Service
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Service Manual

COMPACT disc DIGITAL AUDIO

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CLASS 1
LASER PRODUCT

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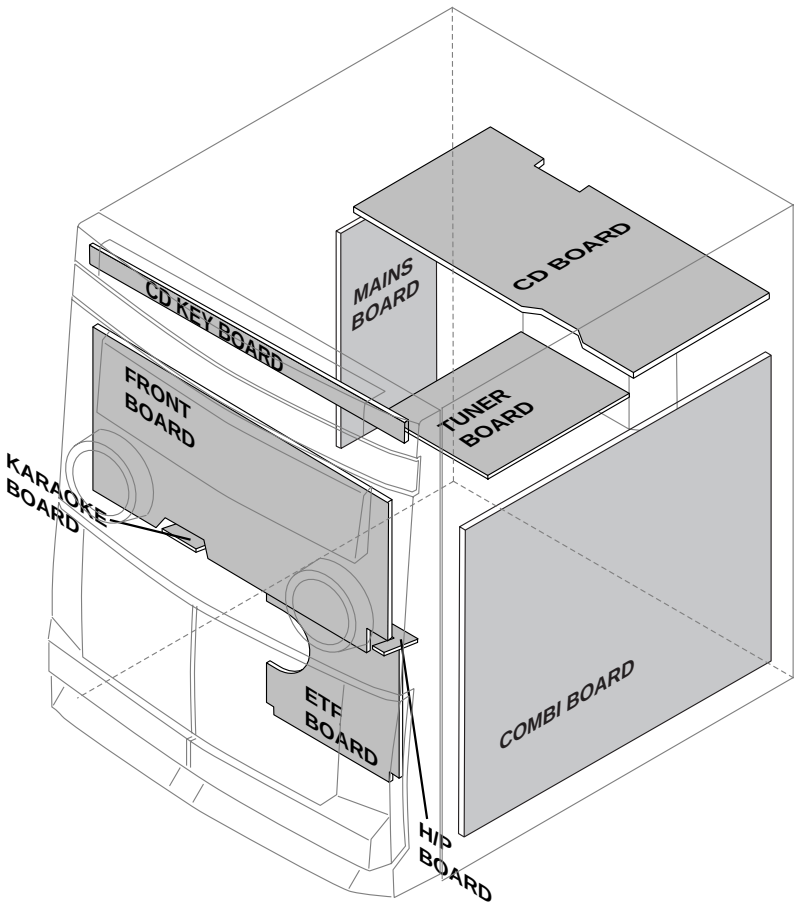
PHILIPS

LOCATION OF PC BOARDS



VERSION VARIATIONS:

Type /Versions: / Features & Board in used:	FW-C280							
	/22	/34						
Incredible Surround	x	x						
Karaoke								
News	x	x						
RDS	x	x						
Rotary Encoder (volume control)	x	x						
Jog Shuttle	x	x						
Voltage Selector								
Aux Input	x	x						
Digital Output								
Headphone Socket	x	x						
Line Output								
Subwoofer Output								
Surround Output								
Matrix Surround Loudspeakers								
Standby - Clock Display	x	x						
Standby - Dark								
Tuner board - ECO5 Sys		x						
Tuner board - Tuner 95	x							
Combi board 12W version								
Combi board 18W version								
Combi board 25W version	x	x						

SPECIFICATIONS

GENERAL:

Mains voltage : 220-230V for /22/34
Mains frequency : 50Hz
Power consumption : < 25W at Standby
< 75W Active
Clock accuracy : < 4 seconds per day
Dimension centre unit : 265 x 310 x 340mm

TUNER:

FM

Tuning range : 87.5-108MHz
65.81-74MHz for /34 [1)]
Grid : 50kHz (& 30kHz for /34)
IF frequency : 10.7MHz ± 25kHz
Aerial input : 75Ω coaxial
Sensitivity at 26dB S/N : < 7µV
Selectivity at 600kHz bandwidth : > 30dB
Image rejection : > 25dB [> 60dB]
Distortion at RF=1mV, dev. 75kHz : < 3%
-3dB Limiting point : < 8µV
Crosstalk at RF=1mV, dev. 40kHz : > 18dB

MW

Tuning range : 531-1602kHz
530-1700kHz for /21/21M/37
Grid : 9kHz
IF frequency : 450kHz ± 1kHz
Aerial input : Frame aerial
Sensitivity at 26dB S/N : < 4.0mV/M
Selectivity at 18kHz bandwidth : > 18dB
IF rejection : > 24dB [40dB]
Image rejection : > 28dB
Distortion at RF=50mV, m=80% : < 5%

LW

Tuning range : 153-279kHz for /22
Grid : 3kHz
IF frequency : 450kHz ± 1kHz
Aerial input : Frame aerial
Sensitivity at 26dB S/N : [< 7.0mV/M]
Selectivity at 18kHz bandwidth : [> 30dB]
IF rejection : [> 25dB]
Image rejection : [> 35dB]
Distortion at RF=50mV, m=80% : [< 5%]

AMPLIFIER:

Output power (6Ω, 1 kHz, 10% THD) : 2 x 35W ± 1dB
Frequency response within -3dB : 50Hz-15kHz
Dynamic Bass Boost : DBB ON, DBB Off [2)]
Digital Sound Control : Jazz, Techno, Optimal, Rock [2)]
Incredible Surround : IS, IS Off [2)]
VEC Control : Hall, Cinema, Concert [2)]
Headphone output at 32Ω : 16mW
Input sensitivity
Aux/Line-in : 700mV ± 2dB at 600Ω

CASSETTE RECORDER:

Number of track : 2 x 2 stereo
Tape speed : 4.76 cm/sec ± 2%
Wow and flutter : < 0.4% DIN
Fast-wind/rewind time C60 : 130 sec
Bias system : 75kHz ± 10kHz
Rec/Pb frequency response within 8dB : 80Hz - 12.5kHz
Signal to noise ratio : > 48dBA

COMPACT DISC:

Measurement done at output conn. of the CDC module.
Frequency response within ± 1.5dB : 20Hz - 20kHz
Output level (in Vrms) : 550mV, Z_{out} = 100Ω
Signal/Noise ratio (A-weighted) : > 80dBA
Distortion at 1kHz : < 0.003%
Channel unbalance at 1kHz : ±1dB
Channel separation at 1kHz : > 60dB
De-emphasis : 0 or 15/50 mS (Switched by subcode on the disc)

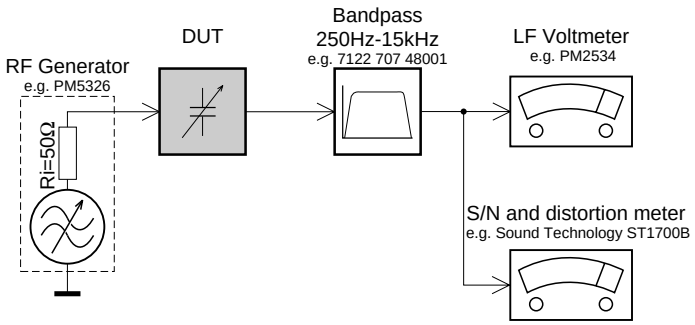
[....] Values indicated are for "Tuner 95 Board" only

[1)] Default setting is OFF, to switch on please refer page 3-4.

[2)] Frequency response in each setting is software controlled.

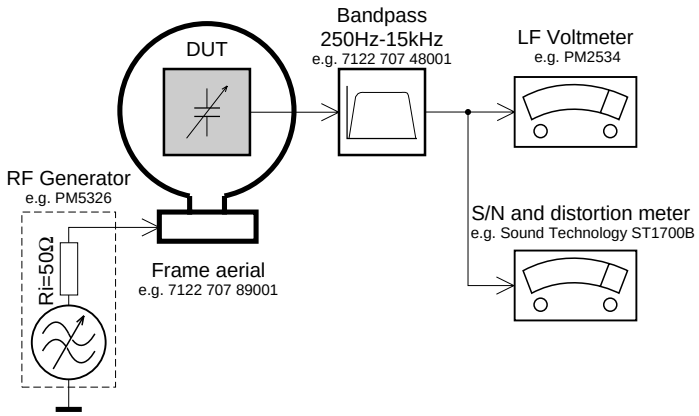
MEASUREMENT SETUP

Tuner FM



Use a bandpass filter to eliminate hum (50Hz, 100Hz) and disturbance from the pilottone (19kHz, 38kHz).

