DENON Hi-Fi Component / Turntable

OPERATING INSTRUCTIONS
SERVO-CONTROLLED DIRECT DRIVE TURNTABLE

MODEL DP- 3700F
MODEL DP- 3500F
MODEL DP- 3000



MODEL DP-3700F

ATTENZIONE !!

Tensione di alimentazione attualmente a 100 V

Non avvicinare campi magnetici di alcun tipo al piatto

NIPPON COLUMBIA CO.,LTD.

—— TABLE OF CONTENTS ——

MAIN FEATURES 2

TO ASSEMBLE AND ADJUST THE MODEL DP-3700F 3

(A) TO ASSEMBLE THE TURNTABLE UNIT AND TONE ARM 3

(B) TO ASSEMBLE THE CARTRIDGE INTO THE CARTRIDGE SHELL 4

(C) TO ADJUST THE TONE ARM 5

(D) CONNECTIONS 5

(E) TO OPERATE THE MODEL DP-3700F 5

TO ASSEMBLE AND ADJUST THE MODEL DP-3500F 6

TO ASSEMBLE AND ADJUST THE MODEL DP-3000 6

CAUTIONS AND MAINTENANCE 7

ALTERATION OF SUPPLY FREQUENCY 7

ADJUSTMENTS 8

PRINCIPLE OF PERFORMANCE 9

STROBO PATTERN STABILITY 9

SPECIFICATIONS 9

TO CHANGE THE OPERATIONAL VOLTAGES 10

—— MAIN FEATURES ——

TURNTABLE UNIT (Model DP-3000, DP-3500F, & DP-3700F)

Direct-Drive Turntable
Long life is assured, as transmission gears such as an idler or a belt is not incorporated.

Magnetic Recording for Speed Detection
For speed control, a magnetic head is employed to detect pulse signals magnetically recorded by a unique method inside the rim of the turntable. The pulse signals are recorded at 1000 spots over the inside circumference of the rim with errors of recorded wave length being less than 0.01%. This serves for precision speed-detection and high servo-response resulting in a low wow/flutter of less than 0.03% WRMS.

Servo-motor
As a solid-rotor type torque-motor is employed, smooth rotating-magnetic-fields are obtained for the rotation of the turntable at any speed and thus wow and flutter or rumble are almost completely (undetectably) eliminated.

Electric Speed-Selection
Speed selection is made by a simple and feather touch of a switching action by means of the completely electrical selection of the servo circuitry.

Rotations almost Unaffected by Voltage and Frequency Fluctuation or Temperature Variation
The rotation speed is almost unaffected either by fluctuation of source voltage and frequency or variation of temperature, thanks to the regulated d.c. power supply and to the adequate temperature-compensation incorporated in the servo-circuit.

Adjustable Speed
Selected speed is adjustable within ±3% with the speed adjusting knob.

Easy Stylus-Pressure Adjustment
Direct-reading micrometer system is adopted for the easy and accurate adjustment of stylus pressure. Although the pressure scale is provided for adjustment in the steps of 0.2gr., finer adjustment is also possible if necessary. Two ranges of stylus-pressure scale are provided to accept cartrdiges ranging from 4 to 15gr. in weight without such troubles as in conventional exchange of weight ring. Almost any cartridge on the market is, therefore, your choice.

Low-capacitance Output Cord
Low-capacitance output cord is used so as not to affect the wide-band reproduction by the cartridge. (Even MM type cartridge with high-impedance for the discrete 4 channel system is free to be used without a slight deterioration of high-frequency response.)

Light and Rigid Cartridge shell
The screw holes for installing cartridge are made long enough to readily accept various types of cartridges, making precision adjustment of overhang possible. The head shell made of hard and light alloy of 1.2m/m thick is robust and free from twist-resonance.

TONE ARM (for DP-3700F only)

Simple and Handy
Easy operation and durability are well considered on the laterally balanced tone arm by the use of S-shaped pipe. The total design promises high-sensitivity and light-weight together with adequate mechanical strength. Gold-plating on every electric contacts free from mal-contact and precision bearings serve to maintain the high sensitivity and reliability over a long period of service. To provide further stability, pivot bearings are protected with special elastic material and, therefore, the resonance of the tone arm is minimized.

LAMINATED PLAYER CABINET (for Model DP-3700F and DP-3500F only)

Special 70m/m (2-3/4") thick ply-wood cabinet for sturdy and rigid construction with beautifully wood-grain finished proves its better quality and minimize the vibration of itself.
Also specially designed elastic material used between tone arm base and cabinet prevents vibration of cabinet from reaching the tone arm.
These two characteristics permit to keep the sound free from acoustic feedback even at any high sound volume level.

HEIGHT ADJUSTABLE INSULATING LEGS (for Model DP-3700F and DP-3500F only)

Insulating legs prevent vibrations (Footsteps, etc.) from reaching the cartridge via floor or rack. Height of legs is easily adjustable to obtain perfect horizontal balance.

—— TO ASSEMBLE AND ADJUST THE MODEL DP-3700F ——

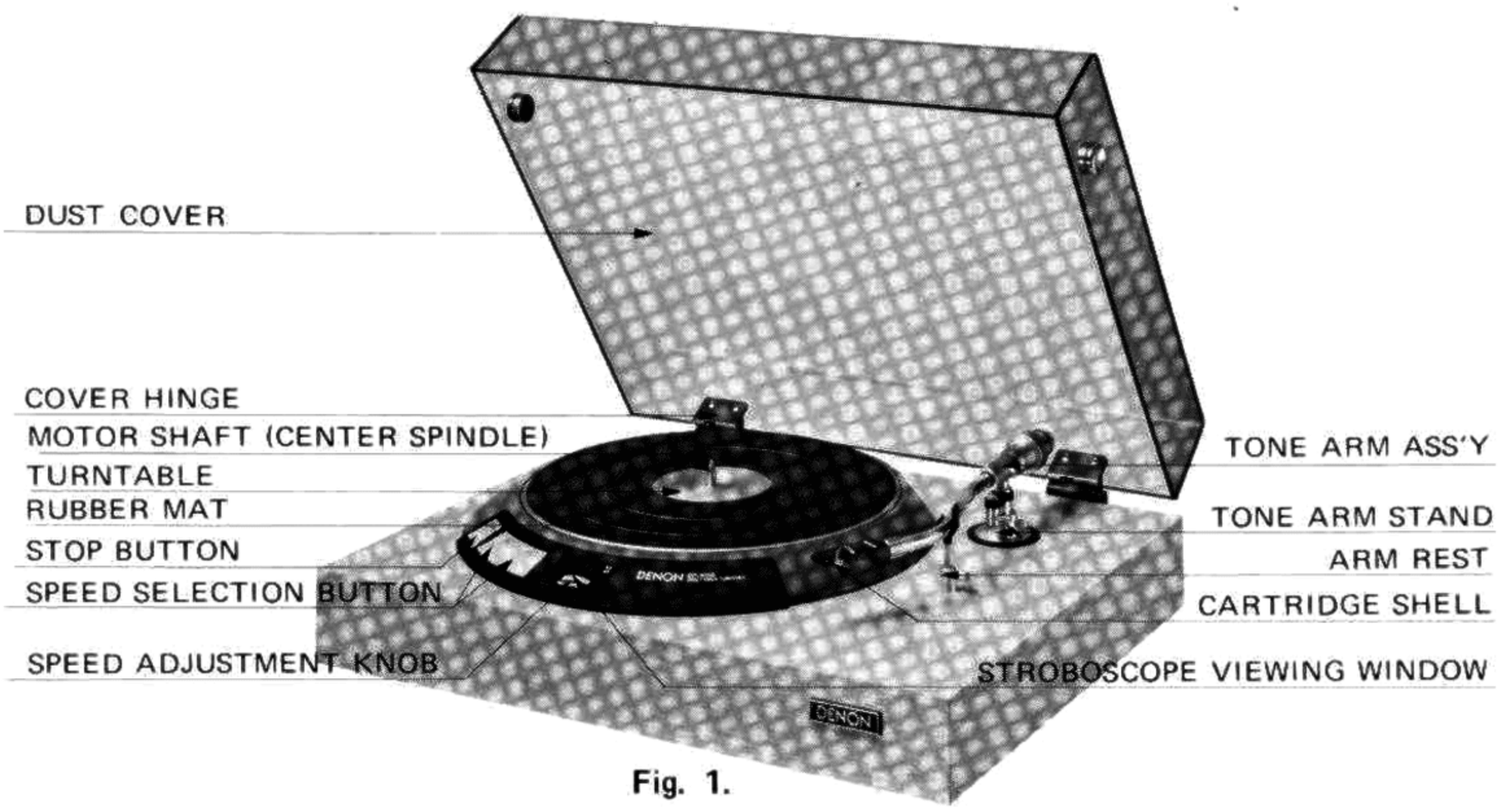


Fig. 1.

