

SERVICE
MANUAL

CD-94

For Service Manuals
MAURITRON SERVICES
8 Cherry Tree Road, Chinnor
Oxfordshire, OX9 4QY.
Tel (01844) 351694
Fax (01844) 352554
email: - mauritron@dial.pipex.com

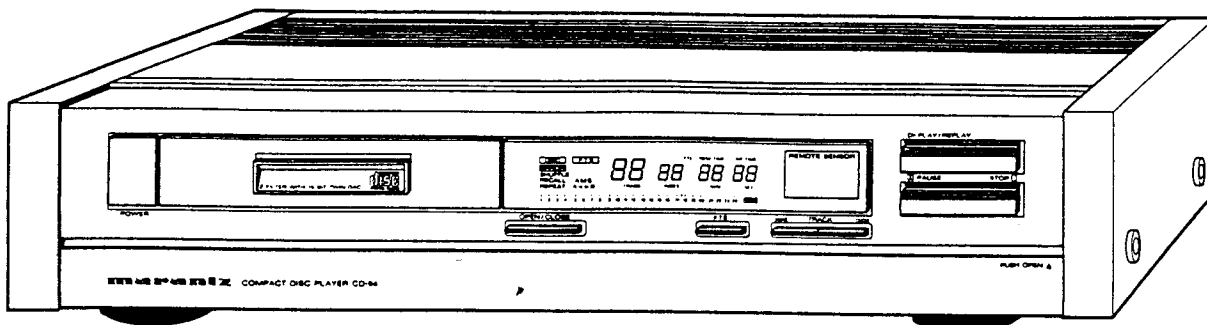
marantz®

model CD-94

Compact Disc Player

THE QUALITY OF
THIS PAGE IS
THE BEST THAT
IS AVAILABLE

MODEL CD-94 COMPACT DISC PLAYER



INTRODUCTION

This service manual was prepared for use by Authorized Warranty Stations and contains service information for the Marantz Model CD-94 Compact Disc Player.

Service information and voltage data included in this manual are intended for use by knowledgeable and experienced personnel only. All instructions should be read carefully. No attempt should be made to proceed without a good understanding of circuitry operation.

The parts list furnishes complete ordering information. Most replacement parts should be ordered from the Marantz Company. However, a simple description is included for parts which can be obtained locally.

For Service Manuals Contact
MAURITRON TECHNICAL SERVICES
8 Cherry Tree Rd, Chinnor
Oxon OX9 4QY
Tel:- 01844-351694 Fax:- 01844-352554
Email:- enquiries@mauritron.co.uk

How to use this service manual

- The "Common parts" which Marantz Japan, Inc. has established are eliminated from this service manual.
- These "Common parts" are applied to all models in the service manuals arranged and issued by MJI.
- To indicate clearly the common parts in the schematic diagram, a line is drawn above or under the Ref. Desig. No. of applicable parts.
- "Common parts" can be supplied from the Marantz service center as ever.
In case of ordering, please establish the parts number of 10 figures following the procedure mentioned in this service manual "How to establish the parts number for common parts".

(NOTE)

When you order parts to the Marantz parts center, please take notice of the following points.

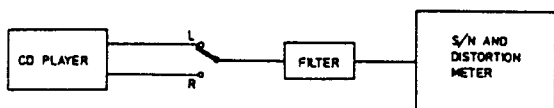
- 1) Please correctly write the parts number of 10 figures following the rule.
- 2) Since ordering parts by the Ref. Desig. No. or ratings indicated in the schematic diagram does not satisfy the above conditions, the Marantz parts supply system does not work properly.

As this case is apt to cause a trouble, please pay attention to it.

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ELECTRICAL MEASUREMENTS AND ADJUSTMENTS

Specification measurement



To measure the specification use can be made of audio test disc 4822 397 30085.

Use a 7th order filter, e.g. 4822 395 30204 (see Figure), to measure:

- Total harmonic distortion (THD).
- Intermodulation distortion.
- Signal-to-noise (S/N).

Laser power supply (POS. VOLT. SH.)

For check and preliminary adjustment of the laser supply see service manual C.D.M.-1.

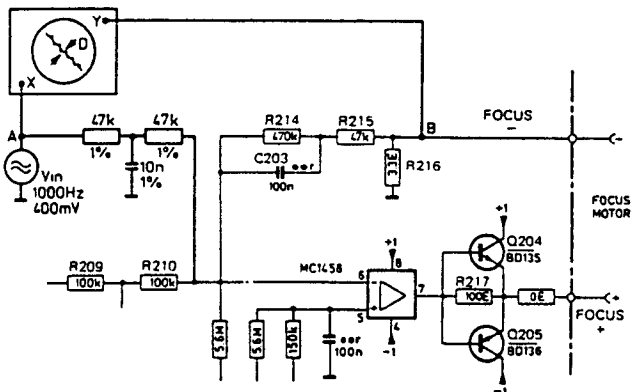
Adjusting the laser supply

Play track 1 of test disc 4822 397 300096 (disc without defects).

Connect a DC voltmeter across resistor R309 on the servo PCB (= on emitter of transistor Q315 and ground).

Adjust the laser power supply with resistor 3180 until the voltage across resistor R309 is 575 ± 75 mV.

Adjusting the focus bandwidth



Make a measuring arrangement according to the figure.

Play track 1 of test disc 4822 397 30096 (disc without defects).

Adjust trimming resistor 3158 on PRE. AMPL + LASER PCB for a 180° phase difference between signals A and B. This corresponds with a minimum distance D in the Lissajous pattern.

R=47 k Ω - 1% 5322 116 54671

C=10 nF -1% 5322 121 54154

Check of the AGC and offset circuits

(See SERVO PCB)

Play track 1 of test disc 4822 397 80096 (Disc without defects).

The voltage between pin 7 of IC Q303 (4/4) and \perp should be $-4 \text{ V} \pm 2 \text{ V}$.

The voltage between pin 8 of IC Q302 (2/4) and \perp should be $0 \text{ V} \pm 2 \text{ V}$.

INITIATION OF THE SERVICING PROGRAMME OF THE μP

— Servicing position "0"

Simultaneously depress the STOP, PLAY and SEARCH $\triangleright\triangleright$ buttons. Keep these three buttons depressed while the mains voltage is switched on.

This is the STAND-BY mode, "0" appears on the display.

In this state it is possible to move the arm by means of the SEARCH FORW and SEARCH REV keys with a minimum torque to the outside and the inside resp.

This enables a check of the free motion of the arm across the disc.

— Servicing position "1"

From servicing position "0" the player can be brought in servicing position "1" by depressing the NEXT key.

In this state the laser emits light and the objective starts to focus. When the focal point has been reached, "1" appears on the display.

When no disc has been inserted the objective goes 16 x to and fro. Then the player reassumes servicing position "0".

As in servicing position "0" the arm can be moved across the diameter of the disc by means of the SEARCH FORW and SEARCH REV keys.

— Servicing position "2"

To be reached by depressing the NEXT key after servicing position "1" has been reached.

The turntable motor starts to run

On the display appears "2".

In preparation of the transition to servicing position "3" the arm is sent to the centre of the disc.

— Servicing position "3"

To be reached by depressing the NEXT key after servicing position "2" has been reached.

The radial control is switched on. The subcode information is ignored. MUSB is high so that the music information is released.

On the display appears "3".

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(Dependent on the length of the lead-in track music will be reproduced after approx 1 min.)

In this state it is possible to move the arm by means of the SEARCH FORW and the SEARCH REV keys to the outside and to the inside resp. Now the motion is controlled by the μ and the arm moves by steps of 64 tracks as long as the key is depressed.

If one of the servicing positions 1, 2 or 3 is disturbed (e.g. braking or removing the disc) the player re-assumes servicing position "0".

The servicing programme can be left by switching the mains switch (POWER ON/OFF) off and on. (Hard-ware reset).

FAULTFINDING METHOD

Preface

In course of the development of the troubleshooting guide for the Compact Disc it has become clear that a different approach from the one applied so far was required.

For, it is no longer possible to use the classic strategy, i.e. basing the troubleshooting method on a number of possible faults in the unit.

Practice has shown that a certain fault, with the associated symptom, can have a wide variety of causes. The reason is that this player incorporates a number of feedback loop configurations—which, moreover, might affect each other—and this impedes the obvious measurements.

The method below divides the player from diagram point of view into nine clearly distinguishable sub-groups and by performing some measurements, the sub-group being in failure can be isolated. Later the defective circuit can be further examined according to the method given.

PRACTICAL HINTS

Test discs

It is important to handle the test discs with great care. For, the troubles (black dots, fingerprints, etc.) are exclusively and unambiguously positioned.

Damage can cause additional drop-outs etc. and as a result the conscious fault on this disc is no longer exclusive.

In that case it is no longer possible to check e.g. whether the track detector is working correctly.

Measurements on op-amps

In the electronic circuits of the servo systems op-amps are frequently being applied. These op-amps can be used as amplifiers, as filters, as investors, as buffers, etc.

In those cases where feedback is applied in one way or the other, the voltage difference at the differential inputs inclines to zero. This applies both to DC

and to AC.

The cause can be traced back to the properties of an ideal op-amp ($Z_i=\infty$; $G=\infty$; $Z_o=0$).

In practice this means that it is nearly impossible to perform measurements on the inverting and non-inverting inputs of op-amps if one input is directly connected to ground.

In those cases only the output signal will be measurable.

That is why in most cases no AC voltages can be given to the inputs.

The DC voltages at the inputs are equal.

Stimulating with "0" and "1"

In the troubleshooting method certain pins should in a number of cases be connected to ground or be connected to the power supply voltage.

This way of acting offers the possibility to overrule certain circuits and to stimulate others.

In this way the diagnose time can be reduced.

In a number of cases the relevant pins appear to be **op-amp outputs**.

In this respect it should be mentioned that the outputs of the used op-amps are short-circuit protected.

This implies that the output of an op-amp can be made low (= usually ground potential) without consequences.

On the other hand should be pointed out that it is **not allowed** to connect the output of an op-amp directly to the **power supply voltage**.

I/Os of microprocessors should not be connected directly to power supply voltage.

These I/Os are allowed to be brought to "0" in case this is mentioned explicitly.

Selection of ground point

It is very important to select a ground point as close as possible to the test point.

Conditions for injecting

— It should be pointed out that injection of levels or signals from a strange source is **never** allowed to occur when the power supply voltage is lacking in the circuit in question.

— Naturally, the injected level is never allowed to exceed the power supply voltage of the circuit in question.

Continuous burning of the laser

— Disconnect plug J203 on the servo PCB and connect pin J203-9 (laser) of the cable connector to ground.

Now the focus loop and the radial loop are interrupted as well:

J203-7 (RE1 = Radial Error 1), J203-8 (RE2 = Radial Error 2) and J203-10 (FE = Focus Error).

The laser also burns continuously when the set is in service loop 2.

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Irregular working of the display

Irregular working of the display when the set is opened and playing, might have been caused by incidental body effect in the region of the crystal oscillators.

Switching "off" and "on" of the mains voltage will eliminate this effect.

Indication of checkpoint

In the circuit diagram the checkpoints have been given a serial number (e.g. ①), to which the troubleshooting method will refer.

For oscillograms, amplitudes, time bases and position of set, see tables of checkpoints.

GENERAL CHECKPOINTS

In the detailed troubleshooting method following below a number of general conditions, required for proper functioning of the player, will **not** be repeated. Before starting the detailed troubleshooting method these general points should be checked.

- a. Ensure that disc and objective are clean (remove dust, fingerprints, etc.) and use undamaged discs.
- b. Convince yourself of the presence of the clock frequencies, viz:
 - 12 MHz for μ P servo (pin 18)
 - 11.2896 MHz for FILTER-B IC (pin 19)
 - 2.82–5.64 MHz for free-running PLL circuit on the DECODER-A IC (pin 27)
 - 3 MHz for control and display μ P (pin 33).
- c. Check whether all power supply voltages are present and have the correct level.
See PCB drawings.
- d. Check whether the two mutes (KILL and $\overline{\text{MUSB}}$) are inactive so that data are nowhere interrupted. This should go high about 2 seconds after the mains voltage is switched on.
 $\overline{\text{MUSB}}$ =pin 23 of the FILTER-B IC on the decoder PCB.
Normally this pin is high during play and low during search.

DETAILED TROUBLESHOOTING METHOD

A number of quick and efficient checks immediately give a definite answer on poorly functioning sections of the player.

To check the servo systems four service loops have been built in μ P Q271.

Before calling in service loops, it should be checked (position power on) whether the bus (clock, data: pin 17 and 10 or 11 of μ P Q271 resp.) is free. In other words, checking whether these lines do not have a short circuit to ground or supply voltage (level low or "high"). In such a case the buttons cannot be operated.

For troubleshooting the step-by-step method below is followed.

First step (with disc on turntable)

Bring the player in service loop 1 or 2

If one of the conditions for service loop 1 or 2 is not met, the questions below should be answered positively **in the sequence given**.

In practice this means that when one question has been answered positively, all the preceding circuits, to which the questions refer, are functioning well.

Example: if the eye pattern is present, we may conclude that the laser is working, the laser is in focus and that the turntable motor is running.

Note:

In some situations, certain faults in the radial servo circuit affect the focus servo circuit (e.g. if supply voltage + 1 of IC Q301 in the radial circuit fails, the focus coil starts oscillating).

To determine if this situation exists, connect point ④ on the servo PCB to ground.

In this way, the influence of the radial servo circuit on the focus servo circuit can be eliminated.

- A. Is the laser giving light?
(Test method: see sub A)
- B. Is the angle disc-light pin within the tolerance, i.e. $90^\circ \pm 0.5^\circ$?
(Test method: see description mentioned in chapter "Mechanical measurements and adjustments" of the C.D.M. manual).
- C. Is the laser giving sufficient light?
(Test method: see sub C).
- D. Does the objective come in focus?
(Test method: see sub D).
- E. Is the turntable motor running and, if so, is it running at the correct speed?
(Test method: see sub E).

If the answers to questions 1 or 2 through E are positive, it should be possible to bring the player in service loop 1 or 2.

Second step (with disc on turntable)

Bring the player in service loop 3.

This means that the eye pattern on point ⑤ (on the decoder PCB has to be stable, while MSC on point ① on the servo PCB has to be more stable too).

(Test method: see DECODER-A IC)

Note that the set is not only tracking a song in loop 3, but also playing the song, provided the digital circuit is working (however music cannot be hard).

If this does not work, return to service loop 2 and answer the questions below positively in the sequence given.

- F. Are $\overline{\text{DO}}$ and HFL detectors functioning?
(test method: see sub F)
- G. Is track detector functioning?
(test method: see sub G)

H. Is the radial control functioning properly?
(test method: see sub H)

If the answers to questions F, G and H are positive, it should be possible to bring the player in service loop 3.

Third step (with disc on turntable)

Note that the set is not only tracking a song in loop 3, but also playing the song, provided the digital circuit is working (music cannot be heard).

If this does not work, return to service loop 3, and answer the question below positively.

I. Is TL functioning, i.e. polarity of RE?
(test method: see sub I)

J. Is information transmission subcode functioning?
(test method: see DECODER-AIC)

Check the Q-channel signals.

If the answers to questions I and J are positive, it should be possible to bring the player in the Play mode.

Fourth step (with disc on turntable)

If no music is heard in position "play" or service loop 3 answer the last question.

K. Is digital decoder circuit functioning according to specification (test method: see II. FILTER-B IC and V. KILL CIRCUIT)

Sub. A. IS THE LASER GIVING LIGHT?

Test method

Bring the player in service loop 1 without placing a disc on the turntable. Now the laser is giving light for an unlimited period of time.

Another method for which the laser gives light during an unlimited period of time and the objective is standing still, is disconnecting plug J203 on the servo PCB and connecting point J203-9 of the cable connector to ground.

In case of power-on the laser should burn. This is checked with the aid of a light-sensitive component which is slightly screened from ambient light.

Hereafter follow some examples:

a. Connect photosensitive diode type BPW4, code number 4822 12032108, with correct polarity to an analogue multimeter (e.g. PM2412) at range 10 k Ω .

If the laser is burning, the meter will give virtually full scale deflection.

b. Connect LDR, code number 4822 116 10002, to digital multimeter PM2517E.

If the laser is burning, the resistance will drop to approx. 8 k Ω .

If the laser is not giving any light, proceed to Annex 1.

Sub. C. IS THE LASER GIVING SUFFICIENT LIGHT?

Test method (Test points on Pre-amp PCB)

— Interrupt the collector of Q203 on the servo PCB or ground-the-side of electrolytic capacitor C201. Disconnect plug J203 on the servo PCB and connect pin **J203-9 (laser)** of the cable connector to ground.

Now the laser should continue to give light while FE, RE1 and RE2 are interrupted.

- Place disc on turntable and switch power on.
- Directly inject with AF generator ($Z_i \leq 600$ Ohms) to test point \diamond FE a sine-wave signal between 25 and 60 Hz (exact frequency is player-dependent) and 2V_{pp}.
- Select such a frequency that the monitor diodes of the light pin give output signals as indicated on test points \diamond 5, \diamond 6, \diamond 7 and \diamond 8. Amplitude 40-80 mV.
- If the amplitude is not sufficient, proceed to Annex 1.

Sub. D. IS THE OBJECTIVE COMING INTO FOCUS?

Test method

● No disc on turntable

Switch power on and actuate Play button.

Now the arm should move inwards. Immediately after that the objective should move two times up-and downwards (this happens during searching of the focusing point).

After this the action will stop.

These actions are software-controlled from the servo μ P. If this is not working, check μ P servo, end stage focus circuit or focus coil.

● With disc on turntable

Quick test procedure:

For a rough check on the working of the focus circuit, proceed as follows:

- place disc on turntable.
- set player in service loop 1.
- remove disc from turntable.
- now examine if the objective focuses by bringing a reflective object (e.g. mirror) above it.

Detailed test procedure

- Check **Q203** (on servo PCB) as follows:
Check whether FN becomes, with each passage of the nominal focusing **low for a short period of time**. Only when focusing point FN has been found, FE will be released via Q203 (base will become negative).
Check whether base of Q202 is driven low from servo μ P (= FCO). If not, check servo μ P.
If so, proceed.
- Test focusing circuit as follows:
Interrupt the collector of Q203 on the servo PCB and disconnect **plug J203** on the servo PCB. Con-

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nect pin J203-9 (laser) of the cable connector to ground.

Now the laser is burning continuously, FE has been released and the focus loop has been interrupted at test point ① (=FE) on servo PCB.

Testing of circuit, between test point ① and focusing coil

(Test points on servo PCB)

- Directly inject a sine-wave signal of 10 Hz, $2V_{pp}$, to test point ① by means of an AF generator ($Z_i \leq 600 \Omega$).
- Check visually whether focusing coil "--" and thus objective too "--" responds.
- Check whether this voltage is $0.6 V_{pp}$ on test point ②.
- Check whether this voltage is $6 V_{pp}$ on test point ③.
- Check whether this voltage is $5 V_{pp}$ on test point ④.

Testing the subchassis (Test points on Pre Amp PCB, injection point on servo PCB)

- Place a disc on the turntable.
- Directly inject to test point ① a sine-wave signal between 25 Hz and 60 Hz at $2 V_{pp}$ by means of an AF generator ($Z_i \leq 600 \Omega$). The exact frequency is player-dependent.
- Select such a frequency that the monitor diodes of the light pin give output signals as indicated on test points ⑤, ⑥, ⑦ and ⑧.
- Check test points ⑨, ⑩, ⑪ and ⑫.
- Check test point ⑬.
- Check test point ⑭.

Is the same as signal on test point ⑬ but amplitude is dependent on position of potentiometer 3138.

If all the checks are positive, close focus loop (insert plug J203). Now the focusing circuit should be able to operate. Reconnect transistor Q203.

It should be noted here that the amplitudes on test points ⑤ through ⑬ are slightly dependent on the characteristic of the monitor diodes.

Sub. E. IS TURNTABLE MOTOR RUNNING AND, IF SO, IS IT RUNNING AT THE CORRECT SPEED?

Test method (Test points on servo PCB)

- Place disc on turntable and bring set in service loop 2.
- If focusing point is found, check whether FCO is low on point ⑮.
- If not, check focus circuit sub D.
If so, proceed.
- Now only power on, disconnect plug J201 on the servo PCB and check MSC=point ⑯ of cable connector J201 or point ⑰ on the decoder PCB.

If not, check Decoder-A IC (Q501) circuit.
If so, proceed.

- Reconnect plug J201, disconnect plug 15 on the preamplifier PCB and inject a DC signal to the cable connector of the motor or directly to the turntable motor.

The turntable motor should be running now.

(A DC voltage of 2,5 V approximately corresponds with the rpm during scanning of the innermost tracks).

In this condition the player should be brought in service loop 2 (depress Stop button while mains voltage is switched on).

If $DC < 2.5 V$ Figure G should be visible on test point ⑰ (servo PCB).

If $DC > 2.5 V$ Figure H should be visible on test point ⑰.

If so, check turntable control circuit (circuit from point ⑰ to turntable motor).

If not, check whether MSC is released by means of SSM at pin 16 of IC Q271.

This connecting plug J201 on the servo PCB and measure on pin 12 of cable connector J201.

If MSC is working now, check circuit around IC Q271.

- Take player out of service loop 2, depress Power-on button and then Play button and check eye pattern on point ⑱ (on decoder PCB).

To stabilize the eye pattern, bring light pin above tracks by hand, or by briefly (5 s) depressing Fast Forward button.

If eye pattern not point ⑱ is not present or unstable, check RF pre amplifier (see Annex IV).

- If eye pattern is correct, proceed.

- Check whether point ⑲ (=HFLS) on the servo PCB is correct in service loop 2 (see Figure Y). If not, check HFLS detector circuit (is circuit between point ⑲ and ⑳). If so, proceed.

Take player out of service loop 2 by depressing the power button.

- Check locking-in of PLL circuit of Decoder-A IC. (See CEFM signal pin 27: point ㉑)

If PLL is locking-in, proceed.

- Check timing signals on output of Decoder-A IC as indicated in "DECODER-A IC".

Is the digital decoder circuit functioning according to specification? If timing signals are correct, proceed.