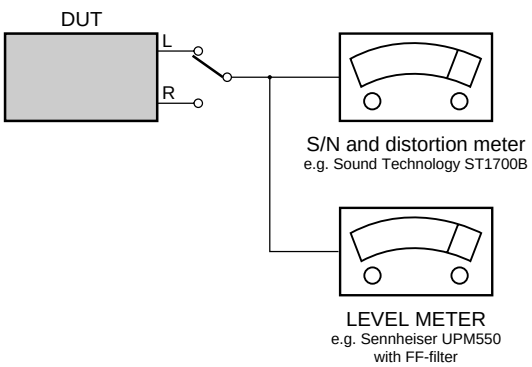
Tuner AM (MW,LW)



To avoid atmospheric interference all AM-measurements have to be carried out in a Faraday´s cage.
Use a bandpass filter (or at least a high pass filter with 250Hz) to eliminate hum (50Hz, 100Hz).

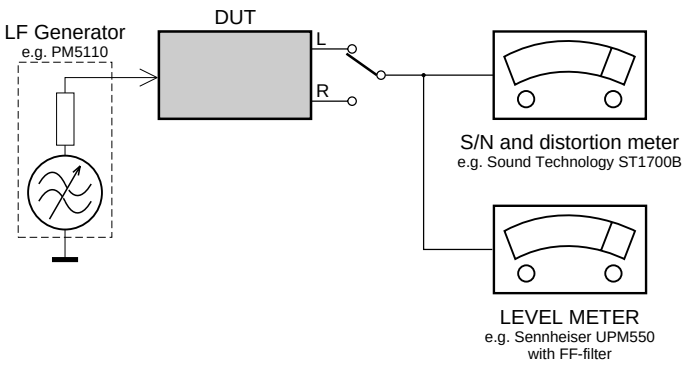
CD

Use Audio Signal Disc SBC429 4822 397 30184
(replaces test disc 3)



Recorder

Use Universal Test Cassette **CrO2** SBC419 4822 397 30069
or Universal Test Cassette **Fe** SBC420 4822 397 30071



SERVICE AIDS

Service Tools:

Universal Torx driver holder 4822 395 91019
Torx bit T10 150mm 4822 395 50456
Torx driver set T6 - T20 ..... 4822 395 50145
Torx driver T10 extended 4822 395 50423

Cassette:

SBC419 Test cassette CrO2 ..... 4822 397 30069
SBC420 Test cassette Fe 4822 397 30071
MTT150 Dolby level 200nWb/M 4822 397 30271

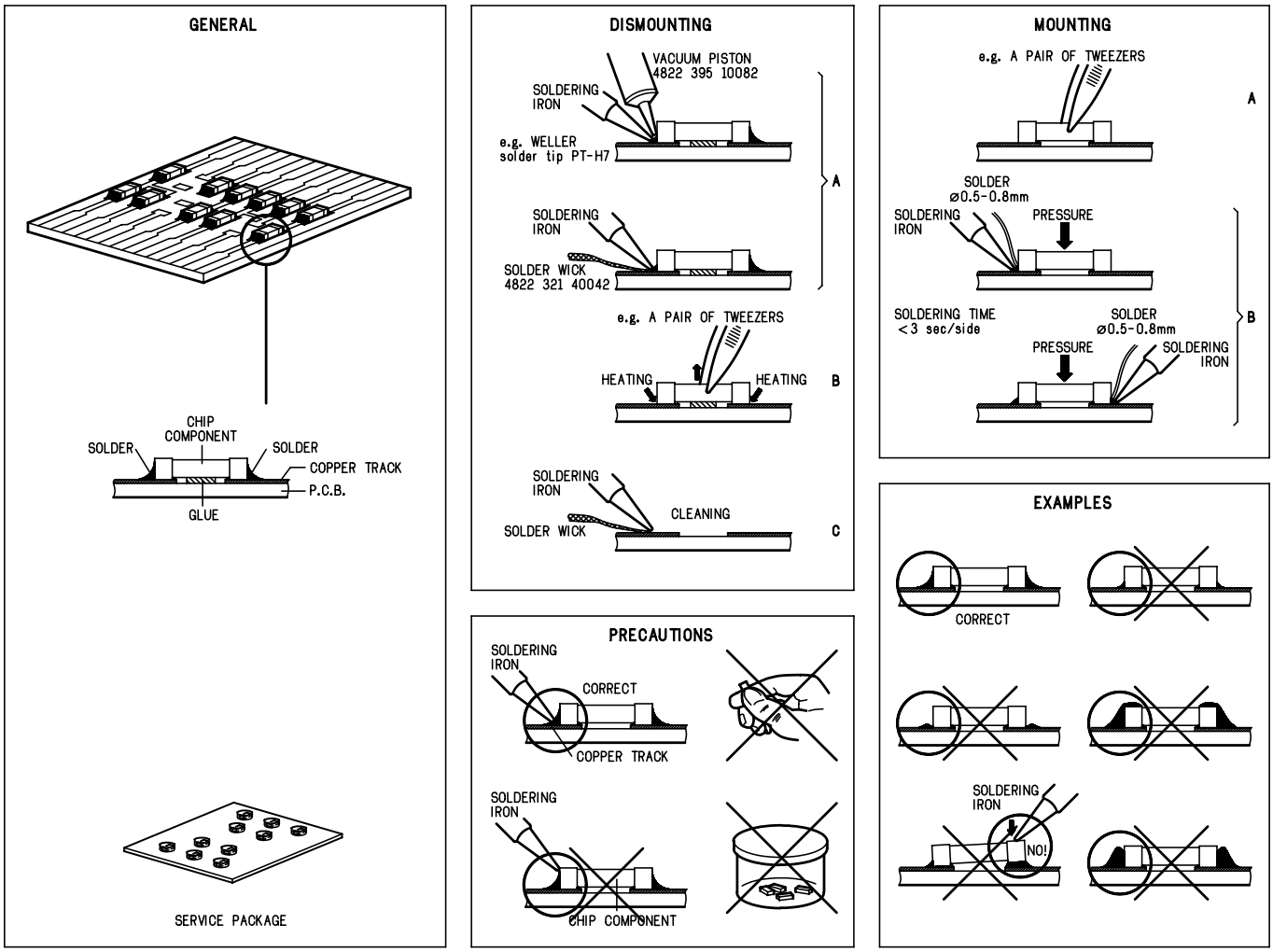
Compact Disc:

SBC426/426A Test disc 5 + 5A 4822 397 30096
SBC442 Audio Burn-in Test disc 1kHz 4822 397 30155
SBC429 Audio Signals disc 4822 397 30184
Dolby Pro-logic Test Disc 4822 395 10216

ESD Equipment:

Anti-static table mat - large 1200x650x1.25mm ... 4822 466 10953
Anti-static table mat - small 600x650x1.25mm 4822 466 10958
Anti-static wristband 4822 395 10223
Connector box (1MΩ) 4822 320 11307
Extension cable
(to connect wristband to conn. box) 4822 320 11305
Connecting cable
(to connect table mat to conn. box) 4822 320 11306
Earth cable (to connect product to mat or box) 4822 320 11308
Complete kit ESD3
(combining all above products) 4822 320 10671
Wristband tester 4822 344 13999

HANDLING CHIP COMPONENTS



ESD

GB WARNING

All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD).
Careless handling during repair can reduce life drastically.
When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance.
Keep components and tools also at this potential.