(A) TO ASSEMBLE THE TURNTABLE UNIT AND TONE ARM

The Model DP-3700F is composed of the model DP-3000 turntable unit, model DA-305 tone arm with arm lifter and specially designed cabinet.
Please assemble and adjust each part as following procedures.

1. After unpacking the carton, carefully take out the dust cover, turntable, rubber sheet, tone arm assembly, cartridge shell and accessories in the parts box, and then take out the cabinet.

2. Insert the main shaft of the tone arm into the arm stand fixed on the cabinet and hold the tone arm to the arm stand by hand, then insert and connect the 5P connector plug of the output cord into the connector socket on the bottom of the tone arm shaft deeply enough to fit the key and slot.

3. Then fix the inserted tone arm to the arm stand. First, temporarily adjust the auxiliary height-adjusting screw with screw driver and fix the tone arm loose so that it can rest by itself and is movable with a slight finger touch. (See figure 1)

4. The tone arm is able to horizontally turn within an angle of about 90 degrees. Adjust the tone arm direction so that it may cover the angle between the arm rest and the center spindle of the turntable. When the adjustment is over, fix the tone arm temporarily at a proper height by means of the main height-adjusting screw. (See figure 2)

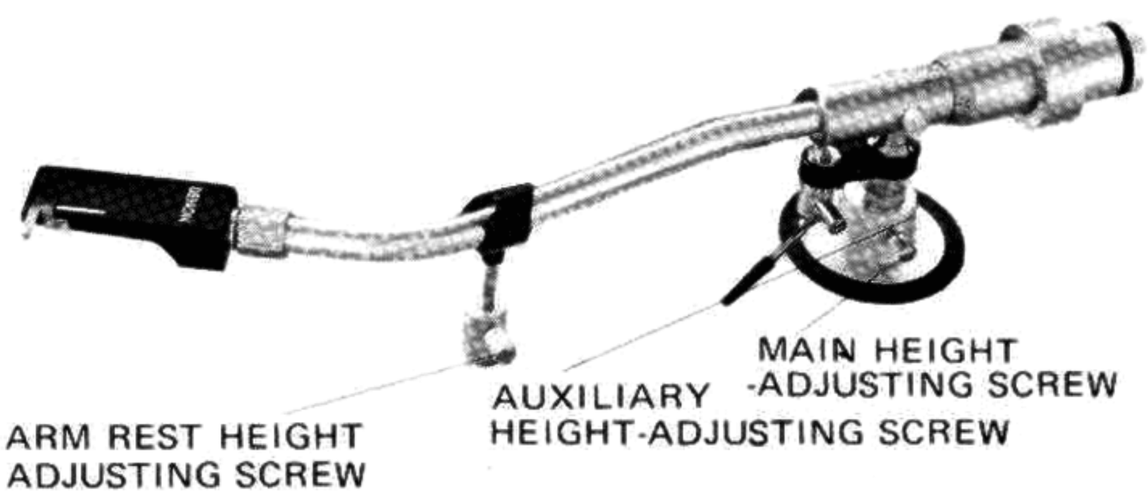


Fig. 2

5. Remove the red colored head screws (Fixing screws for transport) clamping the power transformer for transportation. (See figure 3)
   Note: These screws, if not removed, will cause noises, as vibration of the power transformer is conveyed to the turntable. Make sure to re-clamp the transformer with the screws when transporting the player as you change residences.

6. Fit the turntable to the tapered-part of the motor shaft (center spindle). Do it gently after making it sure that the tapered surface is clean without dust and that the detecting magnetic-head is retracted as shown in figure 4.

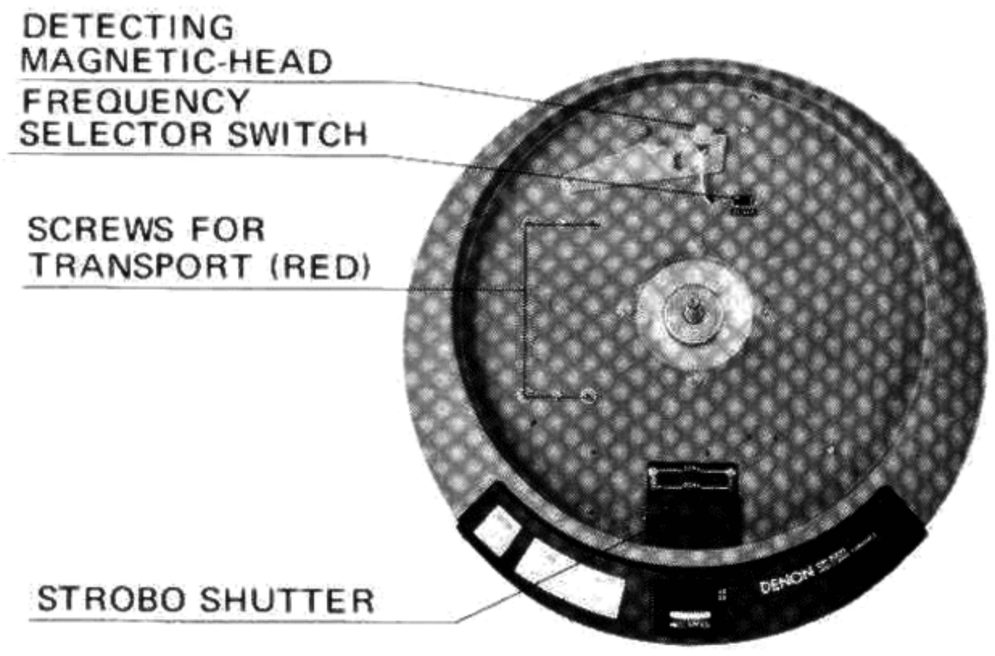


Fig. 3

7. Rotating the turntable slowly by hand, bring the adjustment hole of the turntable to the position right above the detecting magnetic-head.
   Once loosen the clamping screw, tighten it again after putting the magnetic-head fixing arm in a position pressing against the stopper as shown in figure 5.
   Pre-adjustment is provided at factory so that the distance between the magnetically-coated surface of the turntable inner rim and the detecting magnetic-head may come within a range of 0.2m/m – 0.25m/m.
   Manually rotate the turntable for a few turns and confirm that vibration or shock during the transportation has not disarranged the pre-adjustment. When the detecting magnetic-head comes in touch with the turntable, refer to "Adjusting the position of the detecting magnetic-head" on page8 .

