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Technics by Panasonic

Direct drive automatic player system

SL-1400

Operating instructions



Read these instructions completely, before operating this set.

We want to thank you for selecting the SL-1400, DIRECT DRIVE AUTOMATIC PLAYER SYSTEM. For optimum performance, we recommend that you read these instructions carefully.

Parts identification

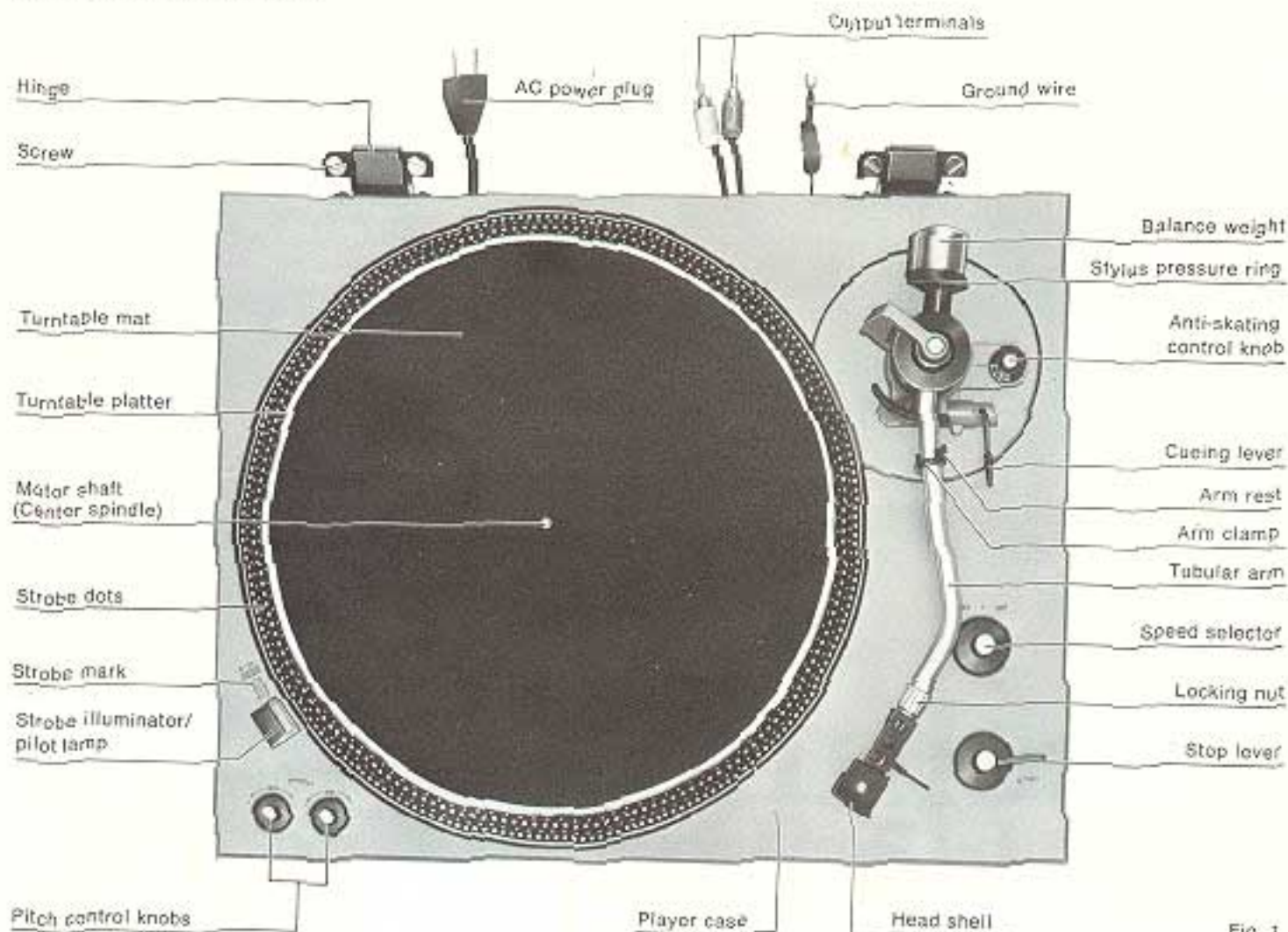


Fig. 1

Assembly and set-up

Caution:

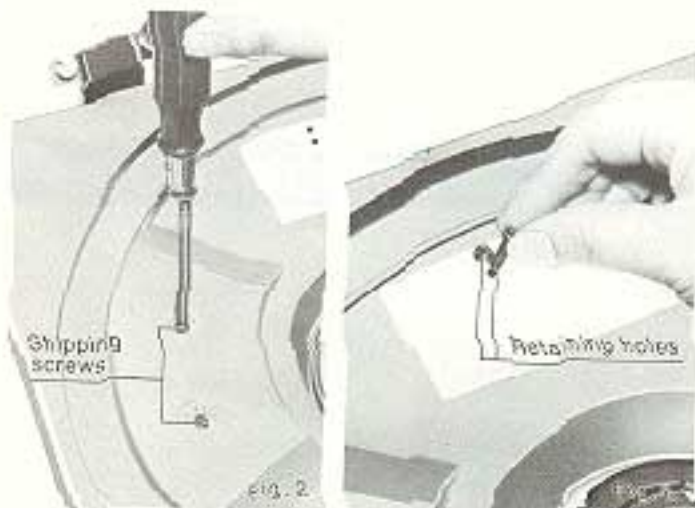
Never connect the AC power plug before the assembly has been completed. Attach the dust cover at the last stage of the assembling work so that assembling of other parts and adjustments can be made efficiently.

① Check the parts.

Player unit	1	45 r.p.m. adaptor	1
Turntable platter	1	Special oil	1
Turntable mat	1	Balance weight	1
Dust cover	1	Head shell	1
		Overhang gauge	1

② Remove the shipping screws.

Remove the two shipping screws and place them in the retaining holes for future use, when the player must again be transported. (See Figs. 2 and 3)



“Warning: To prevent fire or shock hazard, do not expose this appliance to rain or moisture.”

- ③ Apply two or three drops of oil to the motor shaft using the furnished oil container. (See Fig. 4)

Although the unit has been lubricated before shipping from the factory, apply a few drops of oil to the motor shaft for assurance. After that, application of two or three drops of oil once every 2000 hours' operation or so is sufficient. The time interval is much longer than that of the former type motors (200-500 hours), so do not apply too much oil, nor more frequent than necessary. Never use any other type of oil.



- ④ Remove the protective cover from the rotor of the turntable platter. (See Fig. 5)



⑤ Installation of the turntable platter

1. Place the turntable platter on the motor shaft (center spindle).
2. Place the turntable mat on the platter.

Note:

- 1) After having placed the turntable mat, manually rotate the turntable platter clockwise (in the direction shown by the arrow) about 10 times, with the tonearm moved towards the center spindle to allow it to automatically return one time. (See Fig. 6) This operation is to ensure that there is no engagement or displacement between the tonearm driving section and the automatic returning mechanism, which may have taken place during transit.



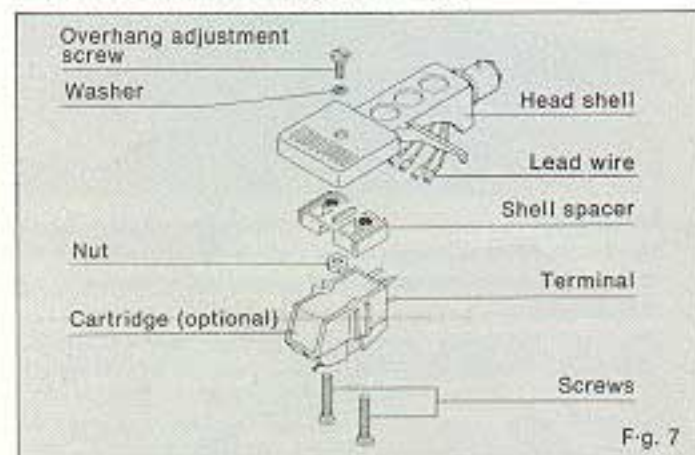
- 2) The rotor is connected to the reverse surface of the turntable platter. (The magnet of the motor is attached to the turntable platter.) To maintain optimum performance as specified, extra care should be taken to prevent adhesion of dust or iron filings to the magnet and not to damage the magnet by dropping it.