F ATTENTION

Tous les IC et beaucoup d'autres semi-conducteurs sont sensibles aux décharges statiques (ESD).
Leur longévité pourrait être considérablement écourtée par le fait qu'aucune précaution n'est prise à leur manipulation.
Lors de réparations, s'assurer de bien être relié au même potentiel que la masse de l'appareil et enfiler le bracelet serti d'une résistance de sécurité.
Veiller à ce que les composants ainsi que les outils que l'on utilise soient également à ce potentiel.

D WARNUNG

Alle ICs und viele andere Halbleiter sind empfindlich gegenüber elektrostatischen Entladungen (ESD).
Unsorgfältige Behandlung im Reparaturfall kan die Lebensdauer drastisch reduzieren.
Veranlassen Sie, dass Sie im Reparaturfall über ein Pulsarmband mit Widerstand verbunden sind mit dem gleichen Potential wie die Masse des Gerätes.
Bauteile und Hilfsmittel auch auf dieses gleiche Potential halten.

NL WAARSCHUWING

Alle IC's en vele andere halfgeleiders zijn gevoelig voor electrostatische ontladingen (ESD).
Onzorgvuldig behandelen tijdens reparatie kan de levensduur drastisch doen verminderen.
Zorg ervoor dat u tijdens reparatie via een polsband met weerstand verbonden bent met hetzelfde potentiaal als de massa van het apparaat.
Houd componenten en hulpmiddelen ook op ditzelfde potentiaal.

I AVVERTIMENTO

Tutti IC e parecchi semi-conduttori sono sensibili alle scariche statiche (ESD).
La loro longevità potrebbe essere fortemente ridatta in caso di non osservazione della più grande cauzione alla loro manipolazione.
Durante le riparazioni occorre quindi essere collegato allo stesso potenziale che quello della massa dell'apparecchio tramite un braccialetto a resistenza.
Assicurarsi che i componenti e anche gli utensili con quali si lavora siano anche a questo potenziale.

GB

Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified, be used.

NL

Veiligheidsbepalingen vereisen, dat het apparaat bij reparatie in zijn oorspronkelijke toestand wordt teruggebracht en dat onderdelen, identiek aan de gespecificeerde, worden toegepast.

F

Les normes de sécurité exigent que l'appareil soit remis à l'état d'origine et que soient utiliséés les piéces de rechange identiques à celles spécifiées.

D

Bei jeder Reparatur sind die geltenden Sicherheitsvorschriften zu beachten. Der Original zustand des Geräts darf nicht verändert werden; für Reparaturen sind Original-Ersatzteile zu verwenden.

I

Le norme di sicurezza esigono che l'apparecchio venga rimesso nelle condizioni originali e che siano utilizzati i pezzi di ricambio identici a quelli specificati.

"After servicing and before returning set to customer perform a leakage current measurement test from all exposed metal parts to earth ground to assure no shock hazard exist. The leakage current must not exceed 0.5mA."

"Pour votre sécurité, ces documents doivent être utilisés par des spécialistes agréés, seuls habilités à réparer votre appareil en panne".

GB Warning !

Invisible laser radiation when open.
Avoid direct exposure to beam.

S Varning !

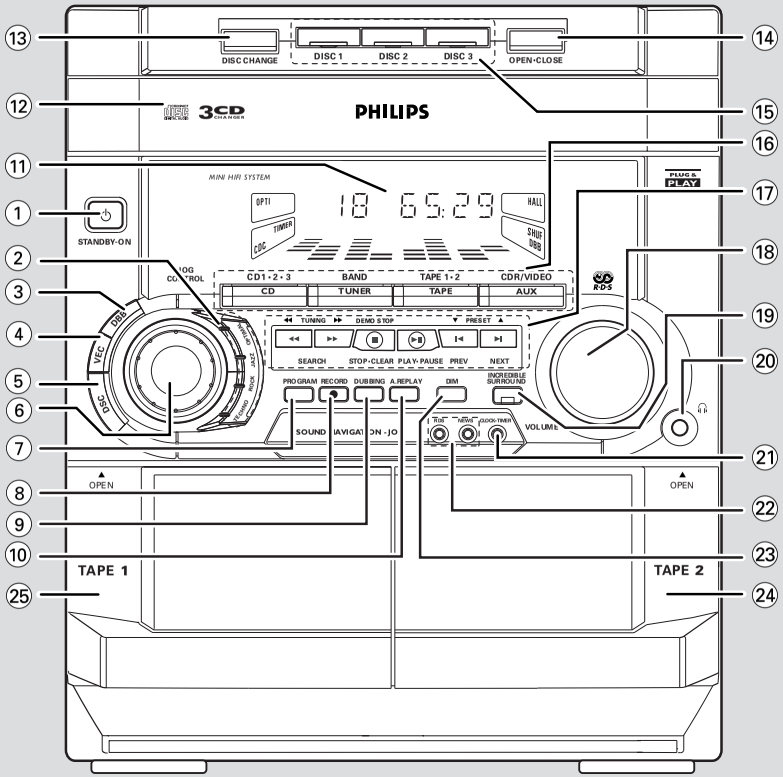
Osynlig laserstrålning när apparaten är öppnad och spärren är urkopplad. Betrakta ej strålen.

SF Varoitus !

Avatussa laitteessa ja suojalukituksen ohitettaessa olet alttiina näkymättömälle laserisäteilylle. Älä katso säteeseen!

DK Advarse !

Usynlig laserstråling ved åbning når sikkerhedsafbrydere er ude af funktion. Undgå udsaettelse for stråling.



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English

Contents

General Information

English

- ***The type plate (which contains the serial number) is located at the rear of the player.***
- ***Recording is permissible if copyright or other rights of third parties are not infringed.***
- ***This product complies with the radio interference requirements of the European Community.***

Environmental Information

All unnecessary packaging has been omitted. We have tried to make the packaging easy to separate into three materials: cardboard (box), polystyrene foam (buffer) and polyethylene (bags, protective foam sheet).

Your system consists of materials which can be recycled and reused if disassembled by a specialized company. Please observe the local regulations regarding the disposal of packaging materials, exhausted batteries and old equipment.

Supplied Accessories

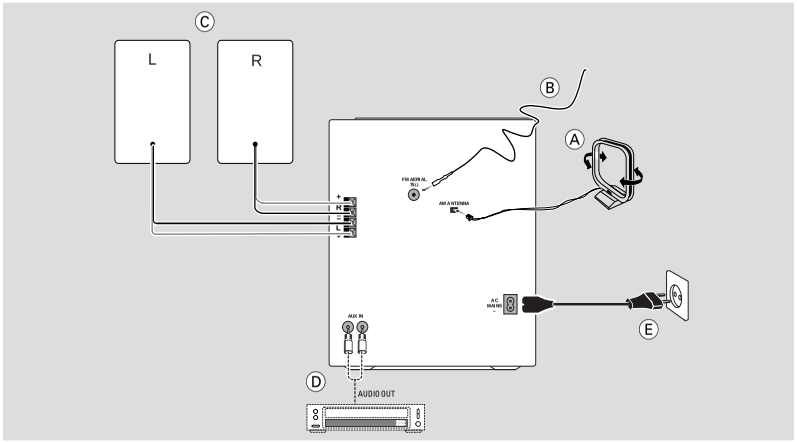
– Remote control
– AM loop antenna
– FM wire antenna
– AC power cord

Safety Information

- Before operating the player, check that the operating voltage indicated on the typeplate (or the voltage indication beside the voltage selector) of your player is identical with the voltage of your local power supply. If not, please consult your dealer. The typeplate is located at the rear of your player.
- When the player is switched on, do not move it around.
- Place the player on a solid base (e.g. a cabinet).
- Place the player in a location with adequate ventilation to prevent internal heat build-up in your player. Allow at least 10 cm (4 inches) clearance from the rear and the top of the unit and 5 cm (2 inches) from the each side.
- Do not expose the player to excessive moisture, rain, sand or heat sources.
- Under no circumstances should you repair the player yourself, as this will invalidate the warranty!
- If the player is brought directly from a cold to a warm location, or is placed in a very damp room, moisture may condense on the lens of the disc unit inside the player. Should this occur, the CD player will not operate normally. Leave the power on for about one hour with no disc in the player until normal playback is possible.
- Electrostatic discharge may cause unexpected problems. See whether these problems disappear if you unplug the AC power cord and plug it in again after a few seconds.
- **To disconnect the player from the power supply completely, remove the AC power plug from the wall socket.**

2-2

Preparations



Rear Connections

Ⓐ AM Loop Antenna Connection

Connect the supplied loop antenna to the AM ANTENNA terminal. Place the AM loop antenna far away from the system and adjust its position for the best reception.