- If MSC is still not functioning properly, replace the relevant specific digital IC according to the trial and error method with the aid of service IC box.

- MSC has to be present now.

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Sub. F. ARE THE \overline{DO} and \overline{HFLS} DETECTORS FUNCTIONING?

Test method (Test points on servo PCB)

— Starting point is:

- \overline{HFLS} = 1 when spot is exactly on track
- \overline{HFLS} = 0 between tracks (e.g. during track jumping)
- \overline{DO} = 0, or \overline{DO} = 1 in case of drop-out
- \overline{DO} = 1, or \overline{DO} = 0 when there is no drop-out.

Approximative method

(applicable in service loop 2)

- Place disc on turntable.
- Bring player in service loop 2.
- Check whether \overline{DO} (test point 57) is not continuously "high". Normally test point 57 is "low", however small spikes of approximately 100mV are present in case of scratches on the disc.
- Check \overline{HFLS} (test point 55).

Precise method

(can be checked in playing set only)

- Place test disc 5A on turntable. Switch power on and depress Play button.
- Select track no. 10: Check point 55. \overline{HFLS} pulses should be present.
- Select track no. 15: Check point 56. \overline{DO} pulses should be present. With this track the \overline{HFLS} pulses on point 55 should also be present.
- In case of track jumping \overline{HFLS} pulses are always present on point 55.

Sub. G. IS TRACK DETECTOR FUNCTIONING WELL?

Test method (Test points on servo PCB)

Switch off the offset circuit:

Loosen resistor 3315 (at the side where it is in contact with pin 8 of IC Q302).

Mount a 47 k Ω trimming potentiometer between +1 and -1 supply voltage (for example between pins 4 and 11 of IC Q302). Connect the wiper of the trimming potentiometer to the loose side of resistor 3315.

- Place a disc on the turntable.
- Bring the set in service loop 2.
- Adjust the signal on test point 21 symmetrically round 0V by means of the external 47 k Ω trimming potentiometer. The amplitude of the signal may change during this adjustment.
- Measure F.S on point 36. Here too the frequency variation depends on the eccentricity of the disc.
- Check point 60.
- Check point 61. Signal cannot be triggered.
- Check point 62.
- Switch the offset circuit on again.

Sub. H. IS THE RADIAL CONTROL FUNCTIONING PROPERLY?

Attention: The offset circuit (d-multiplier) and the AGC circuit (k-multiplier) are correction circuits. This means that under optimal conditions (new disc, minimum tolerances of components) the set may be working properly even if a fault is preset in offset or AGC circuit.

Test method (Testpoints on servo PCB)

- Place disc on turntable.
- Switch off AGC circuit (k-multiplier) and switch off offset circuit (d-multiplier).

Method:

Switching off AGC circuit: interconnect points 5 and 6 of IC Q309.

- Place a disc on the turntable.
- Bring the set in service loop 2.
- Adjust the signal on test point 21 symmetrically round 0V by means of the external 47 k Ω trimming pot. The amplitude of the signal may change during this adjustment.
- c. Bring set in service loop 3. At this moment there is a high probability that the set is working. If so, check d and k factor (see Annexes II and III). If not, proceed.
- d. Bring set in service loop 2 and check signal on point 21. The AC-component has to be 12-14 V symmetrically, around a DC level of zero volt. If this is correct, proceed to e). If this is not correct check following testpoints:
 - 22, 23: value should be 0.7 V_{pp}
 - 24: value should be 0.2 V_{pp}
 - 25: value should be 0.25 V_{pp}
 - 26: value should be 20 mV_{pp}
 - 27, 28: value should be 800 mV_{pp}
- Note:*
The frequency variation strongly depends on the eccentricity of the disc. If points 22 + 23 are OK, check point 21 again. If 21 is OK, proceed.
- e. Check point 29 (is RE + 650 Hz). Value should be V_{pp} If so, proceed. When the set is in the normal stand-by position 650 Hz at 300 mV is present on point 29.
- f. To check radial output stage, do not use a disc, only power on. Inject on points 30 and 31 respectively a sine-wave signal of 8 to 10 Hz 3 V_{pp}. Then the radial motor will go back and forth.

At this moment radial tracking must be possible in service loop 3.

- Switch the AGC circuit on again. If the original fault symptom is still present proceed

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to Annex III:

Check of the k-factor.

- Switch the offset circuit on again.

If the original fault symptom is still present, proceed to Annex II:

Check of the d-factor.

Sub. I. IS INT FUNCTIONING. O.E. POLARITY OF RE?
(Measure points on servo PCB)

Test method

Bring player in service loop 3 and measure INT on pin 12 of μ P servo IC Q271.

A square-wave voltage (0-5V) should be measured on this pin. As a result of the frequency variation this square-wave is hard to trigger.

I DECODER-A IC

- Check the MC signal (pin 17; test point 67)

- In stand-by mode, the MC signal (Motor Control) corresponds to the figure below.

Note:

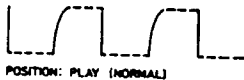
The repetition time of the MC signals is 11.3 μ sec.

- Place a disc on the turntable.
- In position PLAY or SERVICE POSITION 3, the MC signal corresponds to the figure below.

Note:

During start-up the duty cycle is 98%, then the duty cycle of the signal becomes about 50%.

See also Service Manual CDM-1: "Check of the motor control".

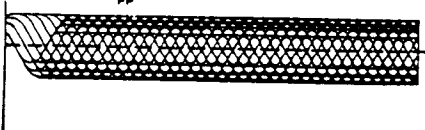


- Check the HF signal on test point 65 (eye pattern)

- Place a disc on the turntable.
- The HF signal should be present and be stable in the PLAY mode and in: SERVICE POSITION 3 after the run-in track has been read.
- In SERVICE POSITION 2 and during reading of the lead-in track the HF signal is not stable.

Position of oscilloscope 0.5 μ s/DIV.

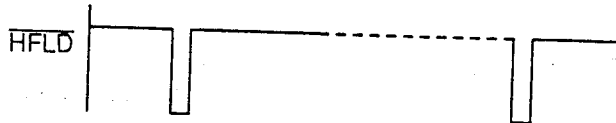
Amplitude $\approx 1.5 V_{pp}$



- Check the HFLD signal on test point 68

- Place a disc on the turntable.
- In the PLAY mode and in SERVICE POSITION 3 the HFLD signal is "high"; however, minor pulses may be present and in cause of disorders on the disc.
- In SERVICE POSITION 2 and during playback of track no. 15 of test disc 5A HFLD pulses are visible.

Position of the oscilloscope 5 ms/DIV



- Check if the MUTE signal (pin 11; test point 67) is "high"

When Filter-B IC is applied, the MUTE input will not be used.

- Check the CEFM signal (pin 27; test point 68)

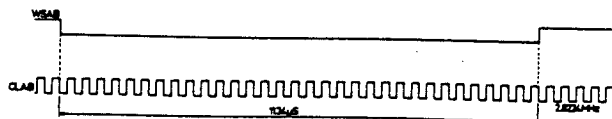
- Place a disc on the turntable.
- In stand-by mode (only the main switch is depressed), the frequency lies between 2.82 MHz and 5.64 MHz.
- In the position PLAY and SERVICE POSITIONS 2 and 3, the frequency is 4.32 MHz.

- Check the Xin signal (pin 19; test point 69)

- The Xin frequency is 11.2896 MHz.
- If this frequency deviates, check test point 70; Xout signal, on Filter-B IC. This frequency should also be 11.2896 MHz.

- Check the timing signals meant for Filter-B IC

- Place a disc on the turntable.
- Select one of the following positions: SERVICE POSITION 2 or 3, or position PLAY.
- Trigger the oscilloscope with the WSAB signal (test point 67, pin 39).
- Check signals:
 - WSAB at test point 67 (pin 39) (Word Select from Decoder-A to Filter-B)
 - CLAB at test point 68 (pin 38) (Clock from Decoder-A to Filter-B)and their interrelation.
- There must be activity at test point 69 (pin 37), DAAB signal (DATA from Decoder-A to Filter-B).



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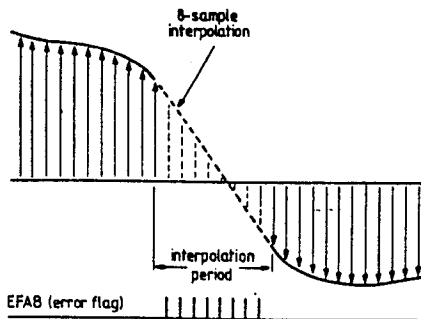
M7180

● Check the EFAB signal (Error Flag from Decoder-A to Filter-B) at test point $\diamond 74$ (pin 36)

- Place test disc 5A on the turntable.
- During playback, EFAB pulses should be present at test point $\diamond 74$ for soft braking of the disc and during fast search (F.Forward, F.Reverse).

Note:

Filter-B IC is capable of interpolating linearly 8 successive EFAB pulses.



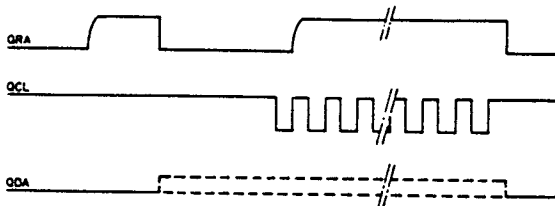
● Check the Q-channel signals

- Place a disc on the turntable.
- Select one of the following positions: SERVICE POSITION 3 or position PLAY.
- Trigger on the QRA signal (Q-channel Request Acknowledge) test point $\diamond 75$; pin 30.
- Check signals QRA at test point $\diamond 75$ (pin 30).
QCL at test point $\diamond 76$ (pin 31).
(Q-channel-clock) and their interrelation.
- There should then be activity at test point $\diamond 77$ (pin 29) QDA (Q-channel Data).

Note:

The QRA request is initiated by decoder μP (QRA "high"). Then Decoder-A answers this request (QRA goes "low"). With the next leading clock pulse (QCL) the QRA signal is rendered "high" again by the decoder μP .

As soon as the decoder μP has taken in enough information via QDA, QRA will go low again. That is why the QRA times vary each time.



● Check the \overline{SSM} signal (test point $\diamond 78$; pin 33) = Start-Stop turntable motor

- Motor start pulse when test point $\diamond 78$ is "high" for ≥ 0.2 sec.
- Motor start pulse when test point $\diamond 78$ is "low" for ≥ 0.2 sec.

Note:

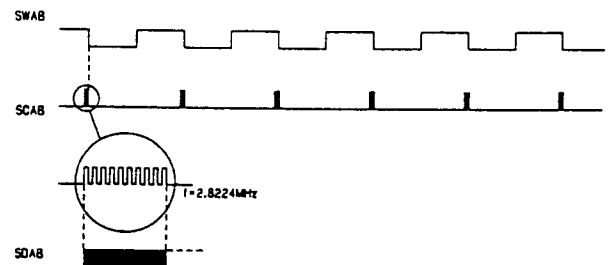
After the motor start pulse, SWAB information (Subcoding Word clock) will become visible at this point. The period time of that signals is 136 μ sec.

● Check the subcode clock signals

- Place a disc on the turntable.
- Select one of the following positions: SERVICE POSITION 3 or position PLAY.
- Trigger the oscilloscope with the SWAB signal at test point $\diamond 78$.
- Check the following signals:
SWAB at test point $\diamond 78$; pin 33
SCAB at test point $\diamond 79$; pin 35 (Subcode Clock from Decoder-A to Filter B)
SDAB at test point $\diamond 80$; pin 34 (Subcode Data from Decoder-A to Filter B) and their interrelations.

Note:

While the burst of 10 clock pulses, appear on SCAB the Q-channel information is transferred on SDAB. Hereafter the P-bit indication follows. The P-bit "high" between two bursts of 10 clock pulses in case of pause indication and "low" in case of music indication.



● Check the \overline{CRI} signal

The \overline{CRI} is "low" in case of track jumping. Player in position SEARCH.

● Check the \overline{DEEM} signal (test point $\diamond 84$; pin 32)

- Place test disc 5 on the turntable.
- During playback of track no. 14 (recorded without PRE-EMPHASIS), the \overline{DEEM} signal should be "low".
- During playback of track no. 15 (recorded with PRE-EMPHASIS), the \overline{DEEM} signal should be "high".

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II FILTER-B IC

● Check the signals between Decoder-A IC and Filter-B IC

See sub. "I Decoder-A IC".

- Check the X IN signal (test points 69 and 70)
- Check the timing signals meant for Filter B (WSAB, CLAB, DAAB signals; test points 71, 72 and 73).
- Check the EFAB signal (test point 74)
- Check the subcode clock signals (SWAB, SCAB, SDAB signals; test points 78, 79 and 80).

● Check the timing signals between Filter-B IC and DAC IC

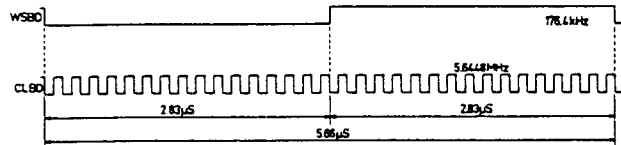
- Place disc on the turntable.
- Select one of the following positions: SERVICE POSITION 3 or position PLAY.
- Trigger the oscilloscope with the WSBD signal (Word Select from Filter B to DAC) test point 85 (pin 18).

Check the following signals:

WSBD at test point 85; pin 18

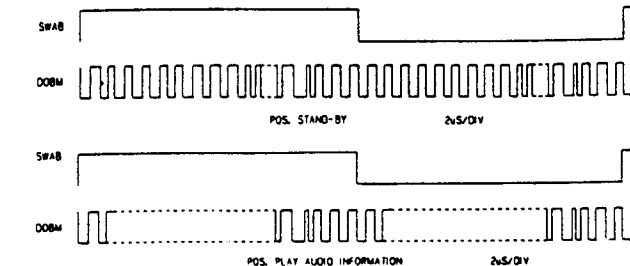
CLBD at test point 87; pin 16 (Clock signal from Filter B to DAC) and their interrelation.

If an Audio disc is used, there should be activity at test point 89 (pin 15) DABD signal (DATA from Filter B to DAC). If a disc with Digital Data (CD-ROM) is used, this point is continuously switched "low" by transistor Q537. In that case the word "data" appears on the display.



● Check the DOBM signal (Digital Output)

- Place a disc on the turntable.
- Select the stand-by mode (only mains switch depressed).
- Trigger the oscilloscope with the SWAB signal (test point 88).
- Check the DOBM signal (test point 89; pin 14). An empty audio signal has a fixed pattern. See drawing, "Stand-by".
- Select the PLAY mode. Check the DOBM signal. See drawing "PLAY".



● In position SEARCH the \overline{ATSB} signal is "low" test point 89; pin 22 (Attenuation Audio Signal)

- When the "µP panel" is applied, (a sub-printed circuit board) that houses IC Q271, test point 89 is not connected.

● Check the \overline{MUSB} signal test point 89; pin 23 (Soft Mute)

This signal is "low" in positions:

- PAUSE
- NEXT or PREVIOUS when jumping from one track to another.
- Fast SEARCH when the Search button is kept depressed for some time.

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III DAC IC (Dual Digital Analog Converter)

● Check the signals between Filter-B IC and DAC IC

See sub. "II Filter-B IC":

- Check the timing signals between Filter-B IC and DAC IC.

● Check the output of the OP-AMP after the DAC IC

- Place a disc on the turntable.
- In position PLAY or in SERVICE POSITION 3, the analog (music) signal should be present at the output of the OP-AMP, after the lead-in track has been read.

IV DEEM CIRCUIT

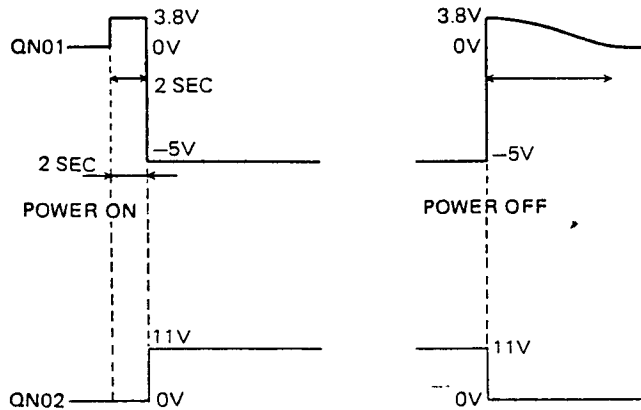
● Check DEEM circuit

- Place test disc 5 on the turntable.
- During playback of track no. 14 (recorded without PRE-EMPHASIS) the DEEM signal at test point 84 should be "low".
- During playback of track no. 15 (recorded with PRE-EMPHASIS), the DEEM signal at test point 84 should be "high".
- During playback of track no. 14 the analogue signal should be present at the source of R564 (test point 91) and R565 (test point 92).
- During playback of track no. 15 the analog signal at the source of R564 (test point 91) and R565 (test point 92) should be 0 V..

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V KILL CIRCUITL

- During switching on and off the mains voltage the signal on the collector of QN01 and QN02 should be as indicated in the figure below.



VI FAVOURITE TRACK SELECT (FTS)

Attention:

When repairing a CD player it is important that the contents of the FTS memory (EEPROM) should not unnecessarily be damaged.

If no complaints are reported about the functioning of the FTS, a check of the functions of the EEPROM should be left undone.

The EEPROM IC is in the Stand-by mode when \overline{CE} and RDY are both high.

Selftest of the FTS μP

During the self-test of the FTS μP , I/O Gate will not be tested.

Therefore this self-test can be executed without damage to the memory as indicated in General Test Points.

Annex I: LASER IS GIVING NO OR INSUFFICIENT LIGHT

Together with laser supply and the monitor diode the laser forms a feedback system.

A defect in the laser supply might thus result in destruction of the laser. Replacement of the laser (=new light pin) will not solve anything. The new laser will also be destroyed since the original fault in the laser supply is still present.

On the other hand it is impossible to check and repair a feedback system when one link is missing.

For this reason the so-called laser simulator 3 is supplied. Code number 4822 395 30229.

This laser simulator consists of a PCB which contains the laser and monitor simulation, a switch to test the On/Off position and a number of sockets.

This PCB can be connected to the laser supply instead of the light pin so that the feedback system is closed.

Repair procedure:

Since the light pin is very sensitive to static charges, care should be taken that during measurements and adjustments of the laser power supply the potential of the aids and yourself equal the potential of the CD mechanism.

Detach light pin and connect laser simulator as follows: (connections on pre-amp PCB).

Take the flex PCB out of socket 11 and connect the simulator PCB with the socket.

Remove plug 16 and insert it in the socket on the simulator PCB.

Connect the plug with 4 wires to socket 16. Take out plug 17 and insert the plug with 1 wire in socket 17.

- Switch on the mains switch and ensure that the drawer is closed or else that the tray-end-in switch on the tray PCB (S004) is depressed.

Now press the play key and check if the L-line of the servo μP , pin 21-2 on the pre-amplifier PCB, goes "low".

- In rest position the current through the laser diode should be ≤ 1 mA. For NEG. VOLT. lasers this can be checked as follows:

Set the switch on the simulator PCB in the OFF position and the mains switch in the ON position.

Turn trimming resistor 3180 counterclockwise (min. R) and measure the voltage across resistor 3194 on the pre-amp. PCB.

On pre-amplifier PCBs with discrete components turn resistor 3180 clockwise (min. R) and measure the voltage across resistor 3194.

The voltage should be ≤ 15 V.

Check of laser supply control

Set the switch on the simulator PCB in the ON position and measure the voltages between points +V and =V on the simulator PCB.

Resistor 3180 clockwise (max. R): $U_{+V-V} = 225 \text{ mV} \pm 45 \text{ mV}$. On pre-amplifier PCBs with discrete components resistor 3180 counterclockwise (max. R): $U_{+V-V} = 225 \text{ mV} \pm 45 \text{ mV}$.

R3180 counterclockwise (min. R): $U_{+V-V} = 750 \text{ mV} \pm 150 \text{ mV}$.

On preamplifier PCBs with discrete components resistor 3180 clockwise (min. R): $U_{+V-V} = 750 \text{ mV} \pm 150 \text{ mV}$.

Set resistor 3180 in the mid-position.

This is a preliminary adjustment. After the simulator PCB has been removed the laser current must be adjusted.

Fine adjustment of laser current

- Playback track 1 of test disc 4822 397 30096 (Disc without defects). Connect a DC voltmeter across resistor 3308 on the SERVO PCB circuit

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diagram D. Adjust the laser power supply with resistor 3308 is $575 \text{ mV} \pm 50 \text{ mV}$.

Annex II: CHECKING d-FACTOR

(Test points on servo PCB)

- Switch off AGC circuit (k-multiplier) and switch off offset circuit (d-multiplier). See sub G and H.

Place disc on turntable and set player in service loop 2.

- Check points 22 and 23.
Value should be $0.7 V_{pp}$.
Frequency variation strongly depends on the eccentricity of the disc.
- Check points 25.
Value should be 250 mV_{pp} .
- Check point 35.
Value should be 200 mV_{pp} .
- Check point 36.
Value should be $2 V_{pp}$.
- Check points 37 and 38.
Value should be $10 V_{pp}$.
The signals is more sine-shaped now due to filtering out of 650 Hz.
- Point 39 is hard to measure since switch is in position Yoc and thus connected with input of op-amp Q302 (pin 9).
However, a signal of 200 mV_{pp} is present.
- Check point 40.
Value should be $9 V_{pp}$.

Bring the player in service loop 3. With a disc on turntable and the AGC and offset-circuits are still switched off.

- Check point 41.
- Check point 40 on beam A of oscilloscope and check point 39 on beam B of oscilloscope while oscilloscope is triggered with point 41.
- Switch on the AGC-circuit and offset circuit.

Annex III: CHECKING k-FACTOR

(Test points on Servo PCB)

a. Static

Switch power on **without** depressing the Play button. i.e. $RC0=\text{high}$; $\overline{RC0}=\text{low}$ so switch Ya is in position 0 and switch Yc is in position 0.

