for setting stylus overhang and paralleling the stylus.
7. Transit wing nuts (2).
8. Extra lock nut.
9. Pick-up head.

A small cardboard packing piece is installed in the right-hand pivot of the tonearm gimbal. MAKE CERTAIN THIS IS REMOVED, or the unit will not perform properly. Also, make certain that all rubber bands securing the line cord, audio cables, the tonearm tie, etc., are removed along with all other packing pieces.

Nylon wedges are installed between the unit plate and turntable. They must also be removed and, if possible, should be retained as they are a very important part of the packing if the unit is ever shipped.

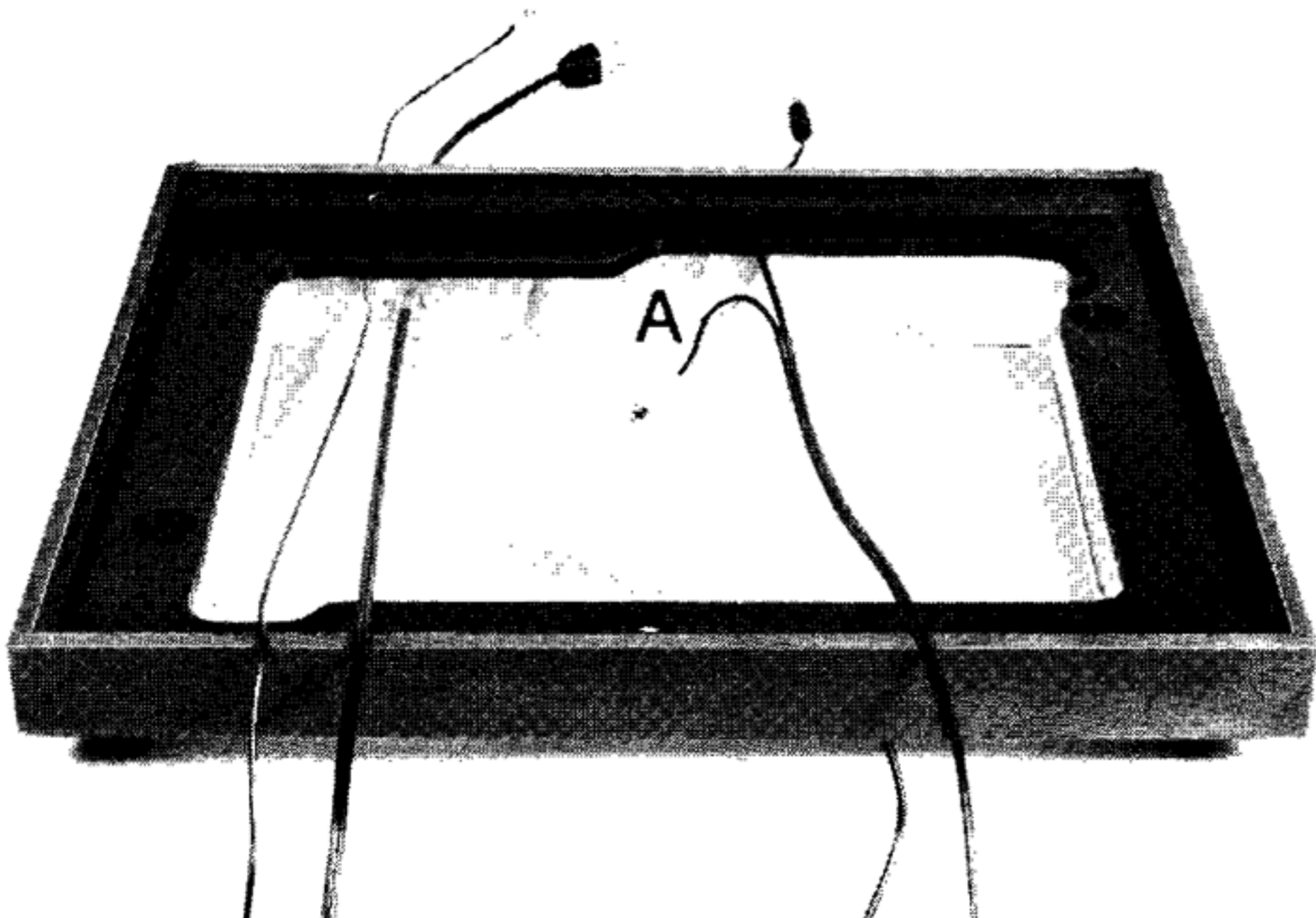




### Installing the Unit on the Base

Both the B-20 Base and WB-20 Base are supplied with a bottom safety cover which eliminates any possibility of mechanical hazard. Listed below are instructions pertaining to mounting your unit on the base.

1. Place the unit in front of the mounting base and push the AC plug into the die cut portion of bottom cover shown in the Diagram; the flap will open.
2. Place the audio cable, *one plug at a time*, through the tunnel. (Ref. "A" of the diagram.)
3. Place ground lead wire through the  $\frac{1}{4}$ " hole next to die cut flap. This location is also shown on the label affixed to bottom of base.
4. Position the unit over the base while, at the same time, pulling the slack on the cables through the bottom cover. (It is recommended that someone assist you during this stage of set-up.) Pull the line cord until the knot passes through the die cut flap. Position line cord to locate in the half circle in the center of the flap.
5. Once the unit has been properly located on the mounting board of the base, thread the transit wing nuts and do not tighten fully.



PROPER INSTALLATION IS EXTREMELY IMPORTANT. DO NOT INSTALL THIS UNIT ON ANY DEVICE OTHER THAN THE OFFICIAL B-20 OR WB-20 BASES.

### Prior to Playing Unit

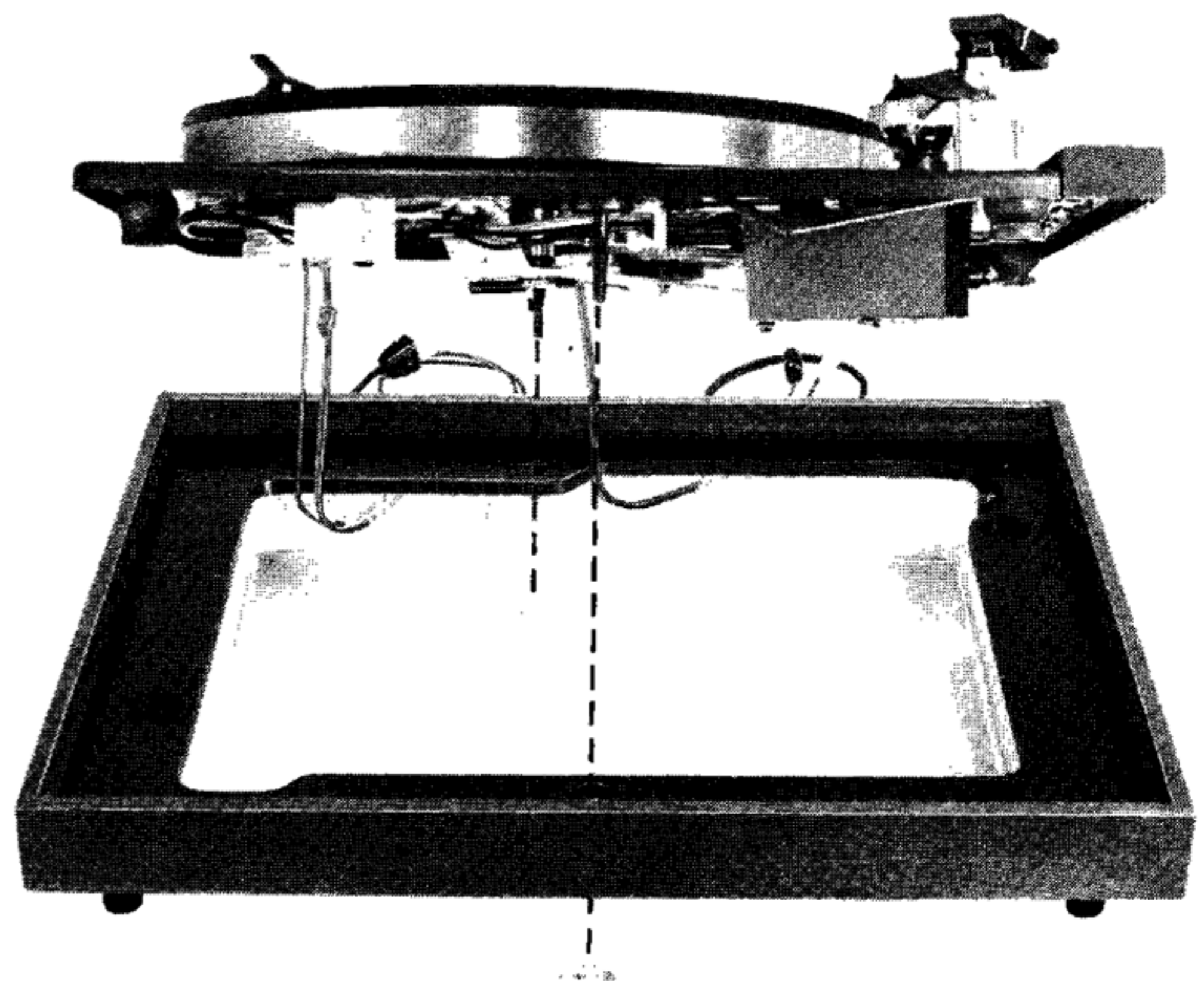
Before playing the unit, loosen the wing nuts by turning clockwise. In the playing position, the wing nuts should be approximately  $\frac{1}{4}$ " below the bottom surface of the motor mounting board.

### Transporting Unit

Should you wish to transport the unit on its base, tighten the wing nuts fully, by continuing to turn them counter-clockwise until the turntable is firmly held on the base and the shock mount suspension system has been fully compressed. Make certain that tonearm lock is in its retaining position so that tonearm is secured to tonearm rest.

### Removal of Unit from Base

If it is ever necessary to remove the unit from the base, simply reverse the above procedures. It should never be necessary to remove the bottom cover; however, this *can* be accomplished by removing the six screws holding the cover in place. To remove the bottom cover of the wood base, remove the four screws securing the feet in place.





### Cartridge Installation and Adjustment

In order to take advantage of the many features of the B·I·C tonearm, it is extremely important that the cartridge be properly installed and the various adjustments pertaining to the cartridge be made. These are described below:

#### Removal of the Plug-In Head

All automatic turntables use some form of cartridge slide or clip to pre-mount the cartridge and fasten it to the arm. Electrical contact for transmission of the minute cartridge signals depends on four surface-to-surface pressure contacts, any one of which may cause intermittent signals or open circuits.

The B·I·C 980 and 960 employ a male/female connector (Fig. 1), interlocked by a knurled nut. Because this system assures permanent, positive contact and withstands repeated use, it is the type of arrangement used on precision manual players.

Remove the pickup shell from the tonearm by turning the shell locking nut fully counter-clockwise until the nut is removed. **BE SURE NOT TO LOSE OR MISPLACE THE SHELL LOCKING NUT.** In the event this occurs an extra nut has been supplied. Pull the shell away from the tonearm horizontally, separating the male and female portions of the plug-in connector.

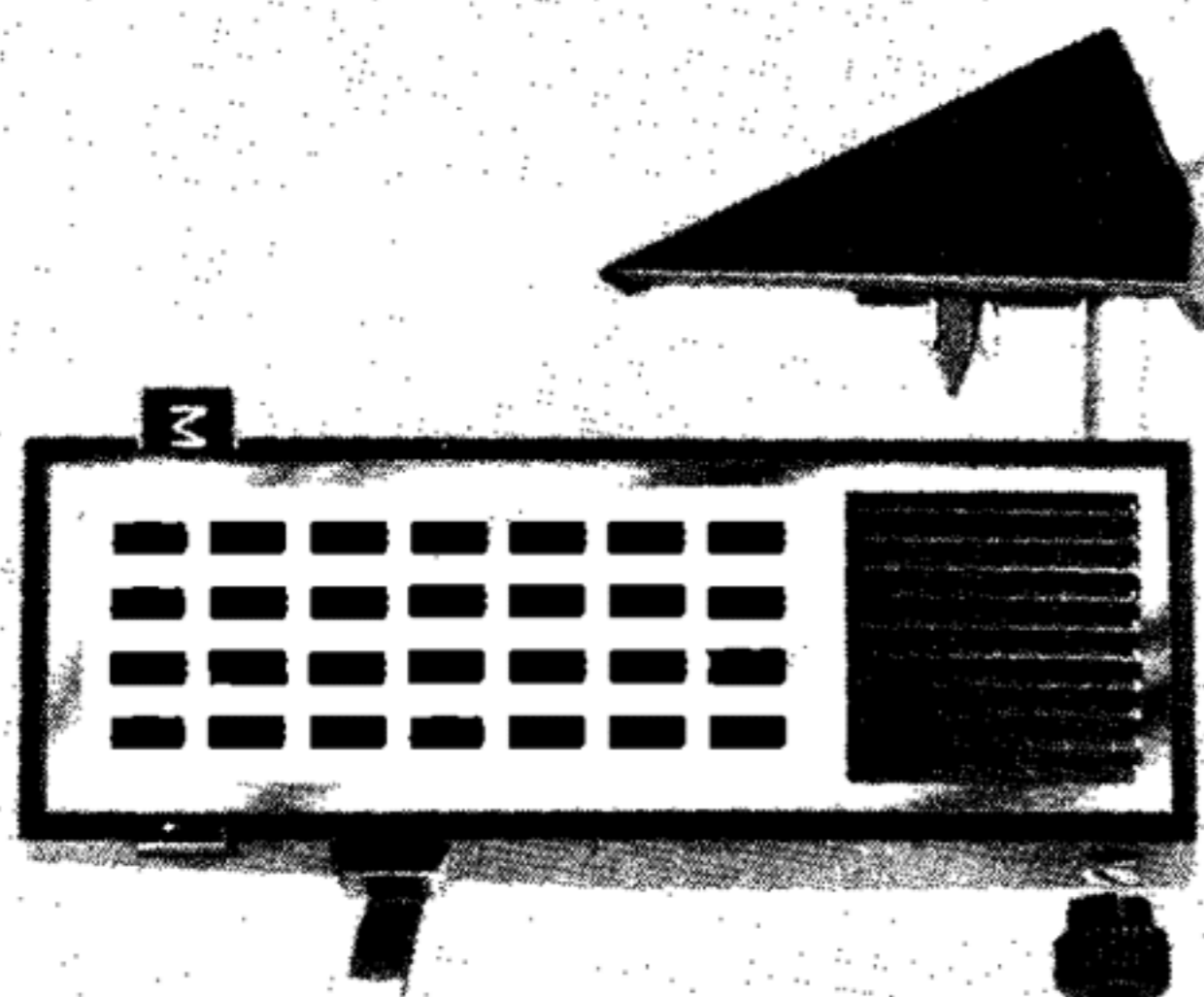


Fig. 1

### Mounting Cartridge in Head

The B·I·C 980 and 960 are supplied with three sets of varied length cartridge mounting screws. It is important that the mounting screws used are not too long or they will pass through the *shell mounting bracket* and cause the tonearm trim to raise. In most cases the mounting screws supplied by the cartridge manufacturer should be used. However, if you do not have these screws, proceed as follows:

From the three sets of screws supplied with the B·I·C 980 and 960, select the screws that appear to be the proper length to pass through the *cartridge mounting bracket*. Place one screw through the *bracket*.

To make certain it is not too long, place the bottom of the cartridge as shown in the diagram below and note whether the screw projects below the simulated *shell mounting bracket*. If too long, use the next shorter screw. When the correct length has been selected, use a small screw driver to secure both screws.

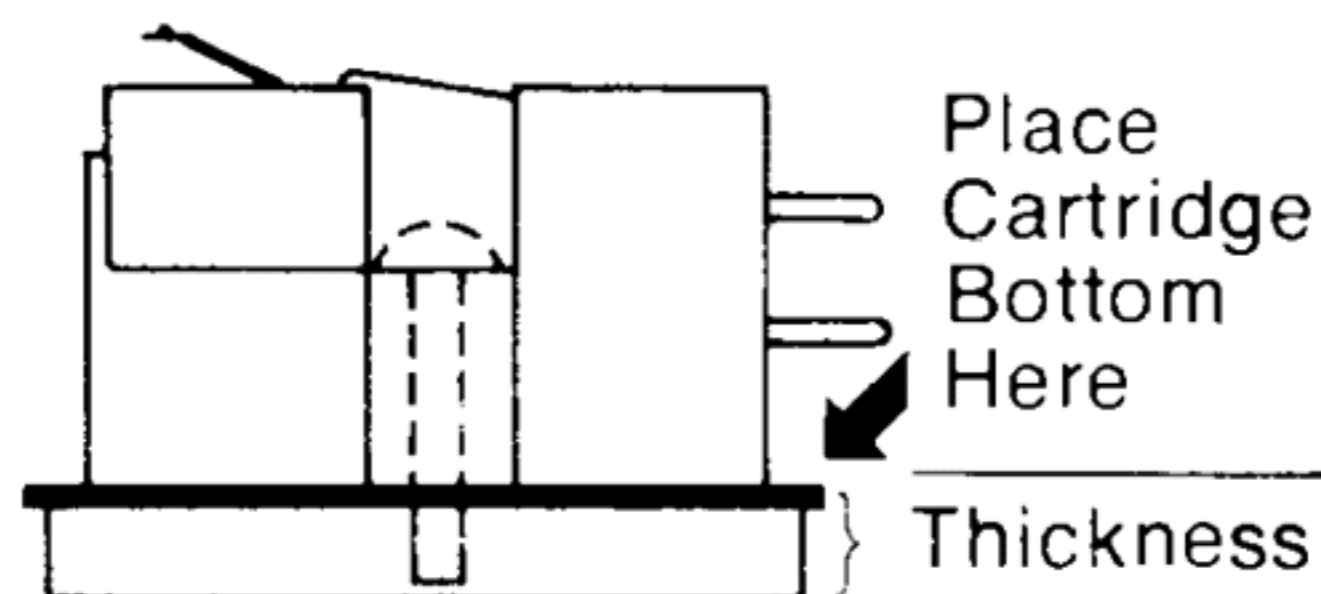


Fig. 2

### Wiring Cartridge

Grasp each of the push-on connectors with a pair of long nosed pliers, and push on to the appropriate pins at the



rear of the cartridge. The chart below (Fig. 3) illustrates the markings at the rear of a typical cartridge. **MAKE CERTAIN** that the cartridge is wired as per the following diagram.

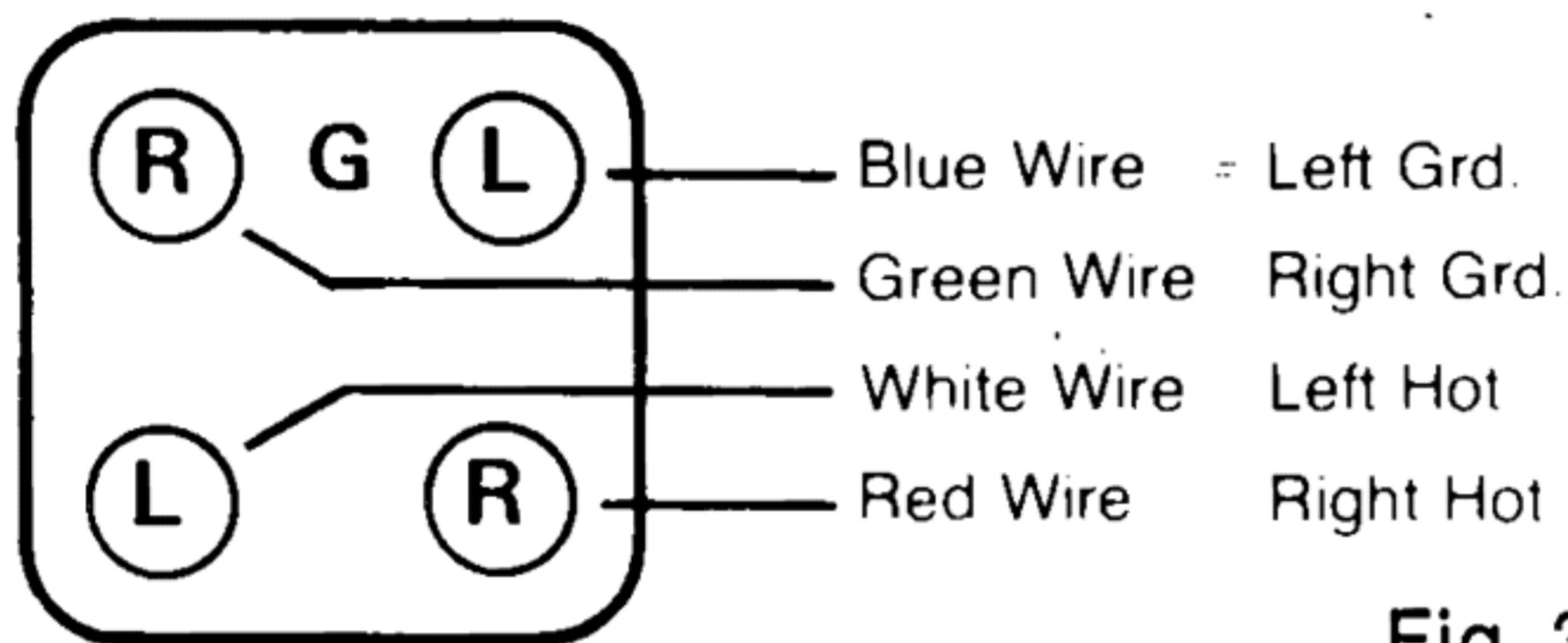


Fig. 3

**CAUTION—Never solder directly to the cartridge. DAMAGE WILL OCCUR**

### Stylus Overhang

The position of the stylus relative to the exact center of a record is extremely critical and relates directly to distortion during playback. In the B·I·C 980 and 960, the proper overhang of the stylus is set by means of a separate plastic mounting gauge supplied (Fig. 4).

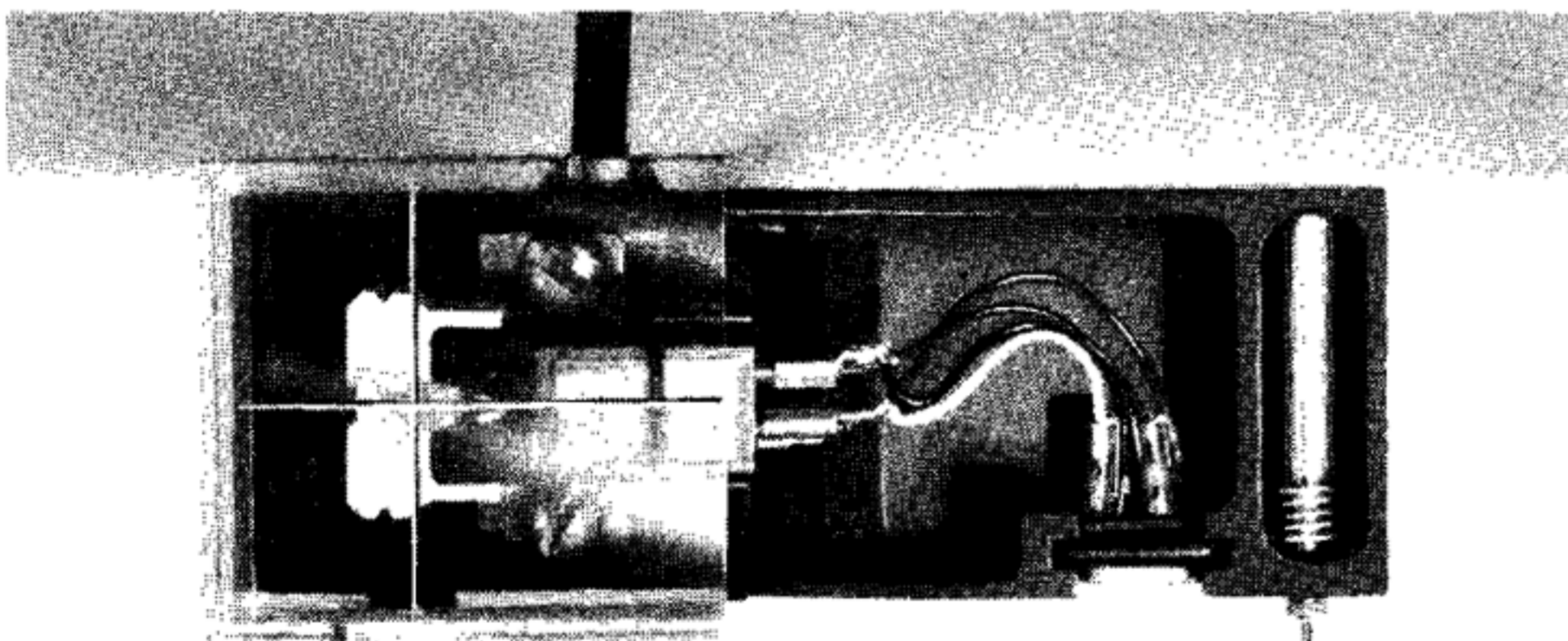


Fig. 4

Temporarily remove the stylus guard from your cartridge, if one is supplied. Move the auto/manual selector to the M position. Place the cartridge shell upside down (stylus facing you) on a flat surface, such as the top of a table, or a stack of books with the finger lift overhanging the edge. Place the stylus gauge over the shell firmly pressing it into the corner of the gauge which contains the slot and parallel lines. De-

termine the position of the stylus in relation to the cross-hairs (Fig. 4) of the gauge. Loosen the cartridge mounting screws and move the cartridge until the stylus tip lies directly under the center of the cross-hairs. Remove the gauge from the shell and re-tighten the mounting screws. Re-check alignment, using the gauge, to make sure the cartridge has not shifted during the tightening process.

### Attach Shell to Tonearm

Line up the hole in the rear of the shell with the pivot pin on the tonearm and engage the plug-in socket of the pickup head with the pickup arm (Fig. 1, Pg. 4). (The connector in the tonearm is a floating, self-aligning connector). Press the pickup head into the tonearm. Re-install the head locking nut but do not fully tighten.