Ⓑ FM Wire Antenna Connection

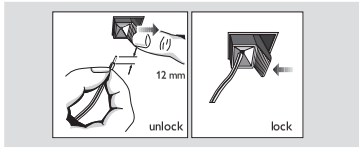
Connect the supplied FM wire antenna to the FM AERIAL (FM ANTENNA) 75 Ω terminal. Adjust the position of the FM antenna for the best reception.

Outdoor Antenna

For better FM stereo reception, connect an outdoor FM antenna to the FM AERIAL (FM ANTENNA) 75 Ω terminal using a 75 Ω coaxial wire.

Ⓒ Speakers Connection

- Connect the right speaker to Front terminal R, with the colored wire to + and the black wire to −.
- Connect the left speaker to Front terminal L, with the colored wire to + and the black wire to −.
- Clip the stripped portion of the speaker wire as shown.



CAUTION:

– For optimal sound performance, it is recommended to use the supplied speakers.
– Do not connect more than one speaker to any one pair of + / − speaker terminal.
– Do not connect speakers with impedance lower than the speakers supplied. Please refer to SPECIFICATION section of this manual.

Ⓓ Connecting other equipment to your player

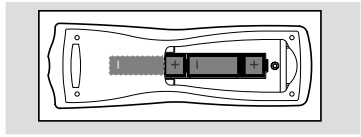
You can connect the audio left and right OUT terminals of a TV,VCR, Laser Disc player, DVD player or CD Recorder to the AUX IN terminals at the rear of the system.

Ⓔ AC Power Supply

After all other connections have been made, connect the AC power cord to the system and to the wall outlet.

Inserting batteries into the Remote Control

- Insert the batteries *(not supplied)* into the remote control as shown in the battery compartment (Type R06 or AA).



CAUTION

– Remove batteries if they are exhausted or not to be used for a long time.
– Do not use old and new or different types of batteries in combination.
– Batteries contain chemical substances, so they should be disposed off properly.

Controls *(illustrations on page 3)*

Controls on the player and remote control

① STANDBY-ON ⏻
– switches the system to standby/on.

② DIGITAL SOUND CONTROL PANEL
– to view the desired DSC display.

③ DBB (DYNAMIC BASS BOOST)
– to switch on bass boost to enhance bass response or to switch off bass boost.

④ VEC
– to select the desired Virtual Environment Control effect : HALL, CINEMA or CONCERT.

⑤ DSC (DIGITAL SOUND CONTROL)
– to select the desired sound effect : OPTIMAL, JAZZ, ROCK or TECHNO.

⑥ JOG CONTROL
– to select the desired DSC setting. You must select the DSC feature first.
– to select the desired VEC setting. You must select the VEC feature first.

⑦ PROGRAM
for CD ..... to programme disc tracks.
for TUNER ..... to programme preset radio stations.
for CLOCK ..... to select 12 or 24 hour in clock setting mode.

⑧ RECORD
– to start recording on tape deck 2.

⑨ DUBBING
– to dub a tape in normal speed.

⑩ AUTO REPLAY
– to select playback mode either in continuous AUTO PLAY or ONCE only.

⑪ DISPLAY SCREEN
– to view the current setting of the system.

⑫ CD CHANGER TRAY

⑬ DISC CHANGE
– to change disc(s).

⑭ OPEN•CLOSE
– to open or close the CD changer tray.

⑮ DISC 1 / DISC 2 / DISC 3 (DISC DIRECT PLAY)
– to select a disc tray for playback.

⑯ SOURCE – to select the following:
CD / (CD 1•2•3)
– to select CD mode. When disc playback is stopped, press to select disc tray 1, 2 or 3.
TUNER / (BAND)
– to select Tuner mode. When in tuner mode, press to select the waveband: FM, MW or LW.
TAPE / (TAPE 1• 2)
– to select Tape mode. When tape playback is stopped, press to select either tape deck 1 or 2.
AUX (CDR/VIDEO)
– to select sound from an external source (e.g. TV, VCR, Laser Disc player, DVD player or CD Recorder).

English

⑰ **MODE SELECTION**
SEARCH ◀◀ ▶▶ (TUNING ◀◀ ▶▶)
for CD ..... to search backward/forward.
for TUNER ..... to tune to a lower or higher radio frequency.
for TAPE ..... to rewind or fast forward a tape.
for CLOCK ..... to set the hour *(on the system only)*.
STOP•CLEAR ■
for CD ..... to stop disc playback or to clear a programme.
for TUNER ..... to stop programming *(on the system only)*.
for TAPE ..... to stop playback or recording.
for DEMO ..... to start or stop demonstration mode *(on the system only)*.
for CLOCK ..... to exit clock setting or cancel timer *(on the system only)*.
for PLUG & PLAY
..... to exit plug & play mode and return to standby mode *(on the system only)*.
PLAY ▶ / PAUSE ❚❚
for CD ..... to start or interrupt playback.
for TAPE ..... to start playback.
for PLUG & PLAY
..... to initiate and start plug & play from standby/demo mode *(on the system only)*.
PREV ⏮ / NEXT ⏭(PRESET ▼▲)
for CD ..... to skip to the beginning of the current, previous, or next track.
for TUNER ..... to select a preset station in memory.
for CLOCK ..... to set the minute *(on the system only)*.

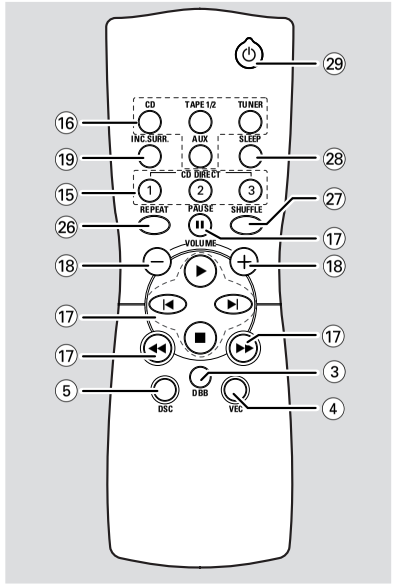
⑱ **VOLUME**
– to increase or decrease the volume.

⑲ **INCREDIBLE SURROUND**
– to switch on or off the surround sound effect.

⑳ 🎧
– to connect headphones.

㉑ **CLOCK•TIMER**
– to view the clock, set the clock or set the timer.

㉒ **RDS**
– to select RDS data in the following order: station name, programme type, radio text and frequency.
NEWS
– to hear news automatically.



㉓ **DIM**
– to select different brightness for the display screen : DIM 1, DIM 2, DIM 3 or DIM OFF.

㉔ **TAPE DECK 2**

㉕ **TAPE DECK 1**

㉖ **REPEAT**
– to repeat a disc track, a disc, or all available discs.