- Check point 45.
Value should be $9 V_{pp}$.
- Check point 46.
On point 29 now appears a sine-wave signal of 650 Hz, 300 mV, and $180-45=360^\circ$ shifted in phase relative to signal on point 45.
- Check point 47.
Value should be $1.5 V_{pp}$.
- Check point 48.
Value should be $1 V_{pp}$.
- Check points 49, 50, 51 and 45 relative to each other.
Amplitudes are 5V.
- Check integrator IC Q303 (4/4)

b. Dynamic

Insert disc, select service loop 2 and check if the signal on point 42 equals to $7 V_{pp}$.

- Select service loop 3.
Now $\overline{RC0}=\text{high}$ and $RC0=\text{low}$.
So switch Ya is in position 1.
Switch Yc switches at $f=650 \text{ Hz}$.
Point 52 is low; so point 51 is in phase point 50.
Now fig. U should be present on point 51 with duty cycle jittering round 50%.

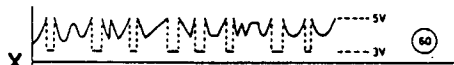
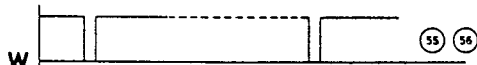
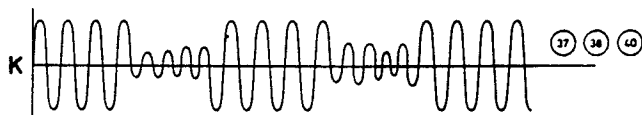
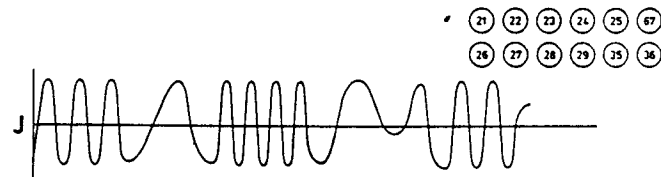
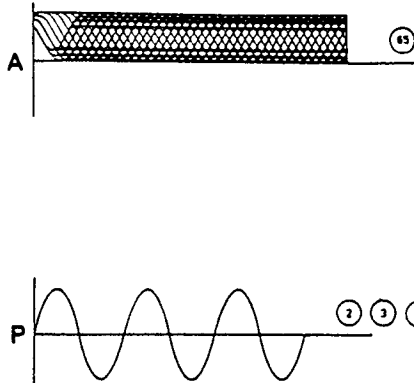
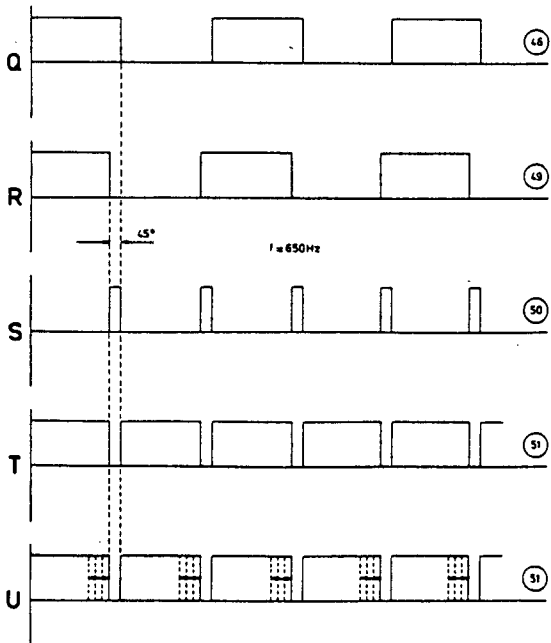
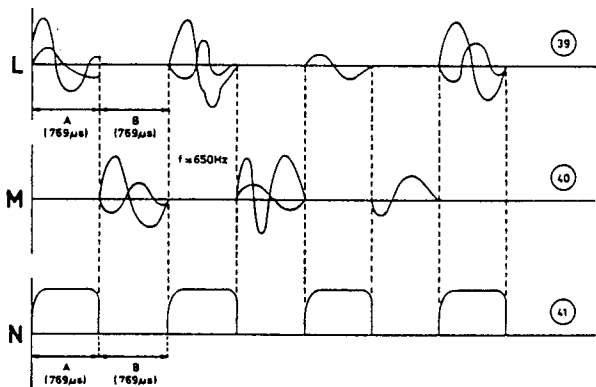
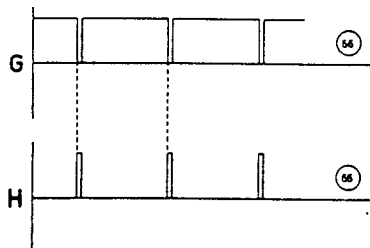
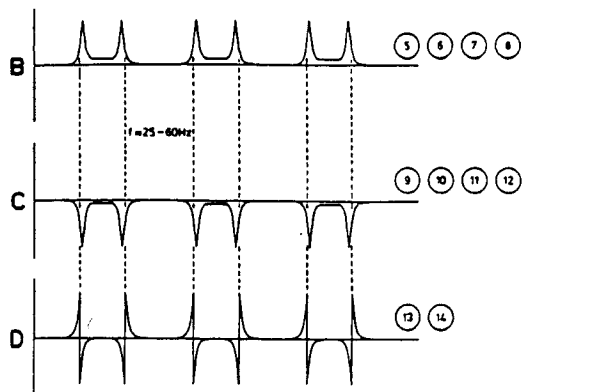
Annex IV: CHECKING RF PRE-AMPLIFIER

(measure points on pre-amp. PCB)

- Check DC-voltages on transistor 6103, 6104, 6105, 6109, 6110, 6111.
- For checking sensitivity, frequency and delay characteristic, proceed as follows:
 - Take flex PCBs of sockets 10 and 11.
 - Take plugs 18, 17, 12, 13, 14 and 15 out of sockets.

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SERVO



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SERVO

Nr.	See	Position	Amplitude	f	Time base
1		see fault finding meth.			
2	P	see fault finding meth.	0,6 Vp-p	10 Hz	
3	P	see fault finding meth.	6 Vp-p	10 Hz	
4	P	see fault finding meth.	5 Vp-p	10 Hz	
5	B	see fault finding meth.	40-80 mV	25-60 Hz	
6	B	see fault finding meth.	40-80 mV	25-60 Hz	
7	B	see fault finding meth.	40-80 mV	25-60 Hz	
8	B	see fault finding meth.	40-80 mV	25-60 Hz	
9	C	see fault finding meth.	-2 V	25-60 Hz	
10	C	see fault finding meth.	-2 V	25-60 Hz	
11	C	see fault finding meth.	-2 V	25-60 Hz	
12	C	see fault finding meth.	-2 V	25-60 Hz	
13	D	see fault finding meth.	-8 V, +8 V	25-60 Hz	
14	D	see fault finding meth.	depends on R3158	25-60 Hz	
15		see fault finding meth.			
20		see fault finding meth.			
21	J	see fault finding meth.	12-14 Vp-p		
22	J	see fault finding meth.	0,7 Vp-p		
23	J	see fault finding meth.	0,7 Vp-p		
24	J	see fault finding meth.	0,2 Vp-p		
25	J	see fault finding meth.	0,25 Vp-p		
26	J	see fault finding meth.	20 mVp-p		
27	J	see fault finding meth.	800 mVp-p		
28	J	see fault finding meth.	800 mVp-p		
29	J	see fault finding meth.	6 Vp-p		
29	P	ON	0,3 Vp-p		
30		see fault finding meth.			
31		see fault finding meth.			
32	.	see fault finding meth.			
33	.	see fault finding meth.			
35	J	see fault finding meth.	200 mVp-p		
36	J	see fault finding meth.	2 Vp-p		
37	K	see fault finding meth.	10 Vp-p		
38	K	see fault finding meth.	10 Vp-p		
39	L	see fault finding meth.	0-4 Vp-p		A = 769 μs B = 769 μs
40	K	see fault finding meth.	9 Vp-p		A = 769 μs B = 769 μs
40	M	see fault finding meth.	0-4 Vp-p		A = 769 μs B = 769 μs
41	N	see fault finding meth.	6 Vp-p		A = 769 μs B = 769 μs
45	P	ON	9 Vp-p	650 Hz	
46	Q	ON	0-5 V	650 Hz	A = 769 μs B = 769 μs
47	P	ON	1,5 Vp-p	650 Hz	
48	P	ON	1 Vp-p	650 Hz	
49	R	ON	0-5 V	650 Hz	
50	S	ON	0-5 V	650 Hz	
51	T	ON	5-0 V	650 Hz	
51	U	service loop B	5 V	650 Hz	
52		see fault finding meth.			
55	Y	service loop A	5-0 V		
55	W	play (with test disc)	5-0 V		
56	W	play (with test disc)	5-0 V		
57		see fault finding meth.			
60	X	service loop A	5-3 V		
61	Y	service loop A	5-0 V		
62	Y	service loop A	5-0 V		
65	A	play	1 Vp-p		
66	G	see fault finding meth.	5-0 V		
66	H	see fault finding meth.	0-5 V		
67	J	see fault finding meth.			

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BLOCK DIAGRAM WARDS INFOMATION

DAC0 – DAC3	Control bit for radial circuit	<u>SSM</u>	Motor Start-Stop signal
DAC	Current output for track jumping	<u>MUTE</u>	Mute signal
<u>DO</u>	Drop out detector signal	<u>MUSB</u>	Soft Mute signal
D1 – 4	Photodiode Currents	PD/OC	Phase detector-oscillator control
FE	Focus error signal	QCL	Q-channel Clock signal
HF	HF output for DEMOD	QDA	Q-channel Data signal
<u>HFLD</u>	HF detector output for DEMOD	QRA	Q-channel Request Acknowledge
MSC	Motor control signal	SCAB	Subcode clock Decoder-A to Filter-B
RE	Radial error signal (Amplified RE2 – RE1 currents)	SDAB	Subcode data Decoder-A to Filter-B
RE1	Radial error signal 1 (Summation of amplified currents D3 and D4)	SWAB/ <u>SSM</u>	Subcode Word/Start-Stop Motor signal
RE2	Radial error signal 2 (Summation of amplified currents D1 and D2)	WSAB	Word select Decoder-A to Filter-B
<u>TL/INT</u>	Track loss signal	WSBD	Word select Filter-B to DAC
Vc	Control voltage for turntable motor	XIN	Oscillator signal in Decoder-A
<u>ATSB</u>	Attenuation of Audio level in search position (cueing)	XSYS	Oscillator signal OUT Filter-B
CEFM	Clock 4.3218 MHz	RDIR	Radial current switch control signal Normal, or Revers
CLAB	Clock signal Decoder-A to Filter-B	RP	Radial puls after Track Jump
CLBD	Clock signal Filter-B to DAC	FN	Focus Neutral
CRI	Counter Reset Inhibit	ANIN	
DAAB	Data signal Decoder-A to Filter-B	<u>HFLS</u>	HF Loss signal
DABD	Data signal Filter-B to DAC	<u>SRDO</u>	Signal Radial ON/OFF for Track jump
<u>DEEM</u>	Deemphasis ON-OFF signal	RCO	Switch Digital to Analogue
DOBM	Digital out signal	FC1, FC2	Focus UP/DOWN signal
EFAB	Error flag Decoder-A to Filter-B	<u>FCO</u>	Focus ON/OFF signal
IREF	Reference current	L	Laser ON/OFF signal
		BUSY	μ -COM Communication Clock
		RXD	μ -COM Communication Receive Data
		TXD	μ -COM Communication Telex Data

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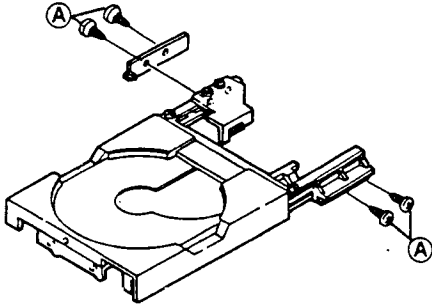
Loading Tray Mechanism

Cautions When Servicing

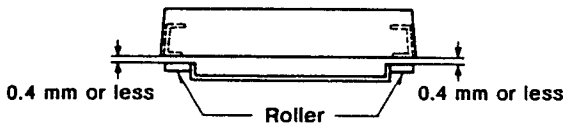
1. Installation of Tray and Tray Case

(Upon replacement of the tray case due to breakage, etc.)

- ① If the position with respect to the tray's front panel window is incorrect, loosen screws (A) and move the tray within the range of play of the hole to adjust. For the inclination of the tray, refer to diagram below.

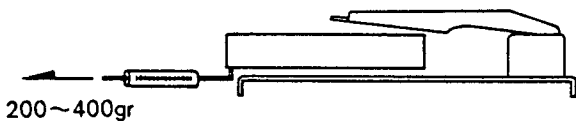


The tray should not be more than 0.4 mm above the rollers on the bottom side.

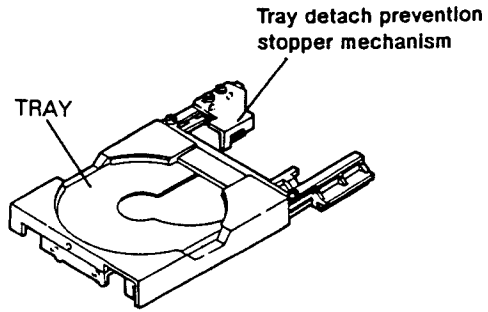


Adjust the inclination as well with screws (A).

- ② The tray's working force should be set to between 200 and 400 gr (when power is off).



2. If Tray has become detached downward

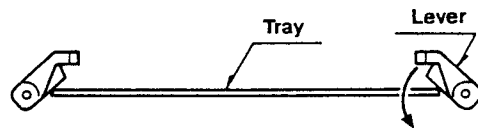


Take care in the following instances as the tray will become detached downward.

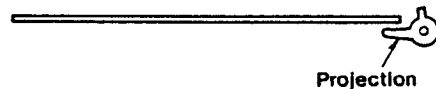
- The tray will become detached if pressed downward with the stopper mechanism removed while the drawer is open.
- The tray will become detached if pressed downward when there is no subchassis (CDM-1). (The same is true when the tray is closed with no subchassis.)

Use the following procedure to reinstall.

- ① Lower the lever and place the tray on the projection.



- ② Next, with the tray pressed down, lower the other lever and place the tray on its projection.



NOTE:

Be sure to lower only one lever at a time as the tray cannot be lifted if they are both lowered.

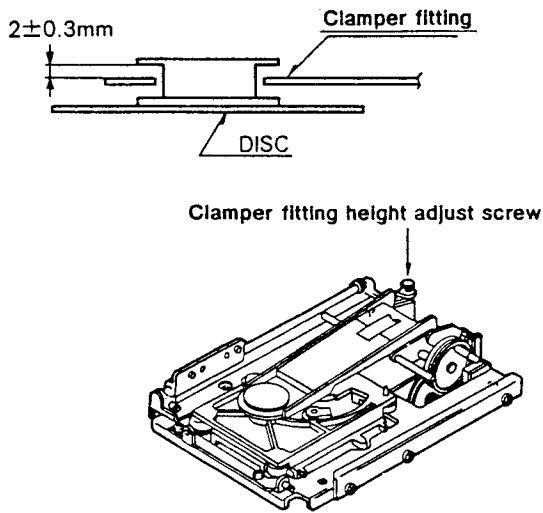
NOTE:

If the tray is forced back to its original position, the two pins in the tray case may bend.

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3. If Subchassis (CDM-1) has been replaced

- ① The height of the subchassis turntable differs from one unit to the next, so it is necessary to adjust according to the height of the turntable so that the magnet clamber is not in contact with the clamber fitting. (Standard 2 ± 0.3 mm)

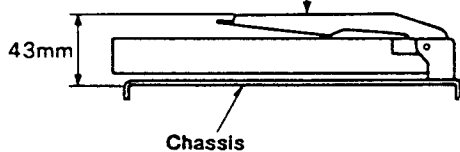


- ② When the height of the clamber fitting is adjusted, the position when the clamber is up must be readjusted. Use the following procedure.

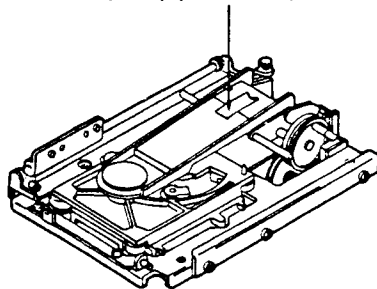
Disc clamber position

When up Max. 43 mm
(Tray and clamber should not come into contact when tray is opened and closed.)

To the eye, this fitting appears parallel to the chassis.

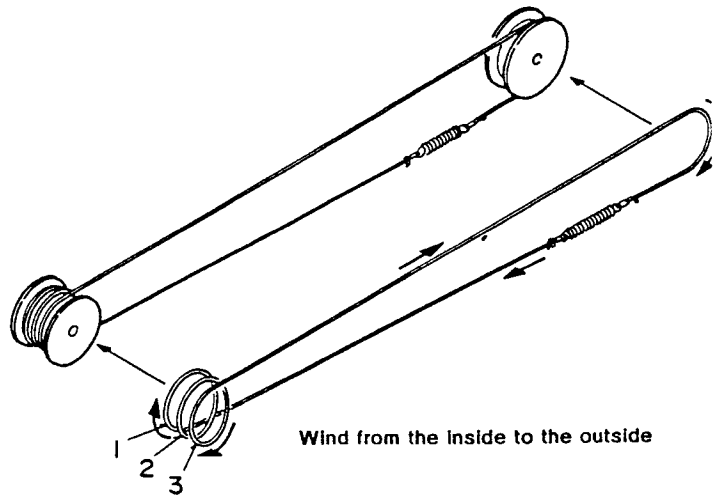


Clamber up position adjust screw

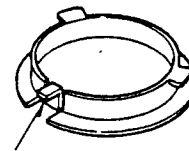


4. Others

- ① Refer to the diagram below to install the loading wire.



- ② All switches on the mechanism are of the socket type. If a switch breaks, remove the socket to replace.
- ③ Use to the structure of the hooks of the magnet clamber (094M), incline as indicated below to remove and install the magnet clamber when replacing it.



The narrowest hook inclines

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Oxon OX9 4QY
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M 7189

TECHNICAL SPECIFICATIONS

Audio Characteristics

Number of channels	2
Frequency response	2 – 20,000 Hz \pm 0.1 dB
Digital to analogue conversion	16 bit 4 times oversampling
Dynamic range	Better than 96 dB
Signal-to-noise ratio	101 dB
Channel separation	Better than 100 dB (1000 Hz)
Total harmonic distortion	0.0015% (1000 Hz)
Wow & flutter	Unmeasurable (quartz accuracy)
Error correction system	Cross Interleave Reed Solomon code (CIRC)
Audio output level	2 Vrms

Optical Data Read System

Laser	AlGaAs semiconductor laser
Wave length	780 nm

Signal Format

Sampling frequency	44.1 kHz
Quantization	16-bit linear/channel

Power Supply Section

Power requirements	220/240V AC, 50/60 Hz
Power consumption	Approx. 30 W
Fuse capacitance	0.2A

Cabinet and Others

Dimensions (W x H x D)	462 x 86 x 333 mm
Weight	Approx. 10 kg
Allowable operating temperature	+5°C – +35°C
Allowable operating humidity	5 – 90% (No condensation)

Provided Accessories

Remote control unit (RMC-94)	1
Dimensions (W x D x H)	63 x 18 x 149 mm
Weight (without batteries)	100 g
Battery (AA/R06)	2
Audio connection (RCA pin-jack) cord	1 pair

Compact Discs

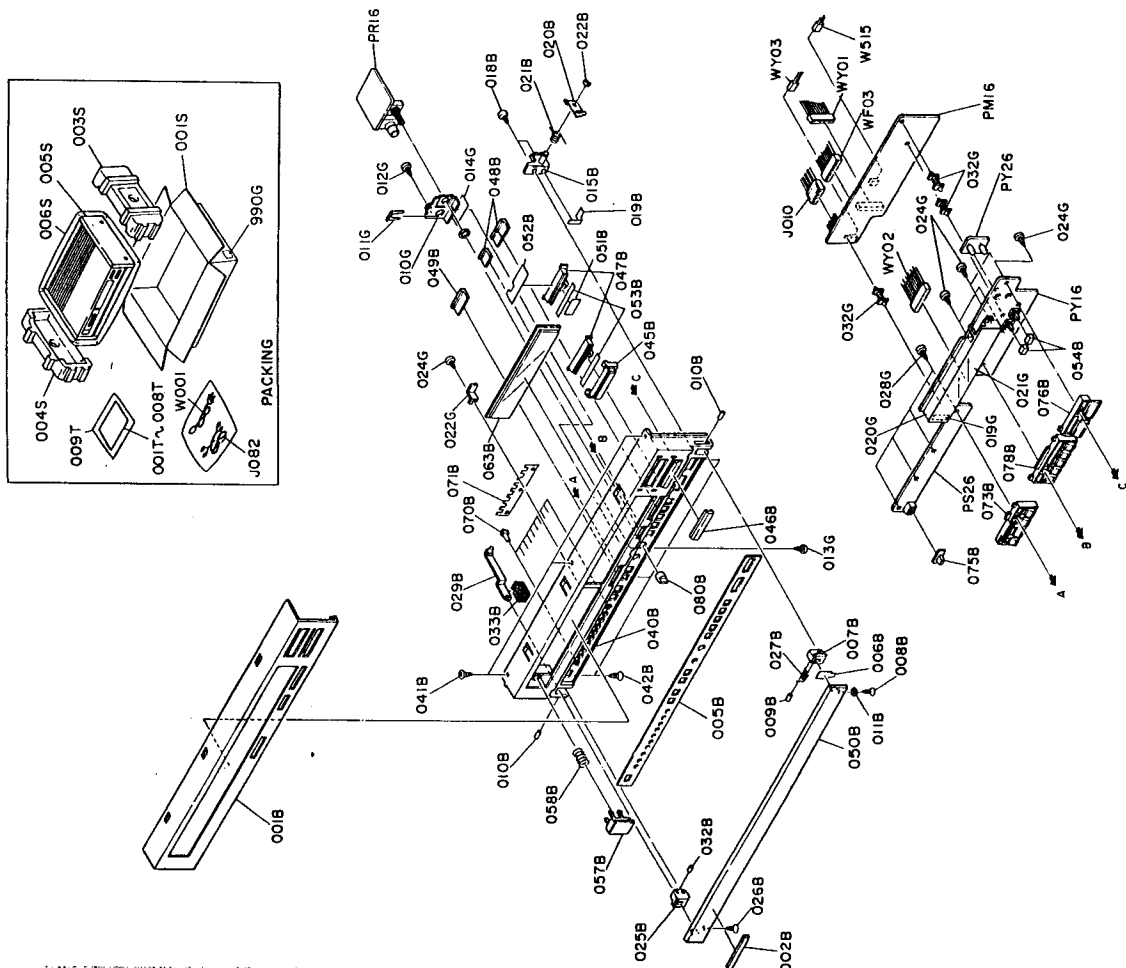
Diameter of disc	120 mm
Thickness	1.2 mm
Rotating direction	Counterclockwise (viewed from the laser pickup side)
Scanning velocity	1.2 – 1.4 m/sec
Revolution (spindle) speed	500 – 200 rpm
Playing time (theoretical)	74 minutes max. (stereo)
Track pitch	1.6 μ m
Material	Plastic (polycarbonate)

* Improvement may result in changes in specifications and design without notice.