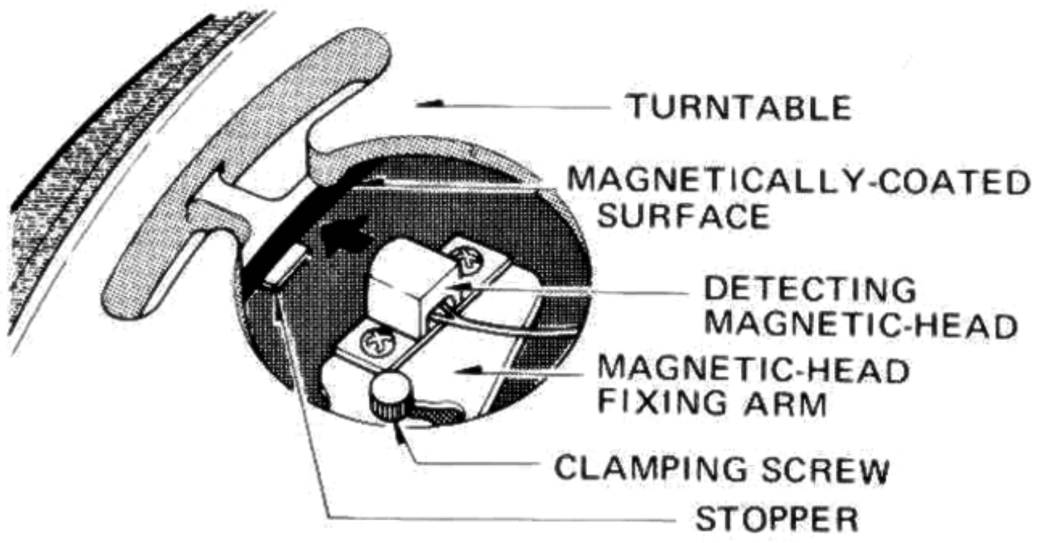


Fig. 4

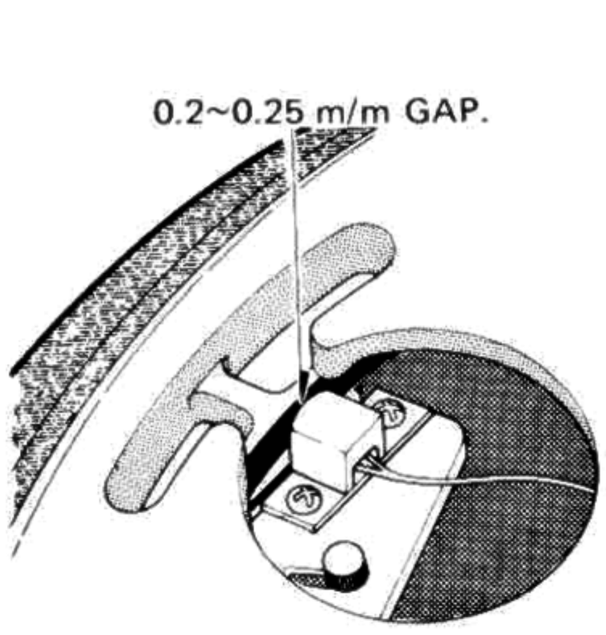


Fig. 5

8. Put the rubber sheet on the turntable.

9. To install the dust cover, fit it to the hinges as shown in figure 6 and 7. Before it is closed, make sure that the cover is first pushed into the hinges and then deeply to the left side, from front view. To take off the cover, first open it fully and next push it to the right, as seen from the front view, and then pull it out.

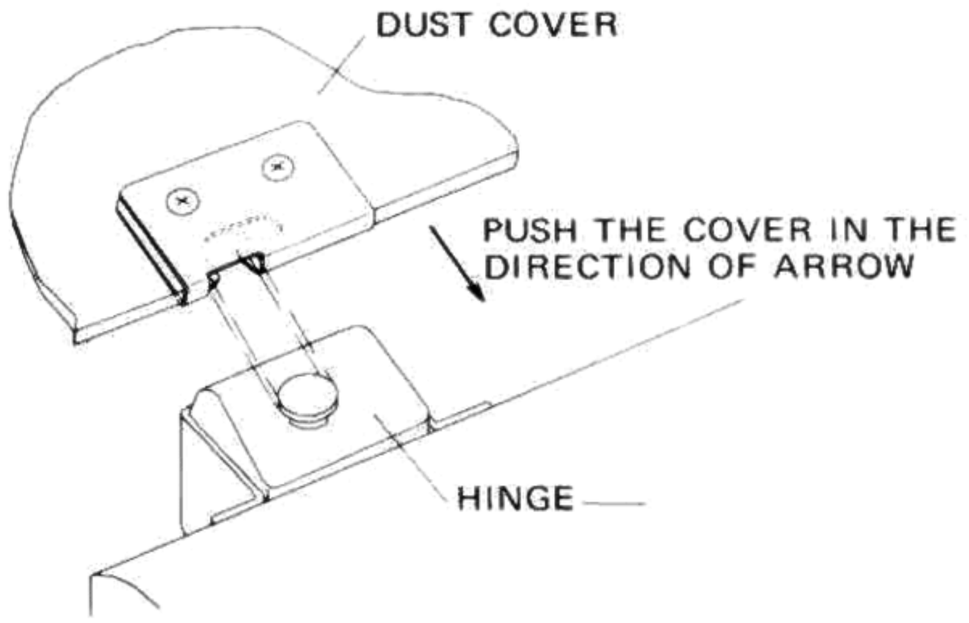


Fig. 6

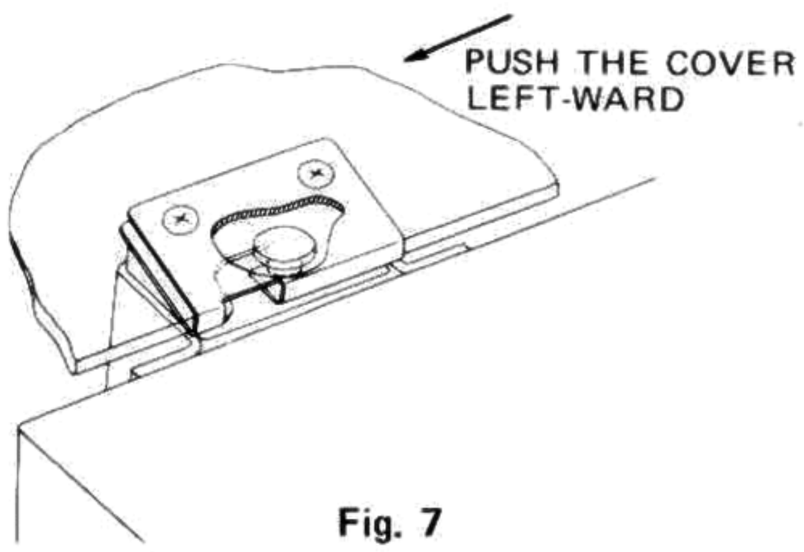


Fig. 7

(B) TO ASSEMBLE THE CARTRIDGE INTO THE CARTRIDGE SHELL

Prepare your desired cartridge and fix it to the cartridge shell as described below:

1. As two different length of cartridge fixing screw pairs are prepared as accessories, select one of them suitable for the cartridge you use. Determine the position of the fixing screw head either to face to upper side of the shell or to the body of the cartridge, so that the stylus protect cover can be suitably put on.
   Utilize the nylon washer attached not to injure the shell.
   Align the cartrdige and the shell in parallel, and in case of DENON PCL-1 cartridge shell adjust the position of cartrdige so that the stylus tip comes out about 7m/m off from the top-end of the shell. (See figure 8)

2. As shown in figure 8, the lead wires are color-coded; red for right channel (+), green for right ground (–), white for left channel (+) and blue for left ground (–). Carry out connections correctly, paying enough attention for the connection to the terminals on the cartridge side. A wrong connection may cause reversed-channels, abnormal sound image position or hum noise.