### Counterweight Installation

The counterweight should be installed on the tonearm in the following manner: Place the counterweight at the end of the tonearm, with the knurl facing the rear, and rotate it in a counter-clockwise direction (Fig. 5). The counterweight must be assembled and taken off the tonearm *only by a winding action*—not by directly pushing or pulling. Rotate the platter in a *clockwise* direction approximately 5 turns to make certain that the mechanism is free and

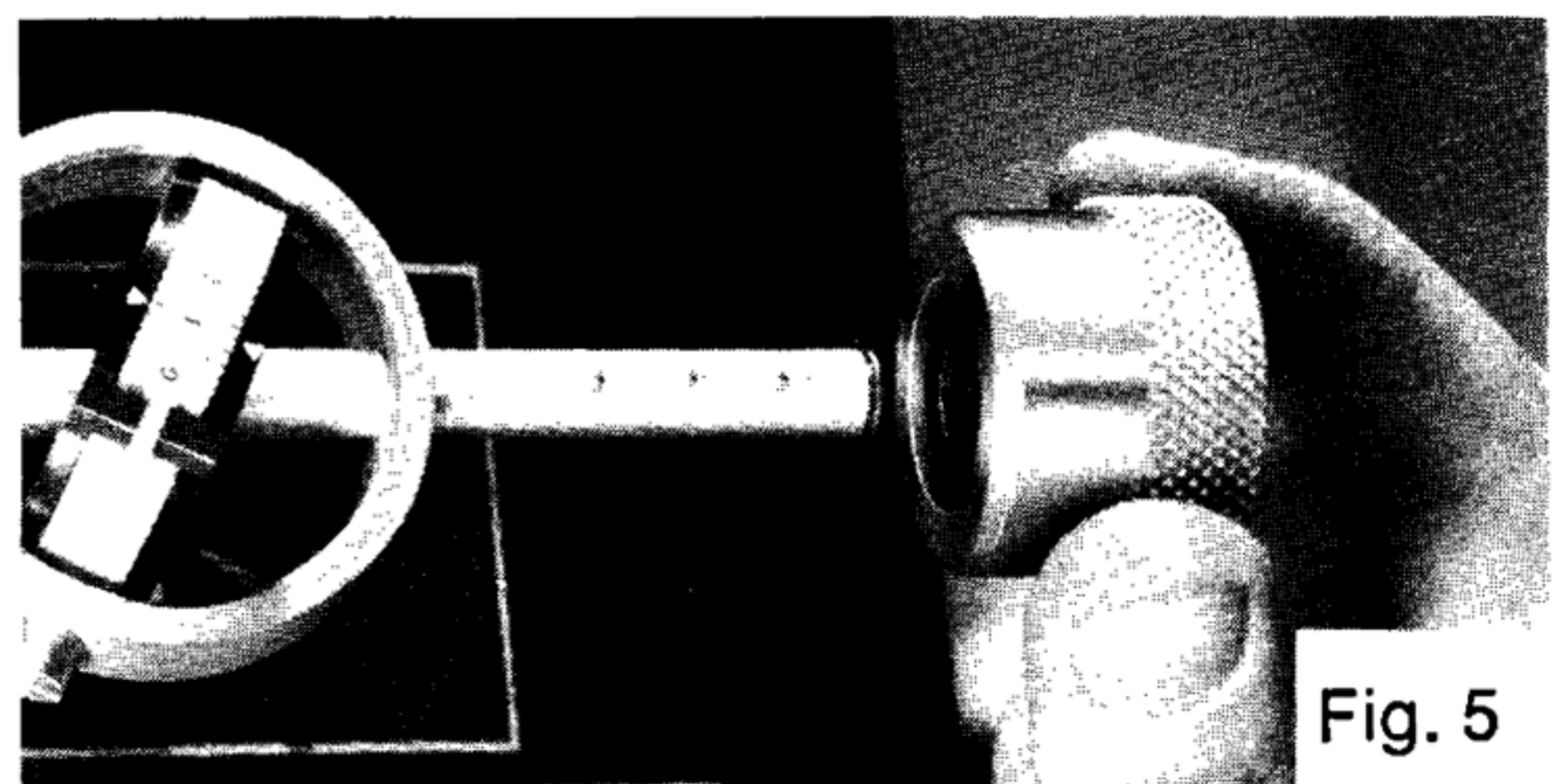


Fig. 5



the unit is not in cycle. Also, make certain that the cueing lever is in the play position. With the tonearm released from its locked position and both anti-skate and tracking force levers set to 0 (zero), continue to rotate the counterweight until the tonearm is perfectly balanced, floating parallel to the turntable. When this is accomplished, the tonearm will be at the approximate level of the extension on the tonearm pickup rest.

### Selecting Proper Anti-Skate Mode

The physical and geometric relationships of *all* offset tonearms give rise to an inward force during record play which applies lateral forces against the inner groove wall of a record. This force is called "skating" and must be countered by an equal and opposite force if minimum record wear and optimum tracking is to be achieved.

The anti-skating systems on the 980 and 960 are unique in a number of respects. On all automatic turntables,



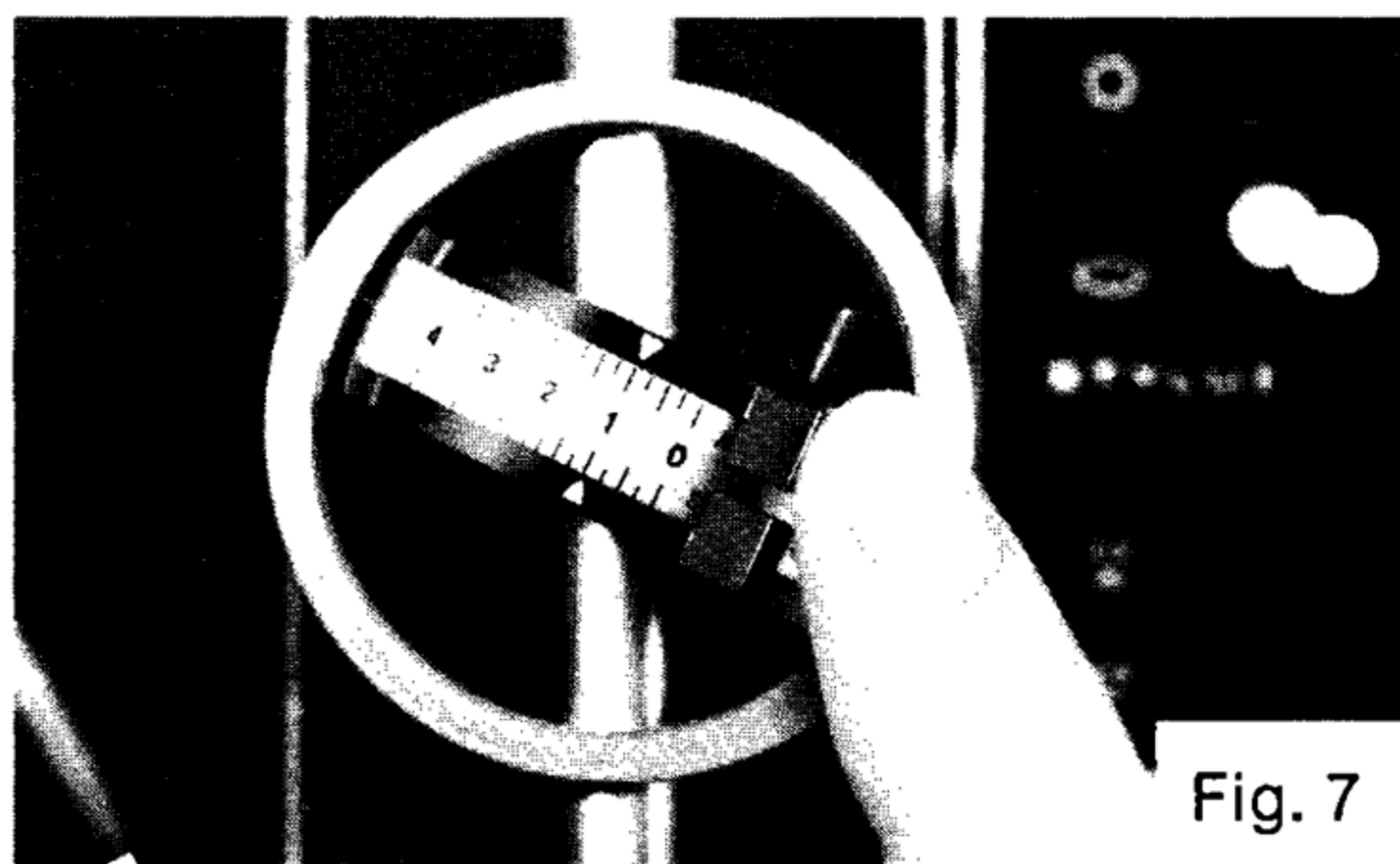
and even on many manual players, a double scale is employed to permit settings for the differences in the amount of force needed when using an elliptical or conical stylus. Not only is this confusing and difficult to set, but in actual fact, this method involves a compromise since one force is being used to create both compensations. In the Models 980

and 960, the reference point for elliptical and conical styli is preset by a separate function lever (Fig. 6).

Shift the conical  $\circ$  /elliptical  $\ominus$  stylus mode selector to the appropriate position—conical or elliptical, depending upon the type of stylus used in your cartridge. For other types of styli, such as Shibata or CD-4 cartridges, consult the cartridge manufacturer's recommendation for anti-skating calibration.

### Setting Stylus and Anti-Skate Force

Set both anti-skating and stylus force levers to the number of grams recommended by the manufacturer of your cartridge (Fig. 7). Although tracking force and anti-skate settings can be made individually, the controls can also be operated in tandem.



### Cartridge Angle Adjustment

Place the setting gauge in the large flat recess of the turntable mat (Fig. 8, page 7).

Set the auto/manual selector at the front of the tonearm shell to the manual (M) position. Gently place the stylus on the plexiglass gauge and sight the location of the top surface of the pick-up head in relationship to the parallel lines of the setting gauge. Ideally, the top surface of the pick-up head



should be parallel with the lines on the gauge. This can be achieved by turning the adjusting screw with a small screwdriver (Fig. 8). Make this adjustment with the tonearm elevated over the gauge to avoid any damage to your styli. Lower to gauge and re-check. Once the correct position is achieved, fully tighten the pick-up head locking nut.

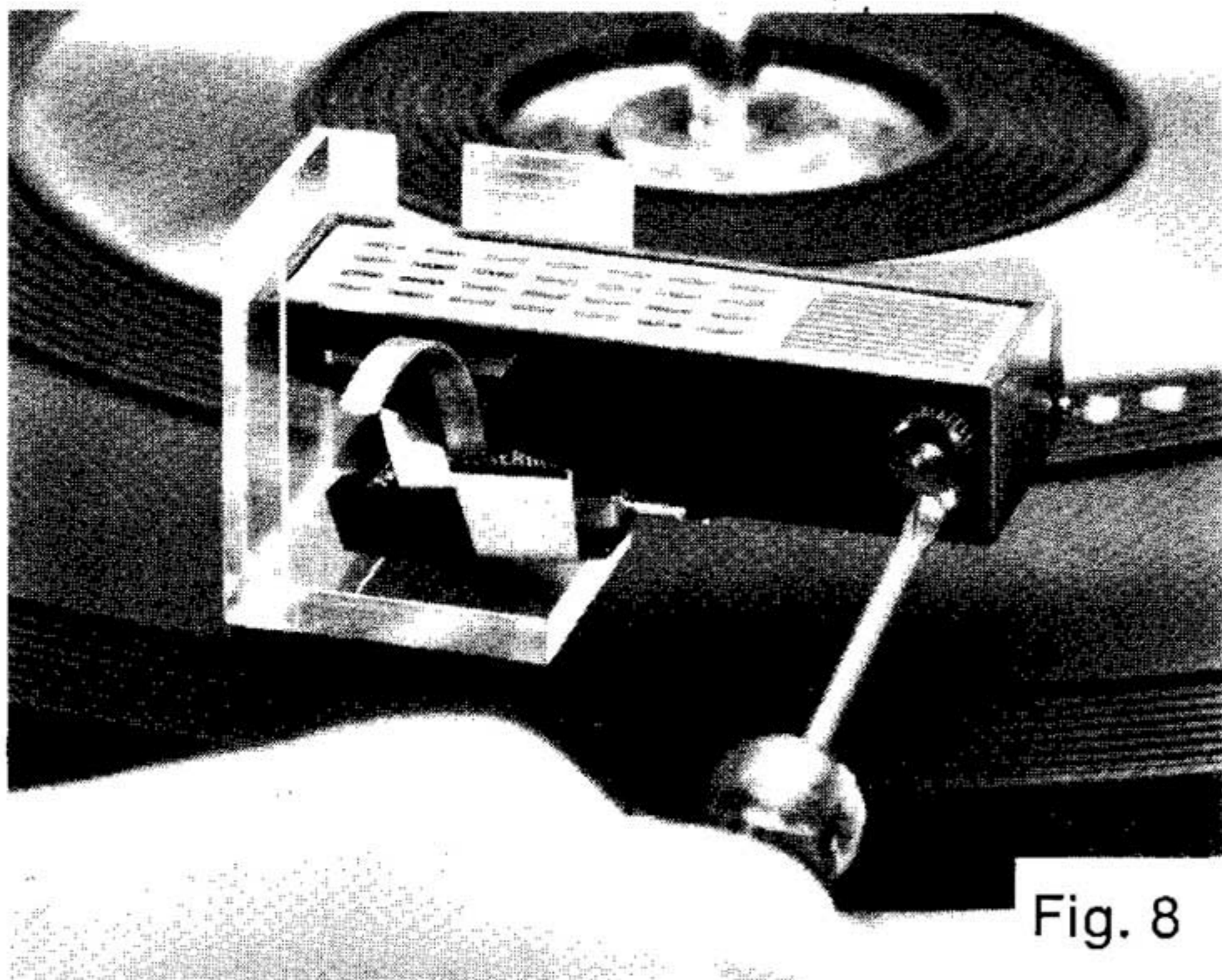


Fig. 8

## Connecting Your B-I-C Programmed Turntable to an Audio Amplifier

### Audio Cables

Models 980 and 960 are supplied with an audio cable installed in the appropriate "left channel" and "right channel" output jacks located beneath the turntable (Fig. 9). This cable was selected to provide minimum capacitive

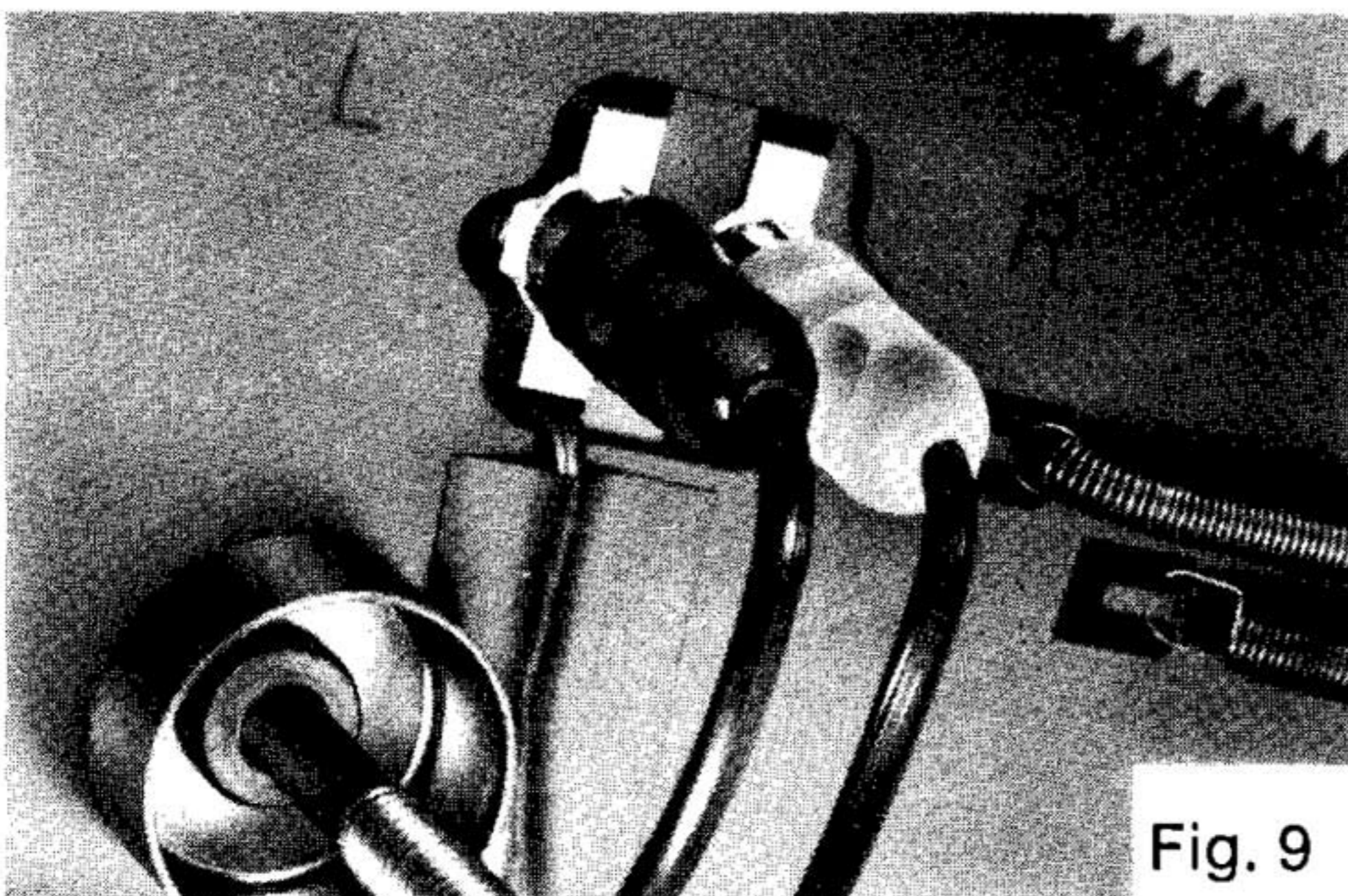


Fig. 9

loading effects on the high frequency response of your cartridge. This is especially important if your cartridge is capable of playing CD-4 discrete four channel recordings. If longer cables are required, make certain they are of a low capacity type or check with the manufacturer of your cartridge for his recommendations regarding cable type and length limitations.

### Amplifier Connections

If you are using a magnetic phono cartridge, insert the phono plugs into the space provided at the rear of the amplifier marked "phono low level" or "phono MAG" (Fig. 10). The red plug goes into the channel marked R—right, and the other plug goes into the channel marked L—left.



Fig. 10

If you are using a ceramic cartridge, insert the audio cable plugs into the high level input of the amplifier (phono CER).

The ground wire supplied with the turntable should be connected to a suitable "ground" point on the metal chassis of your amplifier. Most amplifiers provide a convenient terminal on the rear panel for this purpose. Failure to ground this wire will result in an



inordinately high hum level when attempting to play records.

### Power Cord Connection

Your Model 980 or 960 Programmed Turntable was designed to operate from a supply voltage of 105 to 130 VAC, 50 (adapter required) or 60 Hz. *Connection of the power cord to a higher source of voltage or to a DC power source will cause immediate damage to the unit and is not covered by the warranty.* If you use this product in areas powered by 220 or 240 volts, consult your dealer for proper instructions regarding adaptation of the unit for such use.

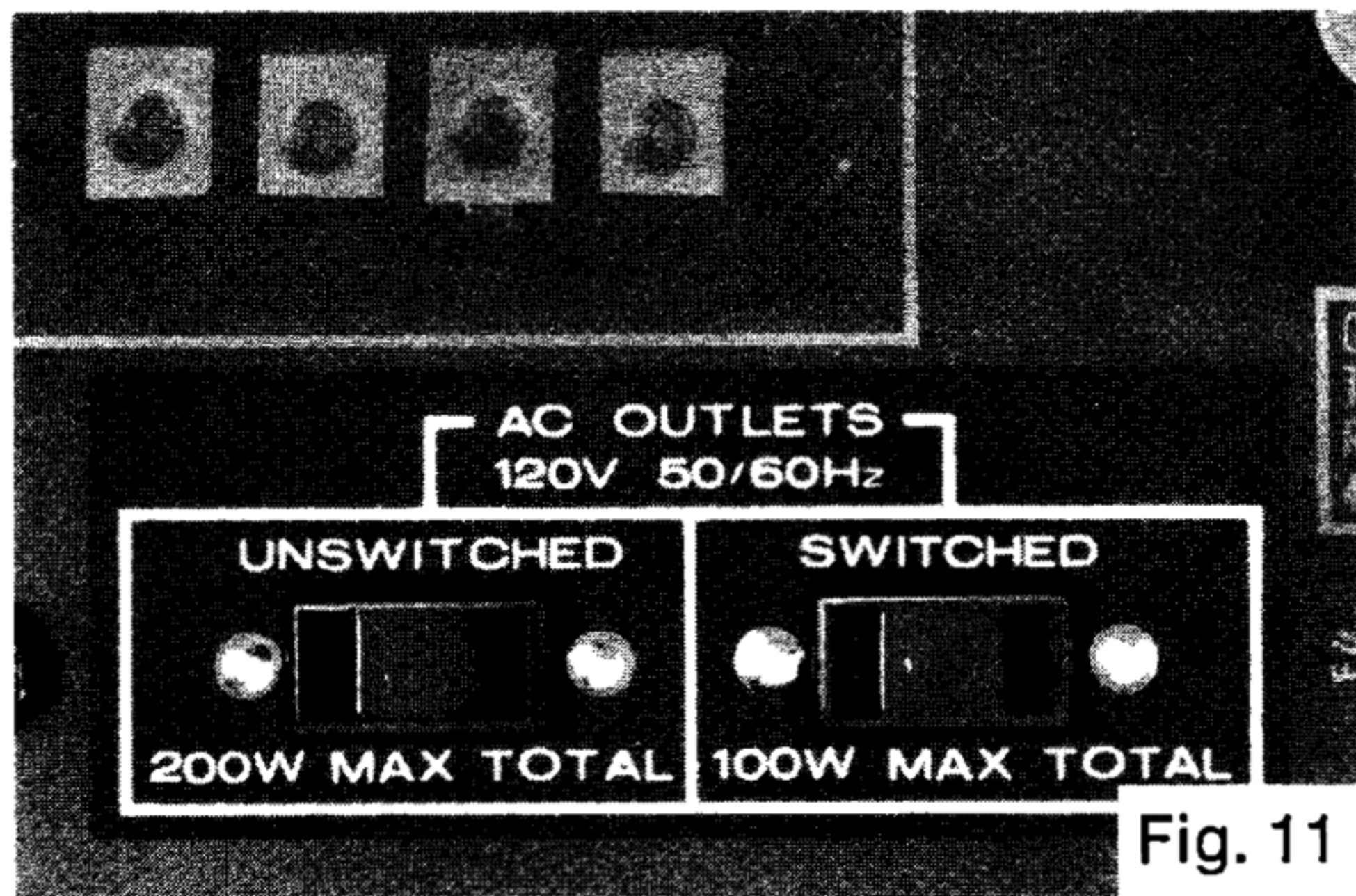


Fig. 11

With the programming lever set to the OFF position, plug the power cord into a suitable outlet. Many amplifiers provide convenient receptacles on their rear panels, to which the turntable power cord may be connected, (Fig. 11). Often, these receptacles are labelled "SWITCHED" and "UNSWITCHED". Choose an "UNSWITCHED" receptacle for powering the turntable. By so doing, if you shut off the amplifier, the turntable will continue to rotate until its selected programming sequence is completed.

# Operating Procedure

Before attempting to play records on your B·I·C Belt Drive Programmed Turntable, make certain that the tonearm retaining lock (Fig. 12) on the tonearm rest is loosened by moving it to the right with forefinger. Most cartridges are fitted with a stylus guard or protective cover. Make certain this cover is removed or pivoted so as to expose the stylus tip.

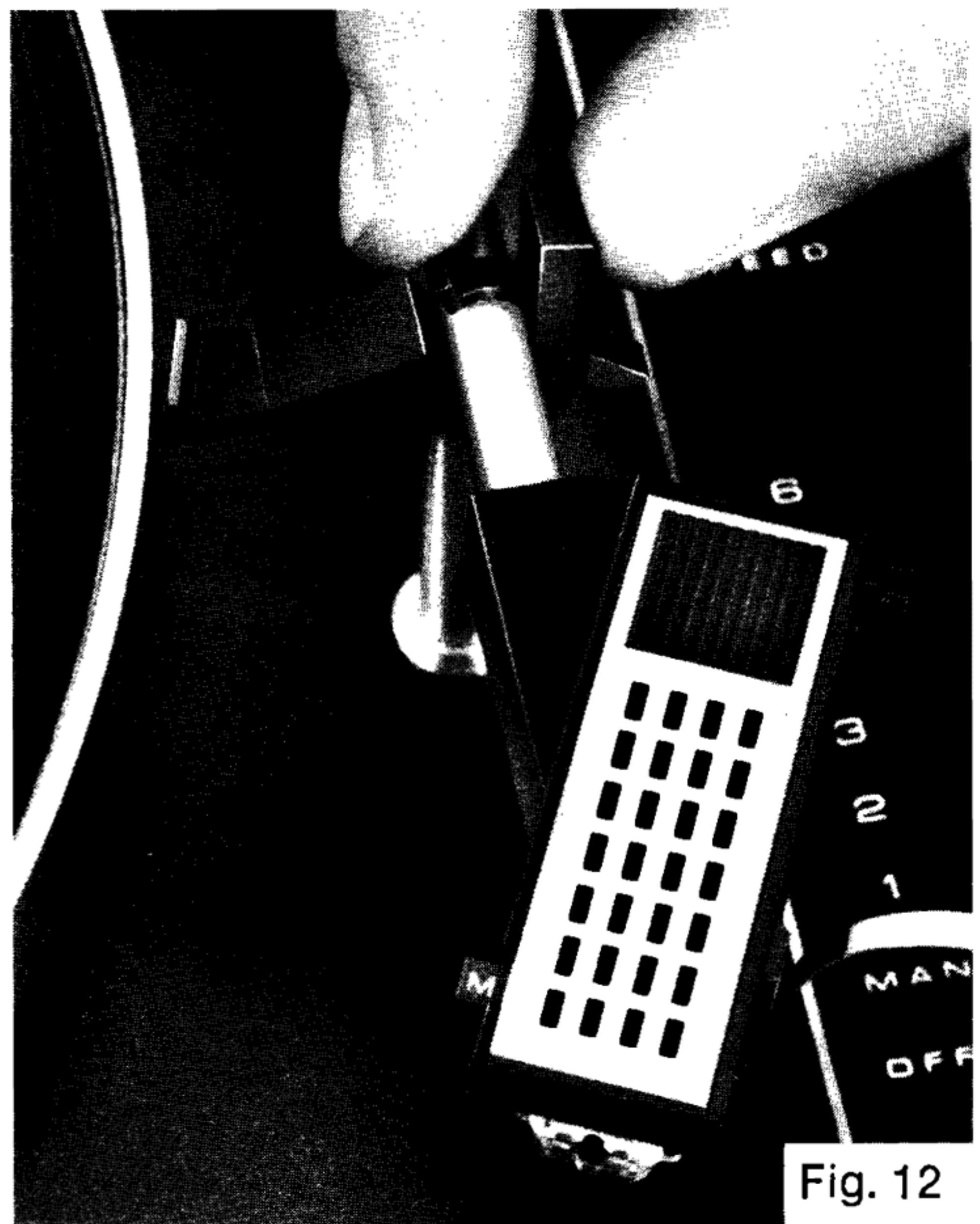


Fig. 12

Set the speed selector lever (Fig. 13) for the type of record you wish to play. The Models 980 and 960 play 12" 33 rpm records when the speed selector lever is set for 33; 7" 45 rpm records when set



to 45. When playing a 45 rpm record, install the manual 45 rpm adaptor over the manual spindle, which should be placed in the center hole of the turntable. Place a record on the turntable and make sure the auto/manual selector located on the front of the cartridge shell is set to the correct position. If playing one record move the auto/manual selector (Fig. 12) to reveal the letter "M"; if playing more than one record, move the compensator to reveal the letter "A". An optional multiple play 45 rpm adaptor is available. Place this adaptor over the automatic spindle to play up to six records. (See page 11.)