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Oxon OX9 4QY
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EXPLODED VIEW AND PARTS LIST

[C01-99] FRONT PANEL AND PACKING MATERIALS



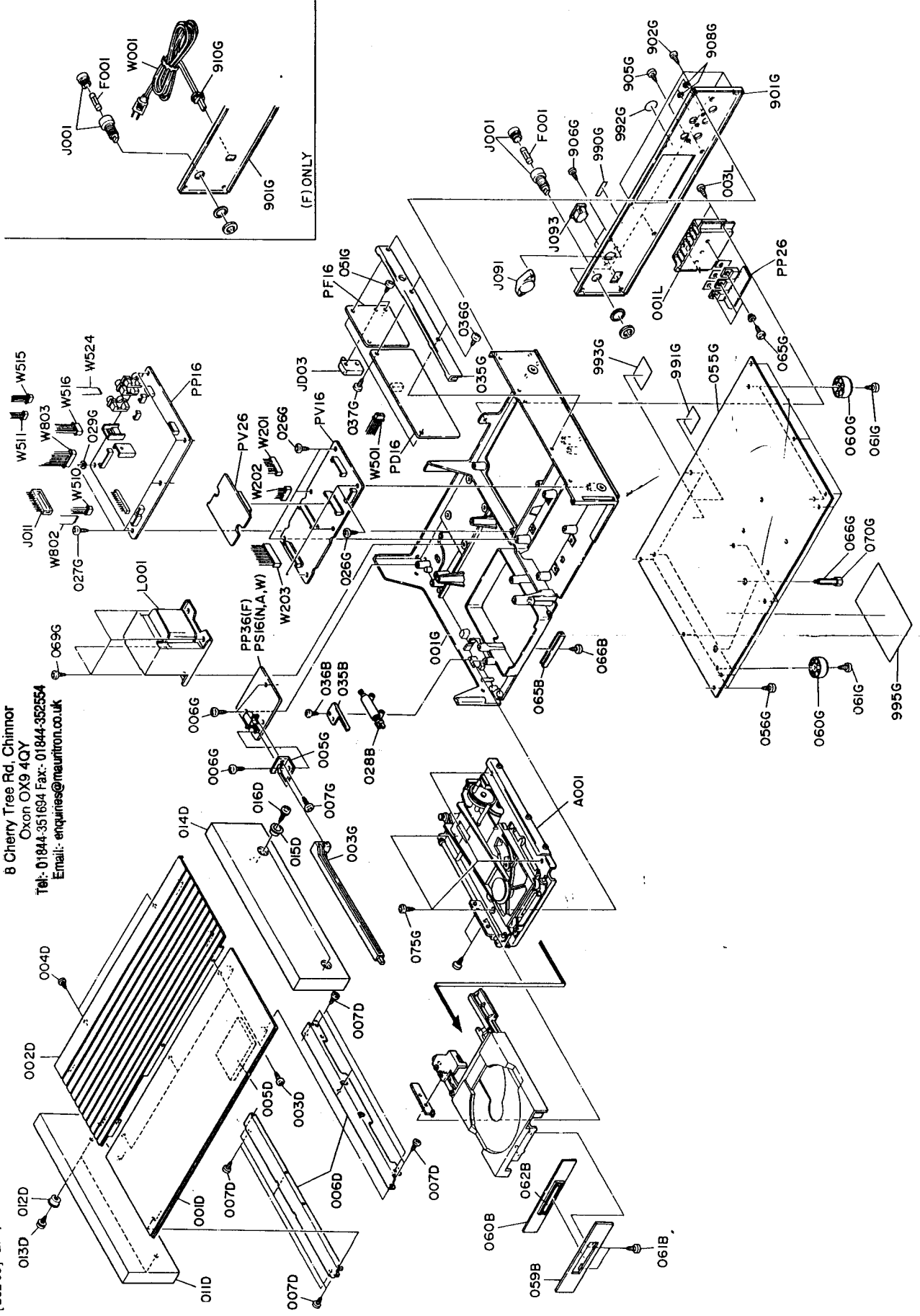
REF. DESIG.	PART NO.	DESCRIPTION
001B	157K248010	Front Panel
002B	274H251020	Escutcheon, Front Panel
005B	157K063020	Indicator
006B	157K265030	Hinge (R)
007B	157K153010	F.H. Taprite Screw
008B	51502608J0	Shaft, Lock
009B	157K112010	Shaft, Hinge
010B	157K112030	T.L. Washer
011B	54050200R0	Bracket (K), Lock
015B	157K160500	B.H. Tapped Screw
018B	51280308M0	Connector
019B	157K123010	Hook, Lock
020B	157K236010	Spring
021B	157K115010	RG Ring, E Type
022B	84002500R0	Hinge (L)
025B	157K153020	F.H. Taprite Screw
028B	51502608B0	Spring, Open
027B	157K115020	Joint (K), Dumper
029B	157K125500	Shaft
032B	157K112050	Buffer
033B	203C056010	Chassis, Front
040B	157K105010	F.H. Taprite Screw
041B	51500308M0	F.H. Taprite Screw
042B	51500308M0	Burton, Play/Reply
045B	157K270060	Burton, Pause/Stop
046B	157K270090	Lens
047B	157K355010	Burton, FTS/Track
048B	157K270040	Burton, Open/Close
049B	157K270070	Escutcheon, Door
050B	157K063010	Buffer
051B	157K056010	Shield
052B	157K109010	Sheet
053B	157K107010	Buffer
054B	416C056030	Burton, Power
057B	157K270050	Burton, Power Button
058B	157K115030	Window
063B	157K158010	Leaf Spring
070B	157K270080	Button
071B	157K116010	Button, Select/Cancel
073B	157K270030	Knob, Timer
075B	157K154010	Button, REV/FF/Index
076B	157K270010	Button, LAP/AMS
078B	157K270020	Knob, Level
080B	135K154110	Bracket, Phone Jack
010G	157K160010	Stopper
011G	198T114010	B.H. Tapped Screw
012G	51280308M0	F.H. Taprite Screw
013G	51500308M0	Connector
014G	157K123020	Buffer
019G	2818056040	Holder, FL
020G	157K271010	Mask, FL
021G	157K303010	Retainer, Display P.W. Board
022G	157K104030	B.H. Tapped Screw
024G	51280308M0	Spacer
025G	213H118010	B.H. Tapped Screw
028G	51280308B0	Spacer
032G	157K118010	Spacer
J010	YJ06001050	Jack 5P
W515	YB00390120	Connective Cord, 3P
WF03	YB00700250	Connective Cord, 14P
WY01	YB00180330	Connective Cord, 13P
WY02	YB00230280	Connective Cord, 13P
WY03	YB00130360	Connective Cord, 5P
001T	157K851310	PACKING
002T	157K851110	User Manual [N, A, W]
003T	157K851320	User Manual [F]
004T	157K856010	User Manual, Spec [N, A, W]
005T	158K861020	Circuit Diagram [N, W]
006T	9631000090	Label, FTS [F]
007T	157K813500	Warranty Card [A]
008T	157K854010	Envelope [F]
009T	9611000050	Warranty Card [F]
008T	9540000010	User's Card [F]
009T	9012540010	License
003S	157K801010	Polyethylene Bag
004S	157K809010	Packing Case
005S	157K809020	Cushion (R)
006S	175H107010	Cushion (L)
J082	9081111030	Sheet
ΔW001	ZD01000230	Polyethylene Sheet
990G	ZC01805010	Connective Cord, Audio
	ZC02006020	A.C. Power Cord [N, W]
	9510901180	A.C. Power Cord [A]
	9510911100	Label [A, F]
		Label [N]

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 8 Cherry Tree Rd, Chinnor
 Oxon OX9 4QY
 Tel: 01844-351894 Fax: 01844-352554
 Email: enquiries@mauritron.co.uk

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 Oxon OX9 4QY
 Tel: 01844-351694 Fax: 01844-352554
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[C02-99] LID, TOP COVER



M7192

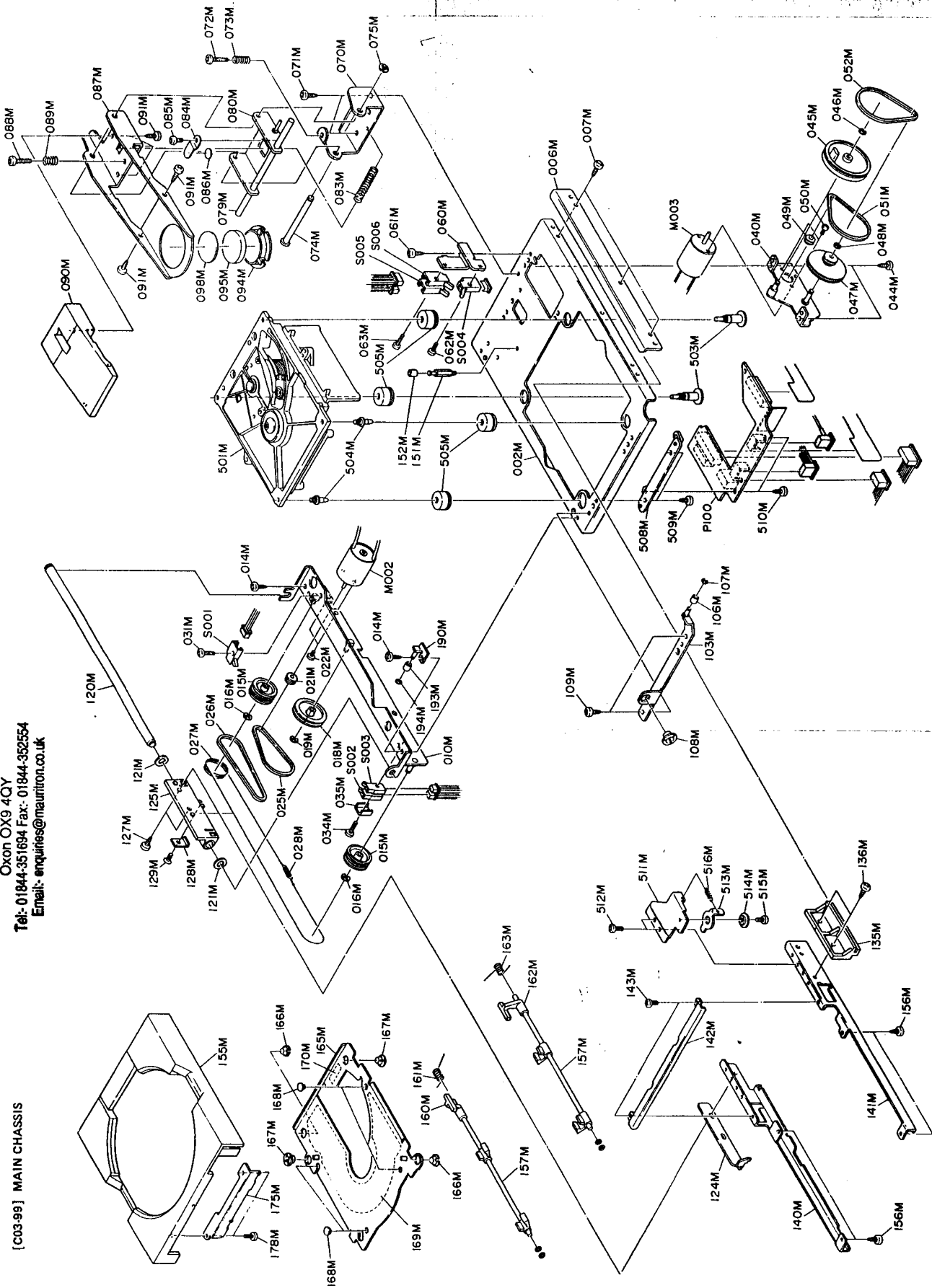
REF. DESIG.	PART NO.	DESCRIPTION	REF. DESIG.	PART NO.	DESCRIPTION
028B	120T276010	Piston, Dumper	001L	158K267010	Heatsink
035B	157K160030	Bracket, Dumper	003L	51280308W0	B.H. Tapped Screw 83 x 8
036B	51280308M0	B.H. Tapped Screw	A001	167K304510	Mechanism (K)
059B	157K063030	Escruchon, Drawer	Δ F001	FS10020800	Fuse
060B	157K104010	Retainer, Drawer	Δ F001	FS10050610	Fuse 0.5A (F)
061B	51280308M0	B.H. Tapped Screw	Δ J001	YJ08000290	Jack, Fuse Holder (N, A, W)
062B	157K251010	Badge	J011	YJ06001070	Jack, Fuse Holder (F)
065B	158K053010	Cover	Δ J091	BY05030040	Jack, gp
066B	51280308M0	B.H. Tapped Screw	Δ J093	YP04000580	Voltage Selector (N, A, W)
001D	157K257010	Lid, Top Cover (Front)	JD03	YJ15000010	Plug, AC Inlet (N, A, W)
002D	157K257020	Lid, Top Cover (Rear)	Δ L001	TS16810010	Power Transformer (N, A, W)
003D	51280308M0	B.H. Tapped Screw	Δ W001	YC01800390	A.C. Power Cord (F)
004D	51280308M0	B.H. Tapped Screw	W201	YB000820250	Connective Cord, 15P
005D	158K056010	Buffer	W202	YB00450190	Connective Cord, 14P
006D	157K104020	Retainer, Top Cover	W501	YB00430040	Connective Cord, 2P
007D	51280308M0	B.H. Tapped Screw	W511	YB00230300	Connective Cord, 4P
008D	157K249010	Side Panel (L)	W515	YB00030120	Connective Cord, 3P
011D	3906259010	Bushing	W516	YB00060240	Connective Cord, 3P
012D	5128043000	B.H. Tapped Screw	W803	YB00060240	Connective Cord, 8P
013D	5128043000	B.H. Tapped Screw			Connective Cord, 9P
014D	157K249020	Side Panel (R)			
015D	3906259010	Bushing			
016D	5128043000	B.H. Tapped Screw			
001G	158K105010	Chassis, Main			
003G	158K121010	Link, Power Switch			
005G	158K160050	Bracket, Power Switch			
006G	51280308M0	B.H. Tapped Screw			
007G	51100306M0	B.H.M. Screw			
026G	51280308M0	B.H. Tapped Screw			
027G	51280308M0	B.H. Tapped Screw			
029G	4214118010	Spacer			
035G	158K104040	Retainer, Front			
036G	51280308M0	B.H. Tapped Screw			
037G	51280308M0	B.H. Tapped Screw			
051G	51500308M0	F.H. Taprite Screw			
055G	158K257020	Lid, Bottom Cover			
056G	51280308M0	B.H. Tapped Screw			
060G	176H057020	Lag			
061G	51280308M0	B.H. Tapped Screw			
065G	51280308M0	B.H. Tapped Screw			
066G	157K112060	Shaft, Transport			
069G	51260408M0	B.T. Screw			
070G	158K067010	Cap, Transport Shaft			
075G	51280308M0	B.H. Tapped Screw			
901G	157K250010	Rear Panel (N, A, W)			
902G	157K250020	Rear Panel (F)			
905G	51280308M0	B.H. Tapped Screw			
906G	51280308M0	B.H. Tapped Screw			
908G	54050300R0	T.L. Washer			
910G	1465259120	Bushing, AC Power Cord (F)			
990G	9510901180	Label (A, F)			
	9510911100	Label (N)			
991G	2911861110	Label, Caution (N, A, W)			
992G	187H265010	Indicator, Made in Japan (N, A, W)			
993G	105K861070	Label, Laser (N, A, W)			
	101K861030	Label, Laser (F)			
995G	158K861010	Label, Transport			

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[C03-99] MAIN CHASSIS



M7194

REF. DESIG.	PART NO.	DESCRIPTION
002M	167K105030	Chassis, Main
006M	167K051010	Tray Guide, Right
007M	51280308M0	B.H. Tapped Screw B3 x 8
010M	167K160500	Tray Guide (K), Left
014M	51280308B0	B.H. Tapped Screw B3 x 8
015M	167K262010	Pulley, Wire Wheel $\phi 2.5$
016M	64002500R0	RG Ring, E Type
018M	167K262030	Pulley, Tray Drive $\phi 2.5$
019M	64002500R0	RG Ring, E Type
021M	167K262040	Pulley, Motor
022M	51102604A0	B.H.M. Screw B2.6 x 4
025M	167K264010	Belt, Motor
026M	167K264030	Belt, Tray Drive
027M	167K125010	Joint, Wire Rope
028M	167K115020	Spring
031M	51100208A0	B.H.M. Screw B2 x 8
034M	51100214A0	B.H.M. Screw B2 x 14
035M	167K160190	Bracket, Switch
040M	167K160510	Bracket (K), Motor
044M	51280308M0	B.H. Tapped Screw B3 x 8
045M	167K054010	Cam, Clamper Drive
046M	64002500R0	RG Ring, E Type $\phi 2.5$
047M	167K262020	Pulley, Clamper Drive
048M	64002500R0	RG Ring, E Type $\phi 2.5$
049M	167K262040	Pulley, Motor
050M	51102604A0	B.H.M. Screw B2.6 x 4
051M	167K264010	Belt, Motor
052M	167K264020	Belt, Cam Drive
060M	167K160130	Bracket, Switch
061M	51280308M0	B.H. Tapped Screw B3 x 8
062M	51100208A0	B.H.M. Screw B2 x 8
063M	51100214A0	B.H.M. Screw B2 x 14
070M	167K160110	Bracket, Clamper
071M	51280308M0	B.H. Tapped Screw B3 x 8
072M	51100315A0	B.H.M. Screw B3 x 15
073M	167K115030	Spring, Down Adj.
074M	167K112060	Shaft, Clamper Bracket
075M	64002500R0	RG Ring, E Type $\phi 2.5$
079M	167K112040	Shaft, Tray Lever
080M	167K354520	Lever (K), Clamper Drive
083M	167K115010	Spring, Pull Down
084M	167K116010	Leaf Spring
085M	51282604U0	B.H. Tapped Screw B2.6 x 4
086M	167K056030	Buffer
087M	167K354010	Lever, Clamper
088M	51100310A0	B.H.M. Screw B3 x 10
089M	167K115030	Spring, Up Adj.
090M	167K271030	Holder
091M	51280308M0	B.H. Tapped Screw B3 x 8
094M	167K005010	Clamper, Magnet Case
095M	167K305500	Magnet (K)
098M	167K056010	Buffer, Clamper
103M	167K160530	Bracket (K), Tray Guide
106M	167K358010	Roller, Tray Guide
107M	64001200R0	RG Ring, E Type $\phi 1.2$
108M	167K259020	Bushing, Front Guide
109M	51280308M0	B.H. Tapped Screw B3 x 8
120M	167K112010	Shaft, Tray Guide
121M	167K056020	Buffer
124M	167K160260	Bracket, Slide Bearing

REF. DESIG.	PART NO.	DESCRIPTION
125M	167K271500	Holder (K), Slide Bearing
127M	51280308M0	B.H. Tapped Screw B3 x 8
128M	167K118010	Spacer, Wire clamper
129M	51500306U0	F.H. Taptite Screw F3 x 6
135M	167K271010	Holder (R), Slide Guide
136M	51280308M0	B.H. Tapped Screw B3 x 8
140M	167K160140	Bracket (L), Tray
141M	167K160150	Bracket (R), Tray
142M	167K126010	Stay
143M	51282604U0	B.H. Tapped Screw B2.6 x 4
151M	167K101010	Support
152M	167K259050	Bushing
155M	167K064010	Case, Tray
156M	51280308M0	B.H. Tapped Screw B3 x 8
157M	167K112050	Shaft, Tray Guide
160M	167K354500	Lever (L), Tray Lift
161M	167K115040	Spring (L)
162M	167K354510	Lever (R), Tray Lift
163M	167K115050	Spring (R)
165M	167K163010	Tray, Disc
166M	167K259010	Bushing, Tray Guide
167M	167K259020	Bushing, Tray Guide
168M	167K259040	Bushing, Disc Buffer
169M	167K056050	Buffer, Silencer
170M	167K056060	Buffer, Silencer
175M	167K160520	Bracket (K), Front Guide
178M	51280308M0	B.H. Tapped Screw B3 x 8
190M	167K160540	Bracket (K), Tray Front Guide
193M	167K358010	Roller
194M	64001200R0	RG Ring, E Type $\phi 1.2$
501M	158K304500	Mechanism (CDM-1)
503M	167K112020	Shaft
504M	167K112110	Shaft
505M	167K259030	Bushing
508M	167K160220	Bracket, P.W. Board
509M	51280308M0	B.H. Tapped Screw B3 x 8
510M	51060303A0	P.H.M. Screw P3 x 3
511M	167K160250	Bracket, Stopper
512M	51282604U0	B.H. Tapped Screw B2.6 x 4
513M	167K354250	Lever, Stopper
514M	302T118050	Spacer
515M	51570304B0	P. Taptite Screw P3 x 4
516M	4397115210	Spring
M002	MM01200130	D.C. Motor, Tray Drive
M003	MM01200130	D.C. Motor, Clamper Drive
S001	SS01020590	Slide Switch, Tray In
S002	SS01020590	Slide Switch, Tray Out
S003	SS01020590	Slide Switch, Push In
S004	SS01020590	Slide Switch, Clamper Down
S005	SS01020590	Slide Switch, Clamper Up
S006	SS01020590	Slide Switch, Laser Safety

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 Oxon OX9 4QY
 Tel: 01844-351634 Fax: 01844-352554
 Email: enquiries@mauritron.co.uk

M 7195

ELECTRICAL PARTS LIST

ASSIGNMENT OF COMMON PARTS CODES.