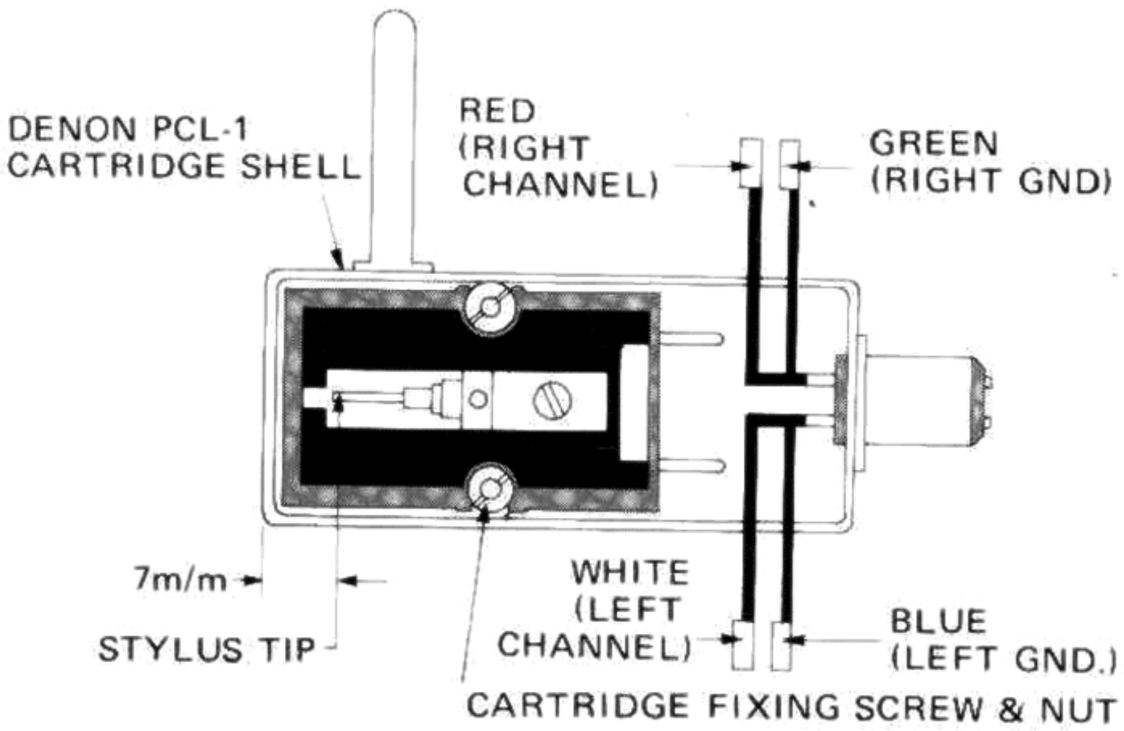


Fig. 8

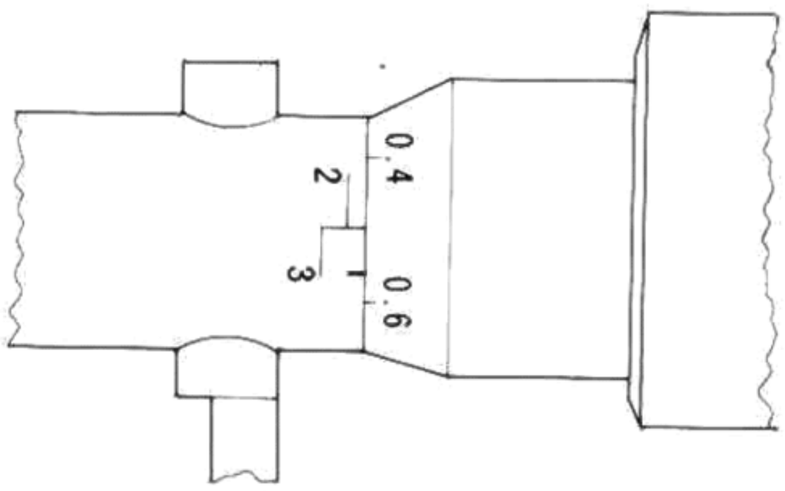


Fig. 9

(C) TO ADJUST THE TONE ARM

Fix the head shell mounted with cartridge to the tone arm with the locking nut, then confirm and adjust the tone arm as described below;

1. The overhang of the DA-305 tone arm is designed to be 14m/m. Minor deviation will affect the sound tone almost none. In case a large deviation has resulted from the installation, correct the cartridge position.
2. To adjust the stylus pressure.

2-1 Confirm the weight of the cartridge you use, as the stylus pressure is to be adjusted by the black-colored scale for the cartrdige weighing from 4 to 9.5 grams and by the orange-colored scale for the cartrdige weighing from 9.5 to 15 grams.

2-2 Align the 0 (zero) point of either one of the two scales with the "0" point of the sleeve scale (rotary), and while keeping the alignment, slide the weight ring to attain the horizontal balance.
In this case if the cartrdige has the stylus protection cover, remove it off from the cartridge or pull it up if it is fixed with hinge before attaining the horizontal balance. When the weight of the cartrdige is unknown, align the "0" point of the either one of the two scales with the 0 point of the sleeve scale and adjust the weight ring to attain the horizontal balance. The balance is attained only on the correct scale.

2-3 When the horizontal balance is attained, set the scale for a desired stylus pressure to complete stylus pressure adjustment.
One turn of the sleeve corresponds to a stylus pressure of 1 gram and the sleeve scale is provided with five calibrations each representing 0.2 grams. Finer adjustment of stylus pressure, if needed depending on the purpose, is possible to the order of 0.05 – 0.1 grams.
Figure 9, for instance, shows the setting of a stylus pressure at 1.5 grams.

3. To adjust the height of the tone arm.
Place a record on the turntable, and put the stylus tip on the surface of the record. Then, loosen the main height-adjusting screw, and watching horizontally from the side, adjust the height of the tone arm so that the tone arm pipe and the record surface are in parallel.
The adjustment can be performed easily with one hand, since the auxiliary height-adjusting screw is properly adjusted in the procedure in A-(3) to prevent the stylus tip from damage caused by dropping of the tone arm by its own weight.
When the horizontal alignment of the tone arm is obtained, fix it there by tightening the main height-adjusting screw.

(D) CONNECTIONS

1. Connect the pick-up output cord to the amplifier: the red-colored pin plug of the output cord to the right channel phono input of the amplifier and the white-colored one to the left channel.
2. Connect the black lead wire of the arm body to the ground (GND) terminal on the amplifier (if the GND terminal is not provided, connect it to the amplifier chassis) separately from the negative line for the input signal so as to improve signal to noise ratio. Sufficient care must be taken to provide adequate grounding, as poor grounding may cause hum and noises, or occasional hum generated by a hand-touch to the tone arm body.
3. As the ground terminal on the back of the player cabinet is connected to the chassis frame of the turntable unit, when the hum and noises occur for grounding of the tone arm only, connect wire from this terminal a ground terminal or chassis of the amplifier for more effective grounding.
4. Connect the AC power cord plug to a wall AC outlet.
(Note:)
This model can be operated with either 220, 230 or 240 volts AC 50 or 60 Hz. power supply and is pre-set at the voltage and frequency to meet your power supply before shipment.
Check and confirm the voltage and frequency stamped on the carton case whether they will meet with the power supply of your usage, if it is different from yours, please contact your nearest DENON dealer for re-adjustment.