- 3) Do not remove the three screws for securing the magnet. (See Fig. 5)

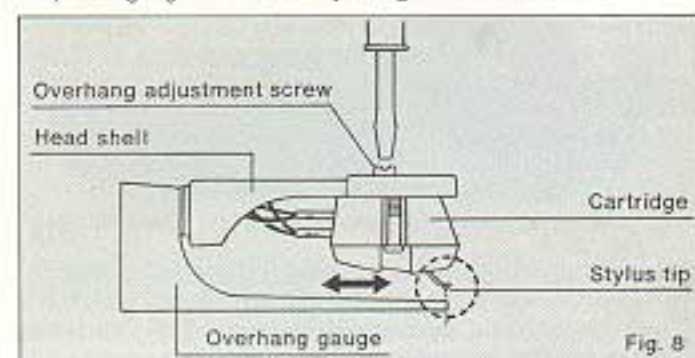
Should the position of the fixed magnet be altered by loosening the securing screws, the rated performance of the unit can not be guaranteed.

⑥ Installation of the cartridge (optional)

1. Connect the lead wires to the cartridge terminals.
 White (L +) Left channel +
 Blue (L -) Left channel -
 Red (R +) Right channel +
 Green (R -) Right channel -
2. Install the cartridge to the spacer, and tighten it with screws provided with the cartridge. (See Fig. 7)



3. Insert the head shell into the gauge. (See Fig. 8)
 4. Loosen overhang adjustment screw and move the cartridge forward or backward until the stylus tip lines up with the edge of the gauge.
 5. Tighten adjustment screw without moving the cartridge.
- Note:**
- 1) Your cartridge is now adjusted for lowest tracking error and minimum distortion.
 - 2) This gauge is exclusively designed for this tonearm.



⑦ Installation of the head shell (See Fig. 9)

Insert the plug portion of the head shell into the front end of the tubular arm, and turn the locking nut clockwise (in the direction shown by the arrow "A"), with the head shell held horizontally to secure firmly.



⑨ Adjustments of the horizontal "0" balance and the stylus pressure

1. Insert the balance weight onto the rear shaft of the tonearm. (See Fig. 11)
2. Remove the stylus cover, if your cartridge has one.
3. Release the arm clamp (Fig. 10) and detach the tonearm from the arm rest to free the tonearm.

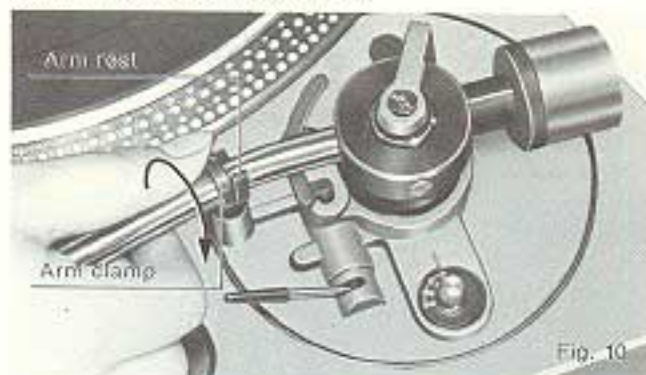


Fig. 10

4. Turn the entire balance weight clockwise (indicated by the arrow "A") or counterclockwise (indicated by the arrow "B") until the tonearm is approximately balanced horizontally. (See Fig. 11)