RESISTOR

- R***:** (1) GD05 --- 140, Carbon film fixed resistor, ±5%, 1/4W
R*:** (2) GD05 --- 160, Carbon film fixed resistor, ±5%, 1/6W
 ① — Resistance value

- Examples**
 ① Resistance value
 0.1Ω...001 10Ω...100 1kΩ...102 100kΩ...104
 0.5Ω...005 18Ω...180 2.7kΩ...272 680kΩ...684
 1Ω...010 100Ω...101 10kΩ...103 1MkΩ...105
 6.8Ω...068 390Ω...391 22kΩ...223 4.7MkΩ...475

(Note) Please distinguish 1/4W from 1/6W by the shape of parts used actually.

C***: CERAMIC CAP.

- (1) DD1 --- 370, Ceramic condenser
 Disc type
 Temp. coeff. P350 ~ N1000, 50V
 ① ②
 Capacity value
 Tolerance

- Examples**
 ① Tolerance (Capacity deviation)
 ±0.25pF...0
 ±0.5pF...1
 ±5%...5

* Tolerance of COMMON PARTS handled here are as follows:

- 0.5pF ~ 5pF...±0.25pF
 6pF ~ 10pF...±0.5pF
 12pF ~ 560pF...±5%

- ② Capacity value
 0.5pF...005 3pF...030 100pF...101
 1pF...010 10pF...100 220pF...221
 1.5pF...015 47pF...470 560pF...561

C***: CERAMIC CAP.

- (1) DK16 --- 300, High dielectric constant ceramic condenser
 Disc type
 Temp. chara. 2B4, 50V
 ①
 Capacity value

- Example**
 ① Capacity value
 100pF...101 1000pF...102 10000pF...103
 470pF...471 2200pF...222

C***: ELECTROLYTIC CAP. (⚡), FILM CAP. (⚡)

- (1) EA --- 10, Electrolytic condenser
 One-way lead type. Tolerance ±20%
 ① ②
 Dielectric strength
 Capacity value

- Examples**
 ① Capacity value
 0.1μF...104 4.7μF...475 100μF...107
 0.33μF...334 10μF...106 330μF...337
 1μF...105 22μF...226 1100μF...108
 2200μF...228
 ② Working voltage
 6.3V...006 25V...025
 10V...010 35V...035
 16V...016 50V...050

- (2) DF15 --- 350, Plastic film condenser
 One-way type, Mylar ±5% 50V
 ①
 Capacity value

- Examples**
 ① Capacity value
 0.001μF (1000pF)...102 0.1μF...104
 0.0018μF...182 0.56μF...564
 0.01μF...103 1μF...105
 0.015μF...153

REF. DESIG.	PART NO.	DESCRIPTION
PD16	YK158K1820 ZZ157K8820	PD16-DEMO CIRCUIT BOARD P.W. Board, Demo P.W. Board Assembly
C502	OA10505010	PD16-CAPACITOR Elect 1μF 50V
C504	EA68505010	Elect 6.8μF 50V
C511	DD15270300	Ceramic 27pF ±5%
C512	DD15270300	Ceramic 27pF ±5%
C520	DF15471350	Film 470pF ±5%
C521	DF15471350	Film 470pF ±5%
D544	?	PD16-SEMICONDUCTORS Diode 1SS133, etc.
D549	HD20002000	Diode 1SS133, etc.
D551	HD20002000	Diode 1SS133, etc.
Q501	HC10009490	IC SAA7210
Q502	HC10158060	IC μPD41416C-20
Q503	HC10010490	IC SAA7220
Q504	HC10010320	IC IR2339
Q510	HT111752D0	Transistor 2SA1175(FF, EF)
Q511	HT111752A0	Transistor 2SA1175(FF, EF)
Q513	HT107332A0	Transistor 2SA733(P, Q)
Q514	HT327852D0	Transistor 2SC2785(FF, EF)
Q530	HT327852A0	Transistor 2SC2785
Q531	HT327852A0	Transistor 2SC2785
Q537	HT309452A0	Transistor 2SC945(Q, R)
J501	YP06003410	PD16-MISCELLANEOUS Plug, 2P
W201	YB00080250	Connective Cord, 15P
W516	YB00060240	Connective Cord, 8P
X501	XB006001Q0	Crystal 11.2896MHz
PF16	YK158K1830 ZZ157K8830	PF16-OPTICAL OUT CIRCUIT BOARD P.W. Board, Optical Out P.W. Board Assembly
QD01	HC404900B0	IC TC4049BP
QD02	HC404900B0	IC TC4049BP
JD03	YJ15000010	Jack, Receptacle with OPT Diode
WD01	YU04100260	Jumper Lead, 4P

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REF. DESIG.	PART NO.	DESCRIPTION
PM16	WB157K1410 ZZ157K8410	PM16-FEATURE U-COM CIRCUIT BOARD P.W. Board, Feature U-Com P.W. Board Assembly
		PM16-CAPACITOR
CF11	DK56331300	Ceramic 330pF ±10%, Chip
CF12	DD55331300	Ceramic 330pF ±5%, Chip
CF13	DK56331300	Ceramic 330pF ±10%, Chip
CF21	DK56331300	Ceramic 330pF ±10%, Chip
CF29		
CF38	DK56331300	Ceramic 330pF ±10%, Chip
CF43		
CF50	OA22703510	Elect 220μF 35V
CF61	DK56331300	Ceramic 330pF ±10%, Chip
CF67		
CF85	DK56331300	Ceramic 330pF ±10%, Chip
CF87	DK56331300	Ceramic 330pF ±10%, Chip
CF91		
CM01	OA47601610	Elect 47μF 16V
		PM16-RESISTORS (All Resistors are ±5% and 1/10W)
RF01	NI05022110	2.2Ω, Chip
RF14	NI05103110	10KΩ, Chip
RF15	NI05103110	10KΩ, Chip
RF16	NI05103110	10KΩ, Chip
RF19	NI05103110	10KΩ, Chip
RF20	NI05103110	10KΩ, Chip
RF21	NI05104110	100KΩ, Chip
RF22	NI05104110	100KΩ, Chip
RF23	NI05022110	2.2Ω, Chip
RF24	NI05022110	2.2Ω, Chip
RF26	NI05102110	1KΩ, Chip
RF27	NI05100110	10Ω, Chip
RF28	NI05222110	2.2KΩ, Chip
RF29	NI05100110	10Ω, Chip
RF30	NI05102110	1KΩ, Chip
RF31	NI05102110	1KΩ, Chip
RF50	NH05010140	1Ω ¼W
RF51	NI05102110	1KΩ, Chip
		PM16-SEMICONDUCTORS
DF01	HZ20003020	Diode MA151K, Chip
DF02	HZ30002050	Zener 02CZ5.1V(Y), Chip
DF03	HZ20001020	Diode MA151WK, Chip
DF05	HZ20001020	Diode MA151WK, Chip
DF50	HD20003000	Diode RL103F
DF51	HD30561000	Zener 5.6V
DM01	HZ30005050	Zener 02CZ6.8, Chip
DM02	HZ30004050	Zener 02CZ8.2, Chip

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REF. DESIG.	PART NO.	DESCRIPTION
QF01	HC10016260	IC MSM80C59
QF02	HC10015260	IC MSM80C51
QF03	HC10011000	IC MSM2816A
QF06	BA20002020	Semicon Composit UN2214, Chip
QF07	BA20002020	Semicon Composit UN2214, Chip
QF08	BA20002020	Semicon Composit UN2214, Chip
QF10	BA20002020	Semicon Composit UN2214, Chip
QM01	HC10148030	IC LB1645N
QM02	HC10148030	IC LB1645N
		PM16-MISCELLANEOUS
JF01	YJ06006330	Jack, 13P
JF02	YJ06006250	Jack, 5P
JF03	YP06004420	Plug, 14P
JF10	YP06001050	Plug, 5P
LM01	LC14730040	Choke Coil 47μH
WF03	YB00700250	Connective Cord, 14P
W202	YB00080240	Connective Cord, 7P
W515	YB00390120	Connective Cord, 3P
XF01	FQ01205030	Seramic Vibrator, 12.0MHZ
XF02	FQ01205030	Seramic Vibrator, 12.0MHZ
		PP16-DAC CIRCUIT BOARD
PP16	YK158K1310 ZZ157K8310	P.W. Board, DAC P.W. Board Assembly
		PP16-CAPACITORS
C551	OA47601650	Elect 47μF 16V
C552	OF15473010	Film 0.047μF ±5%
C556	OF15224010	Film 0.22μF ±5%
?		
C569		
C570	DF15681350	Film 680pF
C571	OF15473010	Film 0.047μF ±5%
C572	OF15473010	Film 0.047μF ±5%
C573	OA47602550	Elect 47μF 25V
C574	OA47602550	Elect 47μF 25V
C575	OA10601650	Elect 10μF 16V
C576	OA10601650	Elect 10μF 16V
C580	OF54222520	Film 2200pF ±2%
C581	OF54222520	Film 2200pF ±2%
C582	DF74153520	Film 0.015μF ±2%
C583	DF74153520	Film 0.015μF ±2%
C584	OF54512510	Film 5100pF ±2%
C585	OF54512510	Film 5100pF ±2%
C586	OF54222510	Film 2200pF ±2%
C587	OF54222510	Film 2200pF ±2%
C588	OF54102520	Film 1000pF ±2%
C589	OF54102520	Film 1000pF ±2%
C590	OA10702510	Elect 100μF 25V
C591	OA10702510	Elect 100μF 25V
C592	OA10601610	Elect 10μF 16V
C593	OA10601610	Elect 10μF 16V
C596	OA10702550	Elect 100μF 25V
C597	OA10702550	Elect 100μF 25V
C598	OA10702550	Elect 100μF 25V
C599	OA10702550	Elect 100μF 25V

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REF. DESIG.	PART NO.	DESCRIPTION		
△ C805	OB68802510	Elect	6800μF	25V
△ C806	OB68802510	Elect	6800μF	25V
C807	OA47602550	Elect	47μF	25V
C808	OA47602550	Elect	47μF	25V
C811	OA47702550	Elect	470μF	25V
C812	OA47702550	Elect	470μF	25V
△ C836	OA33802520	Elect	3300μF	25V
△ C837	OA33802520	Elect	3300μF	25V
△ C845	OA68801620	Elect	6800μF	16V
PP16-RESISTORS				
R560	GM21417810	1.78KΩ	±2%	¼W
R561	GM21417810	1.78KΩ	±2%	¼W
R562	GM21410010	1KΩ	±2%	¼W
R563	GM21410010	1KΩ	±2%	¼W
R568	GM21423710	2.37KΩ	±2%	¼W
R569	GM21423710	2.37KΩ	±2%	¼W
R570	GM21423710	2.37KΩ	±2%	¼W
R571	GM21423710	2.37KΩ	±2%	¼W
△ R580	NH05033140	3.3Ω ±5% ¼W, Fusible [N,A,W]		
△ R583				
△ R801	NH05010120	1Ω	±5%	¼W, Fusible
△ R802	NH05010120	1Ω	±5%	¼W, Fusible
△ R803	NH05010140	1Ω	±5%	¼W, Fusible
△ R804	NH05010140	1Ω	±5%	¼W, Fusible
R807	GM21456200	562Ω	±2%	¼W
R808	GM21456200	562Ω	±2%	¼W
R809	GM21438310	3.83KΩ	±2%	¼W
R810	GM21438310	3.83KΩ	±2%	¼W
R813	GM21412110	1.21KΩ	±2%	¼W
R814	GM21412110	1.21KΩ	±2%	¼W
R815	GM21414710	1.47KΩ	±2%	¼W
R816	GM21414710	1.47KΩ	±2%	¼W
R817	GM21412110	1.21KΩ	±2%	¼W
R818	GM21412110	1.21KΩ	±2%	¼W
△ R821	NH05010120	1Ω	±5%	¼W, Fusible
R822	GM21410010	1KΩ	±2%	¼W
△ R831	NH05010120	1Ω	±5%	¼W, Fusible
△ R832	NH05010120	1Ω	±5%	¼W, Fusible
PP16-SEMICONDUCTORS				
DB01	HD20001000	Diode	1S2473	
DN01	HD20001000	Diode		
DN06		1S2473		
DN08	HD20001000	Diode	1S2473	
DN09	HD20001000	Diode	1S2473	
DN10	HD30063060	Zener	3.9V	RD3.9EB1
DN11	HD30063060	Zener	3.9V	RD3.9EB1
D801	HD20005010	Diode	W06B	
D802	HD20005010	Diode	W06B	
D803	HD20005010	Diode	W06B	
D804	HD20005010	Diode	W06B	
D805	HD30015060	Zener	5.6V	
D806	HD30015060	Zener	5.6V	
△ D807	HD20005010	Diode	W06B	
△ D808	HD20005010	Diode	W06B	
△ D809	HD20005010	Diode	W06B	
△ D810	HD20005010	Diode	W06B	

REF. DESIG.	PART NO.	DESCRIPTION	
D821	HD30024060	Zener	6.8V
△ D831	HD20005010	Diode	W06B
△ D832	HD20005010	Diode	W06B
△ D833	HD20005010	Diode	W06B
△ D834	HD20005010	Diode	W06B
△ D841	HD20009010	Diode	U05B
△ D842	HD20009010	Diode	U05B
△ D843	HD20009010	Diode	U05B
△ D844	HD20009010	Diode	U05B
QN01	HT107332A0	Transistor	2SA733(P, Q)
QN02	HT112962A0	Transistor	2SA1296(Y, GR)
QN03	HT309452A0	Transistor	2SC945(O, R)
Q551	HC10011490	IC	TDA1541
Q552	HC10027090	IC	NJM5534
Q553	HC10027090	IC	NJM5534
Q554	HC10027090	IC	NJM5534
Q555	HC10027090	IC	NJM5534
Q556	HF203722A0	F.E.T.	2SK372(GR, BL)
Q557	HF203722A0	F.E.T.	2SK372(GR, BL)
Q801	HT403131D0	Transistor	2SD313(D)
Q802	HT309452A0	Transistor	2SC945(O, R)
Q803	HT107332A0	Transistor	2SA733(P, Q)
Q804	HT205071D0	Transistor	2SB507(D)
Q805	HT327852A0	Transistor	2SC2785(RF, JF)
Q806	HT111752A0	Transistor	2SA1175(RF, JF)
Q821	HT113582A0	Transistor	2SA1358(O, Y)
△ F841	FS10200800	Fuse	
JB21	YT02020550	Terminal, IN/OUT; 2P	
JD20	YT02010320	Terminal, 1P	
JG01	YL01010110	Terminal, Earth	
JG02	YJ08000270	Jack, Fuse Holder	
J510	YJ06006240	Jack, 4P	
J511	YP06003330	Plug, 3P	
J515	YJ06006230	Jack, 3P	
J516	YJ06006280	Jack, 8P	
J519	YT02020290	Terminal, Audio Out	
J524	YJ06002440	Jack, 4P	
J010	YJ06001050	Jack, 5P	
J011	YJ06001070	Jack, 7P	
J801	YP06001070	Plug, 9P	
J802	YJ06002450	Jack, 6P	
J803	YP06003340	Plug, 9P	
LD01	TP41042010	Pulse Transformer	
L502	LY20045010	Relay SZ-2101	
PP26-REGULATOR CIRCUIT BOARD			
PP26	YK158K1320	P.W. Board, Regulator	
	ZZ157K8320	P.W. Board Assembly	
D845	HD20001000	Diode	1S2473
△ Q831	HC10044060	IC	μPC7912H
△ Q832	HC10043060	IC	μPC7812H
△ Q841	HC10056060	IC	μPC7805H

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REF. DESIG.	PART NO.	DESCRIPTION	REF. DESIG.	PART NO.	DESCRIPTION
PY16	WB157K1420 ZZ157K8420	PY16-DISPLAY CIRCUIT BOARD P.W. Board, Display P.W. Board Assembly	JY02	YJ06006330	PY16-MISCELLANEOUS Jack, 13P
CY02	DK58473300	PY16-CAPACITORS Ceramic 0.047µF, Chip	SY01	SP01010970	Push Switch, Stop
CY04	DD55330300	Ceramic 33pF ±5%, Chip	SY02	SP01010970	Push Switch, Pause
CY05	DD55330300	Ceramic 33pF ±5%, Chip	SY03	SP01010970	Push Switch, Play
CY07			SY05		
CY14	DK56222300	Ceramic 2200pF ±10%, Chip	SY16	SP01010970	Push Switch, Play
RY01			VY01	HQ30801410	Display Unit
RY05	NI05154110	PY16-RESISTORS 150KΩ ±5% 1/10W, Chip	WY01	YB00180330	Connective Cord, 13P
RY06			WY03	YB00130360	Connective Cord, 5P
RY13	NI05103110	10KΩ ±5% 1/10W, Chip	XY01	FO03004010	Seramic Vibrator 3.00MHz
RY15	NI05101110	100Ω ±5% 1/10W, Chip	ZY01	HW10001550	Photo Unit
RY16	NI05332110	3.3KΩ ±5% 1/10W, Chip			
RY17	NI05562110	5.6KΩ ±5% 1/10W, Chip	PY26	WB157K1440 ZZ157K8440	PY26-LAMP CIRCUIT BOARD P.W. Board, Lamp P.W. Board Assembly
RY18	NI05562110	5.6KΩ ±5% 1/10W, Chip	DY51	HD20003000	Diode RL103E, etc.
RY19	NI05103110	10KΩ ±5% 1/10W, Chip	DY52	HD20003000	Diode RL103E, etc.
RY20	NI05103110	10KΩ ±5% 1/10W, Chip			
RY21	NI05103110	10KΩ ±5% 1/10W, Chip			
RY24	NI05472110	4.7KΩ ±5% 1/10W, Chip			
RY25	NI05334110	330KΩ ±5% 1/10W, Chip			
RY26	NI05103110	10KΩ ±5% 1/10W, Chip			
RY27	NI05103110	10KΩ ±5% 1/10W, Chip			
DY01		PY16-SEMICONDUCTORS			
DY05	HZ20003020	Diode MA151K, Chip			
DY06	HZ20003020	Diode MA151K, Chip			
QY01	HC10212030	IC LC8954D			
QY02					
QY07	BA10001020	Semicon Composit UN2114, Chip			
QY10	HX41328IS0	Transistor 2SD1328(S), Chip			
QY11	HX41328IS0	Transistor 2SD1328(S), Chip			
QY12	HX32712IA0	Transistor 2SC2712(G), Chip			
QY13	HX32712IA0	Transistor 2SC2712(G), Chip			
QY14	HX32712IA0	Transistor 2SC2712(G), Chip			

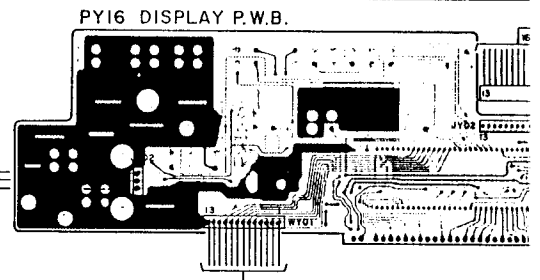
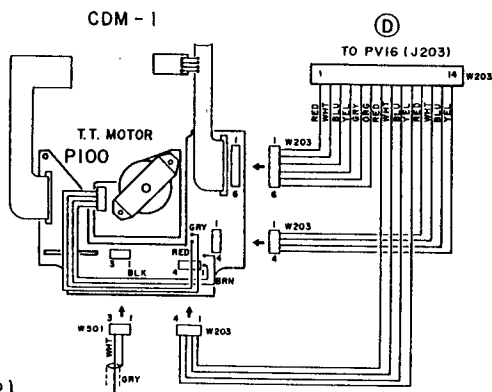
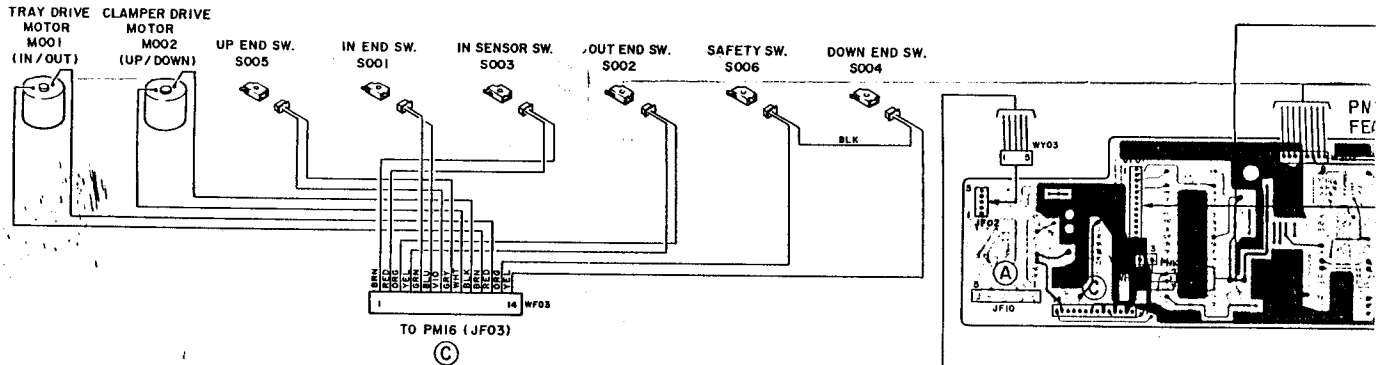
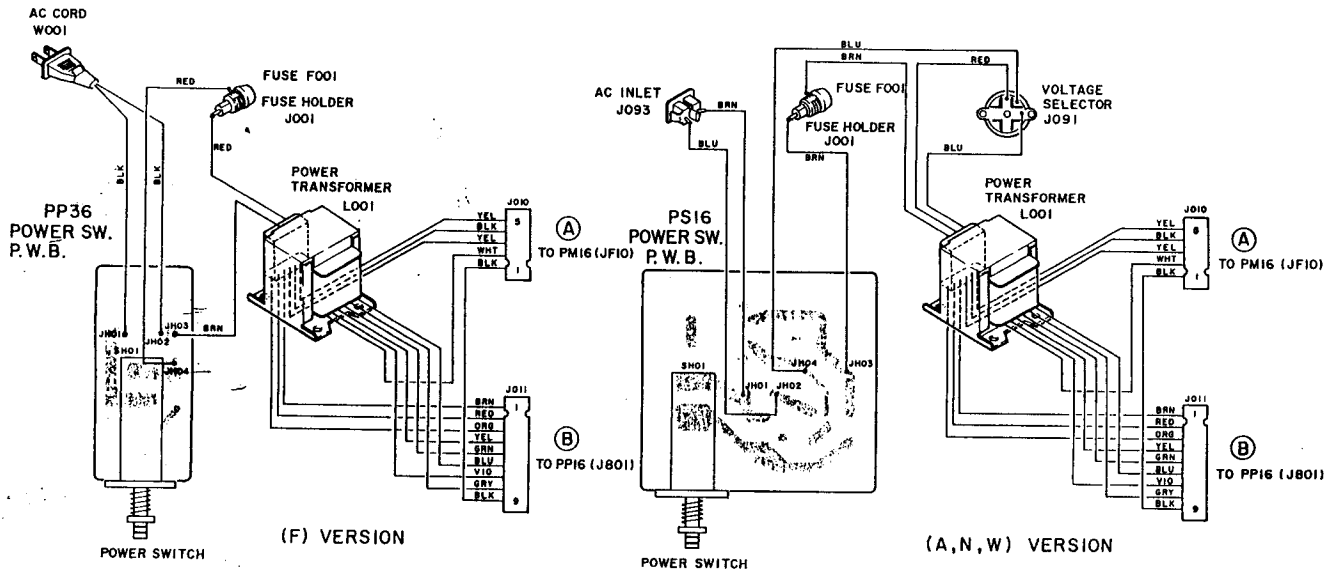
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NOTE ON SAFETY:
 Symbol Δ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol Δ. Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.