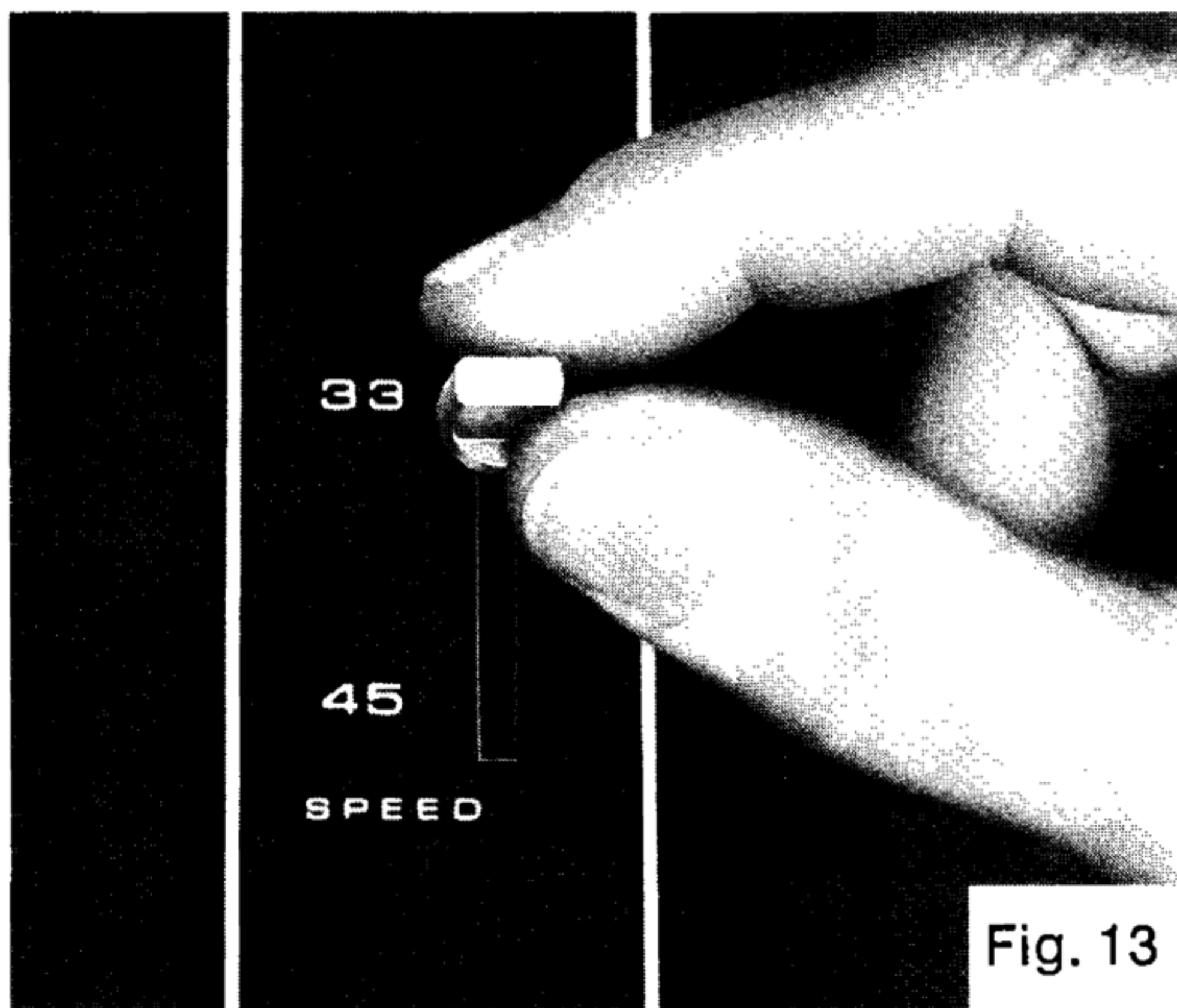


Fig. 13

### Manual Play of a Single Record

Insert the manual spindle (Fig. 14) and move the programmer control knob (Fig. 15) to the manual position. The turntable should begin to rotate at the selected speed. Carefully lift the tonearm by means of the tonearm finger lift, and place it on the record. After the record has been played, the tonearm will return to the tonearm rest and the unit will shut off. You may also use the cueing lever while playing single records manually. For use of this feature, refer to page 12. If you

wish to discontinue playing in the middle of a record, press the cycle button. The tonearm will return to its rest, and the unit will shut off. Alternatively, you may lift the tonearm from the record and manually return it to the rest. The turntable should then be turned off by moving the programmer lever to the OFF position.

**DO NOT MOVE THE PROGRAMMER WITH THE TONEARM ON A RECORD.**

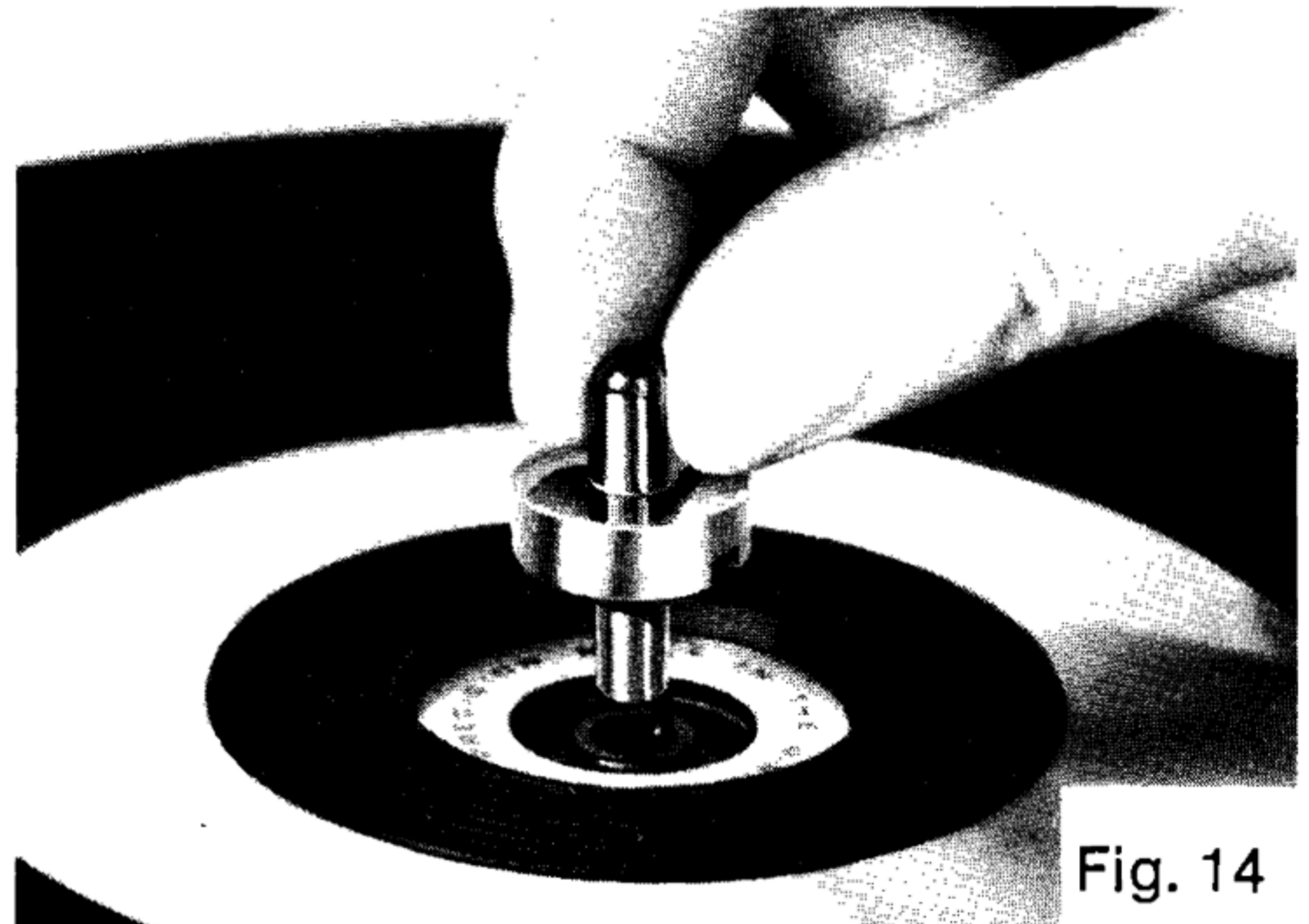


Fig. 14

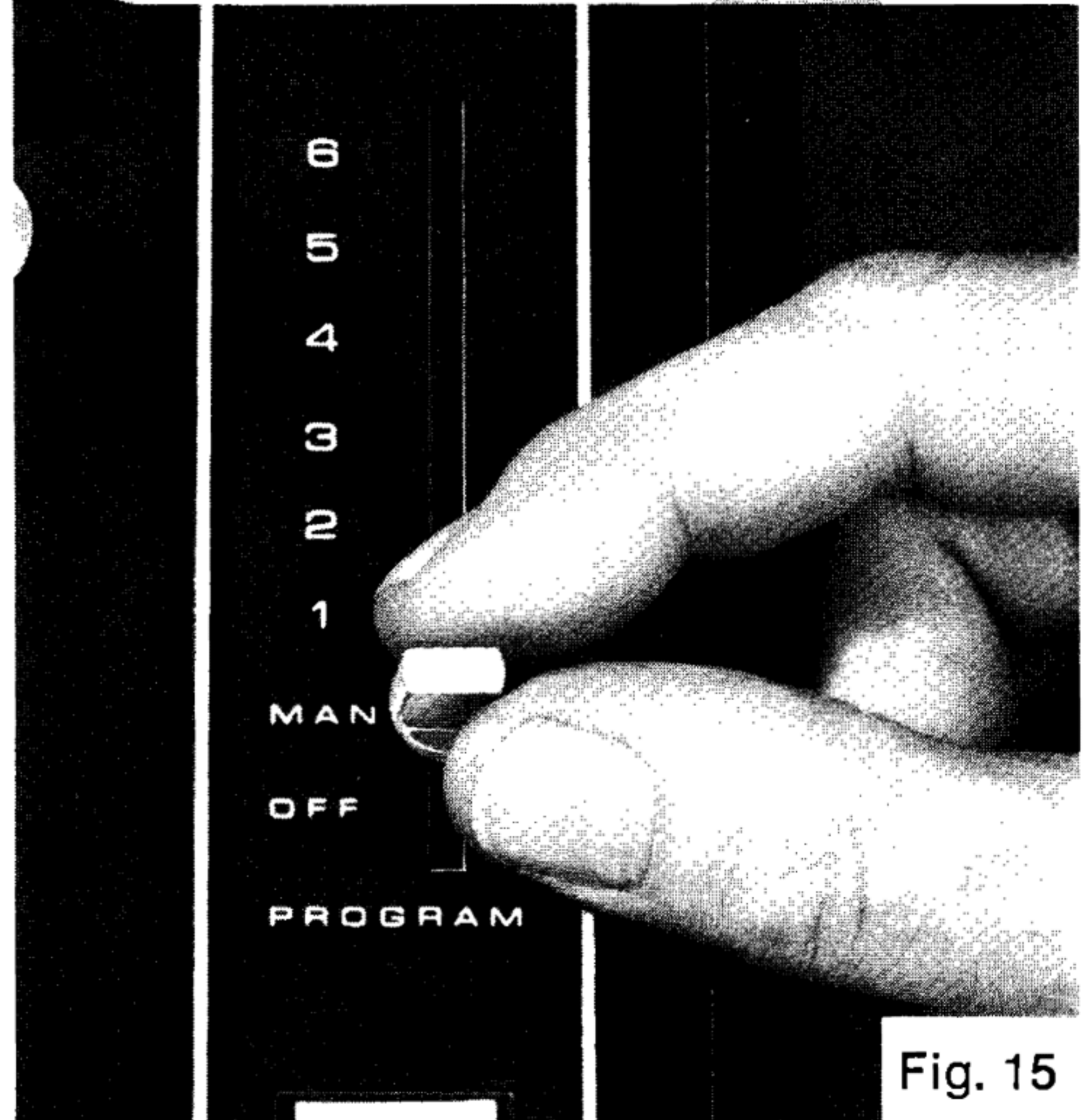


Fig. 15



**Repeat Play of a Single Record**

Here is another B·I·C feature: If you would like to hear one twelve-inch record played three times (Fig. 16), simply advance the programmer to the number 3. With the tonearm on the pickup rest, tap the cycle button and the unit will play the record three times and shut off.

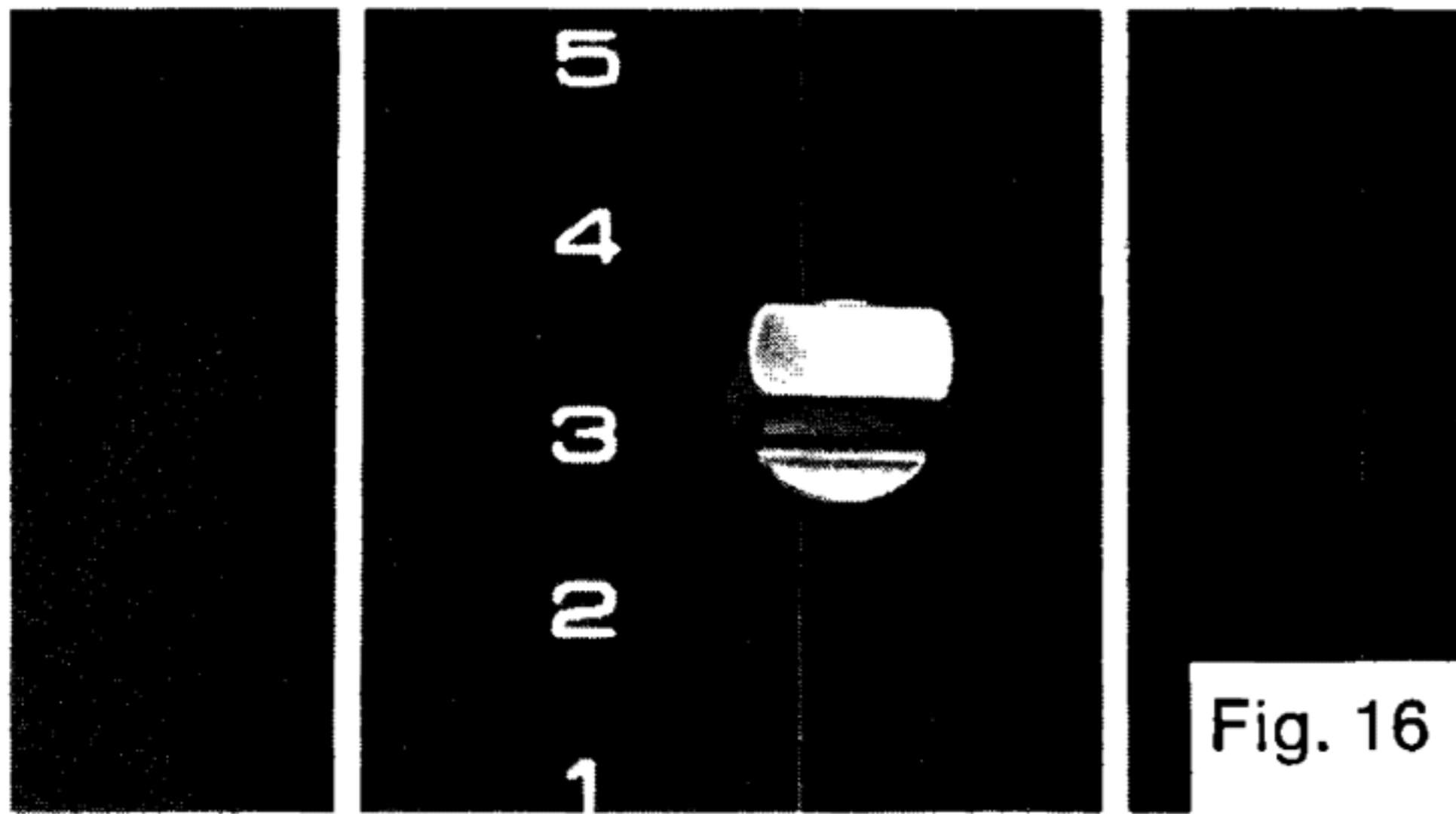


Fig. 16

**Automatic Play of a Single Record**

To play a single record automatically, advance the programmer to the number 1 setting and tap the cycle button. (Fig. 17) This cycle button initiates totally automatic operation. The arm rises, comes to the edge of the record, and is gently lowered.

At the end of record play, the tonearm returns to the rest and the machine

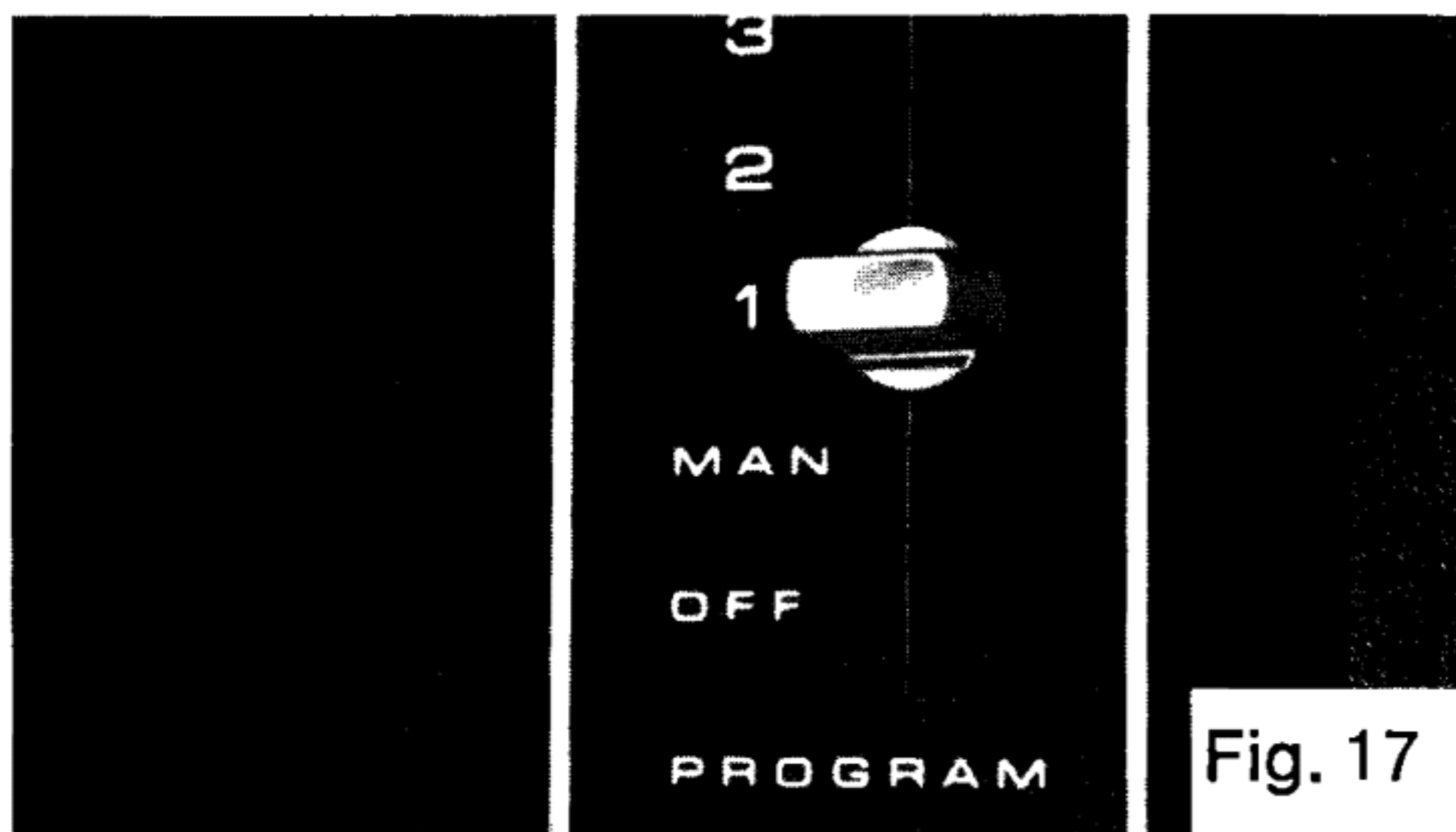


Fig. 17

automatically shuts off. If you move the programmer to the number 1 setting and place the tonearm on the record, the unit will not shut off at the end of the record, but will continue to play the record one more time.

**Turning Off the Unit**

The unit can be turned off at any time in one of two ways:

The cycle button can be tapped to advance the programming cycle to the next lower program number until the "MAN" position is reached. Tapping the cycle button once again will cause the tonearm to return to the tonearm rest and complete shut off of the turntable.

Alternatively, the tonearm can be lifted manually by means of the tonearm finger lift and returned to the tonearm rest. The programming lever should then be moved to the OFF position to turn off the unit (Fig. 18).

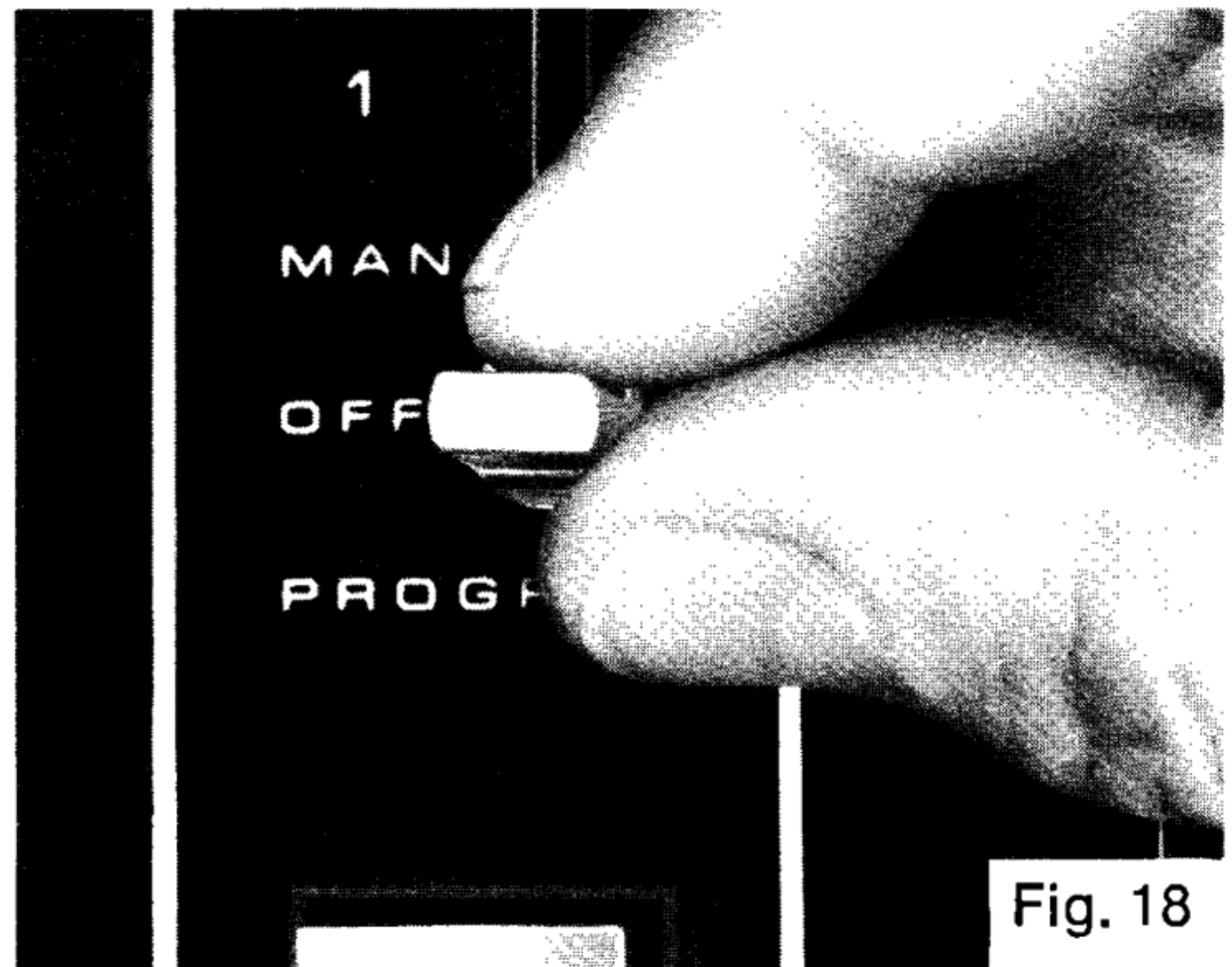


Fig. 18

**Automatic Multiple Record Play**

Your Model 980 or 960 can be used to play multiple records automatically, but with important differences when compared with units which are commonly categorized as "automatic turntables".



The B·I·C mechanism is exceptionally simple, with a minimum number of moving parts.

Records are handled with two-point support, as opposed to the umbrella-type single-support system commonly used. The B·I·C system stabilizes the records and insures reliable dropping. There are other automatic turntables that use a two-point record support system, but the 980 and 960 differ in that automatic shut-off is completely independent of the center automatic spindle. This eliminates the critical sensing nature of the spindle and is one of the reasons for the reliable changing capabilities of the B·I·C unit.

This design also makes it much simpler to accommodate records with variations in the center hole diameter or thickness.

### Installing Multiple Play Spindle

To play up to six records in sequence, remove the short manual spindle from the turntable.

Place the multiple play spindle (Fig. 19) in the center of the turntable. Rotate



Fig. 19

it until it lines itself up with the keyway in the center of the turntable. Press the spindle firmly down until a distinct "click" is heard.

Count the number of records you are putting on the multiple play spindle and place the record hold-down clip (Fig. 20) on the platform in the up position prior to installing records. When the records are sitting on the shelf of the spindle and the edge of the record platform, lower the hold-down clip to stabilize the records in place.

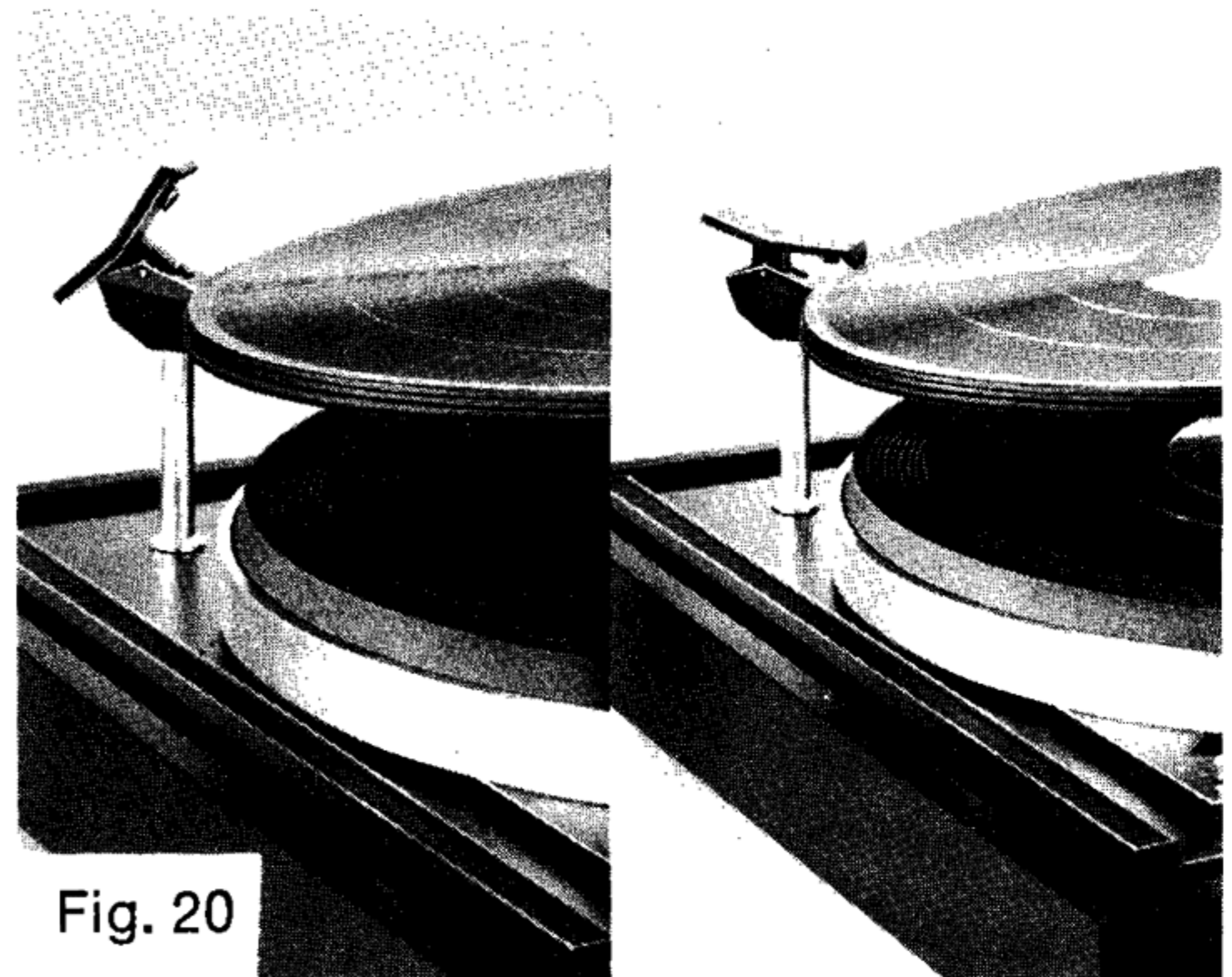


Fig. 20

Move the program selector control knob to the number corresponding to the records you have placed on the spindle. Press the cycle button and the tonearm will play all of the records automatically. When the last record has played, the unit will shut off. For example, to play four records, the four records are placed on the automatic spindle and the programmer is advanced to 4. The cycle button is



tapped, the four records play and the programmer determines when it is to shut off.