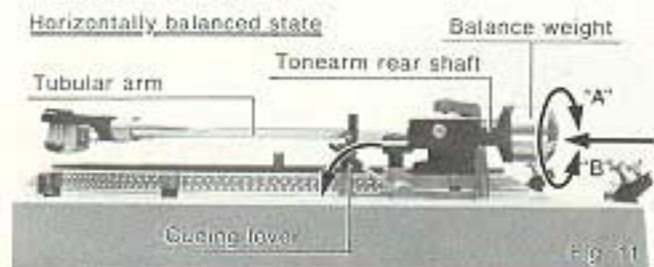


Fig. 11

5. After the tonearm is horizontally balanced, temporarily fix the tonearm by the arm clamp. (Refer to Fig. 12) Hold the balance weight stationary with fingers as shown in Fig. 12 and rotate only the stylus pressure ring to bring the numeral "0" of the ring into alignment with the center line on the tonearm rear shaft. (The adjustment of the horizontal balance is now completed.)

Note:

- 1) During the adjustment of the horizontal balance, be sure that the stylus tip of the cartridge does not contact the turntable mat or player case.
- 2) Ensure that the anti-skating knob is at "0" position. (See Fig. 12)

There are cases where the tonearm may sway or flow slightly at the position of "0" due to the highly sensitive rotational part of the tonearm, but this side force is trivial and presents no inconvenience.



Fig. 12

- 3) Ensure that the cueing lever is in the lowered position as shown in Fig. 11.

- 4) Make certain that the speed selector is in "•" position. In the "•" position, the balance adjustment is easily made as the turntable platter remains stationary.

6. After adjusting the horizontal balance, turn the balance weight clockwise in the direction of the arrow and align the correct stylus pressure. (Follow the Cartridge Manufacturer's recommendation.) (See Fig. 13)

Note:

- 1) As the stylus pressure ring rotates together with the balance weight, proper stylus pressure can be selected by directly reading the graduated ring.
- 2) Set the stylus pressure to the maximum value of your cartridge in cases where the record has an extremely high recording level, or where the unit is operated in a room at low temperature or in places in which the record player is liable to be subjected to vibrations.



Fig. 13

⑩ Anti-skating force control

Set the anti-skating force control to the same value as that set for stylus pressure. (See Fig. 14)



Fig. 14

⑪ Installation of the dust cover (See Fig. 15)

Loosen the securing screws, and place the dust cover into position from directly above, holding both sides, after which retighten the screws securely.

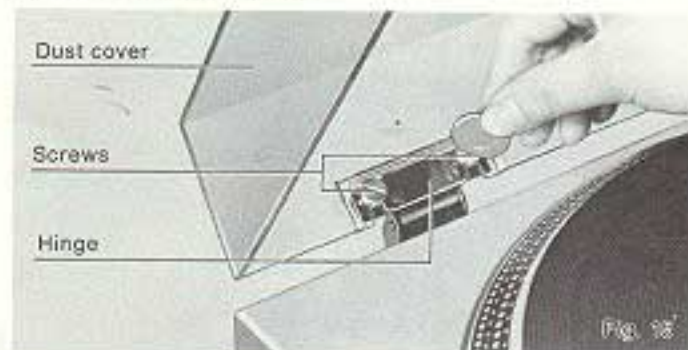


Fig. 15

Note:

In rare cases the dust cover may become the cause of "HOWLING" from vibrations or sound pressure from the speakers. In such cases we recommend that you close the dust cover or remove it during playing. Opening or closing of the dust cover during playing should be made as gently as possible, since this may not only cause harmful player vibrations, but also result in skipping of the stylus.

① Placement

1. Use the player in a stable and horizontal position, where there is little or no vibration.
2. Use the player as far away from the speakers as possible and isolate the player from sound radiation from them. If the speakers are located too close to the player, the vibrations from the speakers affect the player and are again amplified by the amplifier, thus giving rise to the acoustic feedback phenomenon (Howling). Should the player be located in the vicinity of the speakers due to positional limitation, it is recommended to place cushions of felt etc., or blocks under the player and speakers to prevent howling.
3. Do not place the player where it is exposed to direct sun, dust, moisture or heat.
4. Keep it in a well-ventilated place.