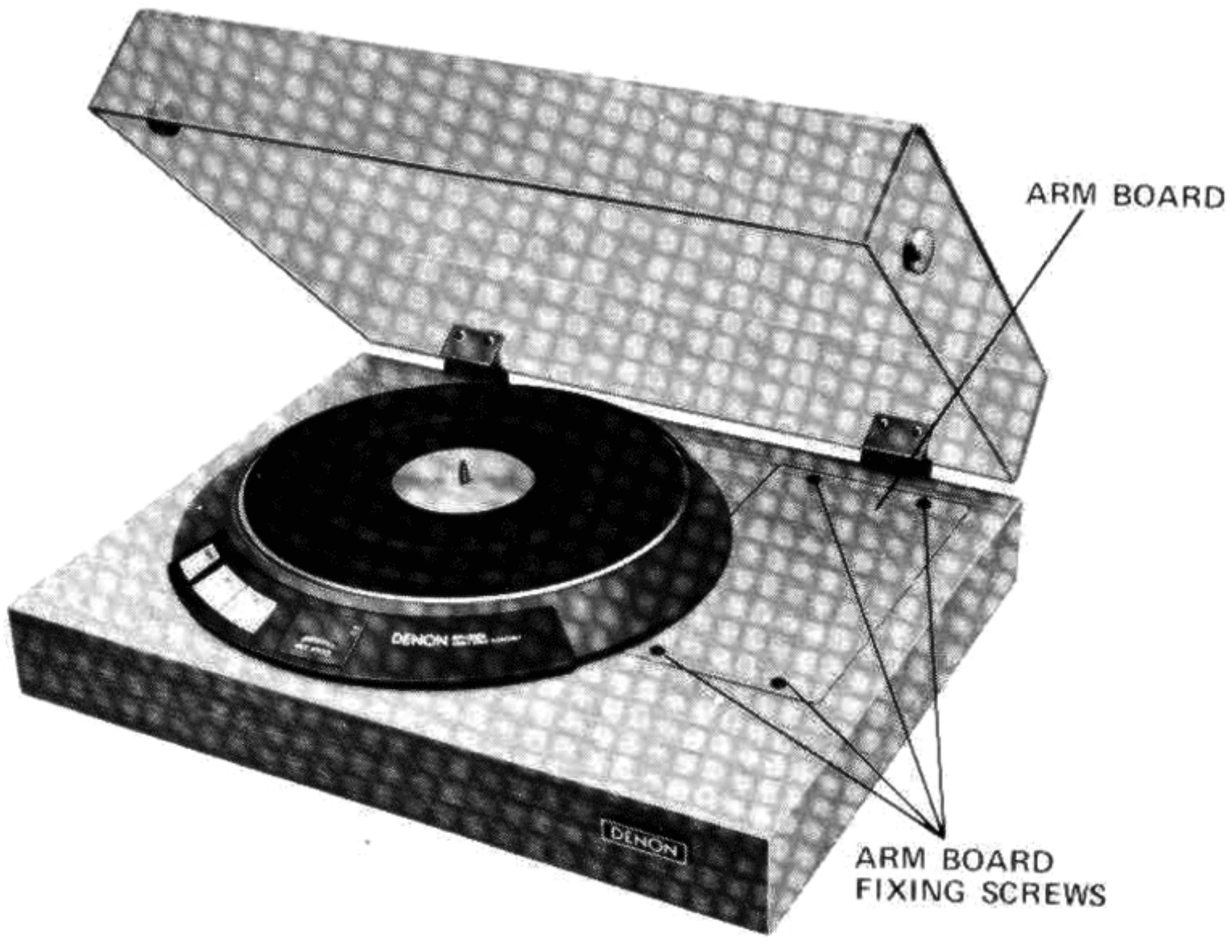
(E) TO OPERATE THE MODEL DP-3700F

1. Check and confirm that the pick-up output cords, ground wire(s) and AC power cord plug are properly connected.
2. Press the speed selection button, either 33 or 45 r.p.
The pilot lamp inside the button and the neon lamp for the stroboscope window will light, then the turntable will start rotating.

Observe the running pattern of the stroboscope through the viewing window, and adjust with the speed adjustment knob in order to get a still pattern in the window. If the pattern is running rightward, turn the speed adjustment knob leftward (in the arrow direction) to quicken the turntable rotation.
If the pattern is running leftward, turn the speed adjustment knob rightward to slow down the turntable rotation.

4. Once the speed is adjusted for either one of 33-1/3 r.p.m. or 45 r.p.m., readjustment for the other one will not be necessary. If, however, re-adjustment would be necessary with the alternation of the speed selection, follow to the procedure described in "Adjustment of rotations" on page 8.
5. To stop the turntable rotation, press the stop button.
6. This model is equipped with the tone arm lift lever so that both the record groove and the stylus tip may not be damaged. By moving it upward, the tone arm will lift up from the arm rest or from the record surface when playing the record. And by moving it downward, the tone arm will gently come down on the record surface or arm rest.

—— TO ASSEMBLE AND ADJUST THE MODEL DP-3500F ——



MODEL DP-3500F

The model DP-3500F is composed of the model DP-3000 turntable unit and specially designed cabinet.

1. Unpack the carton case and carefully take out the dust cover, turntable and rubber sheet from the parts box and then take out the cabinet with the turntable frame.
2. Install your desired tone arm to the arm board of the cabinet according to an instruction and installation manual of the tone arm.
   To take off the arm board, remove four arm board fixing screws with a phillips (+) screwdriver and press down the left side (arrow 1) of the arm board and then the board inclines to be ready for pull-out in the direction (arrow 2) as shown in figure 10.

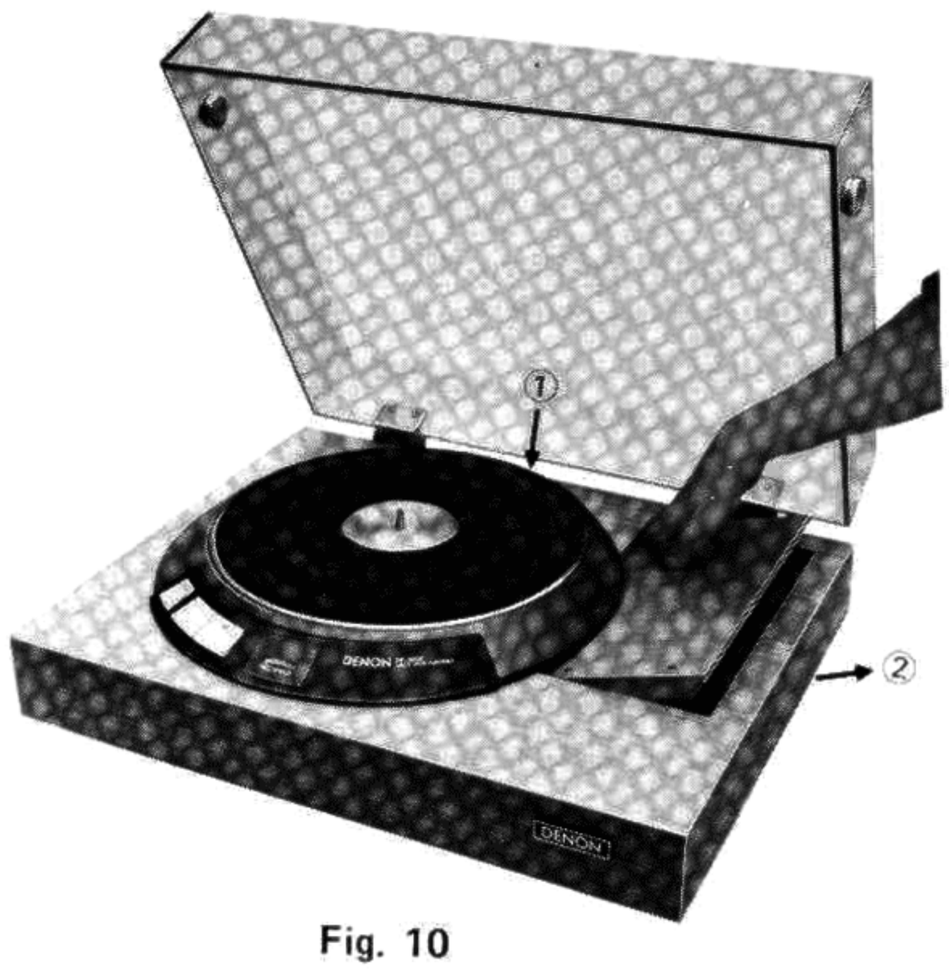


Fig. 10

3. After installing the tone arm, proceed with assembling by following item 5 to 9 in "(A) TO ASSEMBLE THE TURNTABLE UNIT AND TONE ARM" of MODEL DP-3700F on page 3.
4. Please assemble and adjust the tone arm refering to the instruction manual of the tone arm.

—— TO ASSEMBLE AND ADJUST THE MODEL DP-3000 ——

1. Unpack the carton case and carefully take out the turntable, rubber sheet, turntable frame and accessories.
2. Determine the position of the turntable frame on the cabinet, utilizing the template packed with this instruction manual.
   Also determine the tone arm location and position based with the turntable center on the template.
   Place the template on the cabinet. Draw the cutting line on the board by tracing the thick line on the template (carbon is applied on the back of the template), and also mark the tone arm fixing hole position on the board.
4. Cut out a hole as drawn on the cabinet with a fret-saw or the like. Next, drille a hole to install the tone arm.
5. Fix the turntable frame to the cabinet using the wood screws and washers supplied as accessories.
6. Install the tone arm and provide wiring.
7. For final assembly and adjustment of the turntable unit, proceed with item 5 to 8 in "(A) TO ASSEMBLE THE TURNTABLE UNIT AND TONE ARM" of MODEL DP-3700F on page 3.
8. For assembling and adjustment of the tone arm, please refer to the instruction manual of the tone arm.