(W01-99)	Assembly and Wiring
(T01-99)	Adjustment
(X01-00)	Correction

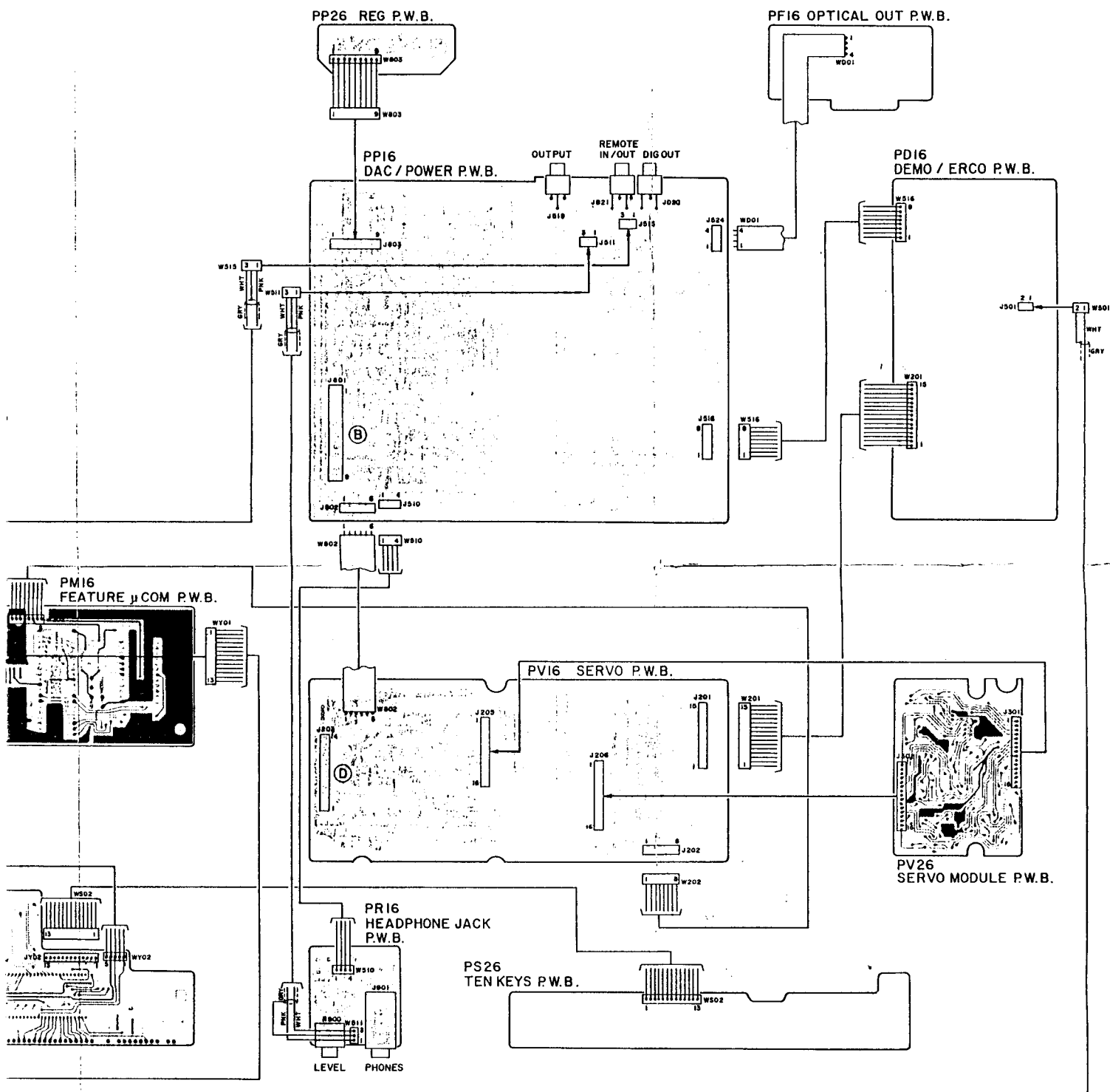
M7200

WIRING DIAGRAMS (COMPONENT SIDE)



M 2201

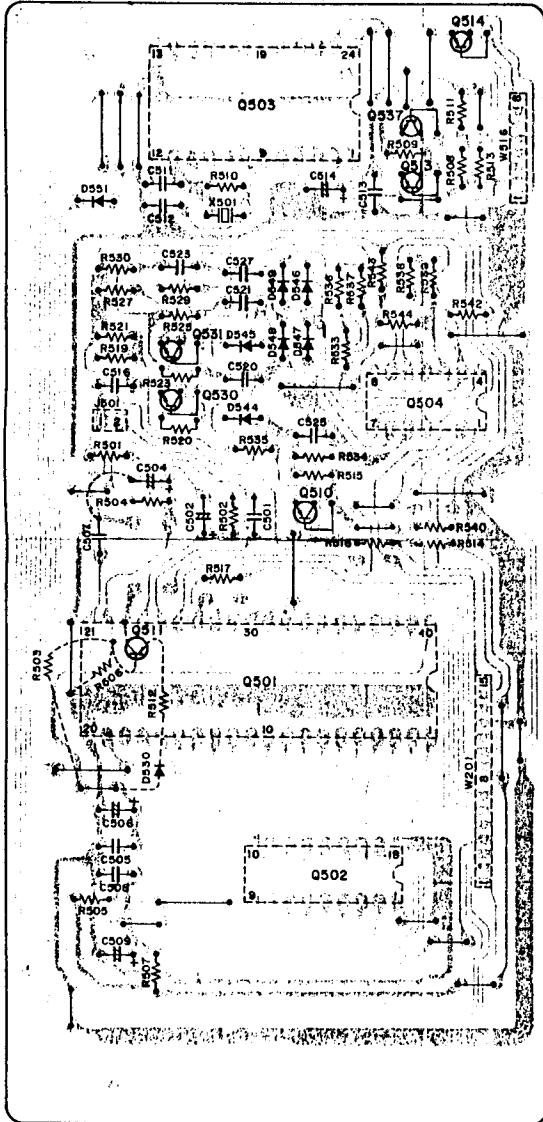
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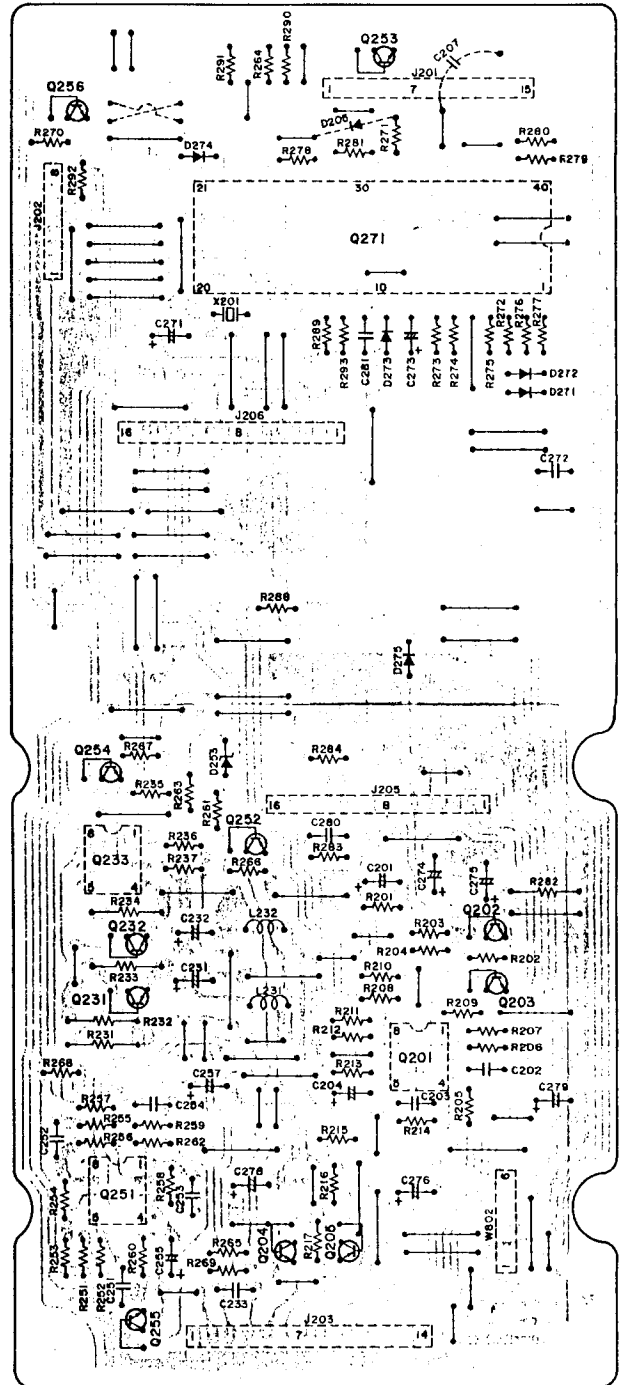
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PART LOCATIONS (PATTERN SIDE)

PD16 DEMO / ERCO P.W.B.

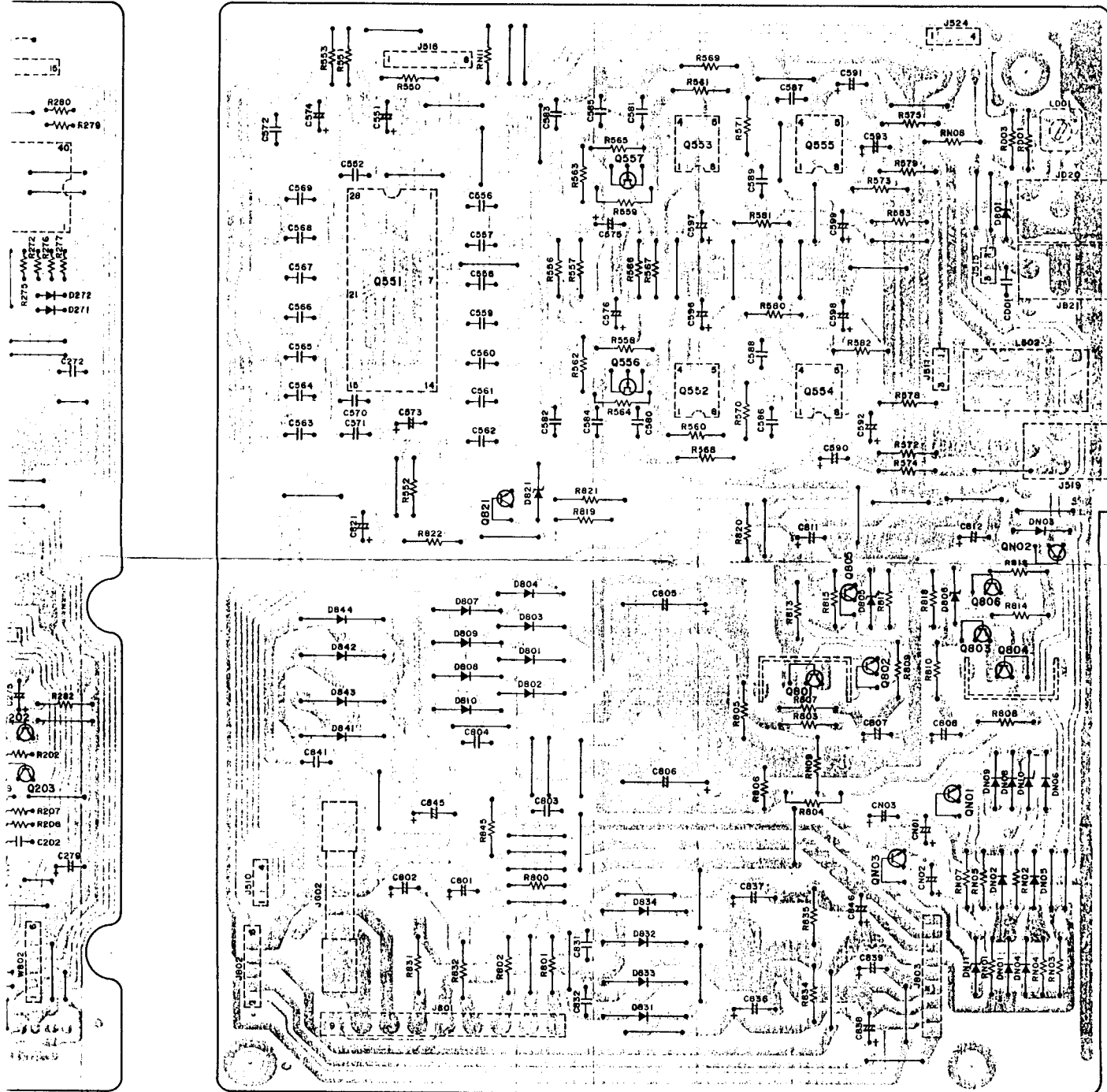


PV16 SERVO P.W.B.



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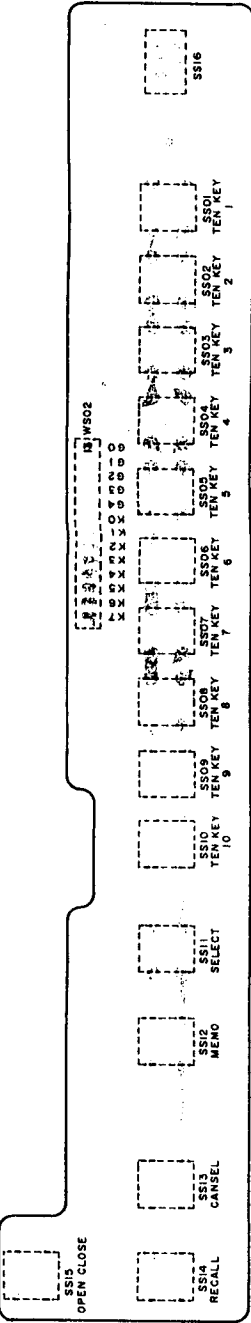
PPI6 DAC / POWER P.W.B.



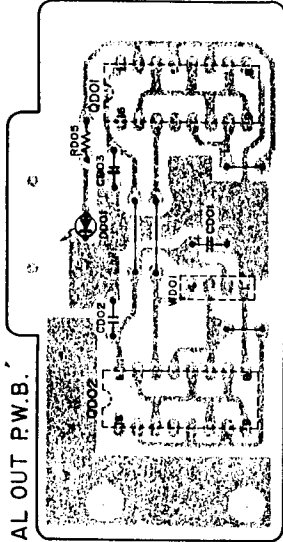
M7202

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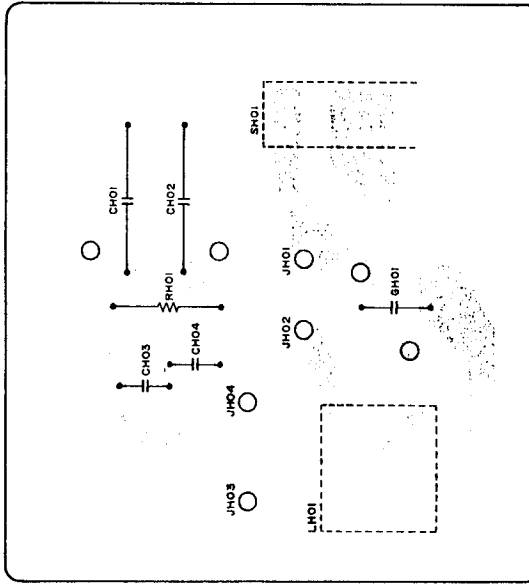
**PS26
TEN KEYS P.W.B.**



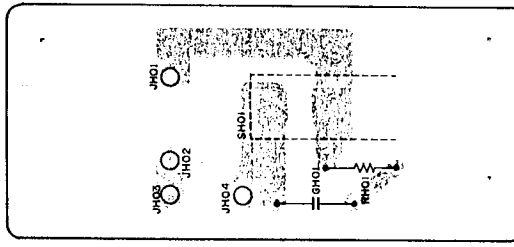
PF16 OPTICAL OUT P.W.B.



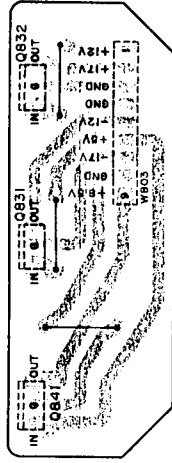
**PS16
POWER SW. P.W.B.**



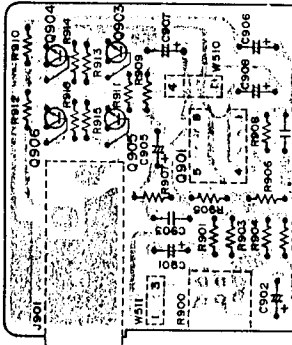
**PP36 (F ONLY)
POWER SW. P.W.B.**



PP26 REG P.W.B.



**PR16
HEADPHONE JACK P.W.B.**

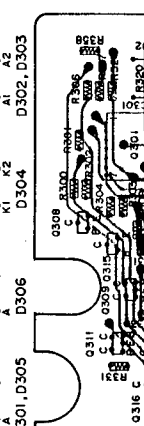
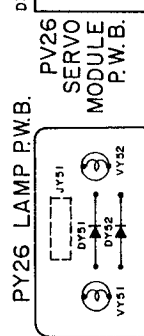
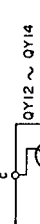
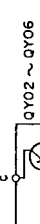
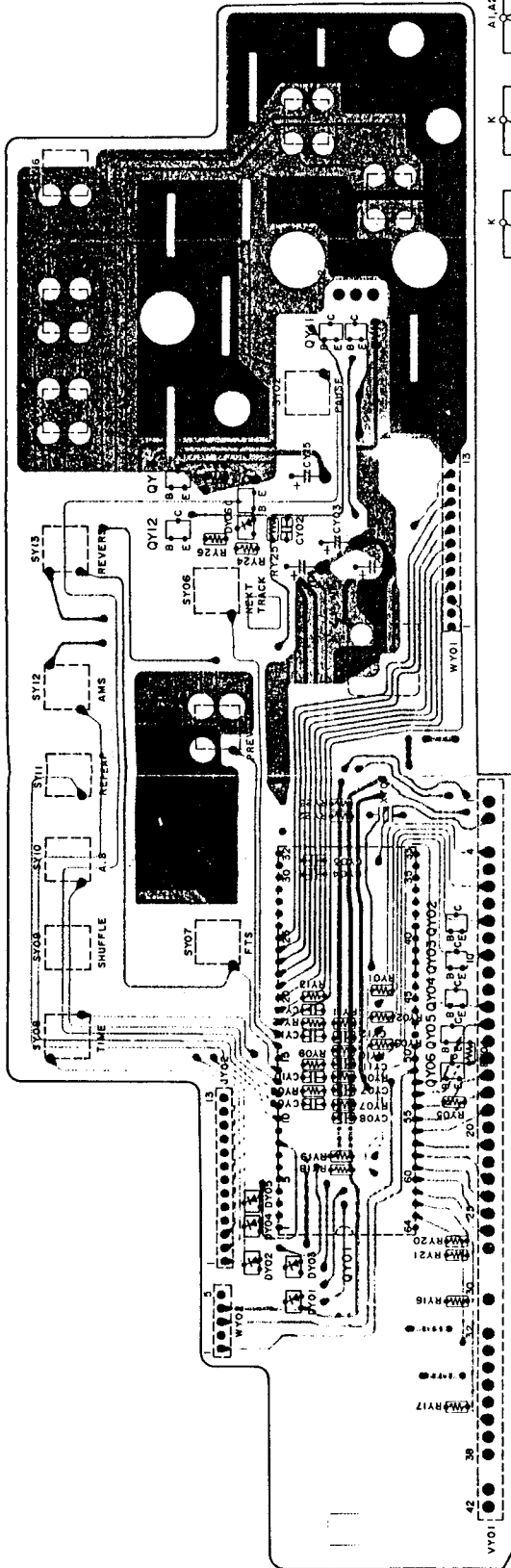


PY16 DISPLAY P.W.B.