② Connect the AC power plug.

Connect the AC power plug to the AC socket. In cases where the AC power plug is connected to the outlet (AC outlet) of the amplifier, receiver and the like, make sure that the wattage indicated on the outlet corresponds to the turntable's requirements before connecting the power plug.

③ Connect the output terminals.

Output terminals	Amplifier or Receiver
L (White) —→	L Channel
R (Red) —→	R Channel
E (Spade lug) —→	GND

Note:

Be sure to connect the ground terminal to the amplifier or receiver. If this connection is not made or is loose, a power source "HUM" will result.

How to play

- ① Set the speed selector to the desired record speed. (See Fig. 16)



- ② Release the arm clamp. (Refer to Fig. 10)

- ③ Lift the cueing lever as indicated by the arrow. (See Fig. 17)



- ④ Move the tonearm over the record and then lower the cueing lever. The tonearm will descend slowly onto the record and play will begin.

Note:

- 1) When the tonearm is moved towards the record, the power is turned on and the turntable will start rotating. If the speed selector is positioned at "45", the turntable will not rotate, although the strobe illuminator is lit.
- 2) If you play a 45 r.p.m. record with a large center hole, use the furnished adaptor on the center spindle.
- 3) For temporary suspension of playing, raise the cueing lever, and the stylus tip of the cartridge will be raised from the record.
- 4) To stop playing during operation, pull the stop lever toward you. The tonearm will automatically return to the arm rest with the power shut off, and the turntable platter stops rotating.

- ⑤ When finished playing, the tonearm will automatically return to the arm rest (auto-return) with the power shut off, and the turntable platter will stop rotation. (The turntable platter will rotate for a short time due to its inertia.)

Adjustments

- ① Adjustment of the arm lift height (See Figs. 18 and 19)

The arm lift height (distance between the stylus tip and record surface when cueing lever is raised) has been adjusted at the factory before shipping to approximately 5 to 10 mm (3/16" to 25/64").

If the clearance becomes too narrow or too wide because of the physical size of the different cartridges on the market turn the adjustment screw clockwise or counterclockwise, at the same time pushing the arm lift down.

Clockwise rotation

—distance between the record and stylus tip is reduced.

Counterclockwise rotation

—distance between the record and stylus tip increases.

5 to 10 mm
(3/16" to 25/64")



Note:

As the adjusting screw has a hexagon head, be sure to make the adjustment while depressing the arm lift.

- ② Adjustment of tonearm automatic return point (See Fig. 20)

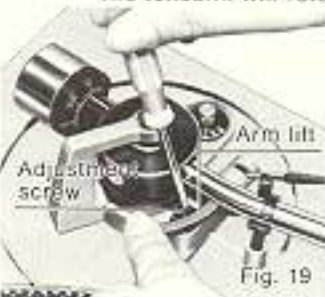
In some cases, the tonearm will tend to return to its rest position before the record has finished playing. In other cases, it will not return to the rest position even after the record has finished. Rotation of this screw in the proper direction will correct either condition.

Clockwise rotation

The tonearm will return to its rest later.

Counterclockwise rotation

The tonearm will return to its rest earlier.



⑤ Speed adjustment (with pitch control knobs)

Strobe dots are set on the tapered rim of the turntable platter according to the power frequency and the number of revolutions of the records. Make adjustment, referring to strobe dot indication.

1. Set the speed selector to the number of revolutions to be adjusted.
2. Release the arm clamp and raise the cueing lever.
3. Move the tonearm to a slight extent towards the turntable platter.

The strobe illuminator/pilot lamp will be lit for illuminating the strobe dots.