—— CAUTIONS AND MAINTENANCE ——

1. **Loading and Unloading of the Turntable**
   Before loading the turntable on the motor shaft or unloading it from the motor shaft, loosen the magnetic-head fixing arm clamping screw and retract the detecting magnetic-head to a position apart from the magnetically-coated surface as shown in figure 4.
   Do this without fail, otherwise, the magnetically-coated surface may be injured or rated performance may fail to be fulfilled.

2. **Clearance between the Magnetically-coated Surface and the Detecting Magnetic-head.**
   If the motor is switched on while the magnetically-coated surface of the turntable inner rim and the detecting magnetic-head are placed more than 0.2 m/m – 0.25 m/m apart or while the turntable is removed, the motor may rotate at high speed or irregularly. In such a case, once press the stop button and stop the motor and correctly adjust the distance between the magnetically-coated surface and detecting magnetic-head.
   (Refer to "Adjusting the position of the Detecting Magnetic Head" on the page 8)

3. **Lubrication**
   Lubricating is not required, as special preoiling is provided for the bearings of this player unit.

4. **Keep this player system in a level position.**
   The height of insulating legs are adjustable by turning up to 15m/m. Unless the level position is maintained, the tone arm may fail to regularly trace the record, resulting the stylus tip to skip the groove of the record.

5. **Never supply oil to the rotating part of the tone arm or elsewhere.**

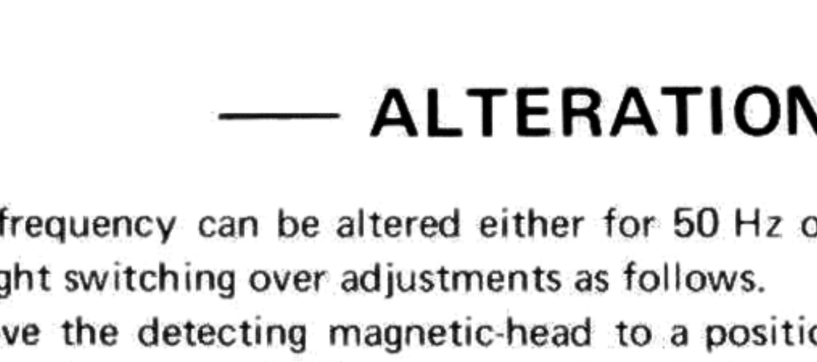
6. High precision double threads are provided for the rotation of the sleeve on the tone arm in order to attain an accurate stylus pressure at all times. Because of double-threading, the pressure indication of the scale may deviate by 0.5 grams when the sleeve is restored after once removed from its position.

   When such deviation is observed, take off the sleeve and refit it to have the deviation remedied.
   Avoid removing the sleeve, unless it is necessary. If silicon grease applied is wiped off or dust is allowed to rest on the sliding surface of the sleeve, the smooth movement of the sleeve is detracted.

—— ALTERATION OF SUPPLY FREQUENCY ——

Power frequency can be altered either for 50 Hz or 60 Hz with slight switching over adjustments as follows.

1. Move the detecting magnetic-head to a position apart from the magnetically-coated surface (refer to Item I of (F) CAUTIONS AND MAINTENANCE on page) and remove the turntable from the motor shaft, and you will find the frequency switch under the turntable. (See Fig. 3)
   Set the switch to the required frequency. (Fig. 11 shows the setting for 50 Hz.)



FREQUENCY SELECTOR SWITCH
(THIS DIAGRAM SHOWS THE SWITCH SET AT 50 Hz OPERATION).

Fig. 11

2. It is also required to change the strobo shutter according to the frequency. Fasten the screw for the strobo shutter on the required frequency. (See Fig. 12)

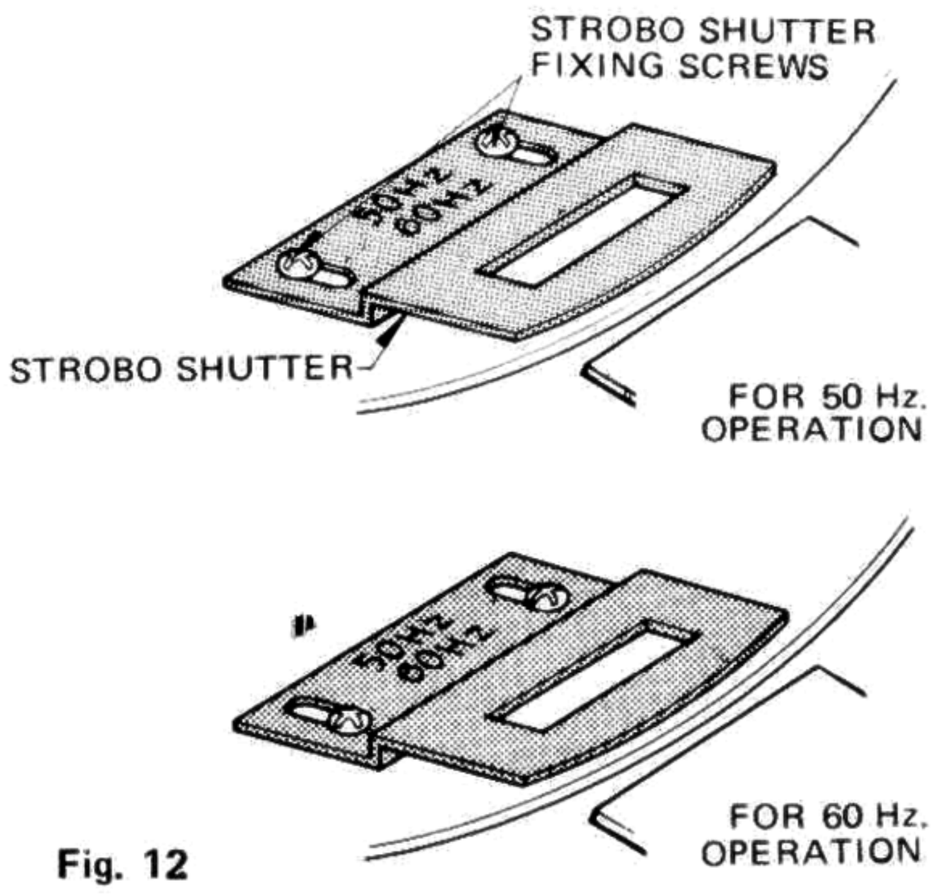


Fig. 12

3. After setting the frequency switch, restore the turntable, put back the detecting magnetic-head to its regular position. Then press the speed selection button "45," and adjust the speed adjustment knob to obtain a still strobo pattern. Next, press the speed selection button "33," and a running strobo pattern will observed. To have still pattern, adjust the speed-adjustment VR with a small screwdriver through the hole with an indication of "33" as shown in Fig. 13.

—— ADJUSTMENTS ——

1) Adjustment of Rotation

This player set or turntable unit is preadjusted so that no readjustment is required, once speed is adjusted for either 33-1/3 rpm or 45 rpm. Should readjustment become necessary for any reason upon altering the speed selection, follow adjustment procedures as mentioned below:

1-1 First, press the speed-selection button for "45" and adjust the speed adjustment knob to have a still strobo pattern.

1-2 Then, change the speed selection to "33" and, leaving the speed adjustment knob untouched, adjust the speed-adjustment V.R. to have a still strobo pattern again using a small (–) screw driver through the hole which is provided at the bottom with an indication of "33". (See Fig. 13)

Note: Please do not touch the VR indicated as "45", the variable range of the speed-adjustment knob for 45 r.p.m. is pre-adjusted to be more than ±3%.