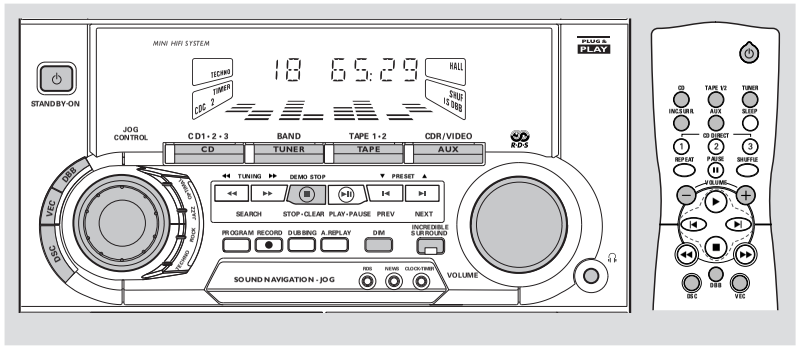
㉗ **SHUFFLE**
– to play all the available discs and their tracks in random order.

㉘ **SLEEP**
– to switch the system to standby mode at a selected time.

㉙ ⏻
– to switch the system to standby mode.

Notes for remote control:
– First select the source you wish to control by pressing one of the source select keys on the remote control (e.g. CD , TUNER, etc.).
– Then select the desired function (▶, ⏮, ⏭, etc.).

English



Important:
Before you operate the system, complete the preparation procedures.

Plug and Play

The system provides PLUG and PLAY feature that allows you to store all available radio stations and RDS stations automatically upon power up.

If the PLUG and PLAY has not been installed

1 Upon power up, "AUTO INSTALL - PRESS PLAY" will be displayed.

2 Press **PLAY** *(on the system only)* to start installation.
➜ "INSTALL" will be displayed and followed by "TUNER" and then "AUTO".
➜ The **PROGRAM** starts flashing.
➜ PLUG and PLAY will start searching for all RDS radio stations with sufficient signal strength and then followed by radio stations on FM, MW and LW band respectively. Weak RDS radio stations may be stored in later presets.
➜ All available RDS and radio stations with sufficient signal strength will be stored. Up to 40 presets may be stored.
➜ The last preset radio station or the first available RDS station will appear on the display when PLUG and PLAY is completed.

3 The system will proceed to set the RDS time automatically with the stored RDS preset station.

- If no RDS station is available in the first preset station, the programme will exit automatically.
  ➜ After the RDS radio station is found, "INSTALL" will be displayed and followed by "TIME".
- When searching RDS time;
  ➜ "SEARCH RDS TIME" will be displayed.
  ➜ When RDS time is read, "RDS TIME" will be displayed. The current time will be displayed for 2 seconds and stored automatically.

Note:
– If RDS station does not transmit RDS time within 90 seconds, the programme will exit automatically and the display will show "NO RDS TIME".

To reinstall the PLUG & PLAY

1 In **Standby or Demostration** mode, press and hold **PLAY** for 5 seconds *(on the system only)* "AUTO INSTALL - PRESS PLAY" will be displayed.

2 Press **PLAY** *(on the system only)* again to start installation.

- To exit without storing the PLUG and PLAY, press ■ button *(on the system only)*.

English

Notes:
– PLUG and PLAY will be reinitiated again during the next power up if :
i) PLUG and PLAY installation was not completed.
ii) No stereo frequency being detected during PLUG and PLAY, "CHECK ANTENNA" will be displayed.
– You can store any radio stations manually or automatically after PLUG and PLAY.
– When PLUG and PLAY is used, all previously stored radio stations will be replaced.
– During PLUG and PLAY, if no button is pressed within 15 seconds, the system will go to demonstration mode (if demonstration mode is enable)

Demonstration mode

The system has a demonstration mode that shows the various features offered by the system.

To disable the demonstration mode

- Press and hold ■ *(on the system only)* for ***5 seconds*** when the system is in demonstration mode.
  ➜ "DEMO OFF" is displayed.
  ➜ The system will switch to standby mode.

To enable the demonstration mode

- Press and hold ■ *(on the system only)* for ***5 seconds*** when the system is in standby mode.
  ➜ The demonstration will begin.

Notes:
– If the demonstration mode has not been disabled, it will resume 5 seconds later after the system switches to standby mode.
– When the system is switched on from the main power outlet, the CD changer tray may open and close again to initialize the set.
– Even though the AC power cord is removed from and reconnected to the wall socket, the demonstration will remain off until it is switched on again.

Switching the system ON

- Press **CD**, **TUNER**, **TAPE** or **AUX**.
- Press **STANDBY-ON** in demo.

You can also switch on the system by pressing any one of the CD DIRECT PLAY buttons *(on system only)*.

Switching the system to standby mode

- Press **STANDBY-ON** or ⏻ on the remote control.
  ➜ The system will switch to standby mode.

Selecting the Source

- Press the respective source selection button: **CD**, **TUNER**, **TAPE** or **AUX**.
  ➜ The display indicates the selected source.

Note:
– For an external source, make sure you have connected the audio left and right OUT terminals of the external equipment (TV,VCR, Laser Disc player, DVD player or CD Recorder) to the AUX IN terminals.

DIM mode

You can select the desired brightness for the display.

- Press **DIM** to select DIM 1, DIM 2, DIM 3 or DIM OFF display mode.
  ➜ The **DIM** display lights up.
  ➜ "DIM 1", "DIM 2", "DIM 3" or "DIM OFF" will be displayed depending on the mode selected.

DIM OFF - normal brightness with Spectrum Analyzer On

DIM 1 - normal brightness with Spectrum Analyzer Off

DIM 2 - half brightness with Spectrum Analyzer On

English

DIM 3 - half brightness with Spectrum Analyzer Off and all LEDs on the system will be switched off.

Sound Control

VOLUME ADJUSTMENT

Adjust **VOLUME** to increase or decrease the sound level.

For Personal Listening
Connect the headphones plug to the 🎧 socket at the front of the system. The speakers will be muted.

DIGITAL SOUND CONTROL (DSC)

The DSC feature enables you to enjoy special sound effects that have preset equalizer settings, providing the best music reproduction.

1. Press to select the **DSC** feature.
2. Adjust **JOG CONTROL** to select OPTIMAL, JAZZ, ROCK or TECHNO.
   ➜ The Digital Sound Control display panel will light up respectively.
   ➜ "OPTIMAL, JAZZ, ROCK or TECHNO" and the respective flag will be displayed.

Note:
– When "OPTIMAL" sound is selected, DBB will be switched on automatically.

DYNAMIC BASS BOOST (DBB)

The DBB mode enhances the bass response.

- Press **DBB** to switch on bass response.
  ➜ The DBB button lights up.
  ➜ "DBB ON" and the **DBB** flag will be displayed.

To switch off DBB

- Press **DBB** again.
  ➜ The DBB button light is switched off.
  ➜ "DBB OFF" will be displayed.
  ➜ The **DBB** flag disappear from the display.

Note:
– Some CDs or tapes might be recorded in high modulation, which causes a distortion at high volume. If this occurs, switch off DBB or reduce the volume.

VIRTUAL ENVIRONMENT CONTROL (VEC)

The VEC feature enables you to adjust the system to select a type of environment.

1. Press to select the **VEC** feature.
2. Adjust the **JOG CONTROL** to select the desired Virtual Environment Control setting : HALL, CINEMA or CONCERT.
   ➜ "HALL, CINEMA or CONCERT" and the respective flag will be displayed.

VEC Selection	DBB	IS
HALL	On	On
CONCERT	Off	On
CINEMA	Off	On

INCREDIBLE SURROUND

Normal stereo sound is determined by the distance between the front speakers. When Incredible Surround is switched on, it magnifies the virtual distance between the front speakers for an incredibly wide, enveloping, stereo effect.