### **Multiple Play Plus Repeat of the Last Record**

If you wish to play less than six records and would like the last record to be repeated one or more times, simply move the program selector knob to the number of records plus the number of additional plays desired. For example, if three records are on the spindle and you wish the last record to play once and repeat three times, simply set the program control to the number 6. (Fig. 21).



Fig. 21

### **Removing Multiple Play Spindle**

All records must first be removed. To remove the records, tilt the stack down and away from the record platform and lift up. The automatic spindle can then be removed by grasping and lifting straight up.

### **Cueing and Pause Control**

The cueing lever (Fig. 22) is used to raise or lower the tonearm during automatic or manual play. Moving the control forward raises the tonearm, pushing it back lowers the tonearm.

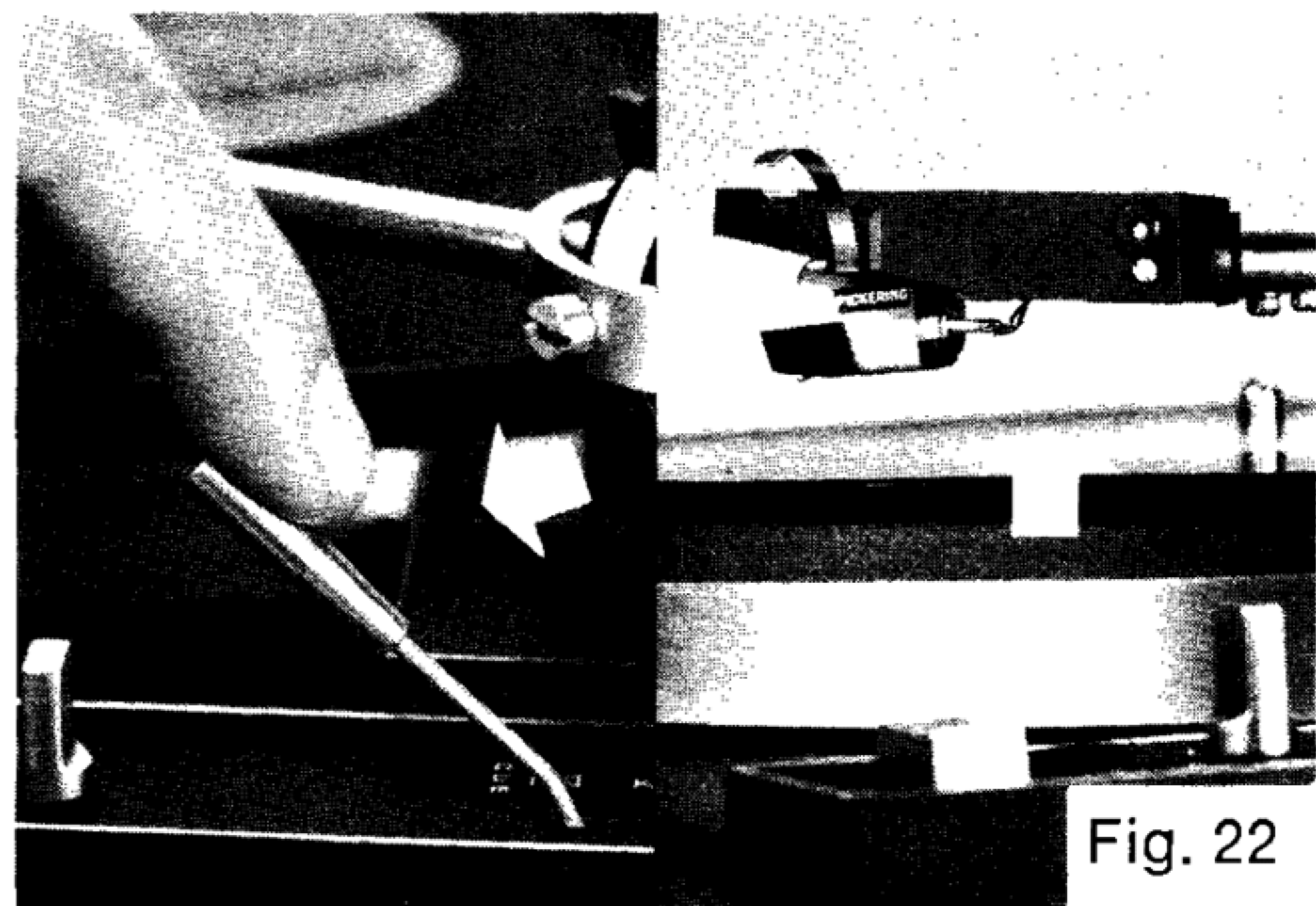


Fig. 22

### **Cueing Rate Adjustment**

Today, most manual and automatic turntables have a cueing device, and many are damped in both upward and downward motions. However, whether damping is accomplished by dashpots, springs, or other devices, they are all pre-set at the factory. This poses two problems:

First, temperature can affect the rate of cueing so that in hot climates the rate of drop is fast (frequently too fast) and in cold weather, may be too slow.

Second, the user normally has his own preferences as to the speed at which he wants the cueing to operate, and has been powerless to control it.

The Models 980 and 960 incorporate, for the first time in any tonearm, a variable control with which the owner can set the rate of cueing to his preference or compensate for temperature variations. The cueing rate can be increased or decreased by a knurled control knob, easily accessible from the top surface of the unit. (Fig. 23).



Turning the knob in a clockwise direction will decrease the rate of cueing; counter-clockwise rotation will increase the cueing rate. When turning the knob to its maximum up or down position, do not force it beyond the stop point.

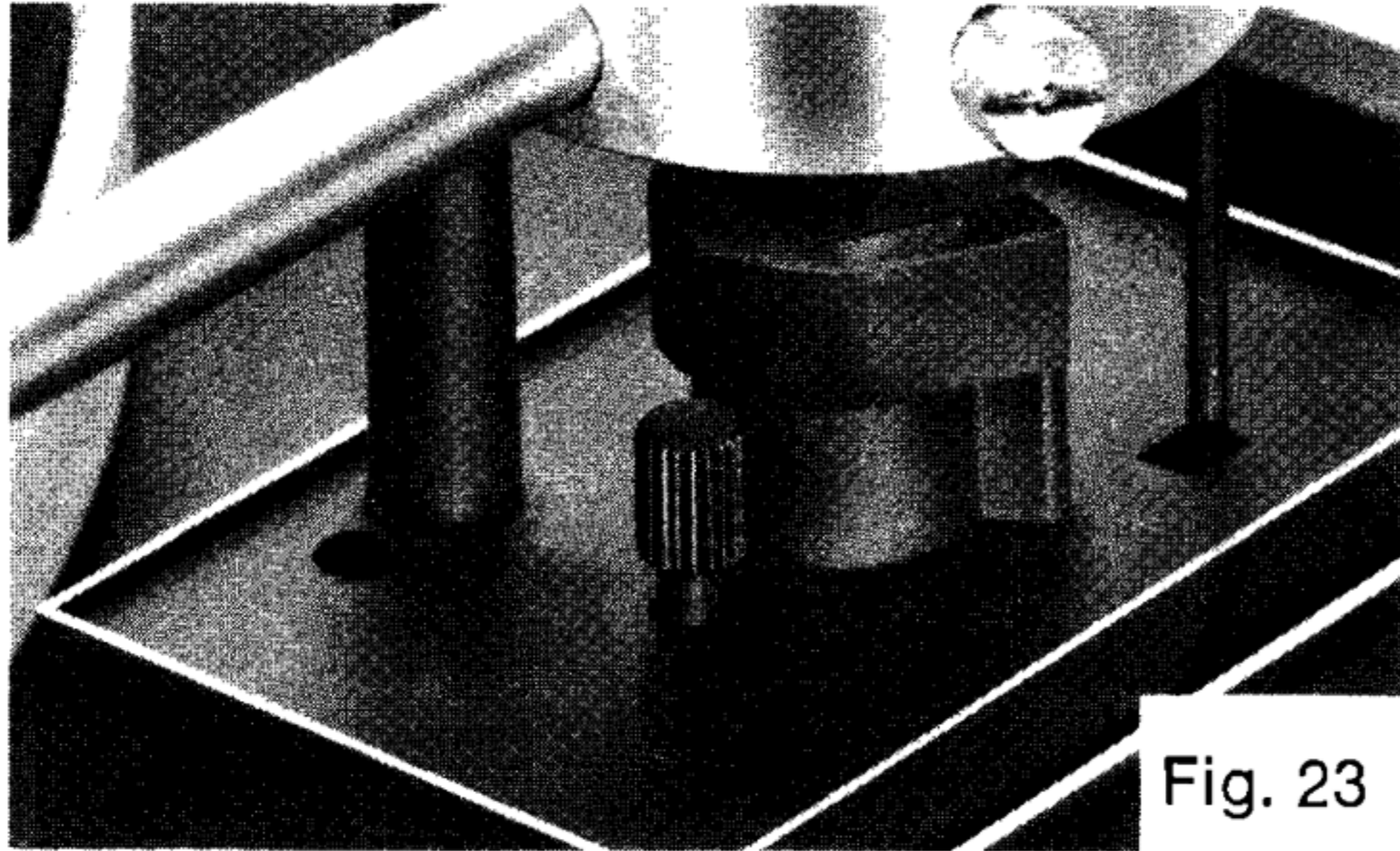


Fig. 23

### Stylus Set-Down Adjustment and Tonearm Height

Your Model 980 or 960 was carefully assembled and all necessary adjustments were performed at the factory. There are, however, two minor adjustments that may have to be made to suit your particular cartridge. One adjustment controls the point at which the stylus lands upon the record's surface. All records contain a groove guard (Fig. 24). Ideally, the stylus should land inside the groove guard just before the recorded portion of the record (Fig. 24). The tonearm set-down adjusting screw (Fig. 25) controls the exact point of set-down. To re-position the tonearm to land inside the groove guard, turn the adjusting

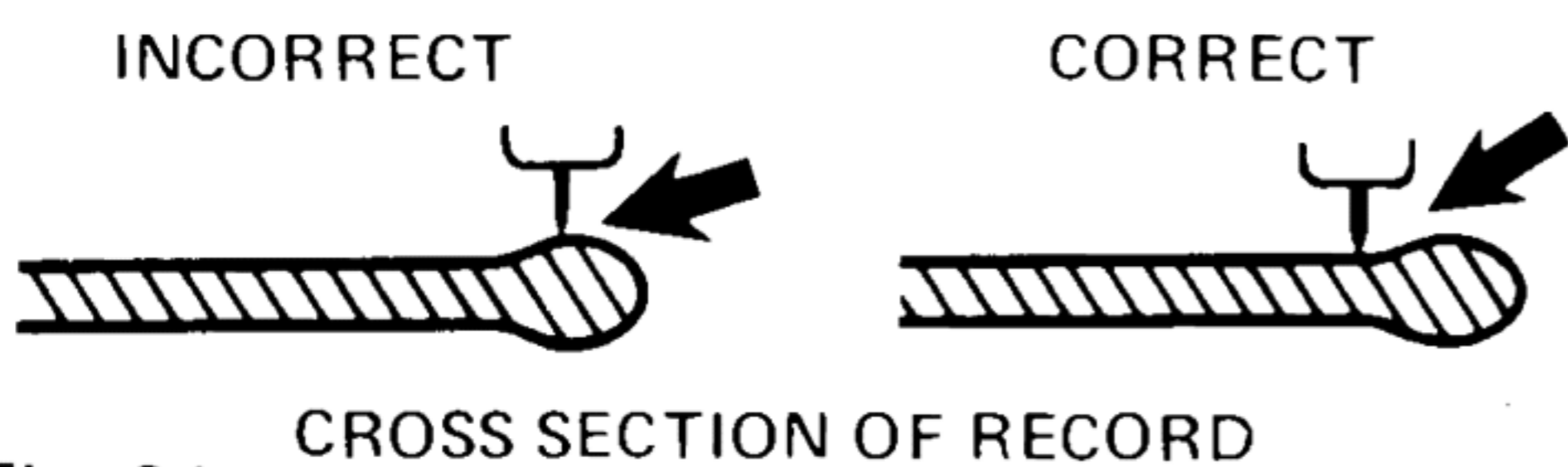


Fig. 24

CROSS SECTION OF RECORD

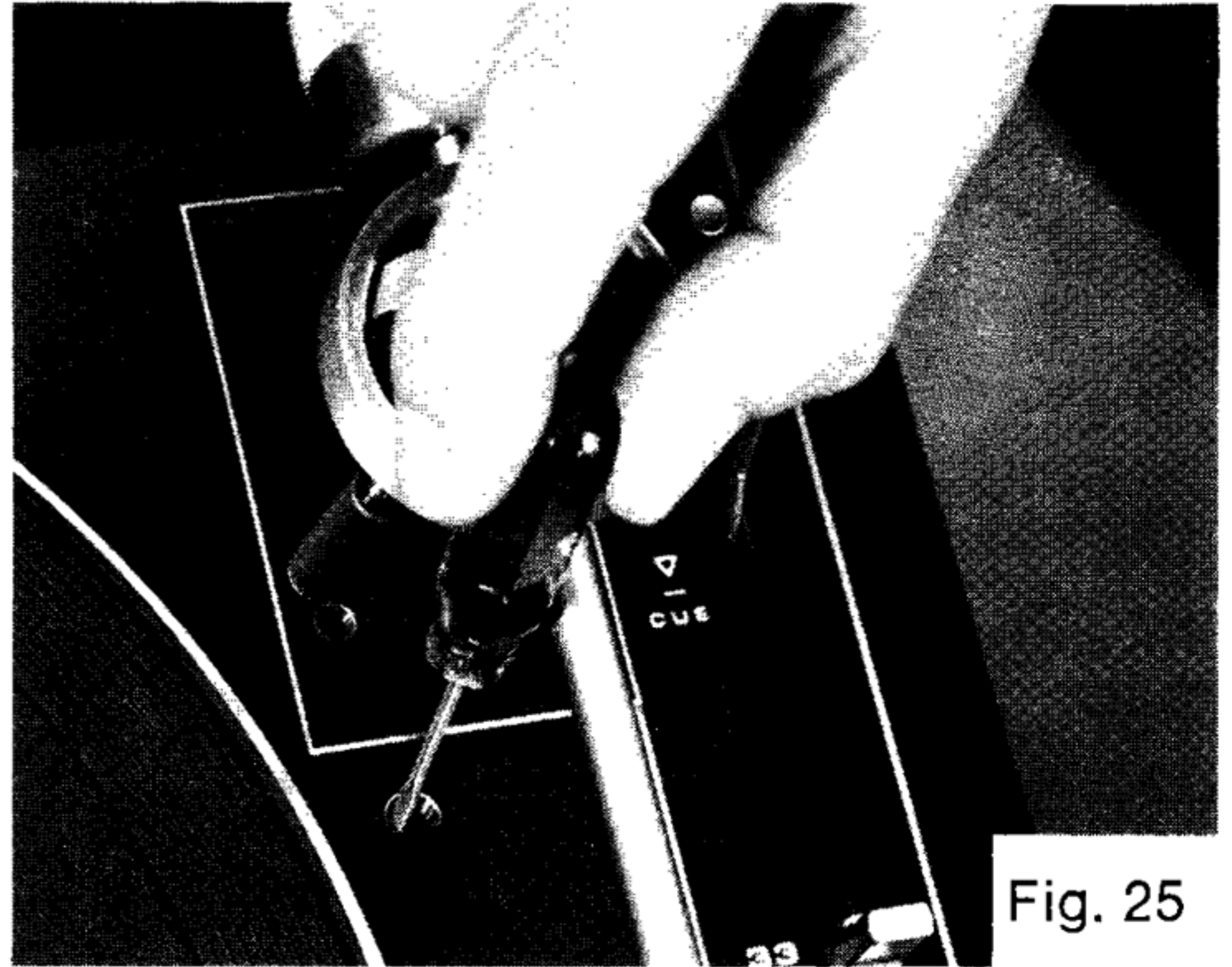


Fig. 25

screw (Fig. 25) until tonearm is at the correct position.

In rare instances, when very deep or very shallow cartridges are used, adjustment may have to be performed to the pickup height. This adjustment controls the amount of lift to the tonearm in both automatic play and manual cueing. The stylus should lift high enough to clear six records and the tonearm extension. If adjusted too high, the top of the shell will touch the bottom record on the stack. Turning the adjusting screw (Fig. 26) counter-clockwise will raise the tonearm; clockwise rotation will lower the tonearm.

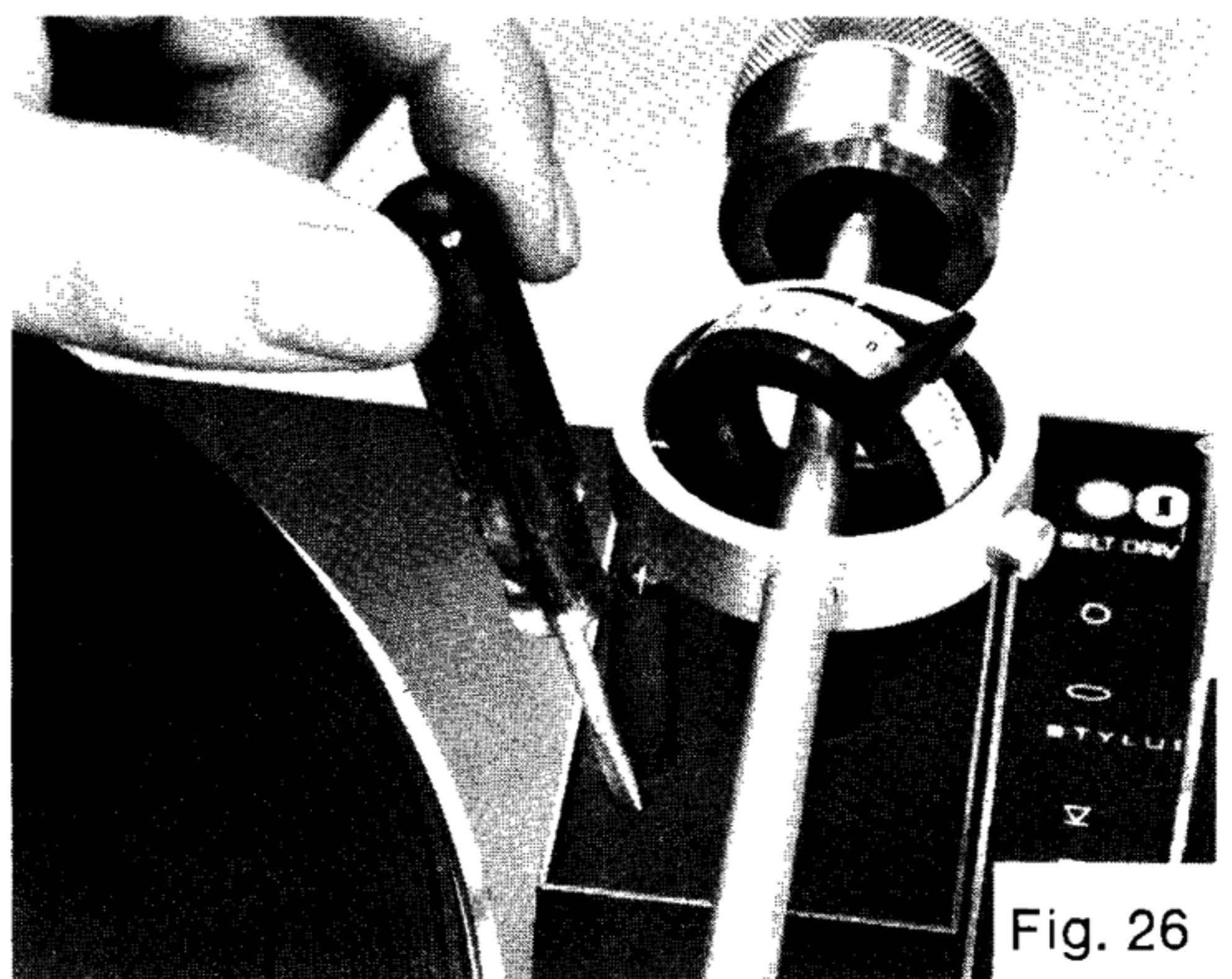


Fig. 26



# Maintenance and Record Care

## Turntable Removal

It is not necessary to remove the turntable mat in order to remove the turntable. The turntable assembly is held in place by a nylon retaining clip located in the center. Remove the spindle and lift one edge of the retaining clip with a screwdriver until the edge of the clip is lifted free (Fig. 27). Once this has been done proceed in



Fig. 27

the same manner with the other edge of the clip, remove, and lift off the turntable (Fig. 28).

A rubber "O" ring and washer may come off with the turntable. Re-insert the

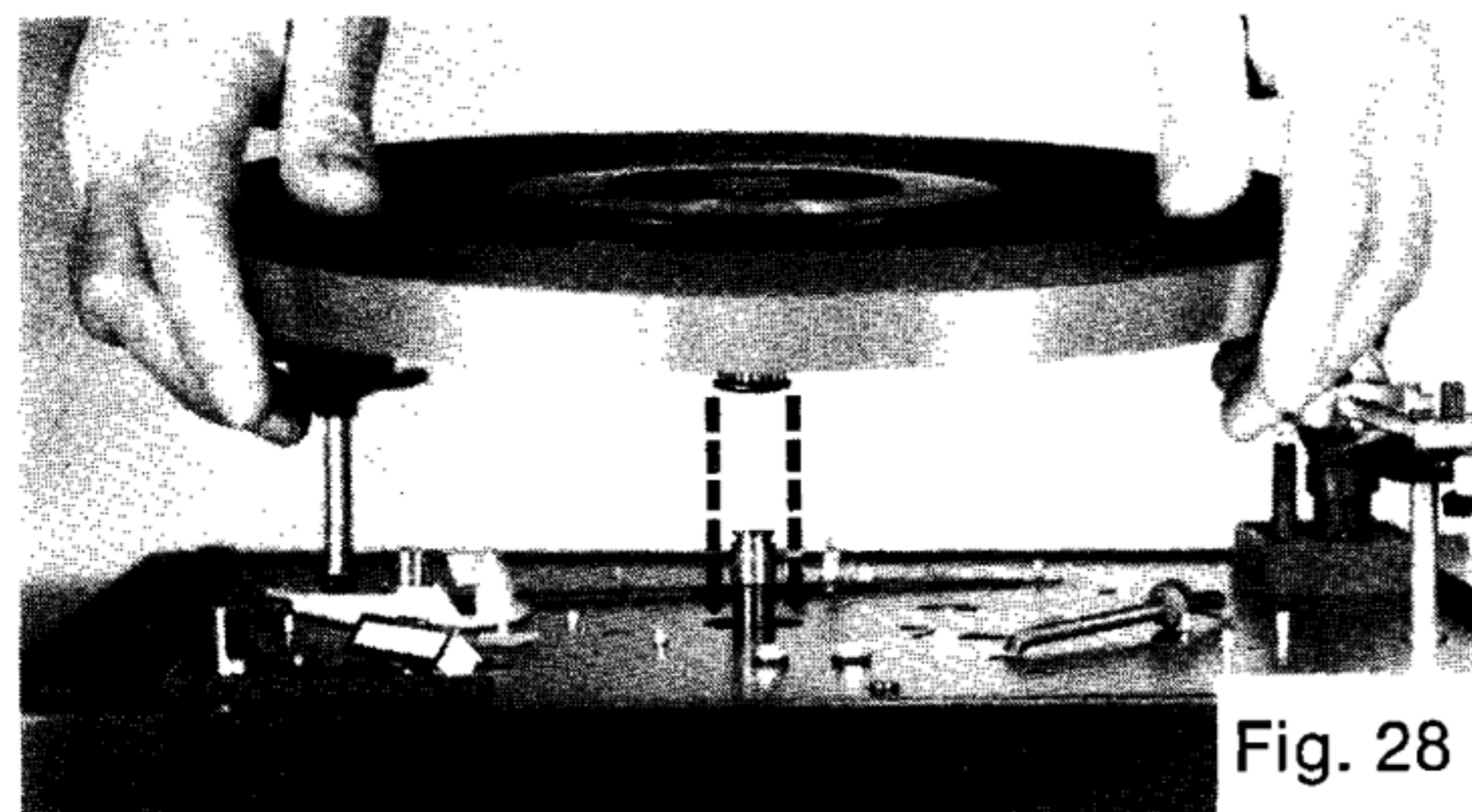


Fig. 28

"O" ring and washer onto the turntable spindle. Be sure the "O" ring is atop the washer. Do not lose these parts! When the turntable is re-installed, the rubber "O" ring and washer (already on the spindle) will automatically align with the bottom of the turntable hub (Fig. 28).

## Belt Installation

When the turntable is removed, the drive belt will come off the rim of the turntable. To re-install the belt onto the platter, place the belt on the drive rim of the turntable (Fig. 29). Grasp the belt and engage either one of the two belt retaining studs projecting from the turntable. Do not twist belt. On the top surface of the platter there are two indicators (Fig. 30). These indicators line up with the two studs. When re-installing the platter, locate the turntable so that the indicator for the stud retaining the belt is facing your left (parallel to front of machine—Fig. 30). Make certain the speed control is set at the 33 position. Place the turntable on the spindle and rotate the turntable clockwise one full turn. The belt will automatically engage the motor pulley.