4. While turning the pitch control knobs either to "+" side or "-" side, adjust to such an extent that the strobe dots of the turntable look as if they were stationary. The state under which the strobe dots seem to be stationary represents the correct number of revolutions.

"+" direction

This increases the speed of the turntable rotation, and the strobe dot pattern seems to flow in the same direction as the rotational direction of the turntable platter.

"-" direction

This decreases the speed of the turntable rotation, resulting in a state opposite to that in the "+" direction.

Note:

Strobe dot pattern.

The strobe illuminator/pilot lamp of this unit employs the commercially available power source. The frequency of such power source, when actually measured, has a fluctuation of about 0.2%. As such a fluctuation of the power source affects the strobe illuminator, the strobe dot pattern also seems to fluctuate to a certain extent. But the unit is not affected by the fluctuations of the power source, since a D.C. motor is employed.

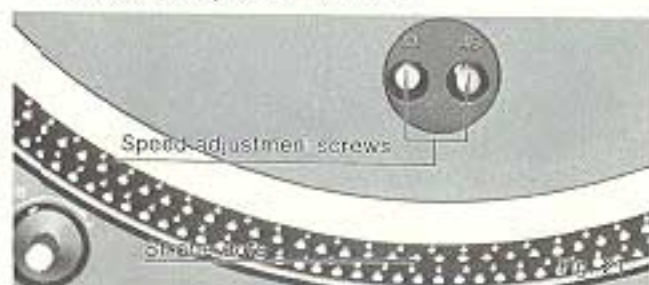
5. If the desired speed can not be obtained by the variable pitch controls, turn the speed adjusting screws with a screw driver for further adjustments. (See Fig. 21)

Clockwise

—The rotational speed is decreased.

Counterclockwise

—The rotational speed is increased.



Maintenance

① Extra care should be taken in handling the turntable platter.

The turntable platter has a rotor (the magnet of the motor) directly connected to it. Therefore, the turntable platter should not be removed from the motor shaft unnecessarily, since adhesion of dust or iron filings onto the magnet results in deterioration of the performance. Should it become necessary to remove the turntable platter, be sure to pull the AC power plug out of the socket.

② Wipe the dust cover and player case with a soft, dry cloth

Never use any cleaners containing alcohol, benzene or thinner. Use of a chemical dust cloth and the like should also be avoided. Be sure that the dust cover is not exposed to insecticide spray, as cracks or blurs may result.

To remove stubborn finger prints or grease spots detach the dust cover or disconnect the AC power plug and use a soft cloth dampened with a mild soap and water solution.

③ Dust and dirt adhering to the stylus tip or the record should be carefully removed.

If used with dust and dirt adhering to the stylus tip, the stylus will not fit into the sound groove of the record correctly. This may not only result in the deterioration of tone quality, but cause undue wear of the record and the stylus tip itself. Use a brush having soft tips, moving it from the base to the tip of the stylus carefully for removing dust and dirt.

The record should also be carefully wiped with a record cleaner of high quality.

④ Before detaching or attaching the head shell, be sure to turn the volume control for the amplifier or receiver to "0" position, or to turn off the power.

Detaching or attaching of the head shell, with the volume control turned high, may not only result in unpleasant noises, but cause damage to the speakers.

⑤ When finished playing, be sure to secure the tonearm by the arm clamp.

After finished playing, if the player is not to be used for some time, care should be taken to secure the tonearm for the protection of the stylus tip.

For the same reason, the stylus cover should also be attached.

⑥ Wipe the head shell terminals from time to time. (See Fig. 22)

Adhesion of dust and dirt to the head shell terminals may give rise to contact faults, thus resulting in increased "hum" noise or non transfer of sound to the speakers. Use a soft dry cloth or the like for wiping the head shell terminals.