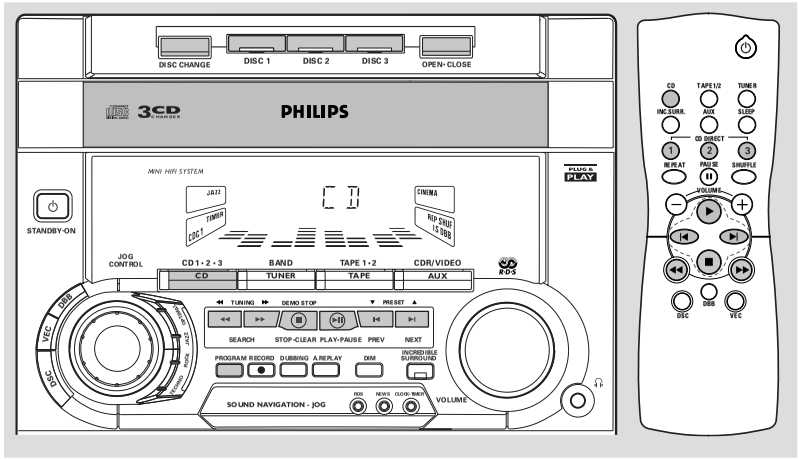
- Press **INCREDIBLE SURROUND** to switch on.
  ➜ The INCREDIBLE SURROUND button lights up.
  ➜ "INCR SURROUND" and the **IS** flag will be displayed.

To switch off Incredible Surround

- Press **INCREDIBLE SURROUND** again.
  ➜ The INCREDIBLE SURROUND button light is switched off.
  ➜ "IS OFF" will be displayed.
  ➜ The **IS** flag disappear from the display.

2-5

English



Warning!

1) ***This system is designed for conventional discs. Do not use any accessories such as disc stabilizer rings or disc treatment sheets, etc., which may damage the disc mechanism.***
2) ***Do not load more than one disc into each tray.***
3) ***When the CD changer is loaded with discs, do not turn over or shake the system. This may jam the changer.***

You may load three discs in the CD changer for continuous playback without interruption.

Discs for playback

This system can play all digital audio disc, finalized digital audio CD-Recordable and finalized digital audio CD-Rewritable format discs.

COMPACT disc DIGITAL AUDIO
COMPACT disc DIGITAL AUDIO Recordable
COMPACT disc DIGITAL AUDIO ReWritable

Loading the CD Changer

1 Press **CD** to select CD mode.
2 Press **OPEN•CLOSE**.
➜ The CD changer tray slides out.
3 Load a disc with the printed side up in the right tray.
- You can load another disc in the left tray.
- To load the third disc, press the **DISC CHANGE** button.
➜ The CD changer tray will rotate until the empty tray is ready for loading.

4 Press **OPEN•CLOSE** to close the CD changer tray.
➜ The total number of tracks and the playing time of the selected disc appear on the display.

Note:
– To ensure good system performance, wait until the CD changer completely reads the disc(s) before proceeding.

Disc Direct Play

- You can play a disc directly by pressing the **DISC 1, DISC 2** or **DISC 3** button. The CD player will stop at the end of playback of the selected disc.
➜ A lit button indicates that a disc is loaded in the disc tray.
➜ A flashing button indicates that a disc is playing.

English

Playing a Disc

1 Press ▶ to start playback.
➜ The disc tray, track number and elapsed playing time of the current track appear on the display.
- To interrupt playback, press ❚❚.
➜ The playing time flashes.
- To resume playback, press ▶ again.

2 To stop playback, press ■.

Note:
– All the available discs will play once, then stop.

Disc Change

You can change the outer two discs while the third inner disc is stopped or is playing.

1 Press **DISC CHANGE**.
➜ The CD changer tray slides out.
2 Replace the discs in the left and right disc trays.
- If you wish to change the inner disc during playback, press **DISC CHANGE** again.
➜ "DISC CHANGE" will be displayed.
➜ The disc will stop playing.
➜ The CD changer tray will close to retrieve the inner disc and then open again with the inner disc accessible.

3 Press **OPEN•CLOSE** to close the CD changer tray.

Selecting a desired track

Selecting a desired track when playback is stopped

1 Press ⏮ or ⏭ until the desired track appears on the display.
2 Press ▶ to start playback.
➜ The selected track number and elapsed playing time appear on the display.

Selecting a desired track during playback

- Press ⏮ or ⏭ until the desired track appears on the display.
➜ The selected track number and elapsed playing time appear on the display.
- If you press ⏮ once it will skip to the beginning of the current track and play the track again.

Note:
– Pressing ⏮ during shuffling can only skip to the beginning of the current track.

Searching for a particular passage during playback

- Press and hold ◀◀ or ▶▶ until the desired passage is located.
➜ The volume will be reduced.
- Play returns to normal when ◀◀ or ▶▶ is released.

Programming Tracks

Programming tracks of a loaded disc is possible when playback is stopped. The display will indicate the total tracks stored in the programme. Up to 40 tracks can be stored in the memory in any order. When 40 tracks are stored and you attempt to store another track, the display will show "FULL".

1 Load the desired discs in the disc trays.
2 Press **PROGRAM** to start programming.
➜ The **PROG** flag starts flashing.
3 Press the **CD** (CD 1•2•3) or **DISC 1/2/3** button to select the disc.
4 Press ⏮ or ⏭ to select the desired track.
5 Press **PROGRAM** to store the track.
- Repeat steps ***3*** to ***5*** to store other discs and tracks.

6 Press ■ once to end programming.
➜ The total number of tracks programmed and total playing time appear on the display.

Notes:
– If the total playing time is more than "99:59" or if one of the programmed tracks has a number greater than 30, then "--:--" appears on the display instead of the total playing time.
– If the system is reading the discs, programming is not possible, "READING" will be displayed and followed by "DISC X". "X" is the current read disc number.
– During programming, if no button is pressed within 20 seconds, the system will exit programme mode automatically.
– "SELECT A DISC" will be displayed when programming an empty disc slot.

Reviewing the programme

Reviewing of the programme is possible only when playback is stopped.
- Press ⏮ or ⏭ repeatedly to review the programmed tracks.
- Press ■ to exit review mode.

Compact Disc

Playing the programme

1 Press ▶ to start programme playback.
➜ "PLAY PROGRAM" will be displayed.
➜ The track number and elapsed playing time of the current track will appear on the display.
- If you press **REPEAT** during programme playback, the current track or all programmed tracks will be played repeatedly.
➜ "TRACK" or "PROGRAM" will be displayed.
➜ The **REP** and **PROG** flags appear on the display.

2 Press ■ to stop programme playback.

Notes:
– If you press any of the DISC DIRECT PLAY buttons, the system will play the selected disc and the stored programme will be ignored temporarily. The PROG display also will disappear temporarily from the display. It will reappear when playback of the selected disc ends.
– REPEAT DISC mode will be cancelled when programme playback begins.

Erasing the programme *(when playback is stopped)*

- Press ■.
➜ "PROGRAM CLEARED" will be displayed.

Note:
– The programme will be erased when the system is disconnected from the power supply or when the CD changer tray is opened.

Shuffle *(only on remote control)*

In shuffle mode, the system plays all the available discs and their tracks in random order. Shuffle may be used also when tracks are programmed.

To shuffle all the discs and tracks

1 Press **SHUFFLE**.
➜ "SHUFFLE" will be displayed.
➜ The **SHUF** flag, the disc and the track selected at random appear on the display.
- The discs and the tracks will be played in random order until you press ■.
- If you press **REPEAT** during shuffling, the current track or all available discs will be played repeatedly.
➜ "TRACK" or "ALL DISC" will be displayed.
➜ The **REP** and **SHUF** flags appear on the display.

2 Press **SHUFFLE** again to resume normal playback.
➜ The **SHUF** flag disappears from the display.

Note:
– REPEAT DISC mode will be cancelled when shuffle is selected.