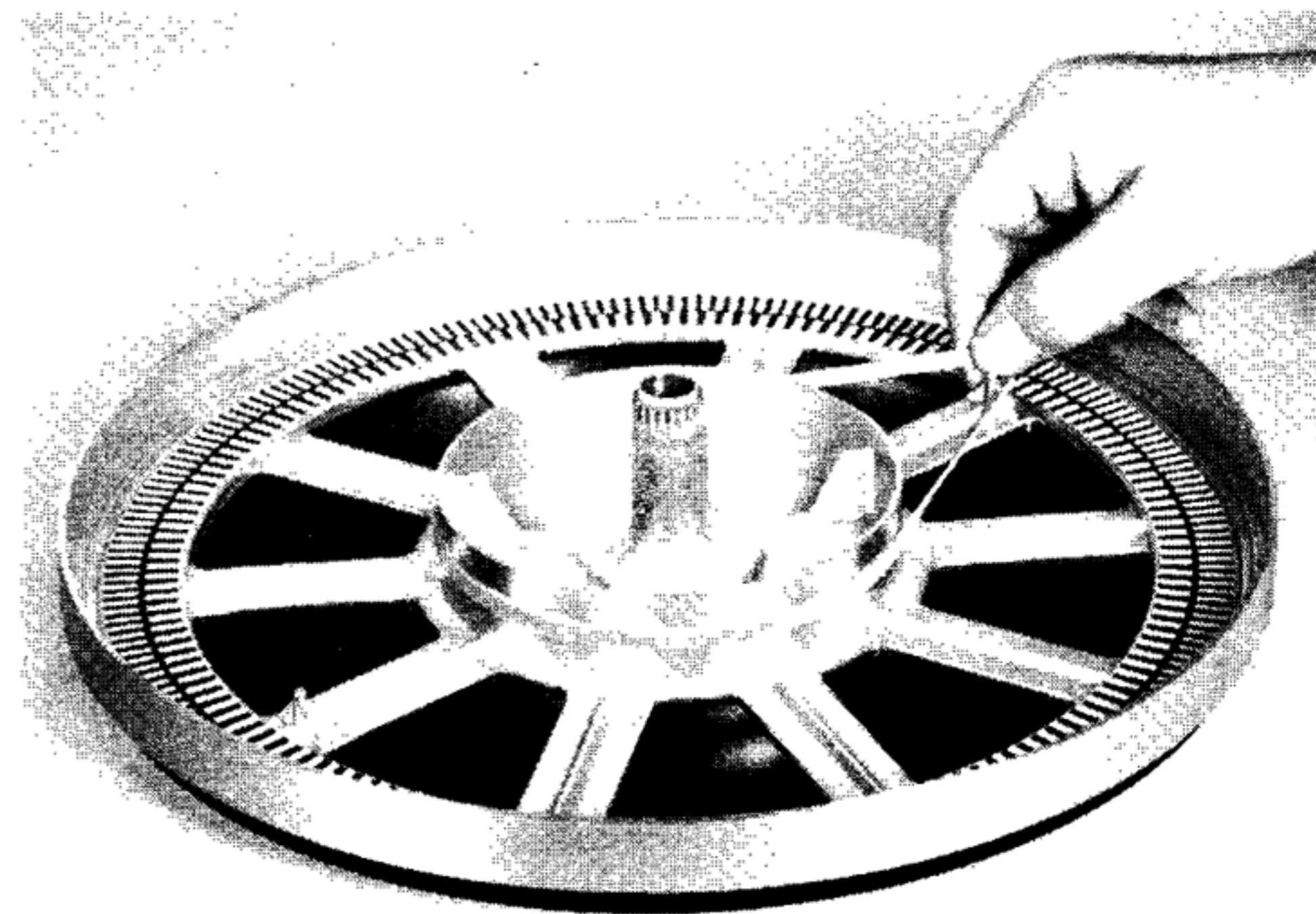


Fig. 29

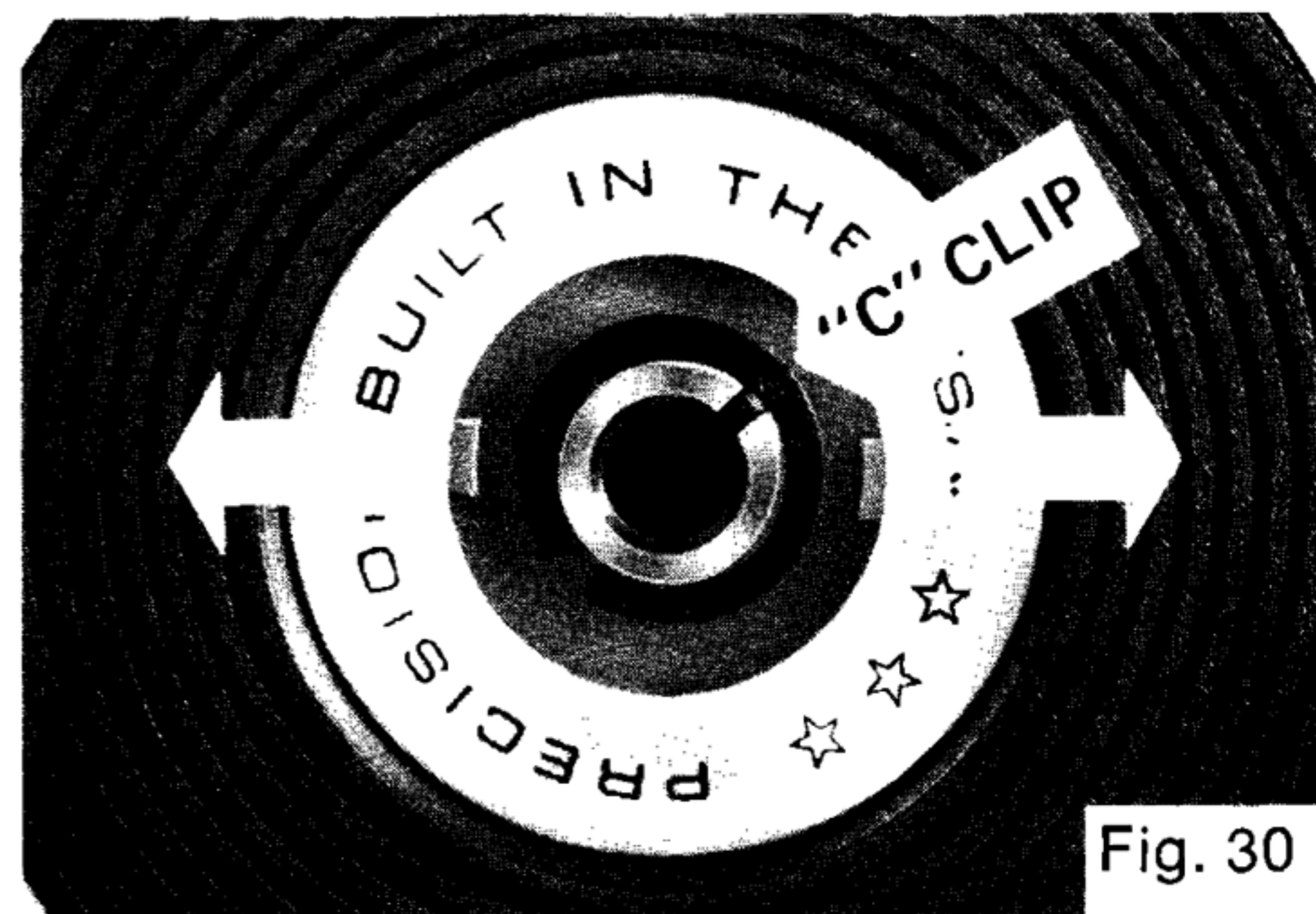


Fig. 30



# Spare Parts, Accessories and Technical References

## Re-install the Turntable Retaining "C" Clip

The turntable "C" clip has a projection on both the top and bottom. This projection must fit fully into the slot of the turntable spindle. (Fig. 30).

## Record Care

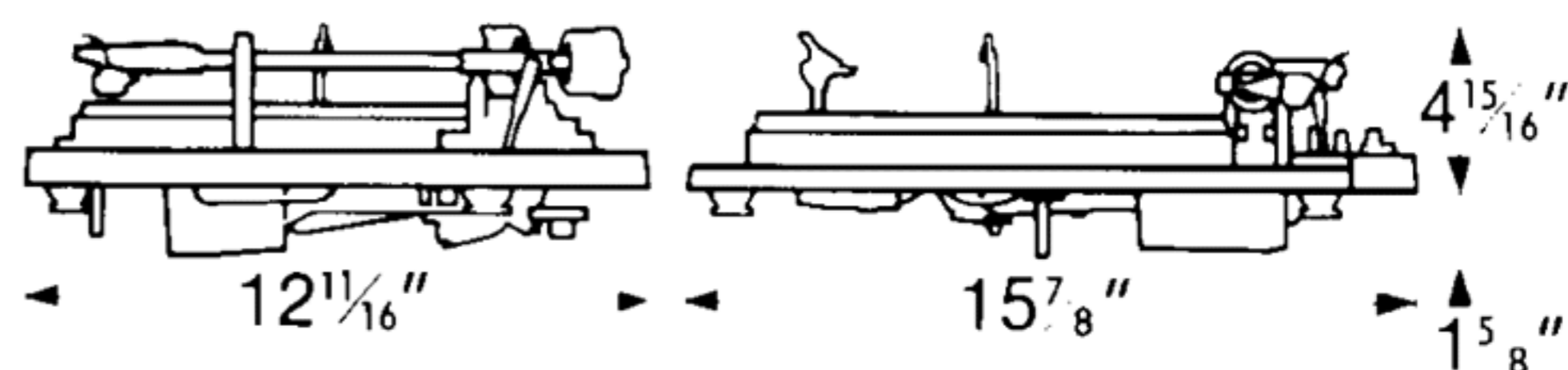
Keep the cartridge and stylus clean and replace if worn. Periodically have the stylus inspected by your dealer.

Return all records to their protective sleeves and jackets. Do not leave records on the turntable for long periods, if not in use.

Store vertically rather than horizontally or flat. If possible, store records at average room temperatures. Do not permit them near or in contact with heat producing devices, such as radiators, electronic equipment, amplifiers, etc. Excessive temperatures tend to cause warpage of records. Avoid handling the groove surfaces as this will deposit a film of oil on the grooves. Hold records by their outer edges when mounting or removing from turntable to keep records clean.

## MINIMUM CABINET DIMENSIONS

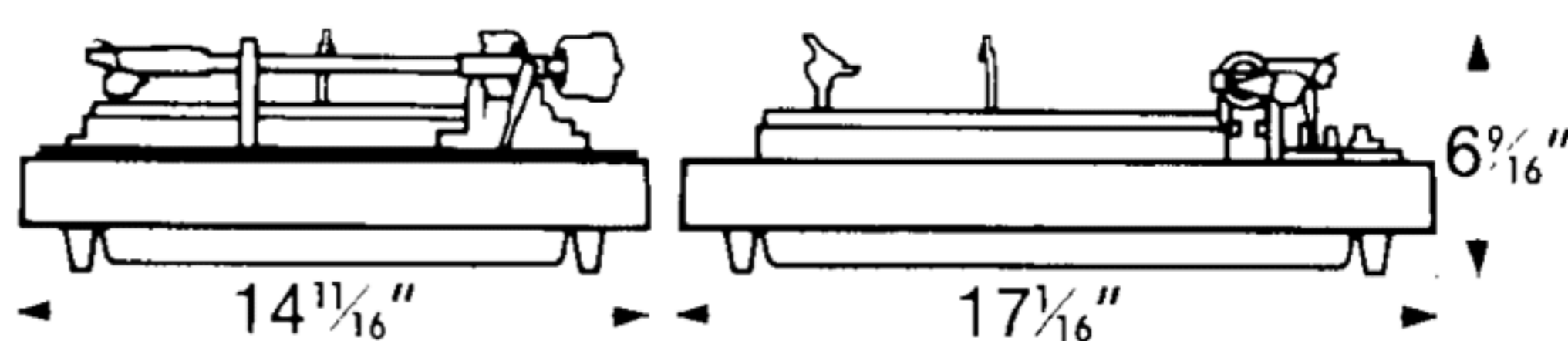
### Unit Off Base



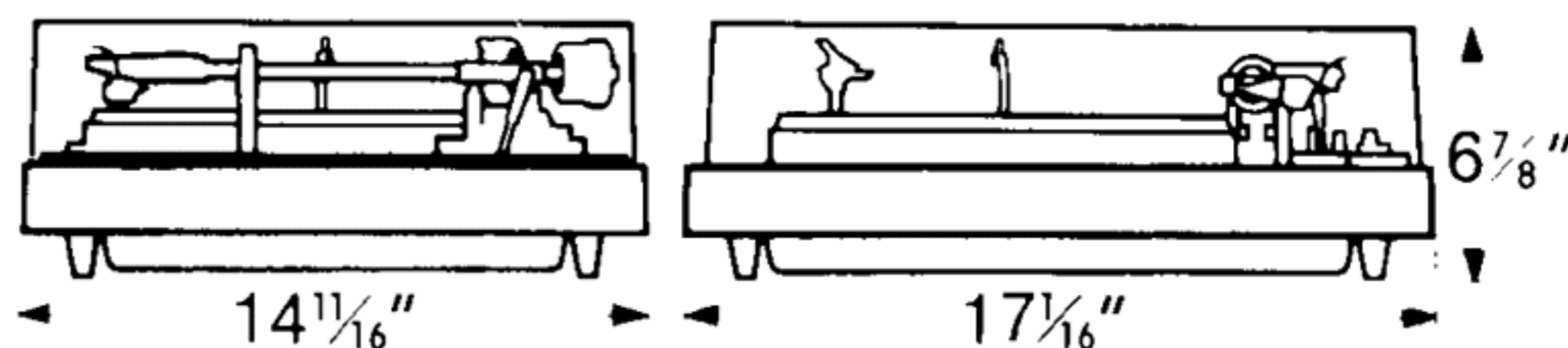
A mounting template is available on request.

1" additional is required above the unit, for removal of automatic spindle, when placed in a confined space.

### Unit On Base Without Dust Cover



### Unit On Base With Dust Cover



### Unit On Base With Dust Cover Raised

Left to right .....	17 1/16"
Front to rear .....	20"
Total height .....	16"
Dust Cover height .....	4 1/4"

Dimensions are with an automatic spindle.

## Spare Parts

To insure positive identification of your unit when ordering spare parts, please quote all the information printed on the foil label underneath the unit plate or on the outside of the packing carton. Also quote the part number if listed, the color, the voltage and the power supply frequency.

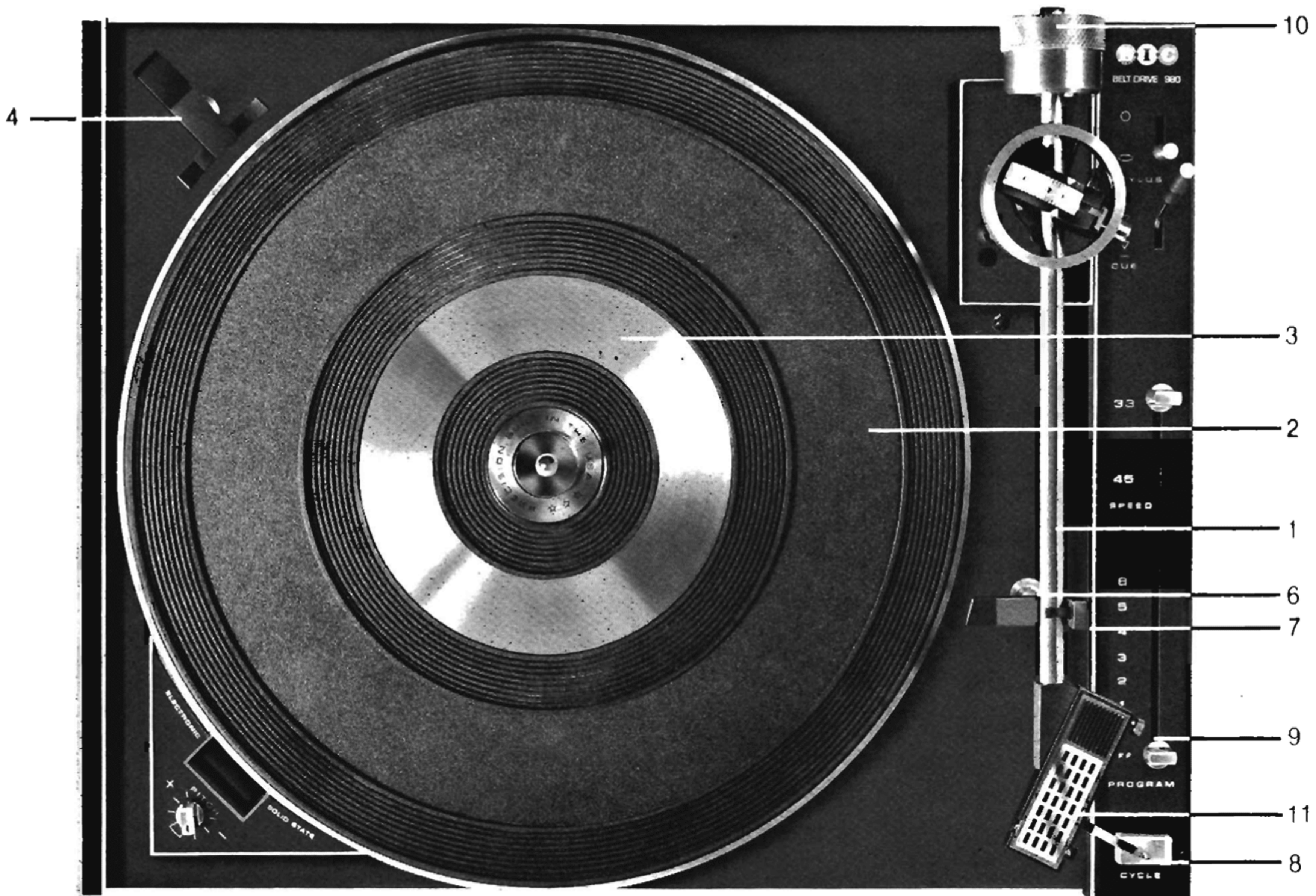
Please address inquiries for spares and service to your dealer.

In case of difficulty, send your inquiry to:

British Industries Company  
Westbury, New York, 11590



SPARE PARTS, ACCESSORIES AND TECHNICAL REFERENCES



**Accessories**

- A-1 Plug-in Head
- A-2 45 rpm Automatic adaptor
- A-3 Automatic spindle
- A-4 Manual spindle
- A-5 50 cycle pulley for 960
- A-6 50 cycle strobe for 980
- A-7 Elastomer drive belt
- A-8 Stylus setting gauge
- A-9 Shell lock nut/"C" clip/"O" ring.

**Part Number and Description**

- 1. 10-028-01 Tonearm assembly
- 2. 10-043-01 Turntable & mat assembly with insert (960)
- 3. 10-043-02 Turntable & mat assembly with insert (980)
- 4. 10-040-01 Record support assembly

- 5. 37-344-01 Cartridge setting gauge
- 6. 37-106-01 P/U rest post
- 7. 37-355-01 P/U rest lock
- 8. 38-386-01 Finger lift
- 9. 39-381-01 P/U head locking nut
- 10. 10-026-01 Counterbalance weight
- 11. 38-151-01 Trim plate for shell

**Items Not Shown**

- 37-143-01 T/T retaining clip
- 37-175-01 "O" ring
- 37-539-01 45 rpm manual adaptor
- 17-113-03 Stereo Audio Cable(s)
- 37-540-01 Isolation mount
- 39-602-01 60 cycle pulley



**Official Bases**

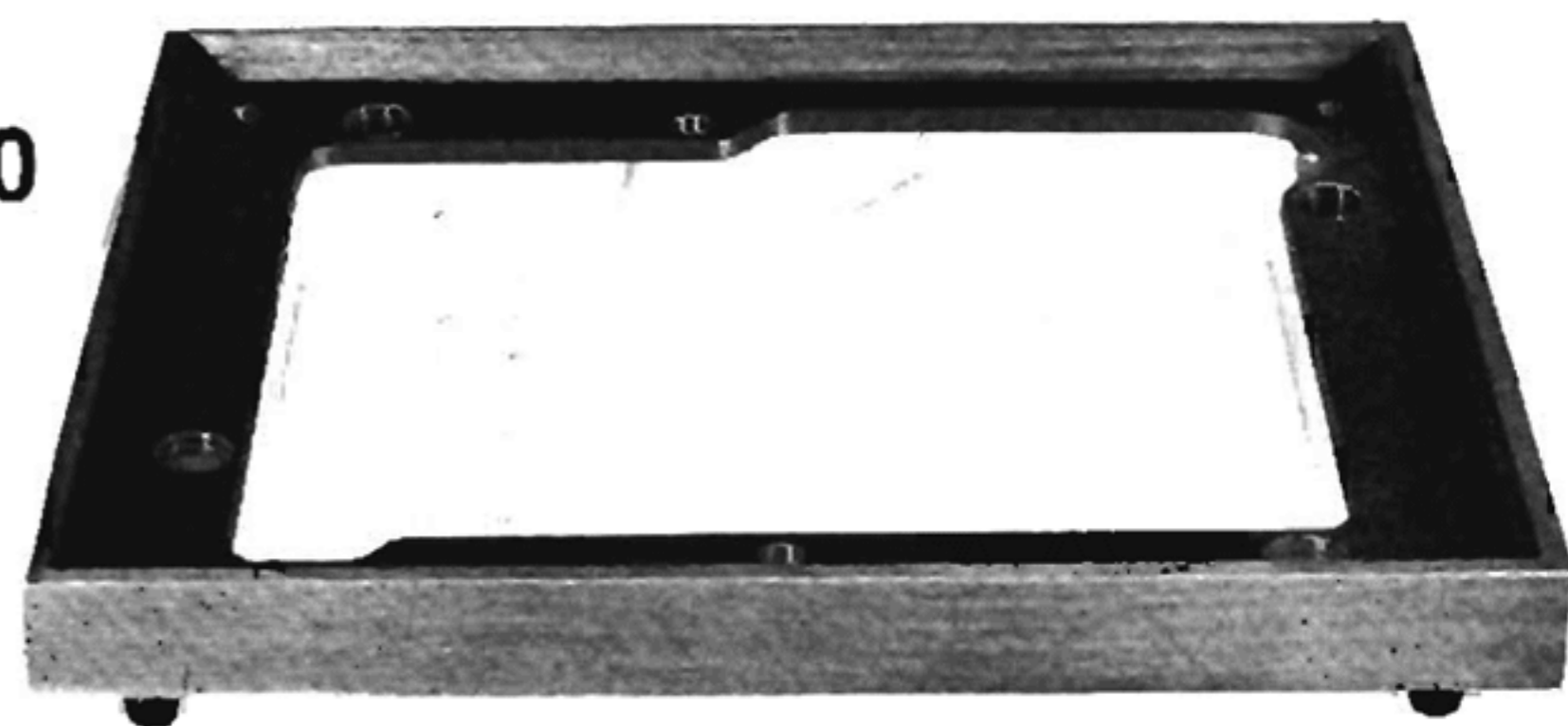
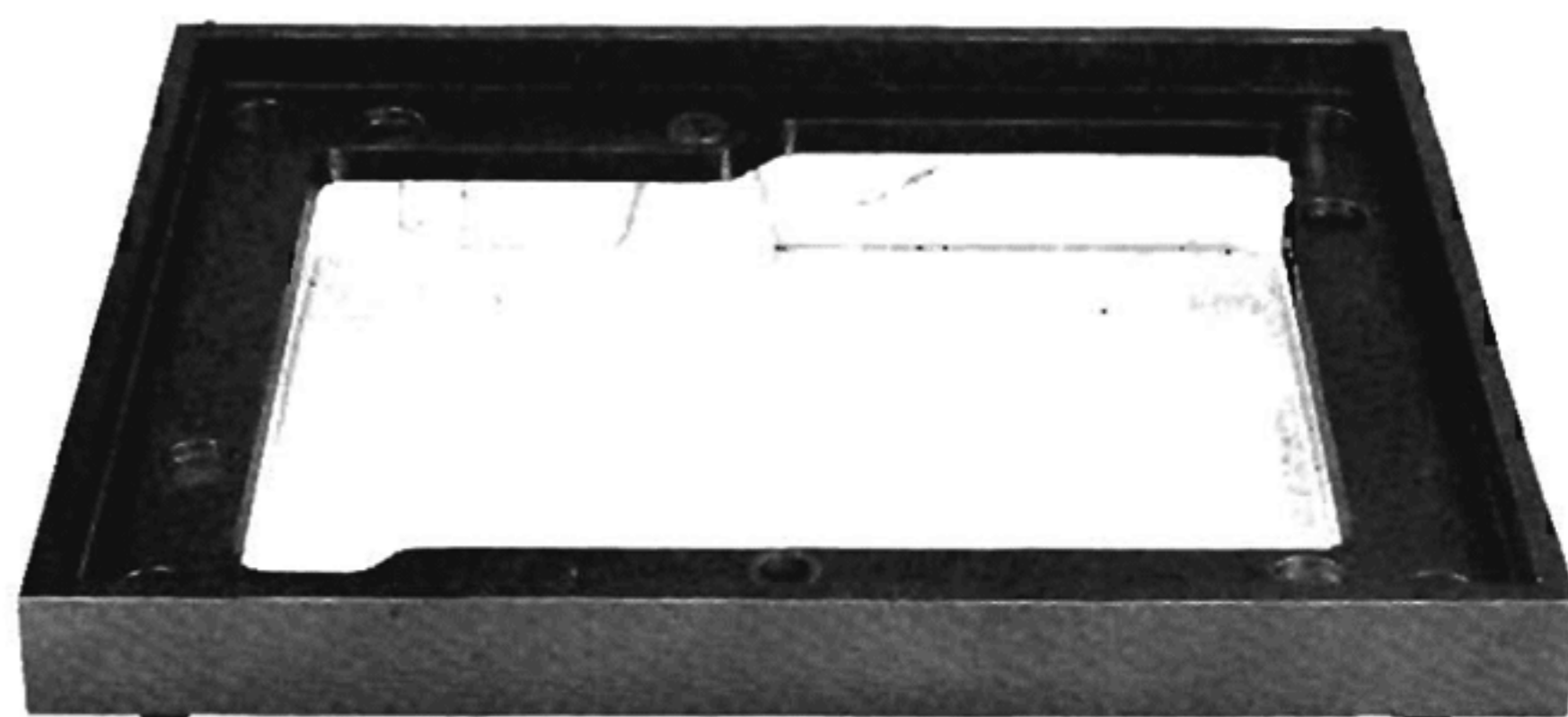
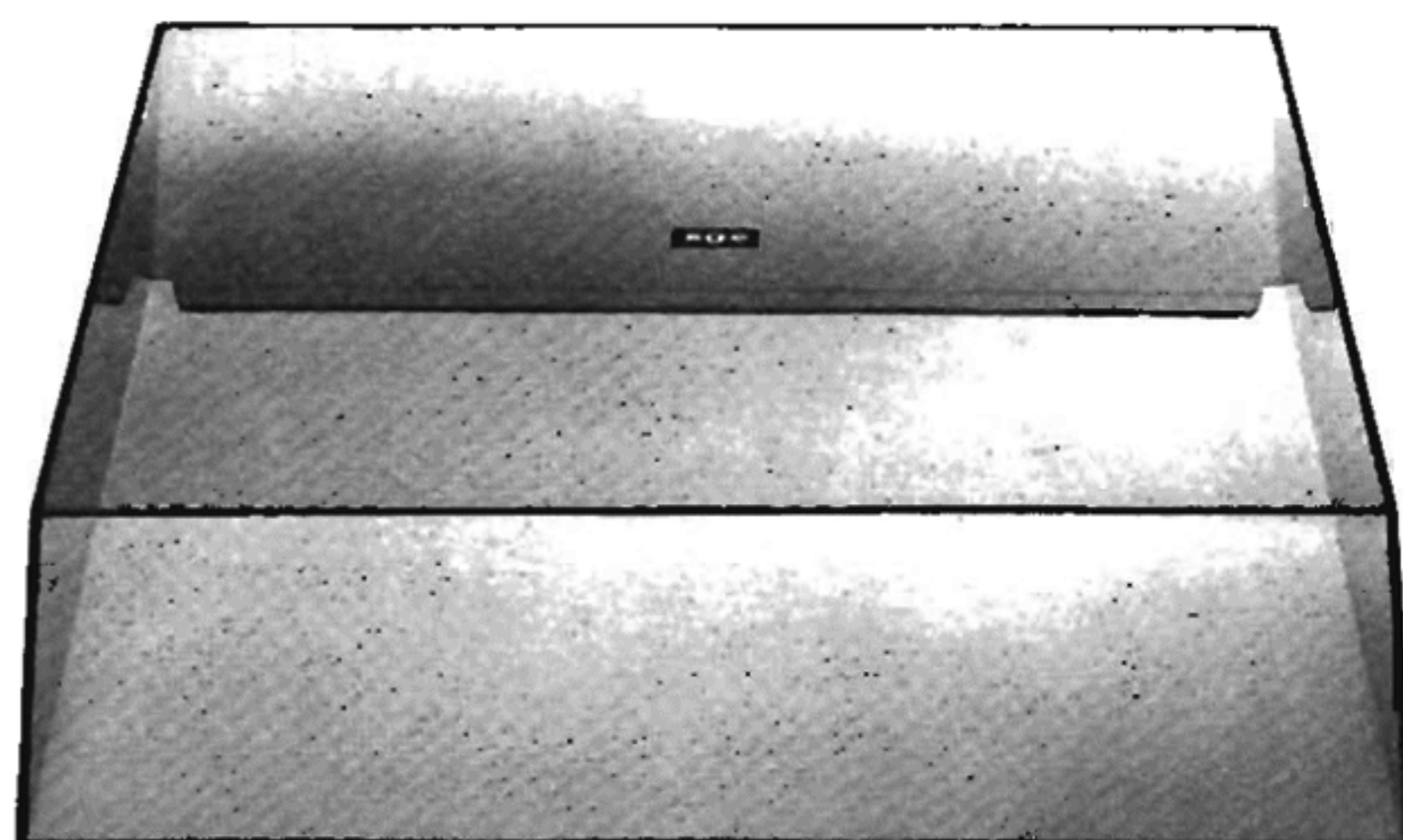
The two bases available for the B·I·C Programmed Turntables are as unique in design as the machines themselves. Their low-profile disguises the sturdiness of construction throughout. Both bases include the exclusive "see-through" bottom safety cover which provides maximum protection from mechanical and electrical hazards.