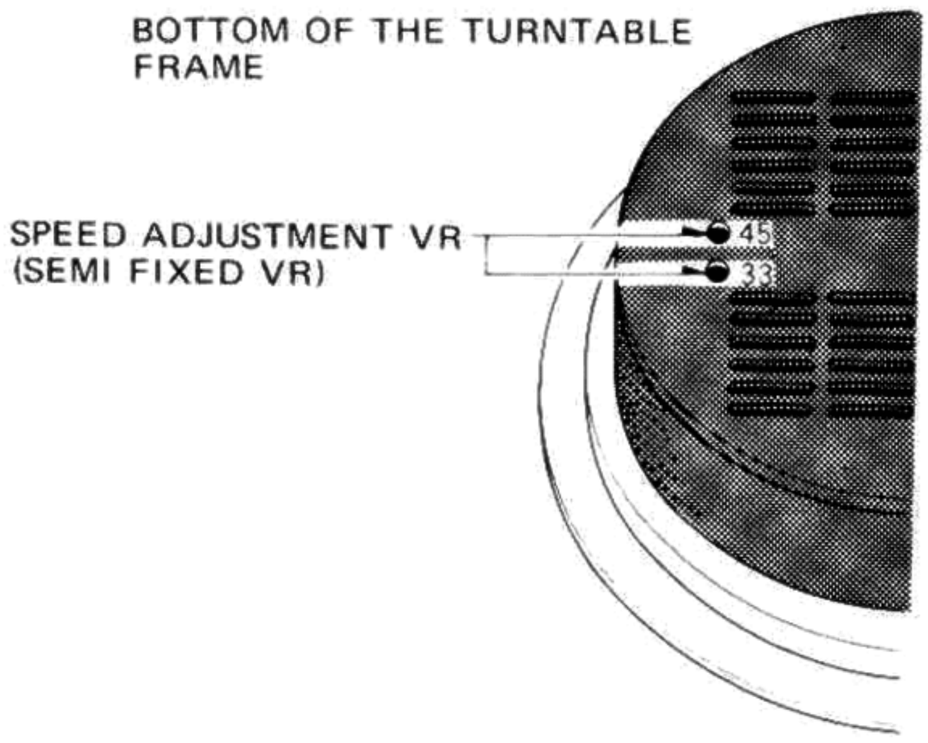


Fig. 13

2) Adjusting the Position of the Detecting Magnetic-Head

The position of the detecting magnetic-head is preadjusted correctly at the factory. In case the alignment is disarranged because of vibration during transportation or any other causes, re-adjust as follows:

2-1 Rotate the turntable with a hand until the hole of the turntable comes just above the magnetic head as shown in Fig. 14.

2-2 Next, loosen the magnetic-head fixing screws and make the magnetic-head movable for adjustment.

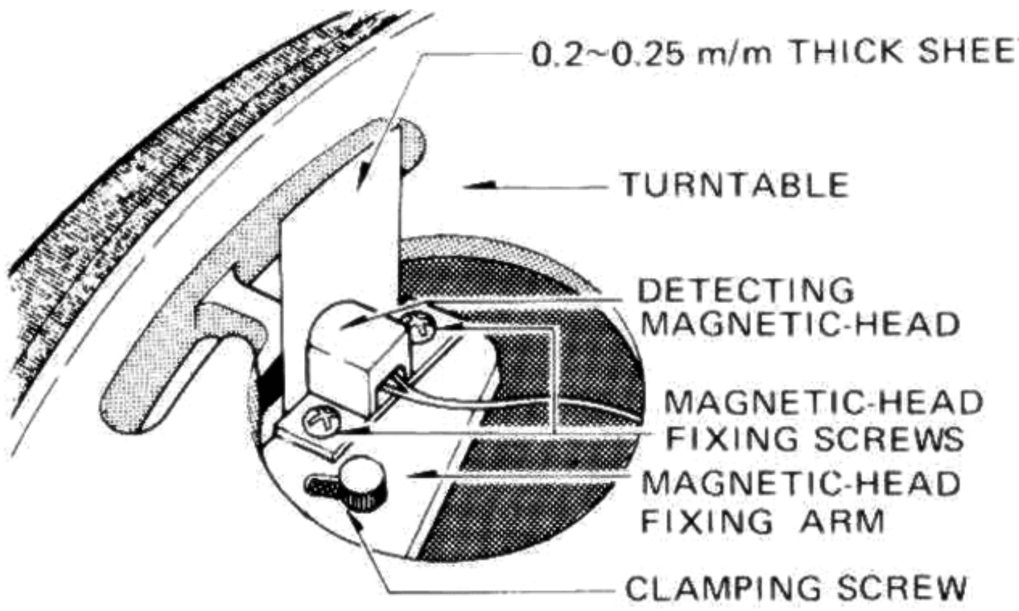


Fig. 14

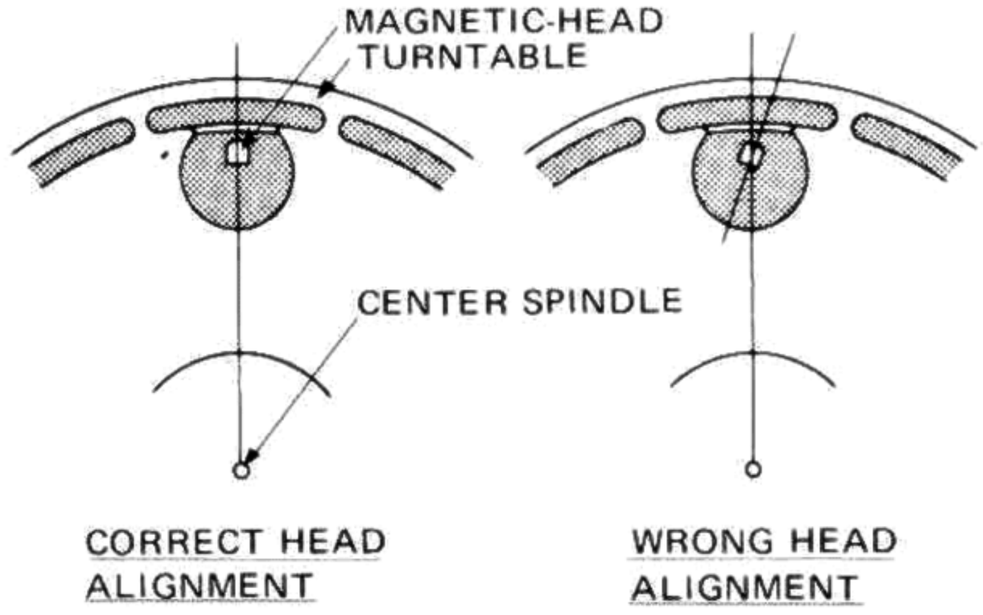


Fig. 15

2-3 Then, press the magnetic-head fixing arm against the stopper, and fix it with the calmping screw.

2-4 After the arm is fixed in that position, insert a 0.2~0.25mm thick sheet (for instance a postcard) between the magnetically-coated surface of the turntable and the detecting magnetic-head as shown in Fig. 14. Fix the magnetic-head fixing screws, pressing the magnetic head against the inserted sheet as shown in Fig. 15.

2-5 Take out the sheet and the adjustment is over.