Repeat *(only on remote control)*

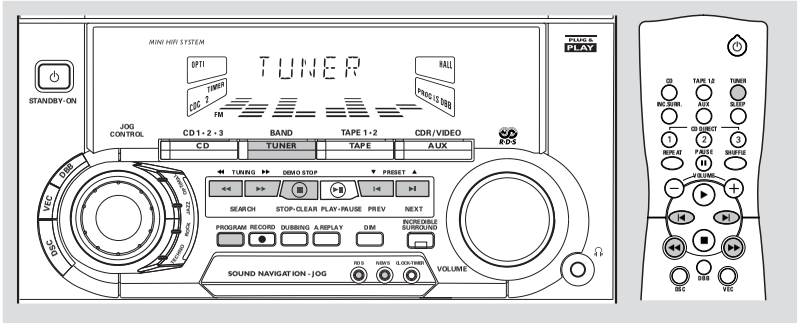
You can play the current track, a disc or all available discs repeatedly.

1 Press **REPEAT** on the remote control to select the various repeat modes.
➜ "TRACK", "DISC", "ALL DISC" or "OFF" will be displayed.
➜ The **REP** flag appears on the display.
- The selected track, selected disc or all available discs will now be played repeatedly until you press ■.

2 Press **REPEAT** until the "OFF" mode is displayed to resume normal playback.
➜ The **REP** flag disappears from the display.

Notes:
– REPEAT DISC mode is not available during programme play or shuffle mode.
– You can also repeat shuffling a programme.
i) "TRACK" or "PROGRAM" will be displayed.
ii) The REP, PROG, and SHUF flags appear on the display.

Tuner



Note:
– For 'PLUG & PLAY' feature, please refer to page 11.

Tuning to radio stations

1 Press **TUNER** (BAND) to select TUNER mode.
➜ "TUNER" will be displayed.
A few seconds later, the current radio frequency will be displayed.

2 Press **TUNER** (BAND) again to select the desired waveband : FM, MW or LW.

3 Press ◀◀ or ▶▶ for more than one second, then release.
➜ The display will show "SEARCH" until a radio station with sufficient signal strength is found.
- Repeat this procedure until the desired station is reached.
- To tune to a weak station, briefly press ◀◀ or ▶▶ repeatedly until the display shows the desired frequency and/or when the best reception has been obtained.

Storing Preset Stations

You can store up to 40 radio stations in the memory. When a preset radio station is selected, the preset number appears next to the frequency on the display.

Automatic programming

1 Press **TUNER** (BAND).

2 Press **PROGRAM** for more than one second.
➜ The **PROG** flag starts flashing and "AUTO" will be displayed.
➜ The system will start searching for all radio stations with RDS and then followed by radio stations on FM, MW and LW band respectively.
➜ All available stations will be stored automatically. The frequency and preset number will be displayed briefly.
➜ The system will stop searching when all the available radio stations are stored or when the memory for 40 preset radio stations is used.
➜ The system will remain tuned to the last stored preset radio station.

Notes:
– You can cancel the automatic programming by pressing PROGRAM or ■ (on the system only).
– If you want to reserve a section of preset numbers, for example preset numbers 1 to 9, select preset 10 before starting automatic programming, only the preset numbers 10 to 40 will be programmed.

English

Manual programming

1 Press **TUNER** (BAND).
2 Press **TUNER** (BAND) again to select the desired waveband : FM, MW or LW.
3 Press **PROGRAM** for less than one second.
➜ The **PROG** flag starts flashing.
➜ The next available preset number will be displayed for selection.
4 Press ◀◀ or ▶▶ to tune to the desired frequency.
● If you wish to store the radio station to another preset number, press ▼ or ▲ to select the desired preset number.
5 Press **PROGRAM** again.
➜ The **PROG** flag disappears and the radio station will be stored.

● Repeat ***steps 3 – 5*** to store other preset radio stations.

Notes:
– When 40 radio stations are stored and you attempt to store another radio station, the display will show "FULL". If you want to change an existing preset number, repeat steps 3 – 5.
– You can cancel manual programming by pressing ■ (on the system only).
– During programming, if no button is pressed within 20 seconds, the system will exit programme mode automatically.

Tuning to Preset Radio Stations

● Press ▼ or ▲ to select the desired preset number.
➜ The preset number, radio frequency, and waveband appear on the display.

Receiving RDS Radio Station

RDS (Radio Data System) is a broadcasting service that allows FM stations to send additional information along with the regular FM radio signal. This additional information can contain:

● **STATION NAME**: The radio station name is displayed.
● **PROGRAM TYPE**: The following programme types exist and can be received by your tuner: News, Affairs, Info, Sport, Educate, Drama, Culture, Science, Varied, Pop M, Rock M, M.O.R. (middle of the road music), Light M, Classics, Other M, No type.
● **RADIO TEXT (RT)**: text messages appear in the display.

When you have tuned to a RDS station, the RDS logo (RDS) and the radio station name will appear on the display:

● The display normally shows the radio station name if available.
By repeatedly pressing **RDS** button you can change the type of display information:

➜ The display shows in turn:
STATION NAME → PROGRAM TYPE → RADIO TEXT → TUNED FREQUENCY → STATION NAME ...

Note:
– When you press the RDS button and the display shows "NO RDS", it indicates that either the tuned station is not transmitting RDS signal or it is a non RDS station.

RDS Clock
Some RDS station may be transmitting a real clock time at an interval of every minute.

English

Setting the time with RDS clock

1 Press **CLOCK•TIMER**.
➜ "--:--" or current time appears on the display.
2 Press **CLOCK•TIMER** once more to enter clock setting mode.
➜ "00:00" or "AM 12:00" or current time starts flashing.
3 Press **RDS**.
➜ The message "SEARCH RDS TIME" will be displayed.
➜ If the current station is not receiving any RDS information, "NO RDS TIME" will be displayed.
➜ When the RDS clock is read, "RDS TIME" will be displayed. The current clock time is displayed for 2 seconds and will be stored automatically.
➜ If within 90 seconds, the RDS time is not detected, "NO RDS TIME" will be displayed.

Note:
– Some RDS station may be transmitting a real time clock at a minute interval. The accuracy of the transmitted time depends on the transmitting RDS station.

News *(only available in Radio Station with RDS)*

You can activate NEWS function in Standby or any source mode except Tuner mode. Once the News PTY (programme type) is detected in a RDS station, it will switch to TUNER mode automatically.

To start NEWS function

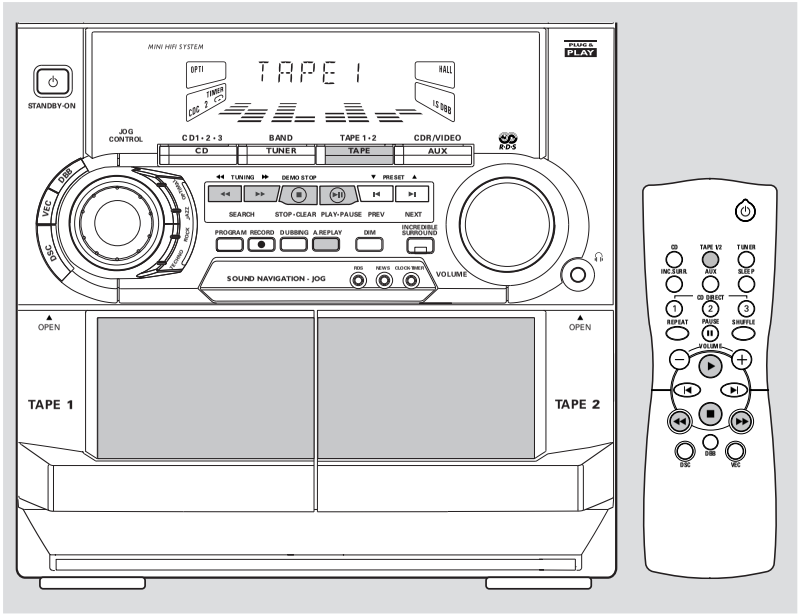
1 Press **NEWS**.
● The **NEWS** and "NEWS" will be displayed.
● It will scan stations stored in the first 5 preset and wait for the News Program Type data to be available in any of these RDS stations. During the search :
➜ The current source activity will remain uninterrupted.
➜ If no RDS station is found in the first 5 presets, the NEWS function will be switched off. The display will show "NO RDS NEWS" and **NEWS** will disappear from the display.
● When NEWS transmission is detected, the system will switch to Tuner mode.
➜ The **NEWS** starts flashing.