**WB20 Wood Base** Solid oiled walnut furniture finish. Unitized construction.

**B20 Molded Base** Molded base with black matte finish for easy care and cleaning. Unitized construction.

**Official Dust Cover**

**D20** The B·I·C Dust Cover fits the B-20 and WB-20 Bases in the 900 series. Its unique construction and design eliminates hinges and other unsightly supports.

**WB20****B20****D20****General Specifications**

The Models 960 and 980 are wired for 117 volts, 60 cycle operation in the United States. Both units are compatible with 50 cycle operation and can be easily converted. On the underside of all units is a code tag which lists electrical specifications.

The Model 960 requires a 50 cycle pulley while the Model 980 requires a 50 cycle strobe disc. These items available through your dealer or from British Industries Co. Detailed information is supplied with each 50 cycle kit. For operation on 220 volts, contact your local dealer or service center for a suitable step-down transformer and conversion.

**Cartridge Mounting Screws** The Model 980 & 960 are supplied with three pairs of machine screws. Their lengths are  $\frac{3}{16}$ ",  $\frac{1}{2}$ " and  $\frac{5}{16}$ " type No. 3—48 threads per inch.

**Belt** The drive belt used in the Model 980 & 960 is made of elastomer and is carefully ground to exact specifications for maximum performance. If ever a new belt is required, we highly recommend that you purchase the genuine, exact factory replacement as inferior replacement belts will seriously downgrade the performance of your unit. This is also available through your local dealer or British Industries Co.

**Motor** B·I·C Turntables incorporate a 24 pole, 300 rpm motor of outstanding characteristics. The design nature of this motor insures many trouble-free hours of listening pleasure and very seldom, if ever, requires maintenance or lubrication.

**Speed** The Model 980 & 960 will play records recorded at  $33\frac{1}{3}$  and 45 rpm.

**Record Size** Twelve inch  $33\frac{1}{3}$  rpm records may be stacked and played automatically on the automatic spindle supplied with the unit. Seven inch 45 rpm records may be stacked and played automatically on the optional automatic 45 rpm adaptor, Stock No. A-2. All other size  $33\frac{1}{3}$  and 45 rpm records can, of course, be played manually.

**Maximum Number of Records** B·I·C Turntables accept and play up to six records automatically.

**Cartridge** B·I·C Turntables will accept any cartridge manufactured at the time of this writing, and will track at the lightest force recommended by cartridge manufacturer.

**Cable Capacitance** The *total* cable capacitance (all wiring) of the Model 980 & 960 is less than 125 pf and, therefore, is perfectly compatible with Discrete Four Channel records (CD-4).



# Fault Finding Chart

**Disconnect the power supply and protect the stylus before making investigations.**

SYMPTOM	CAUSE	REMEDY
Unit fails to start or does not turn.	Nylon packing wedges not removed. No power supply to motor.	Remove all wedges. Check that power supply is in order. Check lead connections. If necessary, clean and re-align connections. Make certain leads are secure. See page 14 for proper installation.
Speed consistently fast or slow (960 only).	Belt not attached properly. Misadjusted or incorrect motor pulley.	Adjust height or replace with the correct motor pulley for the frequency in your area.
Speed variation — Wow or Flutter	Warped record when playing a stack. Grease or oil on driving surfaces, belt, etc.	Play singly. Wipe with a clean lint-free cloth.
No sound.	Incorrect or defective cabling. Defective pickup cartridge.	Check cabling instructions, page 7 fig. 9 & 10. Check cartridge.
Low humming sound.	Ground lead disconnected.	Check cabling and ground lead connection.
Distorted sound.	Worn, damaged or incorrect stylus. Dust on records or stylus affected by fluff. Cartridge out of position.	Replace stylus, if necessary. Check stylus force. Handle and clean records as recommended by the manufacturers. Carefully remove any dust or fluff build-up from around stylus. Check its position with setting gauge.
Tonearm lowers to incorrect position.	Pickup stylus out of position. Setdown adjustment not properly set.	Reset or replace stylus. Adjust setdown position in accordance with instructions.
Tonearm lifts too high.	Tonearm lifting height adjustment incorrectly set.	Adjust height in accordance with instructions, page 22, no. 1.
Tonearm will not lower to record at any time, or will not track properly.	Stylus force too low.	Adjust settings of counterbalance weight and pickup stylus force in accordance with instructions, pages 5 and 6.
Tonearm will not lower for automatic use after manual play.	Cue control is in "UP" position.	Move control back to "DOWN" position.



SYMPTOM	CAUSE	REMEDY
<p>Tonearm will not rise from its rest.</p> <p>Records do not drop.</p>	<p>Arm locked to its rest.</p> <p>Auto spindle not properly in place.</p>	<p>Move locking lever to free tonearm.</p> <p>Check page 11 for correct installation.</p>
<p><b>TURNTABLE SPEED</b></p> <p>1. Variable speed control not in center.</p> <p>2. Unit runs slow, even after adjusting speed control.</p> <p>3. Electronic circuit board defective.</p> <p>4. Motor pulley mis-adjusted.</p> <p>5. Turntable does not revolve.</p> <p>(a) defective switch</p> <p>(b) motor pulley</p> <p>(c) Line Cord</p>	<p>Speed Adjust not set properly.</p> <p>Excessive lubrication on driving surfaces.</p> <p>Component defective.</p> <p>Belt rubbing on speed change mechanism or upper motor plate.</p> <p>Contacts not closing.</p> <p>Motor pulley is not locked in place.</p> <p>Improperly wired or open.</p>	<p>An electronic adjustment control is provided for centering the variable speed control. Refer to schematic, 980 motor supply for this adjustment.</p> <p>Clean the motor pulley, belt, and turntable hub with a clean cloth, saturated in alcohol.</p> <p>Isolate and replace defective component using schematic; if necessary, replace entire board.</p> <p>Relocate the pulley to its proper position. Examine the speed change mechanism to make certain the belt is not rubbing.</p> <p>Replace entire switch assembly.</p> <p>Adjust height of the pulley and fully tighten the locking screw.</p> <p>Rewire or replace.</p>
<p><b>TO NEARM</b></p> <p>1. Record setdown</p> <p>(a) Tonearm does not land on record or too far in.</p> <p>(b) Tonearm lands at 7" position when set for 33.</p>	<p>Stylus overhang adjustment not properly made.</p> <p>Adjustment for record setdown dropping position improperly set.</p> <p>Pickup lever bent.</p> <p>Pickup lever not moving to correct size selector cam.</p>	<p>Using the gauge, reset the location of the stylus.</p> <p>Re-adjust by turning setdown adjusting screw.</p> <p>Re-align; or, if necessary, replace.</p> <p>Inspect the point where the pickup lever contacts size selector cam. Make certain the size selector cam is moving and check for spring becoming detached.</p>



FAULT FINDING CHART

SYMPTOM	CAUSE	REMEDY
<p>2. Tonearm does not return at end of record. Unit does not trip.</p>	<p>Trip pawl on main cam gear sticking. Stylus overhang or setdown dropping position set improperly. Trip rod too short. Angle of trip pawl incorrect.</p>	<p>Clean the pivot with cotton swab saturated in alcohol. <i>DO NOT</i> lubricate. Re-adjust.  Re-align or replace. Replace or re-align.</p>
<p>3. Fails to track record. Lateral friction</p>	<p>Tonearm leads too tight.  Cueing brake pin not disengaging.  Defective ballbearing or rust.</p>	<p>Remove the tape covering the P/U leads and pull slack into the area directly under the pickup arm pivot spindle. Apply a drop of oil to the brake pin and make certain it is disengaging from the brake pad of the pickup lever. Replace entire assembly.</p>
<p>4. Sticks on last band of record.</p>	<p>Excessive friction in trip mechanism.</p>	<p>Clean the pivot with cotton swab saturated in alcohol.</p>
<p>5. Stylus does not track first grooves of a record.</p>	<p>Setdown not properly set.</p>	<p>Re-adjust as follows: All records have a raised outer circumference which is called a groove guard. If the stylus lands on this raised section of a record, the tonearm will have a natural tendency to skate inward on the record. In order to correct a condition of this nature, the setdown adjusting screw should be turned in a clockwise direction until the tonearm lands inside of the groove guard.</p>
<p>6. Does not track warped records.</p>	<p>Vertical friction.</p>	<p>Loosen the right-hand vertical pivot bearing a slight amount. If the problem is corrected, and there is not excessive bearing play, shim with washer or replace pivot screw.</p>



SYMPTOM	CAUSE	REMEDY
<p>RECORD DROP</p> <p>1. Tonearm lifts and moves over to record but record does not drop.</p> <p>2. Does not drop record and tonearm does not move.</p> <p>3. Drops more than one record.</p>	<p>Record platform slightly cocked and record is hanging up on one of the two extensions.</p> <p>Automatic spindle not seated properly.</p> <p>Record exceeds thickness established by NAB standards for thickness.</p> <p>Record pawl not moving fully.</p> <p>Record platform or unit plate bent.</p> <p>Spindle pawl is not <math>\frac{1}{16}</math> of an inch above the step of the spindle.</p> <p>Automatic trip mechanism not activated in change cycle.</p> <p>Spindle latches sticking.</p> <p>Record is too thin.</p>	<p>Loosen locknut. Re-align record platform, tighten locknut.</p> <p>Press the automatic spindle firmly and fully down.</p> <p>Play this type of record manually.</p> <p>Check release lever. Make certain it is not restricted. If release lever is moving fully, spindle blade is defective and automatic spindle should be replaced.</p> <p>If spindle blade moves <math>\frac{1}{16}</math> of an inch past the stop of the spindle and the record does not move off the platform, the platform is defective. Replace the platform assembly; make certain the unit plate is not bent.</p> <p>Inspect the spindle pawl spring blade to make certain it is applying adequate upward pressure.</p> <p>Reshape or replace, if necessary. If blade is applying pressure, check spindle blade for excessive friction.</p> <p>Apply one drop of lubricant to spindle and wipe off surplus. If spindle blade still sticks, replace.</p> <p>See page 20 under heading "Tonearm does not return at end of record." Also inspect cycle button rod make sure it is activating trip pawl on the cam gear.</p> <p>Re-align cycle button rod.</p> <p>Activate spindle latch to insure that it comes all the way down.</p> <p>If not, apply one drop of sewing machine oil and remove excess oil with cloth. If this does not correct the problem, replace spindle.</p> <p>Records that do not conform to standards will double-drop and this type of record should be played manually.</p>



FAULT FINDING CHART

SYMPTOM	CAUSE	REMEDY
<p>CUEING</p> <p>1. Does not lift high enough or cueing lifts too high.</p> <p>2. Cueing drops too fast or too slow.</p> <p>3. Cueing drops too fast, even after adjustment.</p> <p>4. Cueing drifts.</p>	<p>Height adjustment screw improperly set.</p> <p>Cueing cam lever bent.</p> <p>Adjusting knob for rate of descent improperly set.</p> <p>Inadequate supply of silicone damping fluid.</p> <p>Cueing brake rod not operating properly.</p>	<p>Turn screw counterclockwise to raise the tonearm. Pickup height screw also controls the amount of lift during automatic play. After making this adjustment, make certain that when the tonearm lifts in automatic cycle that the top of the pickup head does not touch a stacked record. Lower slightly, if necessary.</p> <p>Replace.</p> <p>Turn knob, fig. 23 page 13, clockwise to decrease speed; counterclockwise to increase speed.</p> <p>Replenish.</p> <p>Examine the brake rod to make certain it is contacting the pickup lever. If it is not contacting, pin is sticking and should be lubricated.</p>
<p>AUDIO</p> <p>Loss of one or both channels.</p>	<p>Cartridge improperly wired.</p> <p>Defective audio cable.</p> <p>Broken wire at phono socket or inside of tonearm.</p>	<p>Rewire cartridge, as per diagram page 5, fig. 3.</p> <p>Reverse audio cable at automatic turntable phono socket. If defective channel moves to the other speaker, audio cable is defective and should be replaced.</p> <p>Examine the phono socket to see if all wires are properly attached. If solder joint appears "cold," resolder. Check the tonearm wiring harness from the phono socket to the pickup head connector with an ohmmeter. If an open wire is detected once again check connection at phono socket and pickup head plug; resolder, if necessary. If connections are OK, replace tonearm wiring harness.</p>



# Lubrication

All of the points of pivot and bearing surfaces have been lubricated at the factory and very seldom, if ever, require lubrication.

We have shown below the points of lubrication and the recommended lubricants. There are a few matters that are extremely important and we highly recommend that you carefully follow the procedures listed below:

1. Before applying lubrication, clean off as much of the old lubricant as you can with a clean, lint-free cloth saturated in a solvent such as alcohol.
2. Apply lubrication *sparingly*; excessive lubrication will accumulate dust, congeal, and cause problems at a later date.

3. Use lubricants only as recommended.
4. When lubricating any part on top of the unit plate, take special care not to contaminate the drive surfaces which consist of motor pulley, inner rim of the turntable and belt.

If this happens, immediately remove the belt and replace with a new one and clean the lubrication from the motor pulley and turntable rim with a lint-free clean cloth saturated in rubbing alcohol. Repeat this several times and allow to thoroughly evaporate for several hours before installing the new belt.

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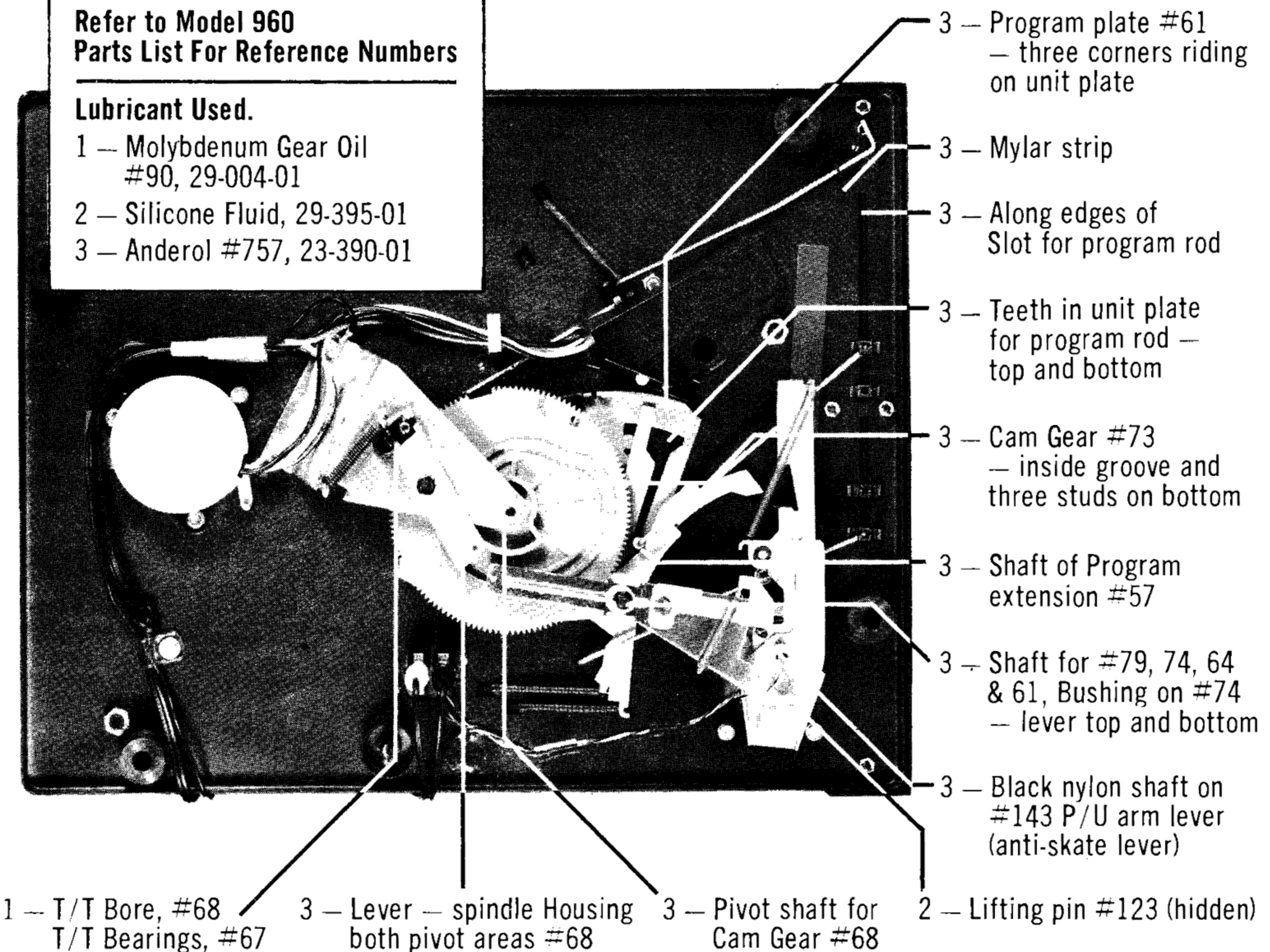
**LUBRICATE ONLY THE POINTS MENTIONED BELOW.**

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**Refer to Model 960  
Parts List For Reference Numbers**

**Lubricant Used.**

- 1 — Molybdenum Gear Oil #90, 29-004-01
- 2 — Silicone Fluid, 29-395-01
- 3 — Anderol #757, 23-390-01

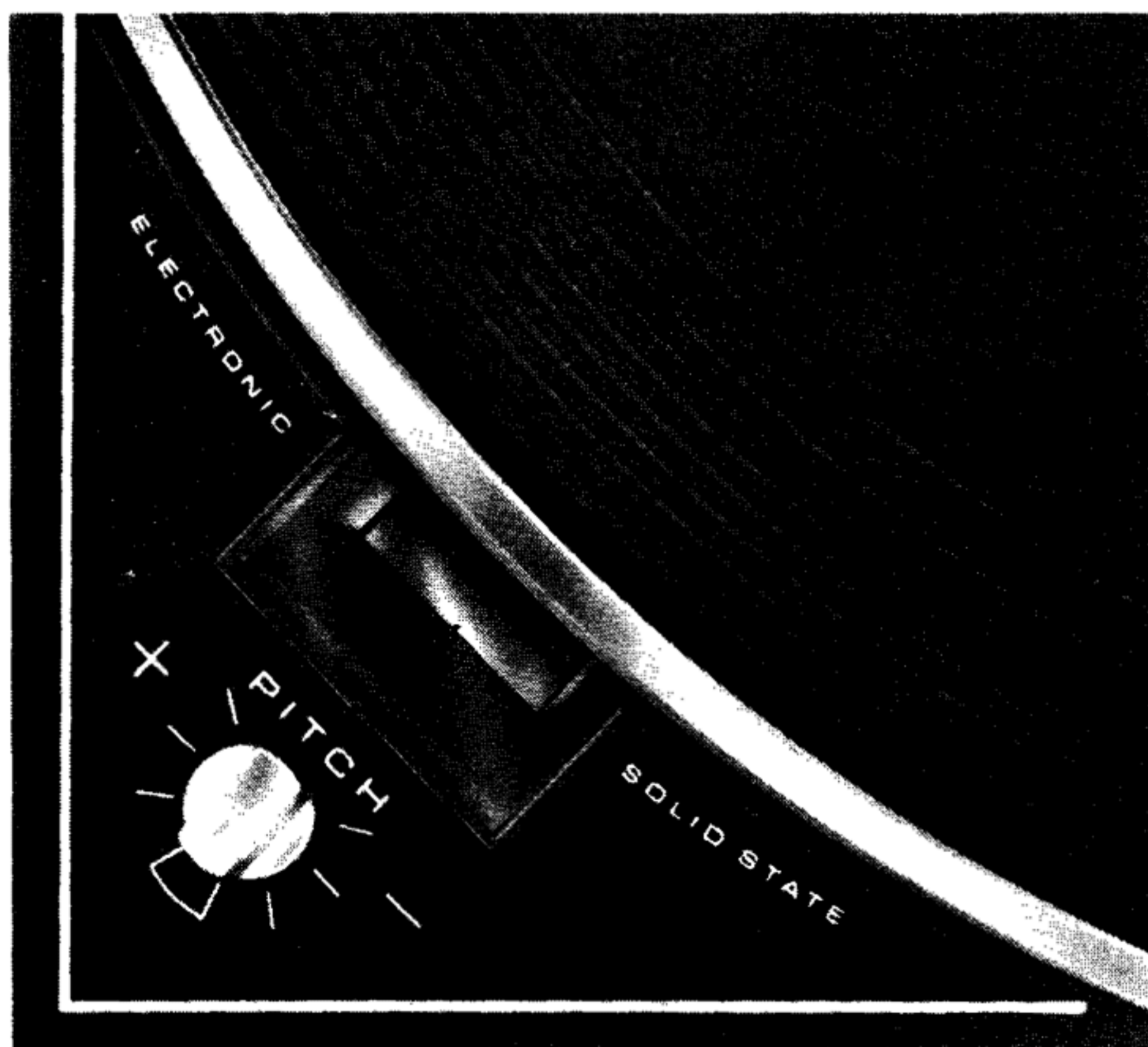




# Electronic Speed Control

## **ELECTRONIC SPEED CONTROL (Model 980 only)**

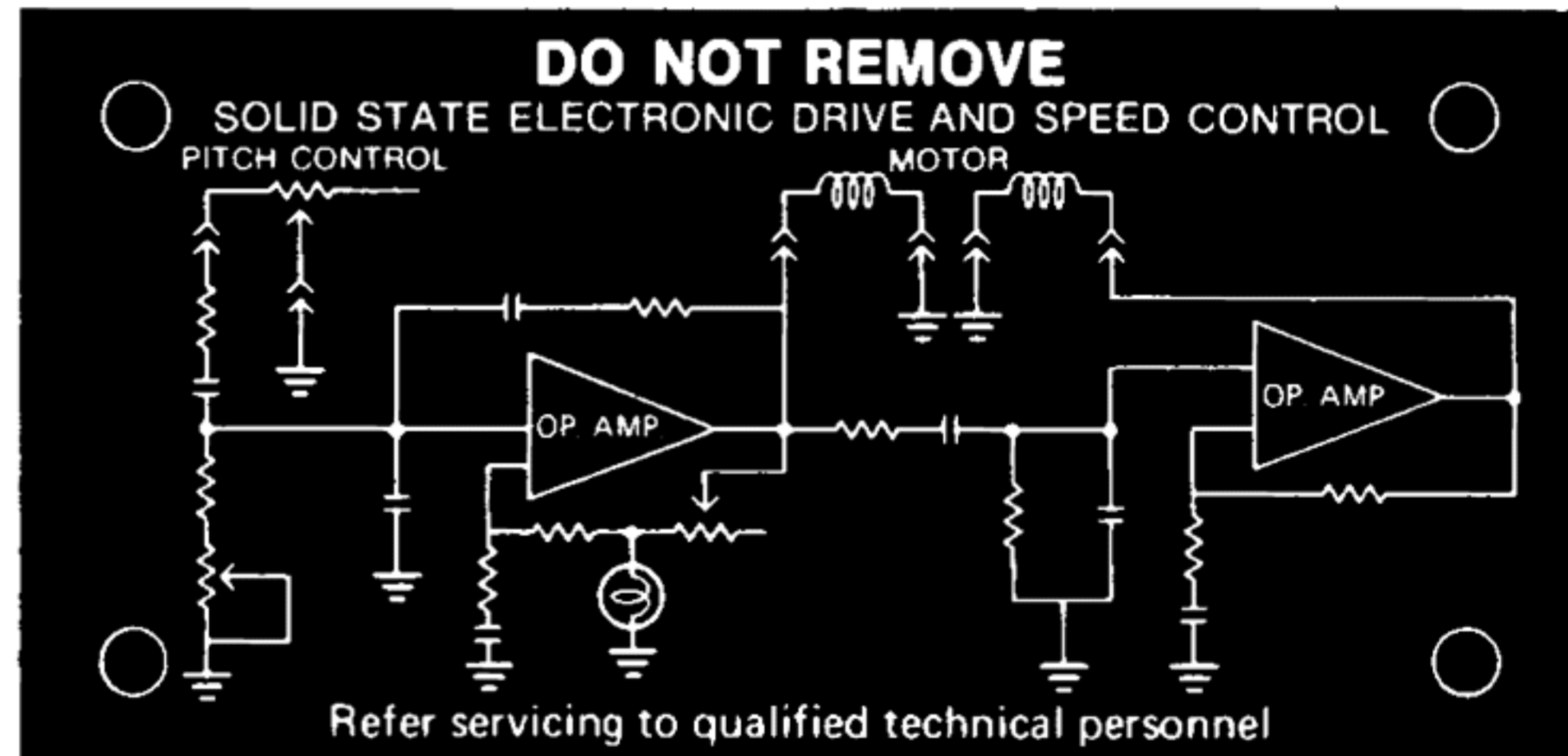
The Model 980 is equipped with an electronic pitch control (Fig. A) which permits speed adjustment over a range of  $\pm 3\%$ . Many automatic and manual turntables having variable speed adjustment do not permit the viewing of a stroboscope while the unit is playing. They employ printed strobes on the turntable or require the use of a separate strobe card. The Model 980 has a brightly illuminated mirrored window, just behind the variable pitch speed control, to monitor turntable speed at any time.



While a record is playing, observe the lines inscribed in the illuminated stroboscope window. Rotate the pitch control until the lines appear to be stationary. When the lines stand still, correct, accurate speed of rotation is indicated. For faster or slower speeds, rotate the pitch control clockwise for increased speed, counterclockwise to reduce speed.

The 980 is equipped with an electronic speed control which permits speed

adjustment within the range of plus or minus 3%. We show a schematic of the printed circuit board used in the 980. Although the parts can be individually replaced, special care must be taken and we recommend that only genuine, original replacement parts be used. Repairs should be attempted only by qualified electronic service technicians; as the 980 consists primarily of solid state devices. All of the parts were chosen for their durability and tolerances and, although other replacement parts may be of similar value, inferior parts may cause additional damage to other solid state devices within the circuit board. If necessary, the entire circuit board can be replaced and this is available from our spare parts department.