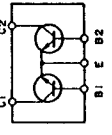
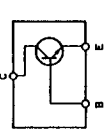
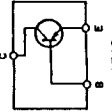
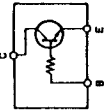
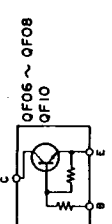
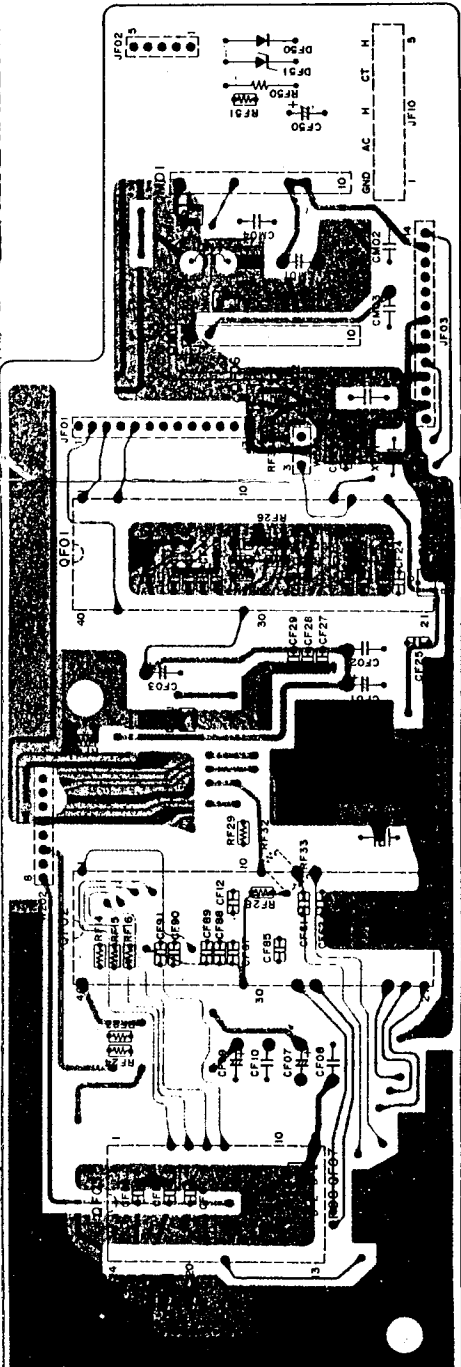


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PY16 DISPLAY P.W.B.



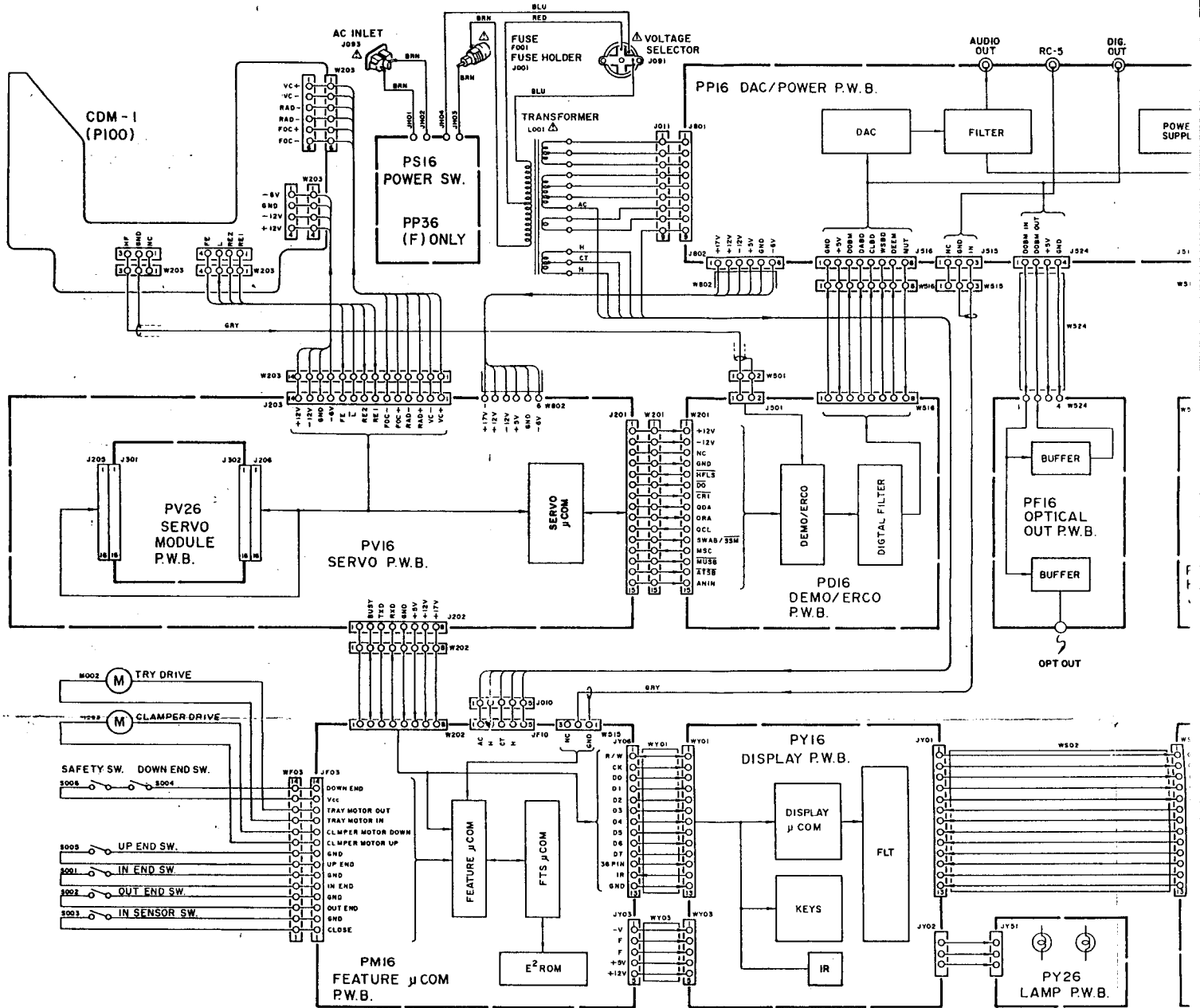
PM16 FEATURE J.COM P.W.B.



M7203

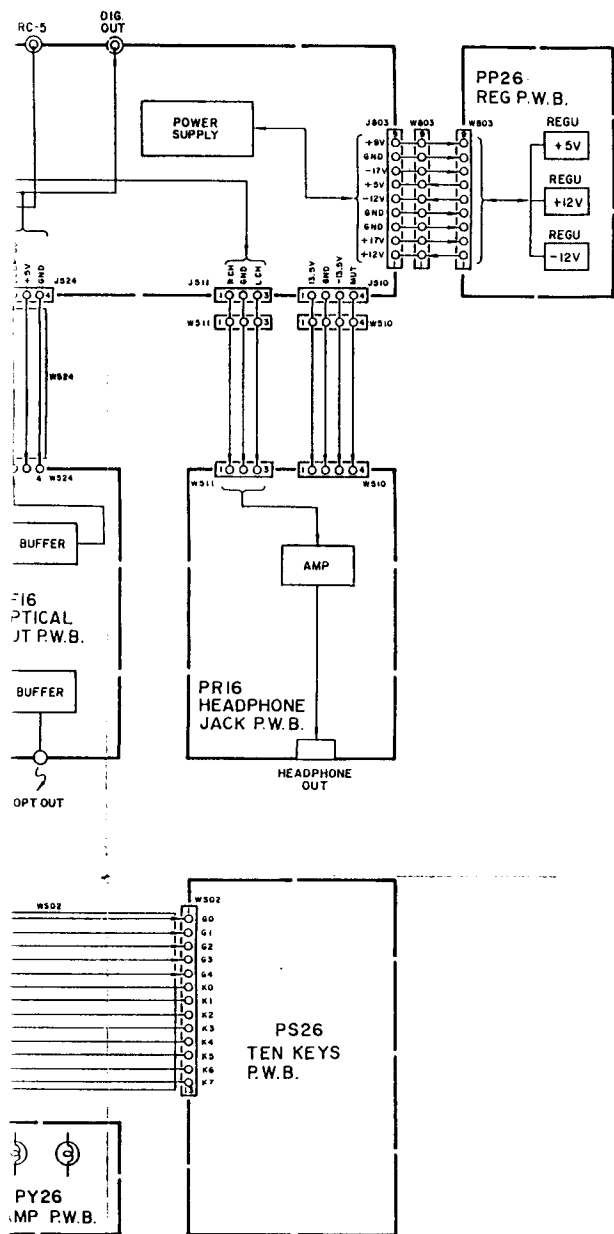
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BLOCK DIAGRAM

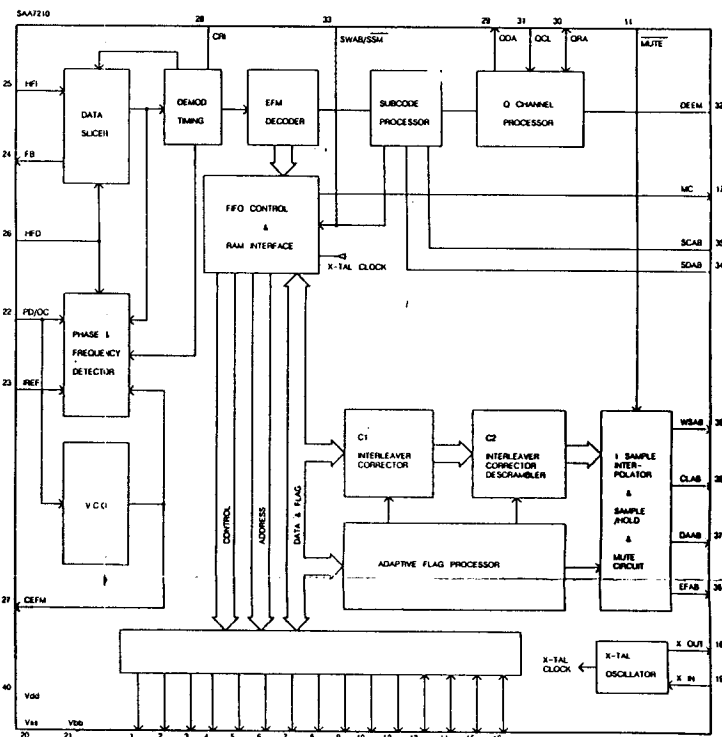


M 7204^A

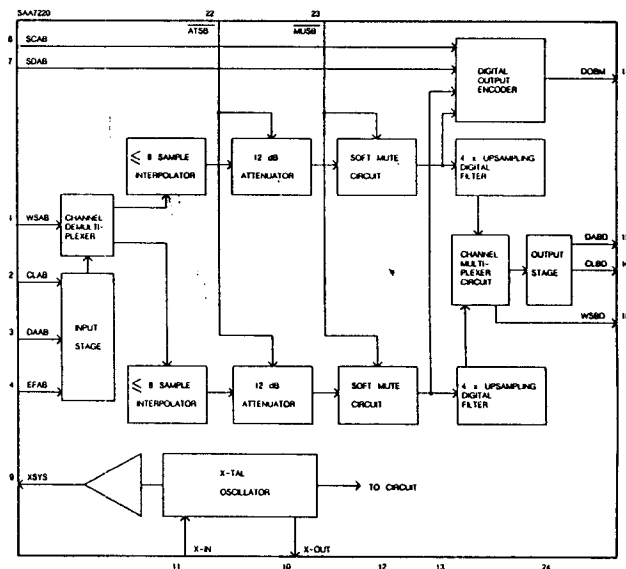
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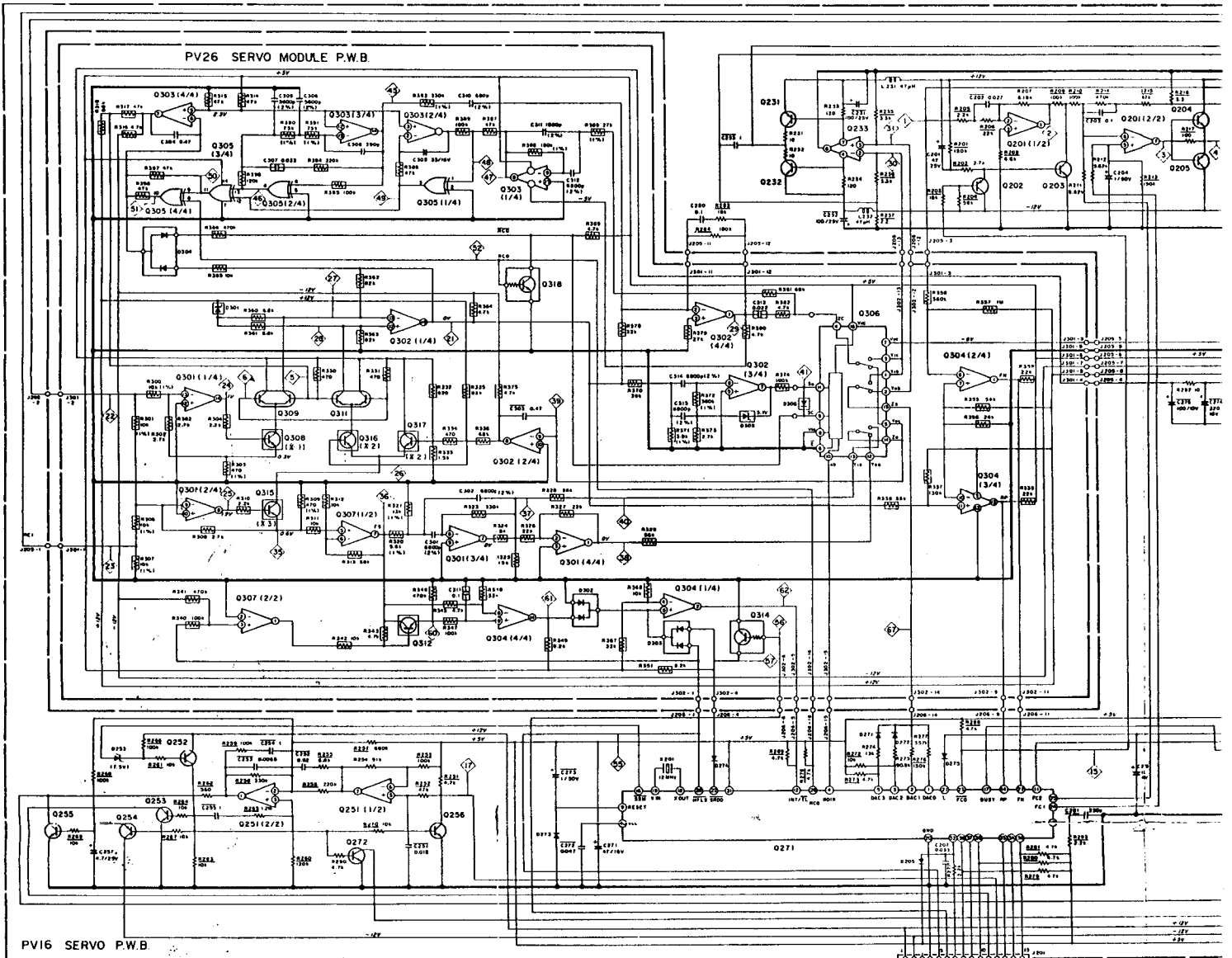
DECODER-A (Q501)



FILTER-B (Q503)



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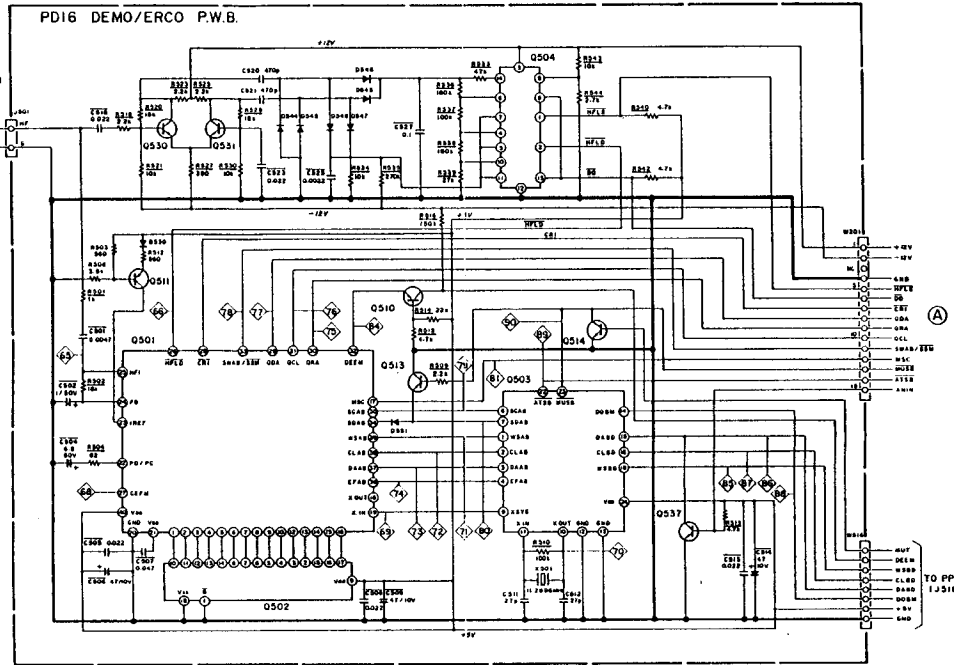
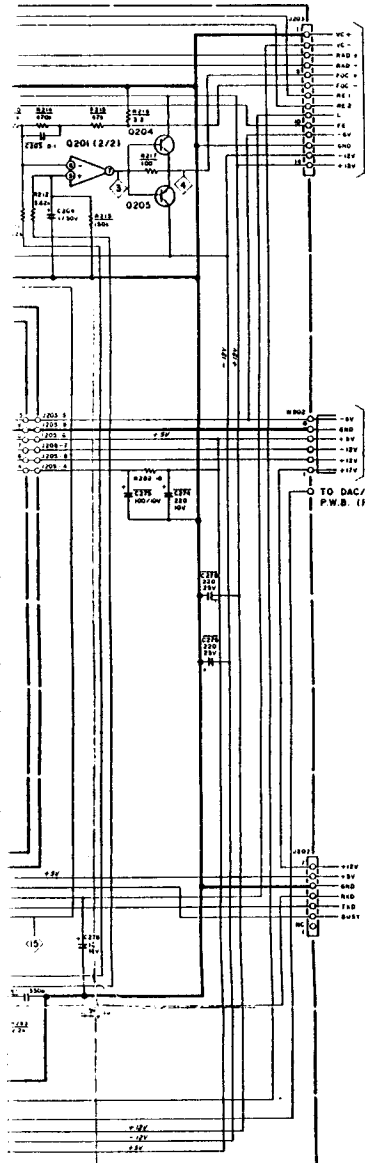
NOTE
 (1), (2), (3): NECESSARILY TO USE SAME TYPE TRANSISTOR

M 2204B

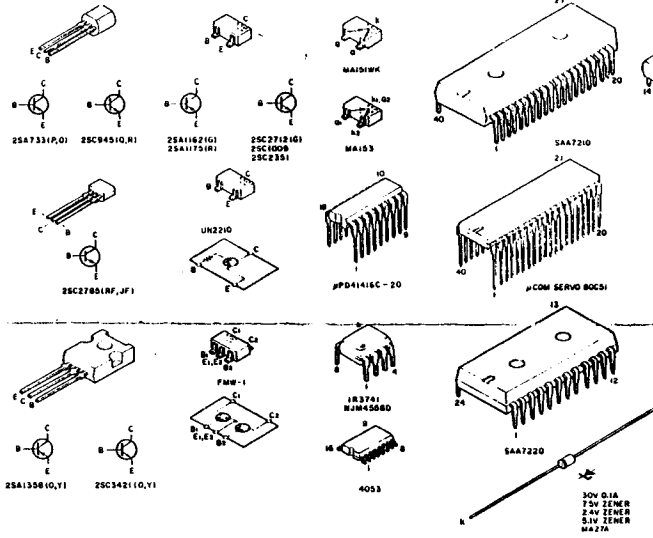
NOTE ON SAFETY :
 Symbol Δ Fire or electrical shock hazard. Only original parts should be used to replace any part marked with symbol Δ . Any other component substitution (other than original type), may increase risk of fire or electrical shock hazard.