—— PRINCIPLE OF PERFORMANCE ——

Principle of Servo Circuit

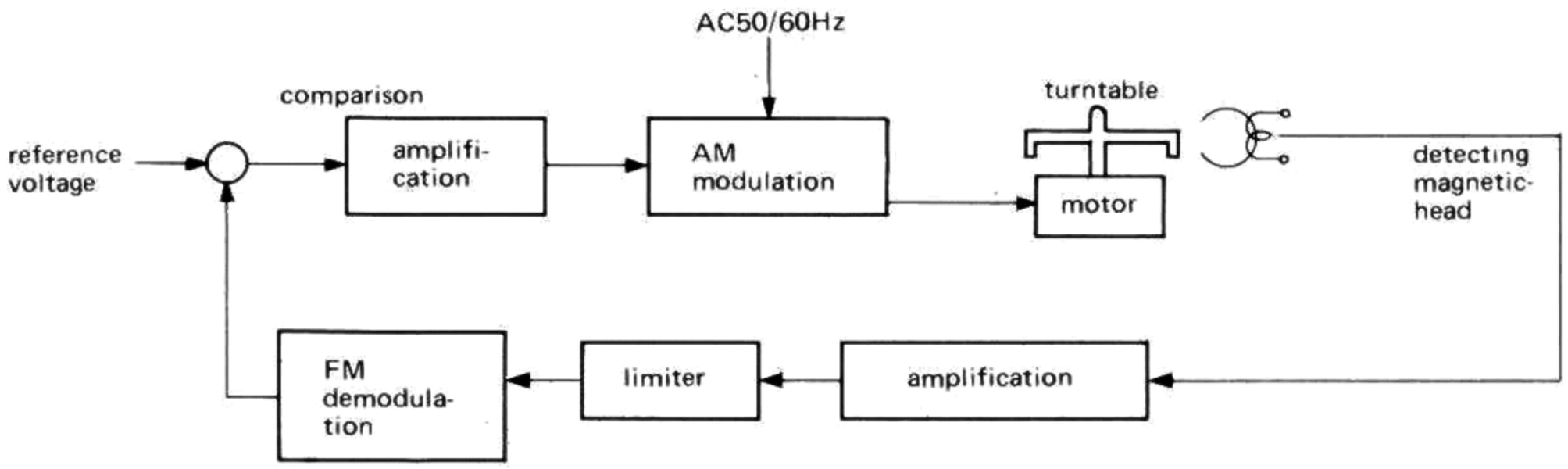
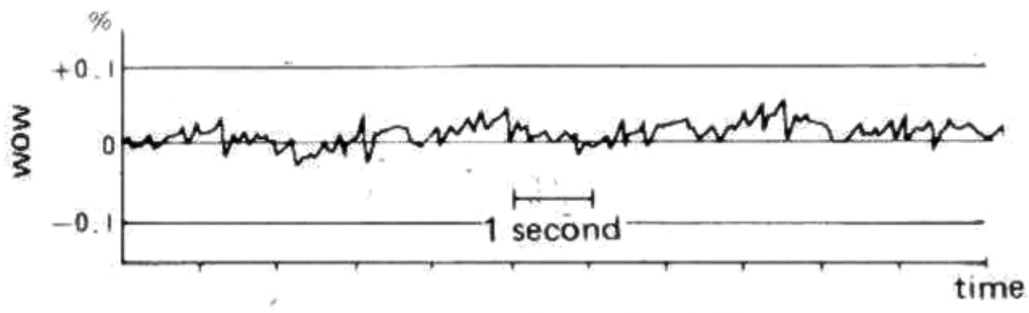


Fig. 16

The block diagram (Fig. 16) shows the principle of the servo circuit utilized for this player system.

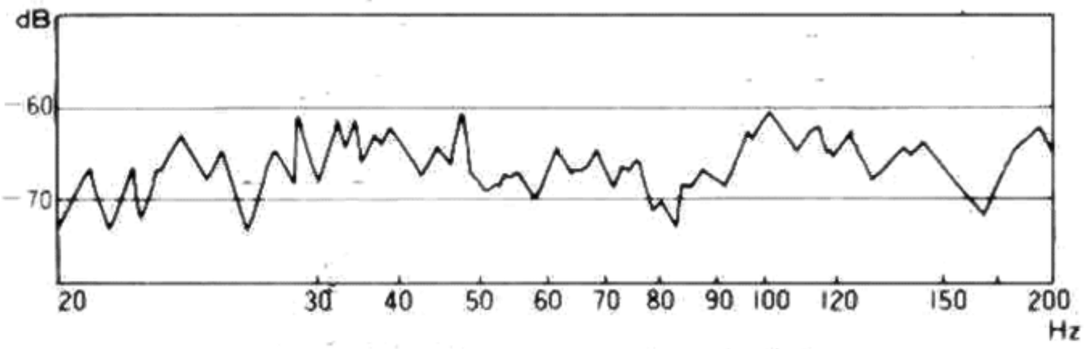
1. The detecting magnetic-head detects the turntable speed as the frequency of pulses.
2. The detected pulses are amplified and, by way of a limiter circuit, sent to the FM demodulation circuit where the speed-signaling pulses are converted to varying voltage.
3. The difference of voltage between the pulse-converted voltage and the reference voltage preset for a stipulated speed is amplified and this amplified voltage is modulated to AM (conversion of DC voltage variation to AC voltage variation), thus the voltage for motor drive is controlled by the modulated signal.

As described above, the servo system is controlled by a fully electrical circuitry: If the motor tends to rotate faster than a stipulated speed, A.C. voltage supplyed to the motor is reduced for slowing down. And if it tends to rotate slower, the voltage is increased for speeding up. A constant speed, thus, is maintained with high accuracy.



wow characteristic (33-1/3 rpm.)

Fig. 17



Rumble Frequency Analythis

Fig. 18

—— STROBO PATTERN STABILITY ——

In the case of a turntable driven by a conventional synchronous motor, both motor driving and neon-lamp lighting have a same power source.

Therefore, on such a turntable, the strobo pattern does not run even if the rotation of the turntable is fluctuated according to variation of power frequency.

In the case of this model DP-3000, though the servo circuit is designed to constantly maintain a stipulated speed once the strobo pattern is adjusted to remain still, the strobo pattern may rarely run due to frequency fluctuation of a power supply which lights the neon lamp only of this set. Actually the frequency fluctuation of power supply is about 0.2%. In adjusting the motor speed, observe the movement of strobo pattern for a few minutes and, taking the frequency fluctuation into consideration, adjust the strobo pattern speed at an average frequency.

When the strobo pattern runs 6 frames/min. for 50 Hz. and/or 7 frames/min. for 60 Hz., that corresponds to a 0.1% variation of the number of motor rotation.

—— SPECIFICATIONS ——

Model DP-3000 Turntable Unit

Rotation Speed	: 33-1/3 rpm, 45 rpm.
Platter	: Aluminum diecast, dia.; 300mm, mass of inertia; 160kg-cm^2, weight; 1.1kg
Range of Speed Adjustment	: ±3% of stipulated speed
Starting Characteristic	: Less than 1/2 turn to reach nominal speed (at 33-1/3 rpm)
Wow and Flutter	: Less than 0.03% (WRMS)
S/N	: Over 60 dB
Power Supply	: ~~AC220, 230, 240V, 50/60 Hz~~ changeable
Power Consumption	: 14W

KU-167 SERVO AMP UNIT

PM-19 パルスヘッド

PULSE HEAD

IC TA7061AP

33 RPM 約55Hz
45 RPM 約75Hz

Q1 2SA562Y
Q2 2SC458D
Q3 2SC458D
Q4 2SC536AY
Q5 2SC458D
Q6 2SC536AY
Q7 2SC536AY
Q8 2SA562Y
Q9 2SA562Y
Q10 2SA562Y
Q11 2SC1213D
Q12 2SD759 RED
Q13 2SC458D
Q14 2SC458D
Q15 2SC458D
Q16 2SC458D
Q17 2SC458D
Q18 2SD256

D1 D2 D3 D4 D5
D6 EP-5619-1 10DC2 N
D7 EP-5619-2 10DC2 R
D8 EP-5619-1 10DC2 N
D9 EP-5619-2 10DC2 R
D10
D11
D12 HZ11C

CH 274

F 14/21 J
FLT-124 J
Co 3.1μ 1.5A
Ro 100(5W)

S1 EP-5548-1
S2 EP-5548-1
S3 FEP-1010
S4 FEP-260
S5 EP-5548-1
SK FEP-429

RL FEP-964H
PL1 FEP-965H
PL2 FEP-965H
NL FEP-967 又ハ FEP-1046-1

VR1 B10K FEP-1022-4
VR2 B10K FEP-1022-4
VR3 B-10K FEP-979J

SPEED
STOP

EP-7132 又ハ EP-6263

（注）

1. ※印ノ抵抗，コンデンサハ
2. 指定ナキダイオードハ 1S15
3. 指定ナキ抵抗ハ 1/8W，±5
4. 抵抗ノ単位ハΩ，コンデンサ
5. 記入サレタ電圧ハ無負荷
   示ス。マタ○内ハ直流
6. コノ回路図ハ標準回路
   アリマス。SCHEMA VALID