Circuit Board Cover

## **Model 960 —**

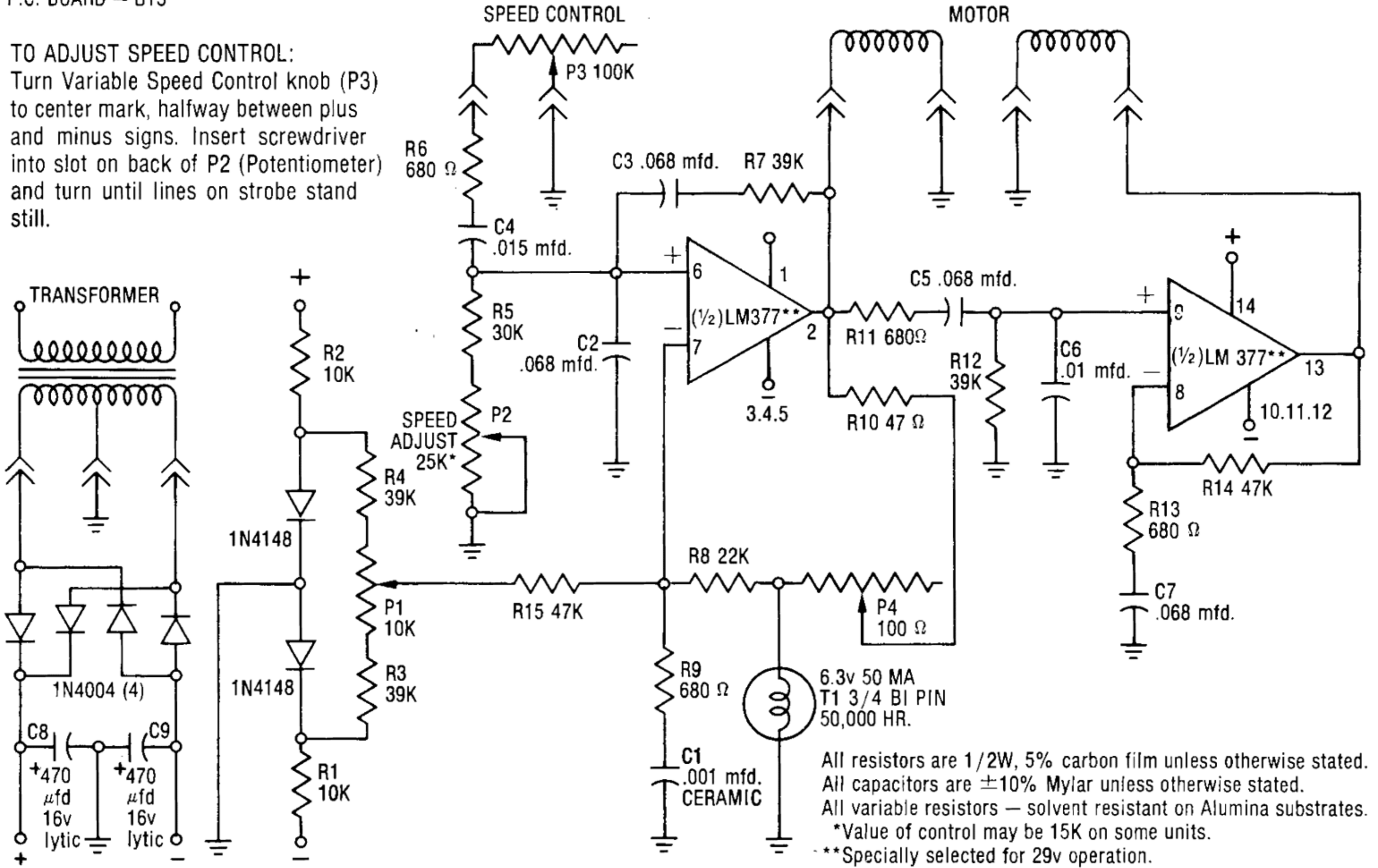
The Model 960 has no variable speed control or built-in strobe. The unit contains a synchronous 24 pole, 300 rpm motor which is locked into the power line frequency, and the turntable will therefore rotate at precisely  $33\frac{1}{3}$  rpm or 45 rpm.



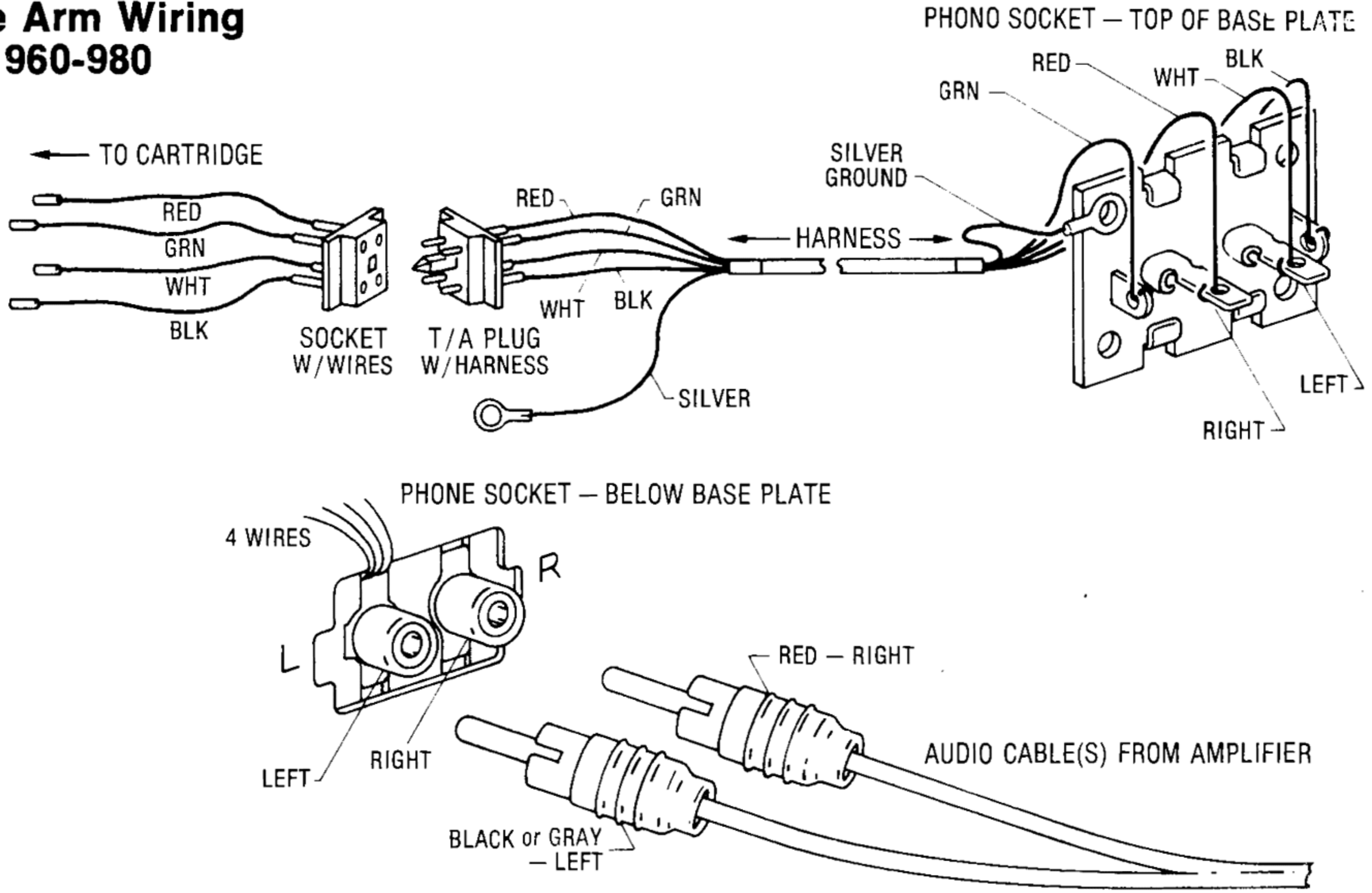
### Schematic — Model 980 Motor Supply

P.C. BOARD — B13

**TO ADJUST SPEED CONTROL:**  
Turn Variable Speed Control knob (P3) to center mark, halfway between plus and minus signs. Insert screwdriver into slot on back of P2 (Potentiometer) and turn until lines on strobe stand still.



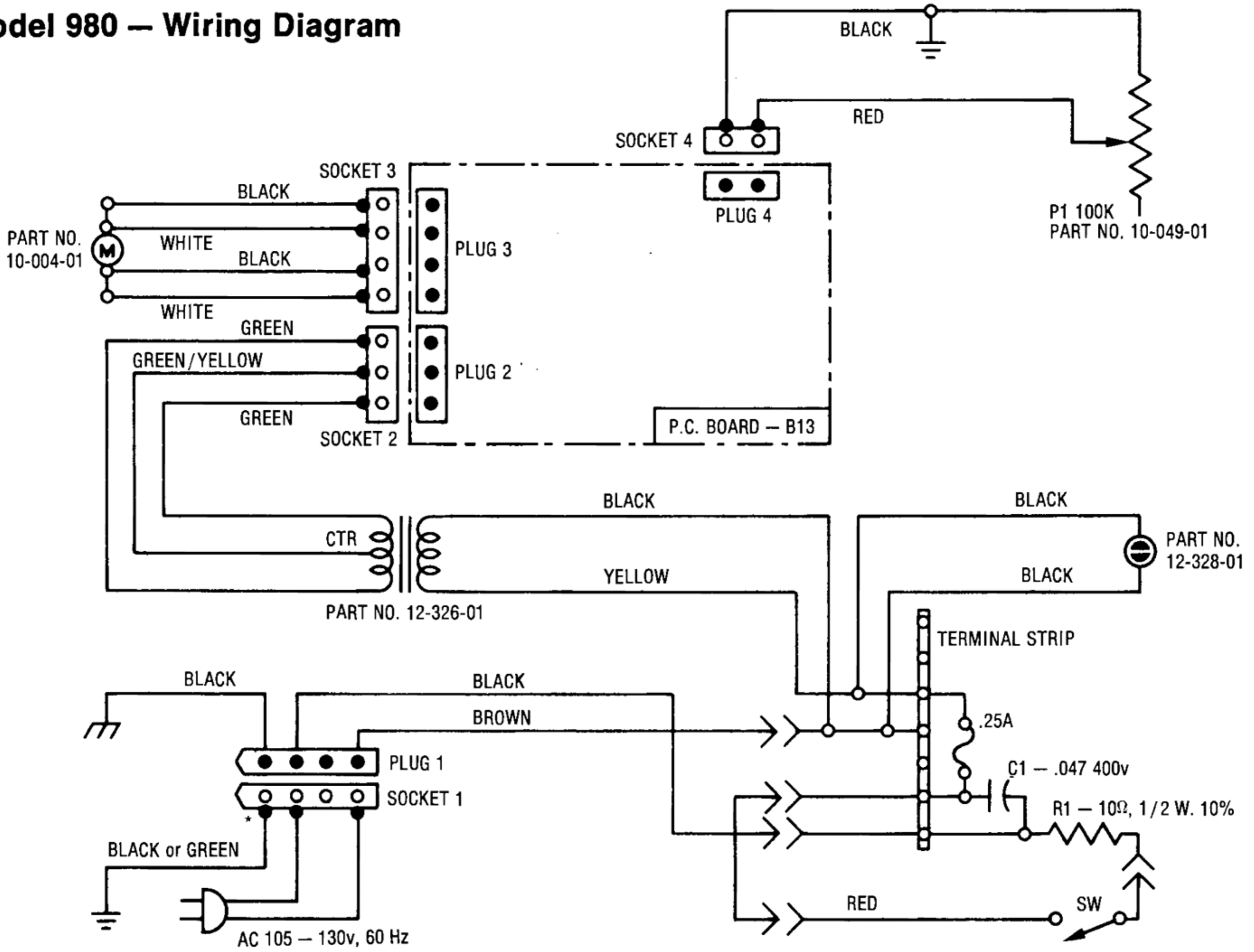
### Tone Arm Wiring 960-980



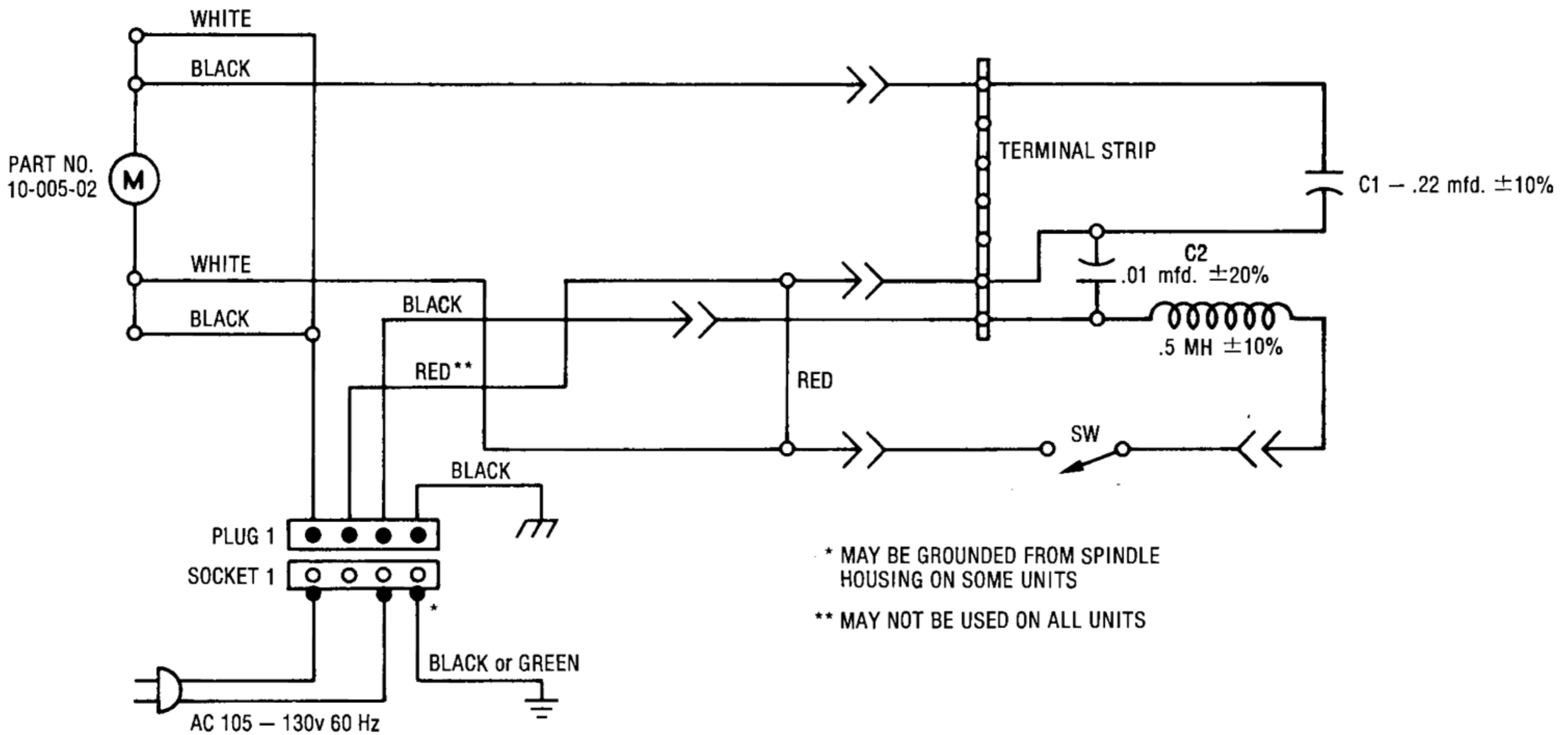


ELECTRICAL WIRING

**Model 980 — Wiring Diagram**

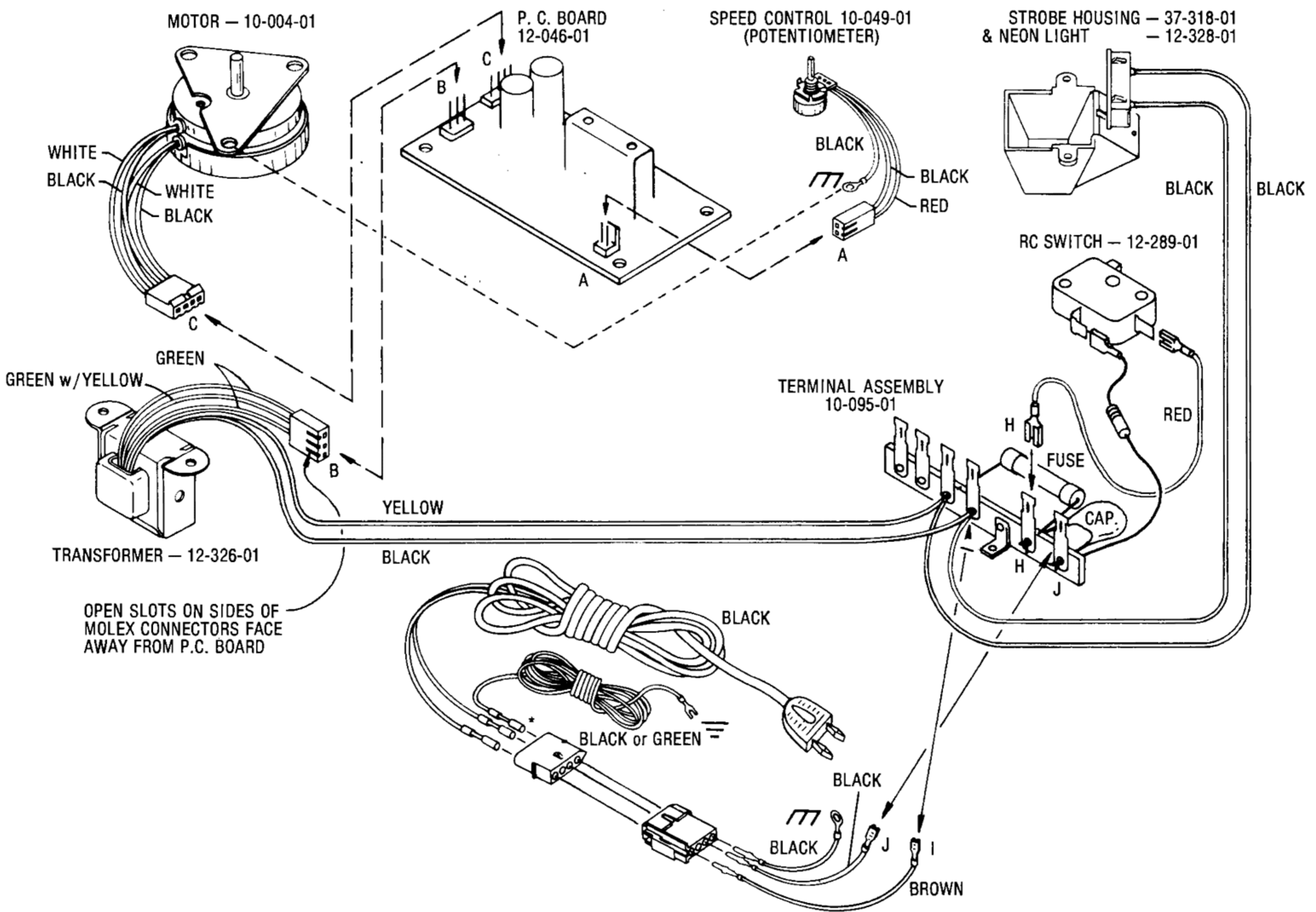


**Model 960 — Wiring Diagram**

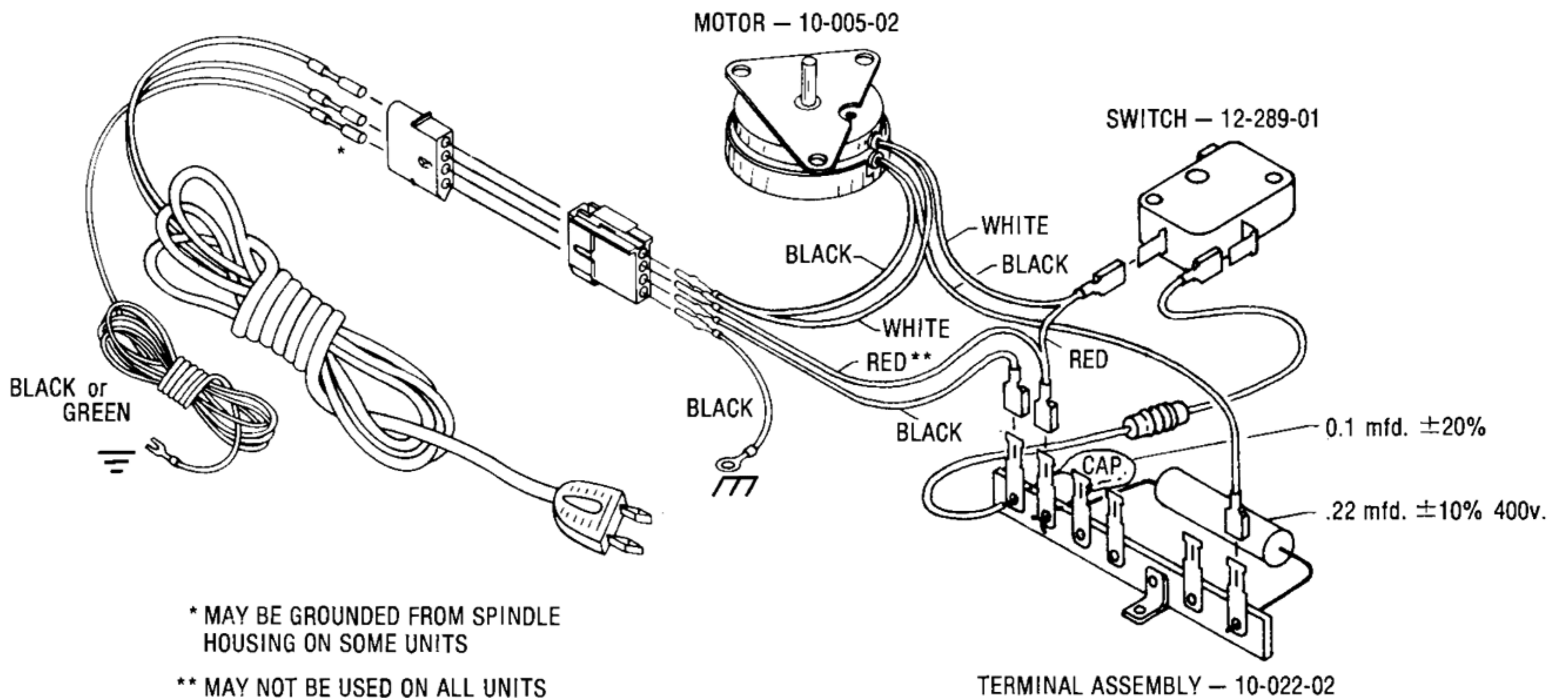




**Model 980 — Wiring Pictorial**



**Model 960 — Wiring Pictorial**





# General Disassembly Instructions

The blown up diagram provides very useful illustrations which, in most cases, will answer your questions regarding disassembly and assembly. We list below some general disassembly instructions which may be useful to you:

1. **Cycle Button** — The cycle button is a press-in, self-locking type device. To remove this part, simply grasp the top portion and lift the button up, or simply push up from the bottom.
2. **Turntable Removal** — Instructions for removing the turntable are found on pages 14 and 15.
3. **Electronic Circuit Board** (Model 980 only) — All of the wiring to this board is accomplished through plug-in connectors. To remove this part, simply remove the two screws located on top of the unit plate (beneath the platter) and unplug the three plug-in connectors.
4. **Main Cam Gear** — Remove the turntable and the rubber belt. Also remove the two  $\frac{1}{4}$ " machine screws and the one  $\frac{3}{8}$ " nut on the turntable spindle housing (both these parts are located on the underneath side of the unit). Remove the retaining clip, washers, spring, and bracket holding the drive plate assembly in place. The cam gear can now be removed from its stud and replaced. When installing the new part, the two rotating levers below the drive plate will have to be rotated to clear the pins on the main cam.
5. **Strobe Light** (Model 980 only) — Remove the switch cover and unsolder the two leads that go from the strobe light to the terminal strip, noting the position of the wires. Remove the platter, the one  $\frac{1}{4}$ " hex headed screw holding the neon light and replace. The strobe housing has two  $\frac{1}{4}$ " hex headed screws on the underneath side of the unit which hold this in place.
6. **AC Switch** — Remove the switch cover, the press on connectors, and the one  $\frac{3}{16}$ " hex machine screw holding the switch in place.
7. **Click Suppressor Network** (Terminal Strip) — The click suppressor consists of a disc type capacitor and a choke on the Model 960, and two capacitors, a resistor and a fuse on the Model 980. They are wired per the schematics included in the technical Service Manual. We recommend that only original parts be used and these should be obtained from British Industries Company or one of their authorized service stations. These should be soldered in place, with the exception of the choke and resistor, which are supplied with a press-on connector on the lead that attaches to the AC switch.
8. **Fuse** (Model 980 only) — Should the fuse have to be replaced, replace with the original type of fuse which is supplied by British Industries Company or one of their authorized service stations. The fuse supplied by British Industries comes with leads which are soldered on to the terminal strip.



9. **Tonearm** — Unplug the audio cables and unsolder the tonearm leads that attach to the phono socket. These are located underneath the platter on the top side of the unit. Remove the  $\frac{1}{16}$ " nut at the bottom of the pickup shaft. The entire tonearm assembly can now be lifted out of the unit and, if necessary be replaced.  
**Tonearm Harness** — Remove tonearm. Remove the two screws holding the coupler in place. Remove and replace coupler with wires.
10. **Lateral Bearing** — Remove the tonearm as described above and lift the lateral bearing out of the top of the pickup base casting. Ball bearings face up.
11. **Connector Block**—Remove the head from the tonearm. Insert a straight blade screw driver under the pin holding the connector block in place. Pry out the pin. The connector block will lift out.  
**IMPORTANT:** Most of the parts of the tonearm are available separately and are replaceable. Before removing the horizontal gimbal held in place with the two #3 Allen screws, scribe a line on the tonearm tube so that the arm can be repositioned to its exact location. If this is not done, there will be no way to determine the location of the tonearm tube in regard to the gimbal and an increase in tracking error may result.
12. **Elastomer Damper in the Counterbalance Weight** — This can be easily replaced in the following manner. Simply press out the old elastomer insert. You will notice that the mount consists of a single insert with two spider-type webs. Place a new web at one end of the insert; press this into the front of the counterbalance weight, take the second web and engage around the flange of the insert.
13. **Speed Change Lever** — Lift the end of the speed cam and slide the speed lever off. Raise the lever up over the record platform, rotating it until the notch in the speed lever aligns with the crimped portion of the speed change rod. The speed lever can then be removed.
14. **Speed Change Rod** — Remove the drive plate assembly and the nut holding the pickup arm lever in place. Slide the pickup arm lever off and out of the way. Pull the rod out of the fastener and rotate until the crimped portion aligns with the notch in the unit plate. Remove the speed rod.



# Analysis of the Mechanism

## Cueing

**Cueing is achieved on the Models 980 and 960 in the following manner:**

As the cueing lever (Ref. No. 137) rotates, the cam surface of the cueing lever rotates against the rocker plate (Ref. No. 133). The rocker plate acts as a seesaw and one side is allowed to raise due to the cam action of the cueing lever. The lifting rod (Ref. No. 132) is now allowed to move upward through the pickup base casting (Ref. No. 130). This, in turn, pushes up against the horizontal gimbal surround (Ref. No. 117); and, this raises the tonearm. The lifting pin (Ref. No. 132) contains silicone damping fluid in the area where it passes through the pickup base casting (Ref. No. 130) and this, in turn, allows the tonearm to move smoothly and slowly upward.

When the cueing lever is returned to the play position the cam surface of the cueing lever (Ref. No. 137) is now moved to a position which allows the rocker plate (Ref. No. 133) to seesaw in the opposite direction. When this happens, the lifting pin (Ref. No. 132) is impulsed downward and the tonearm is allowed to lower via the same action as it was allowed to raise. Since there is cueing fluid between the lifting pin and pickup base casting, the tonearm lowering on to the record is damped and the action is slow and smooth.

**Adjustable Cueing Rate:** Only B•I•C Programmed Turntables have an adjustable cueing rate and this is accomplished in the following manner:

You should now already understand how the cueing device operates and, as you will see, if the spring (Ref. No. 135) that applies tension to the rocker plate (Ref. No. 133) is varied, the amount of

thrust given to the lifting pin (which is damped) will also vary. The heavier the spring tension, the faster the pin will move through the damping fluid; the lower the tension of the spring, the slower it will move through the damping fluid. Adjustable cueing rate is, therefore, accomplished in exactly this way. As the adjusting knob (Ref. No. 128) is turned clockwise, it moves Reference No. 136, which in turn stretches the spring (Ref. No. 135). Turning the knob counterclockwise compresses the spring.