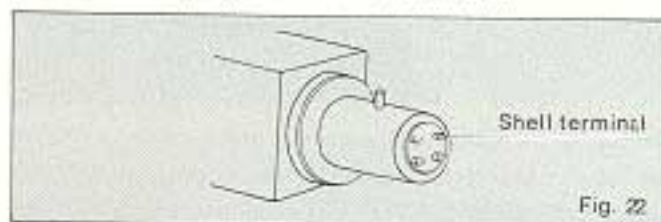


Fig. 22

⑦ When you use other head shells, be careful about the head shell configuration. (See Fig. 23)

When other types of head shells are employed, the handle portion of the head shell may strike against the inner upper surface of the dust cover during returning movement of the tonearm. In such a case, we recommend to play with the dust cover open.

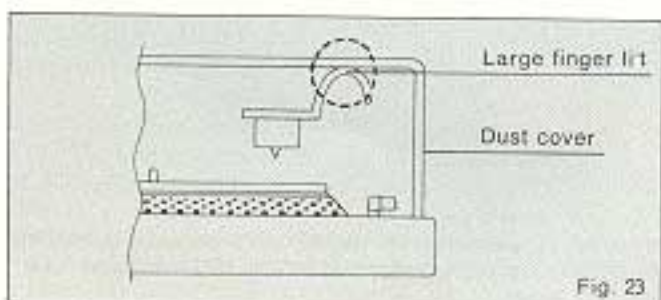


Fig. 23

Features

Turntable section

Success in the development of one chip IC (AN 630) for DD motor

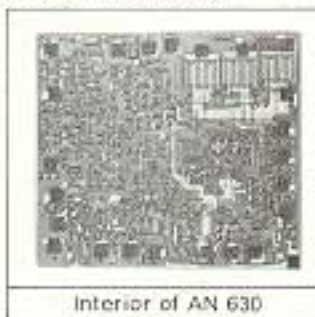
(3 Patents registered, 12 Patents pending)

The one chip IC (AN 630) employed in the Model SL-1400 has 321 elements in total such as transistors, diodes, resistors and capacitors incorporated in a silicon substrate as small as $3 \times 2.7 \text{ mm}^2$ in size, and we take pride in its world's largest degree of integration as a bipolar linear IC. The single IC is capable of controlling the motor drive, turntable speeds and various other functions.

This outstanding one chip IC has now been combined with the high performance automatic player SL-1300 enjoying popularity since its appearance on the market. Thus an automatic player having excellent performance has been developed.



One chip IC (AN 630)



Interior of AN 630

Employment of Back Electromotive Force Frequency Generator system

For the turntable speed detection of this unit, the Back Electromotive Force Frequency Generator is employed. Different from the former Frequency Generator circuits, the counter electromotive force generated in the drive winding of the Direct Drive motor is detected for subsequent wave shaping and logical composition within the IC.

For the above reason, the circuit construction is much simplified for higher reliability. Additionally, in the circuit for converting the frequency to voltage, a polycarbonate capacitor having good temperature characteristics is employed. Thus the drift characteristics and temperature characteristics are improved to an appreciable extent.

Large starting torque through employment of large capacity power transistor

In Technics, large torque making the best use of the features of Direct Drive player has been carefully developed as one of the fundamental capacities.

The one chip IC of this unit has 3 large capacity power transistors integrated in it, thus realizing the torque of $1 \text{ kg}\cdot\text{cm}$. The turntable, despite its large inertia mass ($270 \text{ kg}\cdot\text{cm}^2$), reaches rated speed in about $1/3$ rotation (at $33\frac{1}{3} \text{ r.p.m.}$). Moreover, in cooperation with the employment of Back Electromotive Force Frequency Generator, excellent speed response is obtained in the starting of the turntable and during operation of the automatic mechanism.

Motor construction peculiar to Technics in which the rotor of the motor is integrally connected to the turntable platter

In Technics player system we took the lead in the world by putting the Direct Drive system on the market with a marked improvement in the performance of record players. Since then, we have developed numerous players of high performance, furnishing new topics of conversation each time.

One of such achievements is the motor construction of this unit, unique and singular in the world, in which the rotor of the motor is directly connected to the turntable platter. Moreover, the motor base has been integrally connected to the player case of diecast aluminum for presenting player systems of higher accuracy and rational construction.