Components and wiring are subject to c/t

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Q514, Q256, Q537 Q203, Q253, Q255 HT3094S2A0 25C945 (Q, R)	Q233 HC1001320 1R3741	Q316, Q317 HX310091A0 25C1009
Q254, Q202 Q510, Q513, Q252 HT107332A0 25A733 (P, Q)	Q271 HC10017260 µCOM SERV0 BOC51	Q511 HT11752A0 25A1175
Q501 HC10008490 5A47210	Q301 ~ Q304 HC10042090 NJM2902M	D205 D344 ~ D549 D271 ~ D275, D551 HD20002000 30V 0.1A
Q502 HC10158060 JPD41416C-20	Q305 HC4030020 4030	D253 HD30751000 2.4V ZENER
Q503 HC10010490 5A47220	Q306 HC40530020 4053	D301 H230003090 2.4V ZENER
Q504 HC10010320 1R2339	Q308 HX32351010 25C2351	D302, D303, D306 H220001020 MA151WK
Q530, Q531, Q272 HT327852A0 25C2785	Q309, Q311 HC10058210 FMW1	D304 H220005020 MA153
Q201, Q251, Q307 HC10003090 NJM4558D	Q312 HX11621A0 25A1162 (G)	D305 H230002050 5.1V ZENER
Q204, Q232 HT334212A0 25C3421 (Q, Y)	Q313, Q314, Q318 BA20005020 UN2210	D530 HV0001020 MA27A
Q205, Q231 HT113582A0 25A1358 (Q, Y)	Q315 HX327121A0 25C2712 (G)	



"SERVICE INFORMATION IS FOR USE BY QUALIFIED PERSONNEL ONLY - ANY MISADJUSTMENT OR MISALIGNMENT MAY BE TREATED AS A NON-WARRANTY REPAIR BY ANY MARANTZ SERVICE CENTRE -"

Kind of Common Parts

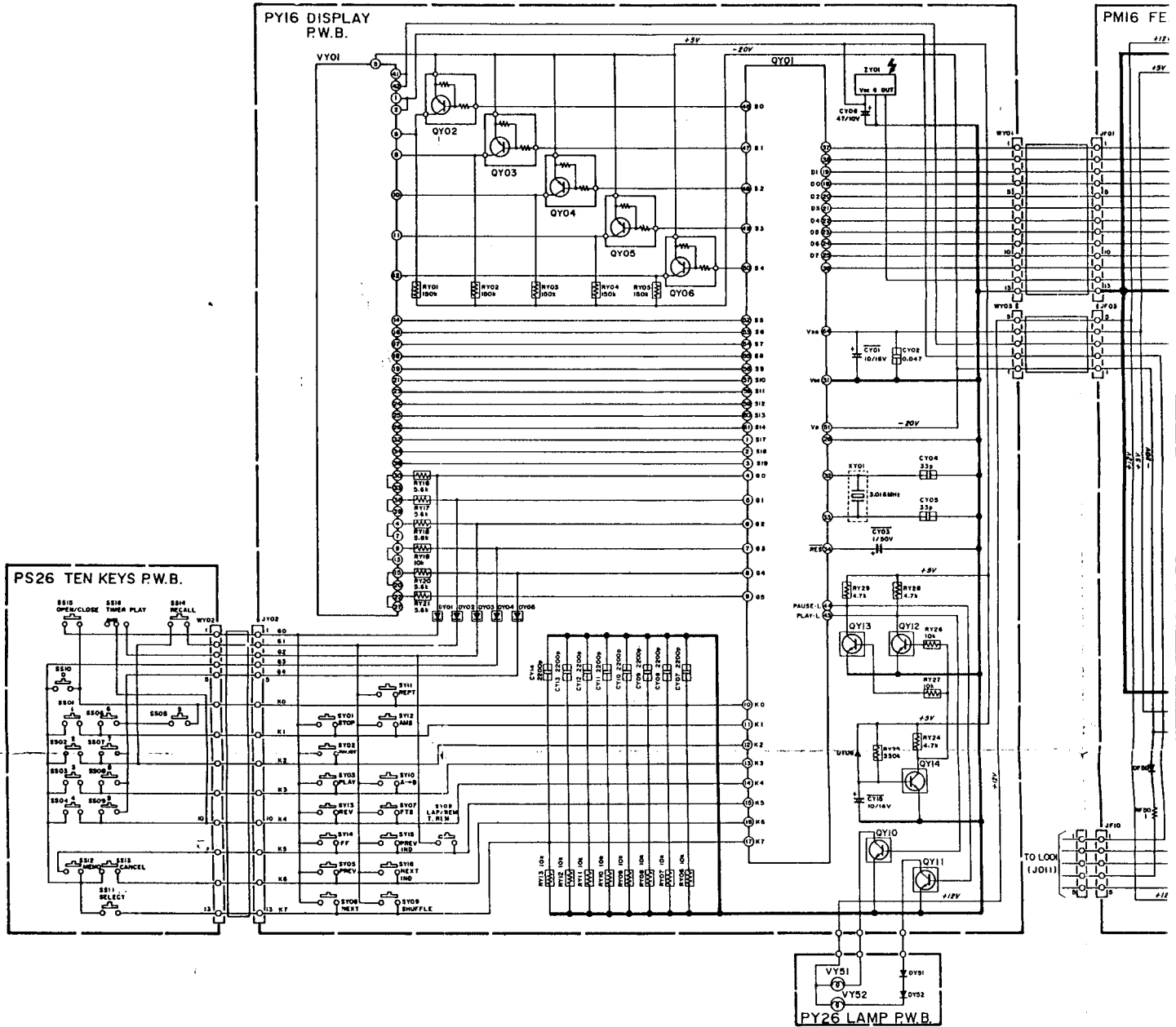
- R***** : RESISTOR
 (1) GD05 --- 140, Carbon film fixed resistor, ±5% 1/4W
 (2) GD05 --- 160, Carbon film fixed resistor, ±5% 1/6W
- C***** : CERAMIC CAP.
 (1) DD1 --- 370, Ceramic condenser, disc type (titan condenser)
 Temp. coeff. P350 ~ N1000 50V
- C***** : CERAMIC CAP.
 (1) DK16 --- 330, High dielectric constant ceramic condenser, disc type (titan variable)
 Temp. chara. 2B4 50V

- C***** : ELECTROLYTIC CAP. (⚡) / FILM CAP. (≡)
 (1) EA --- 10, Electrolytic condenser, one-way lead type, tolerance ±20%
 (2) DF15 --- 350, Plastic film condenser, one-way type, Mylar, ±5% 50V

* In case of ordering the common parts, please establish the correct parts number of 10 figures by the procedure "ASSIGNMENT OF COMMON PARTS CODES"

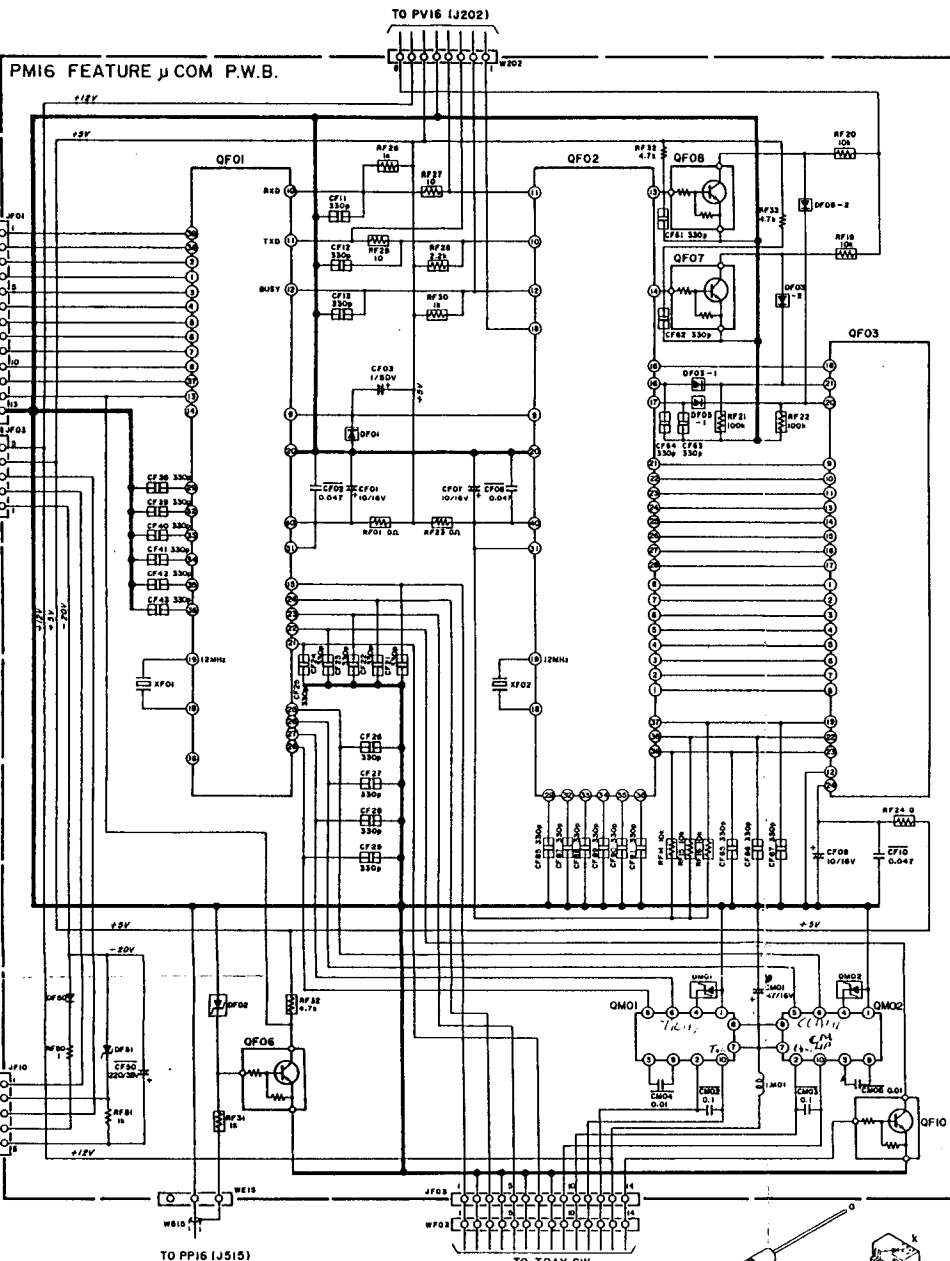
and wiring are subject to change for modification without notice.

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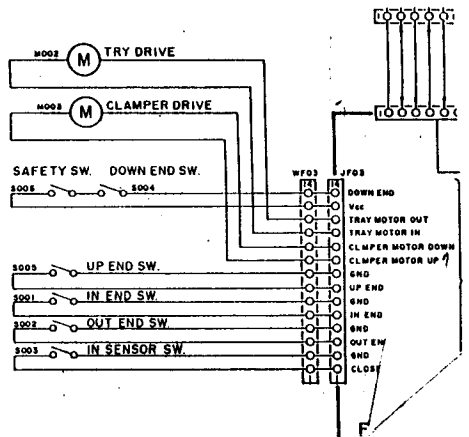
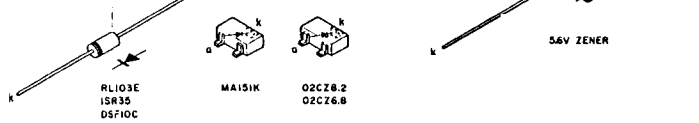
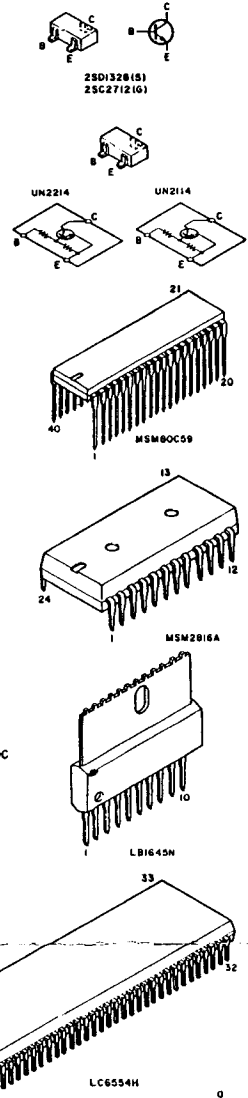


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- MOD1
- MOD
- SAFET
- S008
- S005
- S001
- S002
- S003



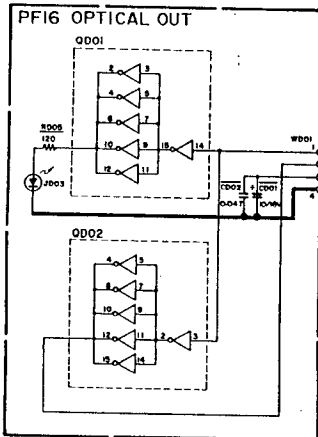
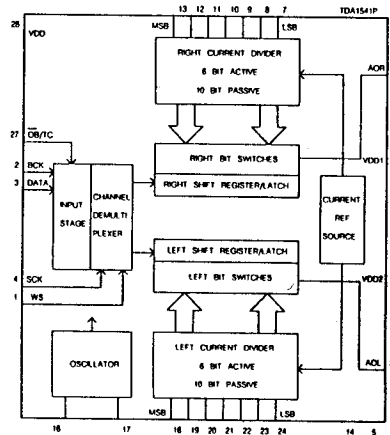
- QY01
HC10212030
LC6554D
- QY02~QY06
BA10001020
2SD1328(S)
UN2114
- QY10,QY11
HX41328(S)
2SD1328(S)
- QY12~QY14
HX327121A0
2SC2712(G)
- QM01,QM02
HC10148030
LB1645N
- QF01
HC10016260
MSM80C59
- QF02
HC10013260
MSM80C51
- QF03
HC10011000
MSM2816A
- QF06~QF08,QF10
BA20002020
UN2214
- DY06,DY01~DY05
DF01~DF03,DF05
HZ20003020
MA151K
- DY51,DY52,DF50
HD20003000
RL103E,SR35,DSF10C
- DM01
HZ30005050
O2C26.8
- DM02
HZ30004050
O2C28.2
- DF51
HD30561000
5.6V ZENER



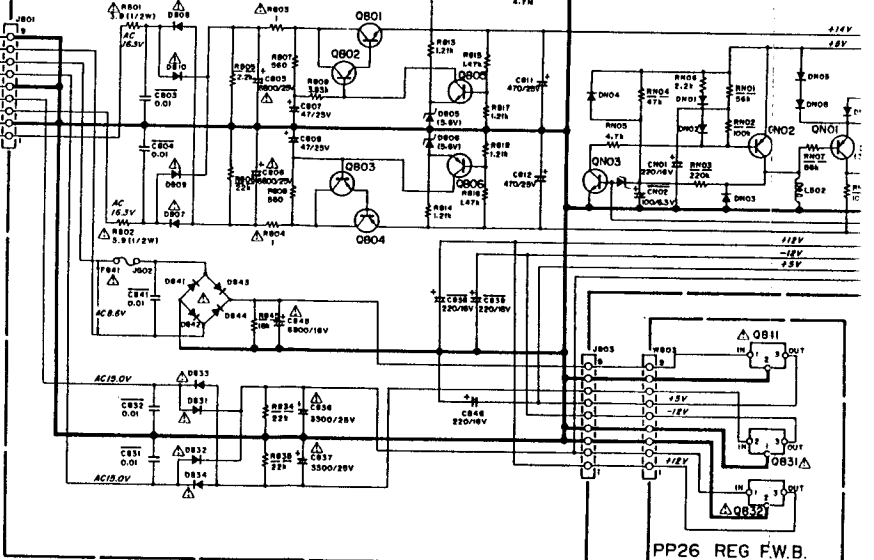
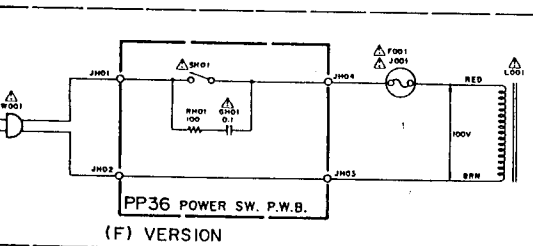
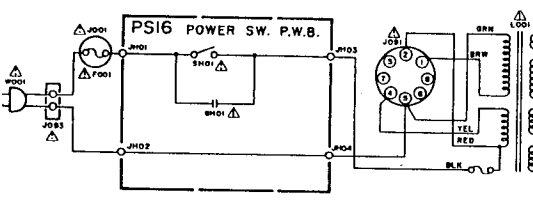
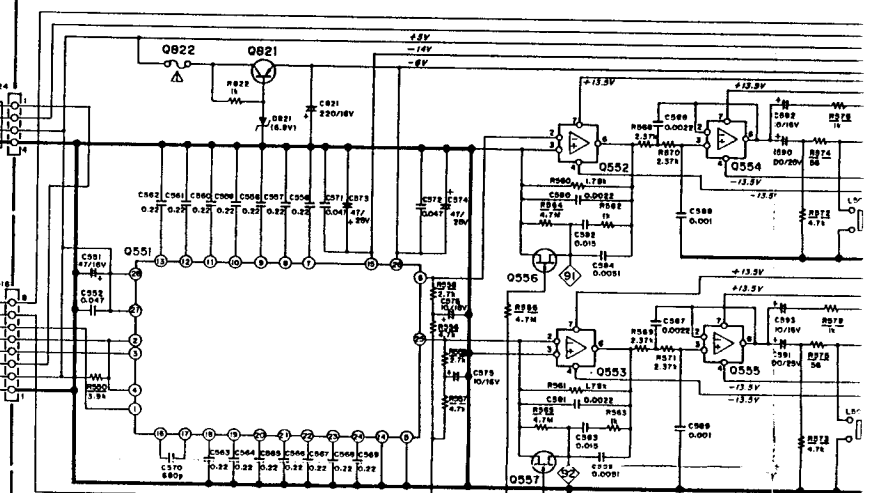
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M_{7205A}

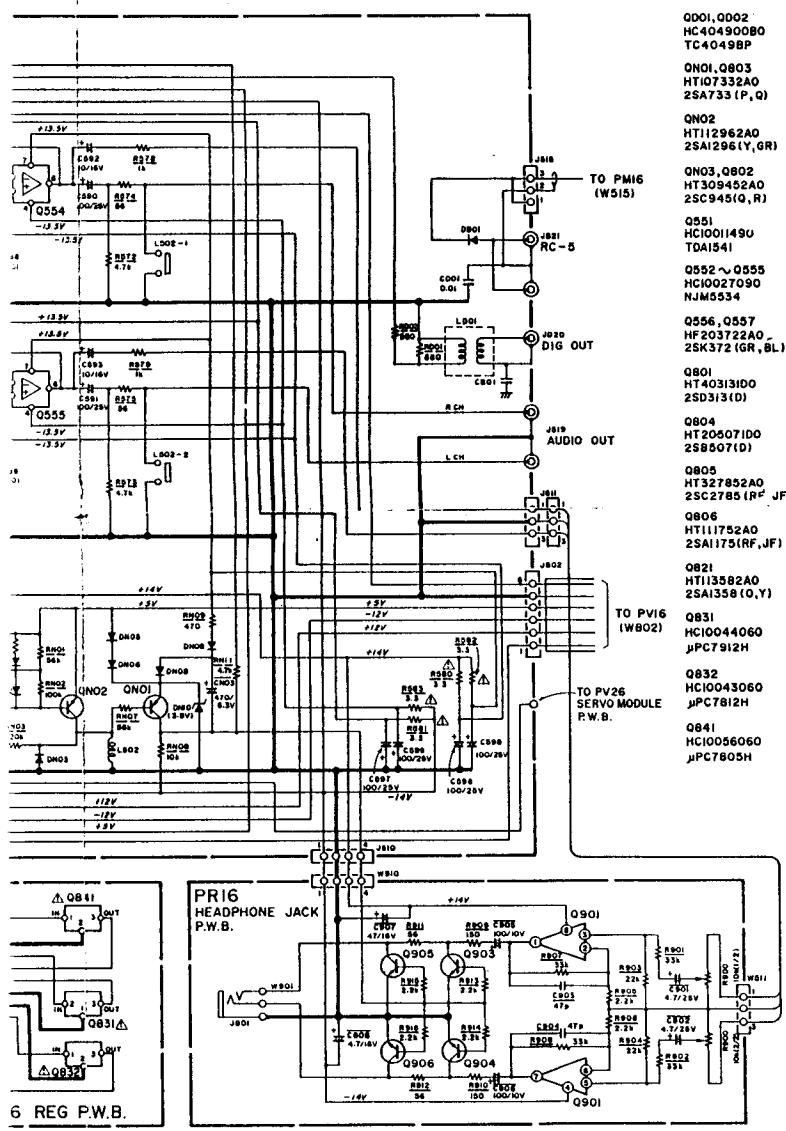
D.A.C (Q551)



PP16 DAC/POWER P.W.B.



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- Q001, Q002
HC40490B0
TC4049BP
- Q001, Q003
HT107332A0
25A733 (P, Q)
- Q002
HT112962A0
25A1296 (Y, GR)
- Q003, Q002
HT309452A0
25C945 (Q, R)
- Q051
HC100149U
TDA1541
- Q552 ~ Q555
HC10027090
NJM5534
- Q556, Q557
HF203722A0
25K372 (GR, BL)
- Q801
HT403131D0
25D313 (D)
- Q804
HT206071D0
25B507 (D)
- Q805
HT327852A0
25C2785 (RF, JF)
- Q806
HT111752A0
25A1175 (RF, JF)
- Q821
HT113582A0
25A1358 (Q, Y)
- Q831
HC10044060
µPC7912H
- Q832
HC10043060
µPC7812H
- Q841
HC10056060
µPC7805H

- Q901
HC1001809
NJM4556D
- Q903 ~ Q906
HT328781A0
25C2878

- D810, D811
HD3C063060
3.9V ZENER

- D845
HD20001000
IS2473

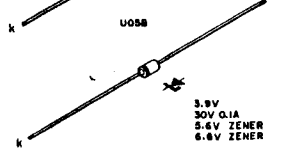
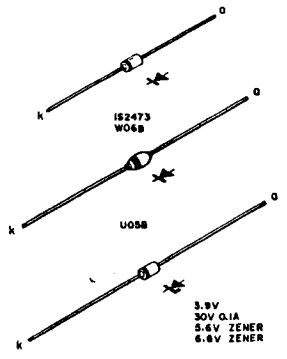
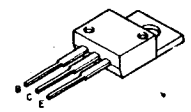
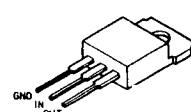
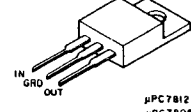
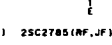
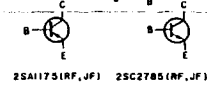
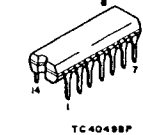
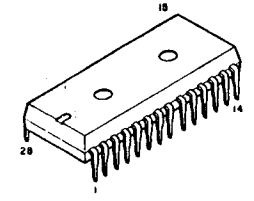
- D801, D801 ~ D806, D808, D809
HD2C001000
30V, 0.1A

- D801 ~ D804, D807 ~ D810, D831 ~ D834
HD20005010
W06B

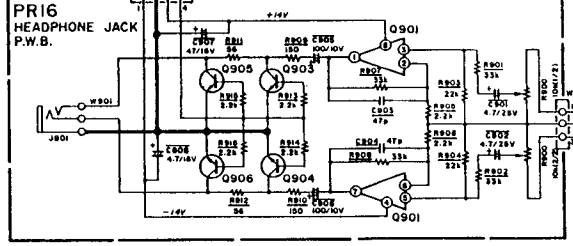
- D805, D806
HD3001506
5.6V ZENER

- D821
HD30024060
6.8V ZENER

- D841 ~ D844
HD20009010
U05B



6 REG P.W.B.



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