## Turntable Rotation and Speed Change (Manual Play)

**Turntable Rotation:** The turntable begins to revolve when the following electrical and mechanical actions occur:

When the program knob (Ref. No. 100) is moved to manual, it impulses the program rod fastener (Ref. No. 97) which moves the program rod (Ref. No. 95) which, in turn, moves the program cam plate (Ref. No. 71).

This, in turn, closes the AC switch (Ref. No. 155) which starts the motor (Ref. No. 48) revolving. The schematic of the electrical components is shown in the technical Service Manual and, if power is not being supplied to the motor, please refer to the schematic for further instruction. As the motor revolves, the motor pulley (Ref. No. 41), which is locked to the motor shaft through a set screw (Ref. No. 42), also revolves. A precision ground drive belt (Ref. No. 12) is installed between the motor pulley and the drive drum of the platter. When the motor pulley revolves, the belt also turns which causes the platter to revolve.



**33 and 45 Speeds:** The speed of the motor in the 980 and 960 is 300 RPM. To achieve 33 and 45 speeds, the belt is moved from one position on the motor pulley to another position on the motor pulley, in the following manner:

The speed control knob (Ref. No. 100) moves the speed/size rod (Ref. No. 96). This moves the speed cam lever (Ref. No. 61). The speed change cam (Ref. No. 40) is attached to the speed cam lever (Ref. No. 61) and, as the lever moves, the cam moves with it.

You will notice that there are two cam surfaces on the speed change cam. The lower surface for the 33 position pushes the belt upward so that it engages the 33 step of the motor pulley. The upper surface pushes the belt down from the 33 step to the 45 RPM step of the motor pulley.

**Record Size:** The size of the record to be played is set at the same time the speed is selected. When the speed knob (Ref. No. 100) is set to 33 the speed/size rod (Ref. No. 96), which travels in a slot in the unit plate, allows the size lever (Ref. No. 83) to pivot to its maximum. As the tonearm moves inward the Pickup arm lever (Ref. No. 152) stops at the edge of the size lever (Ref. No. 83). This prevents the tonearm from landing past the setting for 12" 33 rpm.

When the speed knob (Ref. No. 100) is set at 45 the speed/size rod (Ref. No. 96) prevents the size lever (Ref. No. 83) from pivoting, thereby allowing the pickup arm lever (Ref. No. 152) to move inward. The step on the size lever (Ref. No. 83) stops the pickup arm lever (Ref. No. 152) and the tonearm at the correct setting for 7" 45 rpm.

### **Automatic Play and Shut off**

B•I•C Programmed Turntables have eliminated the typical type selector mechanism used on other automatic turntables. Instead of a critical selector mechanism, B•I•C Turntables employ a programmer for automatic record selection. This mechanism works in the following manner:

The program knob (Ref. No. 100) is moved from the OFF position to the number of records to be played. The turntable will revolve the moment it moves past the MANUAL/ON position; this is normal. The knob (Ref. No. 100) moves the program fastener (Ref. No. 97) which provides motion to the program cam plate (Ref. No. 71), through the program rod (Ref. No. 95). As you will see, the program cam has various detents which cross reference to the number of records that were previously set on the programmer.

**Cycle Button:** The cycle button is impulsed to initiate record drop and shutoff and this operates as follows:

The cycle button is in its normal position and is impulsed in an upward position by the cycle button return spring (Ref. No. 70). When this is pressed down, it impulses the reject rod (Ref. No. 69) which causes rotation to the end of the rod where a spring (Ref. No. 68) is attached. This spring impulses the trip pawl (Ref. No. 72) on the main cam gear (Ref. No. 80). The turntable started to turn previously when the control knob (Ref. No. 100) was moved.

A striker on the turntable hub now engages the surface of the trip pawl. Since the trip pawl is attached to the main cam gear, the cam gear is moved slightly forward and the teeth on the main cam gear (Ref. No. 80) now engage



the teeth on the turntable hub. As the cam gear rotates, a pin on the cam causes the program cam plate to move on a slight arc, which will now allow it to move down one notch from its previous position. When the cam gear has made one revolution, it will stop due to the fact that it has a blanked out toothless area and can no longer engage the turntable hub.

Every time a change of cycle occurs, as indicated above, the program cam plate (Ref. No. 71) moves, engaging the program extension (Ref. No. 101) in its teeth; which, in turn, moves the program extension one notch, until the control knob moves to ONE. At this point the extension (Ref. No. 101) of the program rod will be in the last detent of the program cam (Ref. No. 71).

When the next cycle occurs the program rod and extension will move into the angled portion of the program cam plate (Ref. No. 71), allowing the program plate to open the AC switch (Ref. No. 155) which shuts off the power supply.

**Automatic Cycle:** As the automatic cycle is initiated the cam gear (Ref. No. 80) is engaged by the turntable casting causing it to rotate. This gear also has an eccentric track which varies in depth and causes the drive plate (Ref. No. 87) to move both in and out and up and down. The latter motion causes the pickup arm to move up and down and the former motion allows it to move in and out. This mechanism works in the following manner:

As the cam gear rotates, the following pin on the drive plate (Ref. No. 87) is pushed down causing the opposite end to raise. This pushes up the lifting pin (Ref. No. 132) which raises the tonearm. As the arm raises, the follower

pin is pushed outward. This motion is transmitted to the tonearm through the pickup arm lever (Ref. No. 152) and it, too, is moved outward. As the cam continues to rotate, the eccentric track moves the follower pin inward and, in turn, the tonearm is moved inward until the pickup arm lever (Ref. No. 152) engages the record size lever (Ref. No. 83).

The drive plate now dis-engages from the pickup arm lever and enters the deepest portion of the track releasing the lifting plate. The cam now is in the neutral position and stops moving. The pickup arm is gently lowered to the record and begins tracking inward.

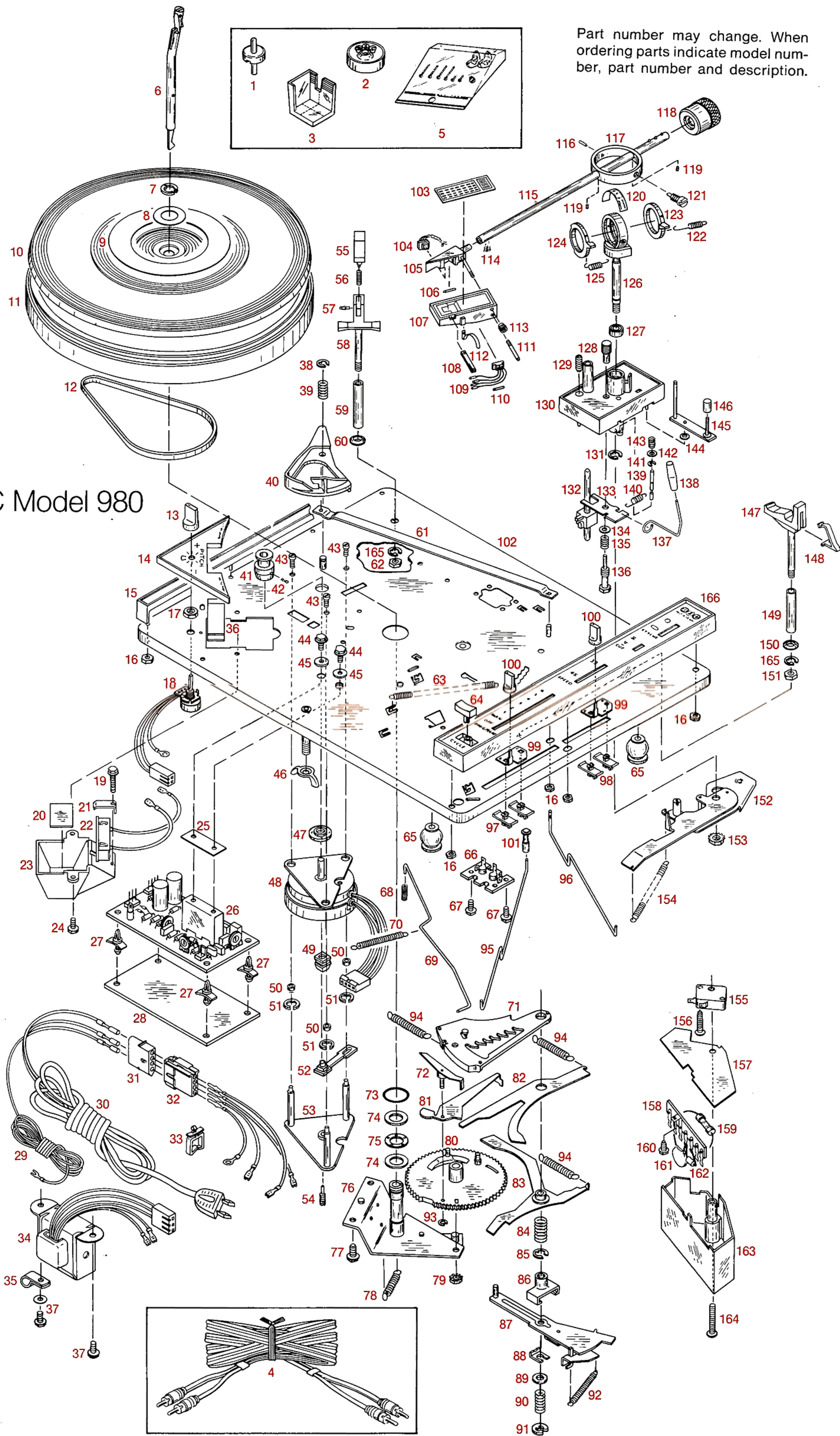
When the pickup arm reaches the lead out grooves at the end of the record, the pickup arm lever (Ref. No. 152) causes the trip pawl plate (Ref. No. 81) to move inward carrying the trip pawl (Ref. No. 72) inward. The trip pawl engages the lug on the turntable spindle and auto cycle is initiated. This process is continued until the last record is finished. At this time the switch off lever (Ref. No. 82) engages the vertical extension tab of the pickup arm lever (Ref. No. 152) holding it over the pick up rest until the cycle is finished. At that time it is gently lowered onto the rest as the unit switches off.

All reference numbers refer to the 980 Parts Catalog Exploded View diagram.



Part number may change. When ordering parts indicate model number, part number and description.

# B-I-C Model 980





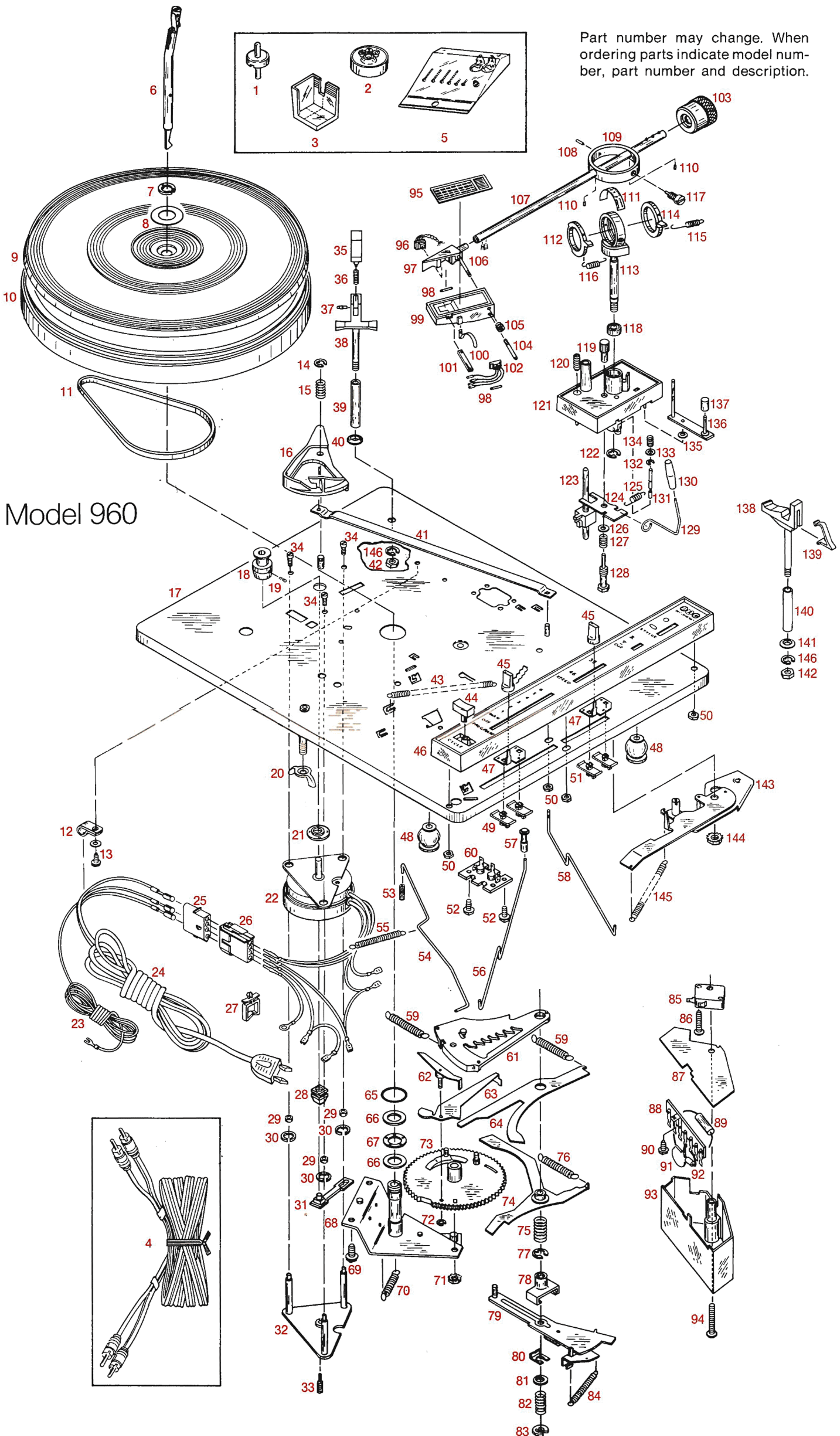
# Official Parts List | Model 980

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
1	36-144-01	Manual spindle (A-4)	40	37-134-01	Speed cam	83	10-027-01	Lever w/bushing	126	10-029-01	Pivot ring & bearing assy
2	37-539-01	45 rpm manual adaptor	41	39-602-01	60 cycle pulley	84	40-283-01	Spring	127	27-366-01	Bearing—T/A shaft
3	37-344-01	Cartridge setting gauge (A-8)	42	20-422-01	Pulley set screw	85	23-292-01	"c" clip	128	37-387-01	Knob—cueing rate
4	17-113-03	Stereo audio cable(s)	43	20-268-01	Screw (3)	86	37-265-01	Drive plate bracket	129	20-263-01	P/U height adjusting screw
5	10-010-01	Accessory package	44	20-181-01	Screw	87	10-039-01	Drive plate assy	130	10-058-01	T/A base
	28-496-01	3 prs. cartridge mtg. screws only	45	22-427-01	Washer (2)	88	38-541-01	Bias plate	131	23-525-01	"c" clip
6	10-038-01	Automatic spindle (A-3)	46	21-200-02	Wing nut	89	22-560-01	Fibre washer	132	10-062-01	Lift pin & pivot assy
7	37-143-01	T/T retaining clip	47	37-572-01	Upper grommet	90	40-155-01	Spring	133	38-563-01	Rocker plate
8	38-385-02	T/T mat insert—inner	48	10-004-01	Motor and terminal assy	91	23-292-01	"c" clip	134	22-544-01	Washer—rocker plate (2)
9	38-169-01	T/T mat insert—small	49	37-571-01	Lower grommet	92	40-371-01	Spring for drive plate	135	40-258-01	Spring—rocker plate
10	37-158-01	T/T mat less inserts	50	17-601-01	Sleeve (3)	93	23-239-01	"c" clip	136	39-369-01	Screw—rocker plate
11	10-043-02	Turntable & mat assy w/60 cycle strobe	51	23-593-01	"c" clip (3)	94	40-286-01	Spring	137	41-159-01	Cueing lever
	28-309-01	60 cycle strobe only	52	10-096-01	Stop link assy	95	41-226-01	Program rod	138	37-430-01	Knob—cueing lever
	28-437-01	50 cycle strobe only (A-6)	53	10-097-01	Motor mount assy	96	41-227-01	Speed/size rod	139	39-139-01	Brake rod
12	37-130-01	Belt (A-8)	54	39-569-01	Screw	97	37-559-01	Fastener—program rod (2)	140	40-493-01	Spring—brake bias
13	37-379-01	Knob—variable speed control	55	37-102-01	Record clamp	98	37-225-01	Fastener—speed/size rod (2)	141	23-543-01	"c" clip
14	10-065-01	Strobe escutcheon & insert assy	56	40-104-01	Spring for record support	99	38-213-01	Slide for control knob (2)	142	22-343-01	Washer
15	10-054-01	Side casting	57	39-103-01	Pin for record support	100	37-406-01	Knob—speed & control (2)	143	40-257-01	Spring—brake rod
16	21-282-01	Palnut	58	37-101-01	Record support	101	37-512-01	Extension for program rod	144	22-343-01	Washer
17	21-378-01	Hex nut		10-040-01*	Record support assy complete	102	10-003-01	Base plate	145	10-042-01	Anti-skate bracket assy
18	10-049-01	Speed control and lead assy	59	36-311-03	Sleeve for record support	103	38-151-01	Trim—cartridge shell	146	37-431-01	Anti-skate adjusting knob
19	20-380-01	Screw #6x $\frac{5}{8}$ Hex (Neon clamp)	60	39-362-01	Base for record support	104	10-053-01	Harness & plug assy	147	37-106-01	Rest (P/U rest post)
20	27-001-01	Reflector	61	38-138-01	Lever for speed cam	105	10-031-01	Coupler & pivot stud assy w/harness	148	37-355-01	Lock—P/U rest
21	38-353-01	Clamp (Neon light)	62	21-382-01	Hex nut for record support	106	41-438-01	Pin—plug retainer (not used)	149	36-312-03	Sleeve—P/U rest
22	12-328-01	Neon light	63	40-286-01	Spring for program	107	10-037-01	Cartridge shell assy (A-1)	150	39-362-01	Base—P/U rest
23	37-318-01	Housing	64	37-296-01	Cycle button	108	37-141-01	Auto/Manual selector	151	21-382-01	Hex nut—P/U rest
24	20-181-01	Screw(2)	65	37-540-01	Isolation mount (4)	109	10-032-01	Socket & wire assy	152	10-063-01	P/U arm lever
25	38-428-01	Mica insulator	66	12-230-01	Phono socket	110	41-438-01	Pin—socket retainer	153	21-426-01	Keps nut
26	12-046-01	Motor control P.C. Board assy complete	67	20-181-01	Screw (2)	111	39-372-01	Head adjusting stud	154	40-179-01	Spring—P/U arm lever
27	12-313-01	Stand off (4)	68	40-315-01	Spring—trip pawl pusher	112	38-386-01	Finger lift	155	12-289-01	AC switch
28	12-413-01	Cover (P.C. Board)	69	41-295-01	Reject rod	113	39-381-01	Knurled lock nut	156	20-187-01	Screw—AC switch
29	10-076-01	Ground wire	70	40-286-01	Spring	114	20-268-01	Screw—4-40x $\frac{7}{32}$ (2)	157	28-255-01	Switch insulator
30	10-044-01	AC cord—includes ref. no. 29 & 30	71	37-214-01	Program cam plate	115	36-164-03	Tonearm tube	158	10-095-01	Terminal assy complete
31	12-402-01	Plug (4 circuit Molex 1490R1)	72	10-089-01	Trip pawl & stud assy		10-028-01*	Tonearm assy complete	159	12-510-01	Fuse— $\frac{1}{4}$ A
32	12-399-01	Receptacle (Molex 1380T) w/wires	73	37-175-01	"O" ring	116	39-165-01	Fixed pivot pin	160	20-181-01	Screw
33	12-432-01	Wire retainer	74	27-177-01	Bearing washer	117	39-163-03	Ring—T/A tube	161	14-001-01	Capacitor—.047mfd 400v
34	12-326-01	Power transformer	75	27-176-01	Bearing retainer w/bearings	118	10-026-01	Counterbalance weight	162	13-025-31	Resistor—10 ohm $\frac{1}{2}$ w 10%
35	12-409-01	AC clamp	76	10-001-01	T/T spindle housing w/bracket, auto spindle lever	119	20-003-01	Screw #2-56x $\frac{1}{32}$	163	37-237-01	Switch shroud
36	37-316-01	Strobe window	77	20-181-01	Screw—spindle housing (2)	120	28-526-01	Label—pivot ring	164	20-293-01	Screw—switch shroud
37	20-290-01	Screw w/washer #6-32x $\frac{7}{16}$ Hex	78	40-294-01	Spring	121	10-066-01	Pivot pin assy	165	22-004-01	Lock washer—P/U rest & record support
38	23-180-01	"c" clip—speed cam	79	21-178-01	Nut w/lock washer #10-32	122	40-182-01	Spring—skate force	166	10-055-01	Control escutcheon
39	40-302-01	Compression spring	80	10-091-01	Cam gear assy w/#72.81 & 93	123	37-117-01	Ring—skate force			
			81	38-554-01	Trip pawl plate	124	37-152-01	Ring—stylus force			
			82	38-211-01	Lever	125	40-216-01	Spring—stylus force			

\*indicates complete assembly



Part number may change. When ordering parts indicate model number, part number and description.



B-I-C Model 960



# Official Parts List | Model 960

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
1	36-144-01	Manual spindle (A-4)	37	39-103-01	Pin for record support	74	10-027-01	Lever w/bushing assy	110	20-250-01	Screw #2-56x <sup>1</sup> / <sub>16</sub> (2)
2	37-539-01	45 rpm manual adaptor	38	37-101-01	Record support	75	40-283-01	Spring	111	28-526-01	Label—pivot ring
3	37-344-01	Cartridge setting gauge (A-8)		10-040-01	Record support assy complete	76	40-286-01	Spring	112	37-152-01	Ring—stylus force
4	17-113-03	Stereo audio cable(s)	39	36-311-03	Sleeve for record support	77	23-292-01	"c" clip	113	10-029-01	Pivot ring & bearing assy
5	10-010-01	Accessory package	40	39-362-01	Base for record support	78	37-265-01	Drive plate bracket	114	37-117-01	Ring—skate force
	28-496-01	3 prs. cartridge mtg. screws only	41	38-138-01	Lever for speed cam	79	10-039-01	Drive plate assy	115	40-182-01	Spring—skate force
6	10-038-01	Automatic spindle (A-3)	42	21-382-01	Hex nut for record support	80	38-541-01	Bias plate	116	40-216-01	Spring—stylus force
7	37-143-01	T/T retaining clip	43	40-286-01	Spring for program	81	22-560-01	Fibre washer	117	10-066-01	Pivot pin assy
8	38-385-02	T/T mat insert—inner	44	37-296-01	Cycle button	82	40-155-01	Spring	118	27-366-01	Bearing—T/A shaft
9	37-158-01	T/T mat less insert	45	37-406-01	Knob—speed & control (2)	83	23-292-01	"c" clip	119	37-387-01	Knob—cueing rate
10	36-150-01	Turntable less mat	46	10-055-02	Control escutcheon	84	40-371-01	Spring for drive plate	120	20-001-01	P/U height adjusting screw
	10-043-01	Turntable & mat assy. w/insert	47	38-213-01	Slider for control knob (2)	85	12-289-01	AC switch	121	10-058-01	T/A base
11	37-130-01	Belt (A-7)	48	37-540-01	Isolation mount (4)	86	20-187-01	Screw—AC switch	122	23-525-01	"c" clip
12	12-409-01	AC clamp	49	37-559-01	Slide fastener for program rod	87	28-255-01	Switch insulator	123	10-062-01	Lift pin & pivot assy
13	20-290-01	Screw w/washer #6-32x7/16 hex	50	21-282-01	Palnut (4)	88	10-022-01	Capacitor & terminal assy complete	124	38-563-01	Rocker plate
14	23-180-01	"c" clip—speed cam	51	37-225-01	Slide fastener for sp/size rod	89	14-252-01	Capacitor	125	40-493-01	Spring—brake bias
15	40-302-01	Compression spring	52	20-181-01	Screw—phono socket (2)	90	20-181-01	Screw	126	22-003-01	Washer—rocker plate
16	37-134-01	Speed cam	53	40-315-01	Spring—trip pawl pusher	91	14-374-01	Capacitor (pop filter)	127	40-258-01	Spring—rocker plate
17	10-003-02	Base plate	54	41-295-01	Reject rod	92	12-565-01	Inductance	128	39-369-01	Screw—rocker plate
18	39-602-01	60 cycle pulley	55	40-286-01	Spring	93	37-237-01	Switch shroud	129	41-159-01	Cueing lever
	39-603-01	50 cycle pulley (A-5)	56	41-226-01	Program rod	94	20-293-01	Screw—switch shroud	130	37-430-01	Knob—cueing lever
19	20-422-01	Pulley set screw	57	37-512-01	Extension for program rod	95	38-151-01	Trim—cartridge shell	131	39-139-01	Brake rod
20	21-200-02	Wing nut (2)	58	41-227-01	Speed/size rod	96	10-053-01	Harness & plug assy	132	23-543-01	"c" clip
21	37-572-01	Upper grommet	59	40-286-01	Spring	97	10-031-01	Coupler & pivot stud assy w/harness	133	22-343-01	Washer
22	10-005-02	Motor & terminal assy	60	12-230-01	Phono socket	98	41-438-01	Pin—plug/socket retainer (plug pin not used)	134	40-257-01	Spring—brake rod
23	10-076-01	Ground wire	61	37-214-01	Program cam plate	99	10-037-01	Cartridge shell assy (A-1)	135	22-343-01	Washer
24	10-044-01	AC cord—includes ref. no. 23 & 25	62	10-089-01	Trip pawl & stud assy	100	38-386-01	Finger lift	136	10-042-01	Anti-skate bracket assy
25	12-402-01	Plug (4 circuit Molex 1490R1)	63	38-554-01	Trip pawl plate	101	37-141-01	Auto/Manual selector	137	37-431-01	Anti-skate adjusting knob
26	12-401-01	Receptacle (Molex 1490P-8)	64	38-211-01	Lever	102	10-032-01	Socket & wire assy	138	37-106-01	Rest (P/U rest post)
27	12-432-01	Wire retainer	65	37-175-01	"O" ring—T/T	103	10-026-01	Counterbalance weight	139	37-355-01	Lock—P/U rest
28	37-571-01	Lower grommet	66	27-177-01	Bearing washer	104	39-372-01	Head adjusting stud	140	36-312-03	Sleeve—P/U rest
29	17-601-01	Sleeve (3)	67	27-176-01	Bearing retainer w/bearings	105	39-381-01	Knurled lock nut	141	39-362-01	Base—P/U rest
30	23-593-01	"c" clip (3)	68	10-001-01	T/T spindle housing w/bkt., auto spindle lever	106	20-268-01	Screw 4-40x <sup>7</sup> / <sub>32</sub> (2)	142	21-382-01	Hex nut—P/U rest
31	10-096-01	Stop link assy	69	20-181-01	Screw—spindle housing (2)	107	36-164-03	Tonearm tube	143	10-063-01	P/U arm lever
32	10-097-01	Motor mount assy	70	40-294-01	Spring—spindle housing	108	10-028-01	Tonearm assy complete	144	21-426-01	Keps nut—P/U arm lever
33	39-569-01	Screw	71	21-178-01	Nut w/lock washer #10-32	109	39-165-01	Fixed pivot pin	145	40-179-01	Spring—P/U arm lever
34	20-268-01	Screw (3)	72	23-239-01	"c" clip				146	22-004-01	Lock washer (P/U rest & record support)
35	37-102-01	Record clamp	73	10-091-01	Cam gear assy w/#62, 63 & 72						
36	40-104-01	Spring for record support									

\*indicates complete assemblies



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