Hi-fi performance with rumble (signal to noise ratio) of -70 dB (DIN 45539B) and wow and flutter of 0.03% (W.R.M.S.)

The brushless DC motor of ultra-low speed (same rotation as the record) adopted has extremely small power consumption of 0.1 W , which is less than approximately $1/100$ when compared with the AC motor ($10\text{--}20 \text{ W}$). Thus the DC motor is free from vibrations due to excessive energy or heat generation. Needless to say, it has no reduction transmission mechanism such as a belt or idler, which may give rise to uneven rotation.

It is to be noted here that, in cooperation with the adoption of the unprecedented one chip IC (AN 630) for the Direct Drive motor and the Back Electromotive Force Frequency Generator system, the model SL-1400 matches the fundamental capacity of Technics Direct Drive player such as the rumble of -70 dB (DIN 45539B) and wow and flutter of 0.03% (W.R.M.S.).

Player case of diecast aluminum make, a slim and compact design

Tonearm section

Highly sensitive universal tonearm which fully demonstrates the excellent performance of the high compliance cartridge

A superior combination of the precision pivot bearing and gimbal suspension system

The employment of the precision pivot bearings at the horizontal and vertical journals of the tonearm, coupled with the gimbal suspension system, displays an excellent tracing performance in cooperation with the adoption of the high compliance cartridge.

Diecast aluminum head shell

The head shell integrally formed by strong diecast aluminum for reduction in weight is protected from harmful head shell resonance. Additionally, the head shell terminals are gold-plated for prevention of contact faults at replacement.

Viscous damped cueing

To prevent damages to the stylus tip and records liable to take place during operation of the tonearm, a cueing device damped with viscous oil is adopted.

Since the tonearm can be raised or lowered through operation of the lever, location of a desired playing portion or temporary suspension of the playing are conveniently made.

Anti-skating control

Proper outside force can be applied by such a simple operation as aligning the knob with the same value as the stylus pressure, thus cancelling the skating force harmful to the stylus tip.

Low-capacitance phono cables that will not affect the high frequency characteristics of the cartridge

Uniquely designed overhang gauge

This unique accessory is designed not only as an overhang adjustment gauge, but also as a head shell stand.

Specifications

Turntable section

Type	Direct Drive Automatic Player system
	Automatic return
	Automatic cut
	Automatic shut-off
Drive method	Direct Drive
Motor	Back Electromotive Force Frequency Generator servo DC motor employing one chip IC
Turntable platter	Aluminum die-cast, 33 cm (13")
Turntable speeds	33-1/3 and 45 r.p.m.
Pitch controls	Individual adjustment controls, 10% adjustment range
Wow and flutter	0.03% W.R.M.S. (JIS C5521) $\pm 0.042\%$ Weighted zero to peak (DIN 45507)
Rumble	-50 dB (DIN 45539A) -70 dB (DIN 45539B)

Tonearm section

Type	Universal tubular arm, static- balanced type
Effective length	230 mm (9-1/16")
Overhang	15 mm (19/32")
Friction	7 mg (horizontally and vertically)
Effective mass	23 g (6.5 g cartridge weight 1.5 g stylus pressure)
Arm resonance	9.6 Hz (12×10^{-6} cm/dyne cartridge compliance)
Tracking error angle	Within $\pm 3^\circ$ at the point of 145 mm (5-45/64") from the center Within $\pm 1^\circ$ at the point of 55 mm (2-3/16") from the center
Adjustable stylus pressure range	0 to 4 g (stylus pressure direct reading type)
Cartridge weight range	5 to 11 g
Head shell weight	9.5 g

General

Power supply	AC 120 V 50/60 Hz
Power consumption	6.5 W
Dimensions (H x W x D)	13.9 x 45.3 x 36.6 cm (5-1/2 x 17-3/4 x 14-3/8 inches)
Weight	8.1 kg (17.8 lbs.)

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