To cancel NEWS function

● Press **NEWS** again.
➜ The **NEWS** disappears and "NEWS OFF" will be displayed.

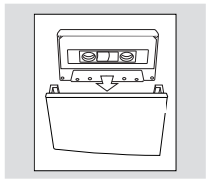
Notes:
– If you are listening to a non RDS TUNER radio station and should you decide to hear NEWS, first select other source (e.g. CD, TAPE or AUX), then press NEWS.
– Before using the NEWS feature, ensure that the first 5 presets are RDS stations.
– The NEWS works only once for each activation.
– During News bulletin, you can press any available source or Tuner function keys to cancel NEWS function and execute the relevant source mode.
– If set is switched to Tuner source, the NEWS function will be cancelled, "NEWS OFF" will be displayed immediately after the "TUNER" message.

Tape



Loading a tape

1 Press **OPEN**.
2 The tape deck door opens.
3 Load the tape with the open side downward and the full spool to the left.



4 Close the tape deck door.

Auto Replay

- Press **A. REPLAY** to select either continuous AUTO REPLAY or ONCE during tape playback.
  ➜ "AUTO REPLAY "(↻) or "ONCE "(1) will be displayed.

Notes:
– This feature is available during tape playback only.
– When "AUTO REPLAY" is selected, the tape will rewind automatically at the end of playback for the selected side.Then it will start playing again. It will replay up to a maximum of 20 times until you press ■.
– When "ONCE" is selected, the tape will play the selected side once and then stop.

Tape Playback

1 Press **TAPE** (TAPE 1•2) to select TAPE mode.
  ➜ "TAPE 1" or "TAPE 2" will be displayed and followed by "T1 >>> " or "T2 >>>".
2 Load the tape into the selected tape deck.
3 Press ▶ to start playback.
  ➜ "T1" or "T2" with ">" scrolling right will be displayed.
- Press **A.REPLAY** to select the different type of playback mode (see Auto Replay)
4 Press ■ to end playback.
  ➜ "T1" or "T2" with ">>>" will be displayed.

Rewind/Fast Forward

When playback is stopped

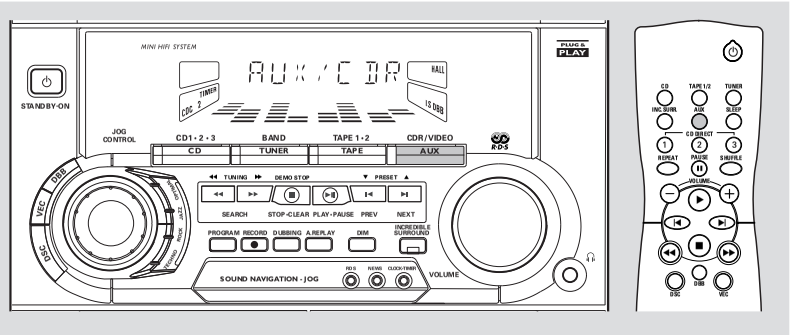
1 You can rewind or fast forward the tape by pressing ◀◀ or ▶▶ respectively.
  ➜ If rewinding, "T1 <" or "T2 <" with "<" scrolling left will be displayed.
  ➜ If fast forwarding, "T1 >" or "T2 >" with ">" scrolling right will be displayed.
  ➜ The tape will stop automatically at the end of rewinding or fast forwarding.
2 Press ■ to stop rewinding or fast forwarding.

During playback

- Press and hold ◀◀ or ▶▶ until the desired passage is located.
  ➜ "T1 or T2" with "<< or >>"" scrolling left or right will be displayed depending on which button is pressed.
  ➜ During searching, the sound is reduced to a low volume.
  ➜ When you release ◀◀ or ▶▶, the tape continues playing.

Notes:
– During rewinding or fast forwarding of a tape, it is also possible to select another source (e.g. CD, TUNER, or AUX).
– Before playing a tape, check and tighten slack tape with a pencil. Slack tape may get jammed or may burst in the mechanism.
– C-120 tape is extremely thin and is easily deformed or damaged. It is not recommended for use in this system.
– Store the tapes at room temperature and do not put them too close to a magnetic field (for example, a transformer,TV, or speaker).

Aux



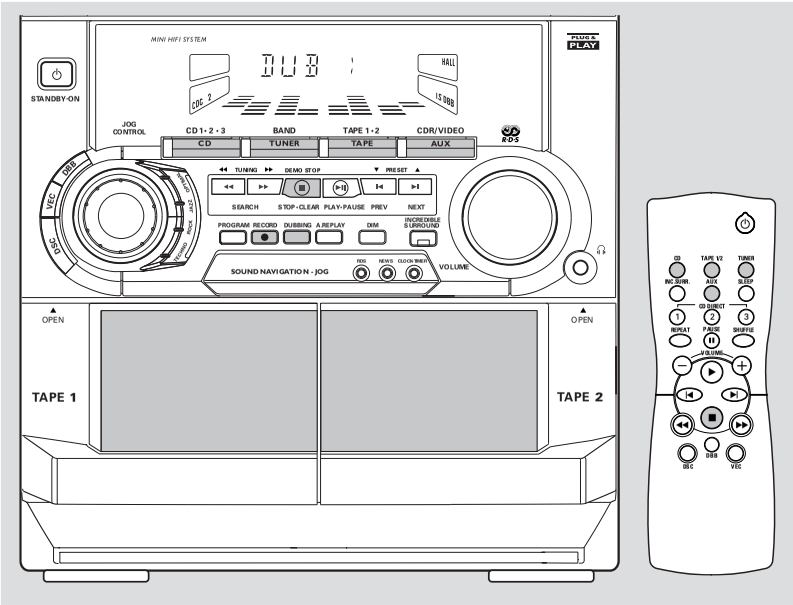
Selecting External Equipment

If you have connected the audio out terminals of the external equipment (TV, VCR, Laser Disc player, DVD player or CD Recorder) to the AUX IN terminals, you can hear the enhanced sound from the system.

- Press **AUX (CDR/VIDEO)** to select the external equipment.
  ➜ "AUX / CDR" will be displayed.

Note:
– All the sound control features (e.g. DSC, DBB, etc.) are available for selection.

English



Notes:

– If you do not intend to record via the microphone, unplug the microphone to avoid accidental mixing with other recording source.

– For recording, use only tape of IEC type I (normal tape).

– The tape is secured at both ends with leader tape. At the beginning and end of tape, nothing will be recorded for six to seven seconds.

– The recording level is set automatically, regardless of the position of VOLUME, DBB, Incredible Surround, DSC or VEC.

– To prevent accidental recording, break out the tab on the left shoulder of the tape side that you want to protect.

– If "CHECK TAPE" is displayed, the protection tab has been broken. Put a piece of clear adhesive tape over the opening.

Recording the mixed sound / One Touch Recording

- For One Touch Recording, as soon as you press **RECORD**, the current source (CD, TUNER or AUX) will be recorded on tape deck 2.

1 Load a blank tape in tape deck 2.
2 Press **RECORD** to start recording.
➜ The **REC** starts flashing.
3 Press ■ to stop recording.

Note:

– When you press RECORD while in TAPE mode, "SELECT SOURCE" will be displayed. One Touch Recording is not possible in TAPE mode.

English

CD Synchro Start Recording

1 Load a blank tape into tape deck 2 and a disc into a disc tray.
2 Press **CD** to select CD mode.
- You can programme the tracks in the order you want them to be recorded (see Programming Tracks). If not, select the disc by pressing **CD** (CD 1•2•3) and the tracks are recorded according to the order on the selected disc.

3 Press **RECORD** to start recording.
➜ The **REC** starts flashing.
- Disc will start playback automatically.

4 Press ■ to stop recording.

Dubbing tapes *(from tape deck 1 to tape deck 2)*

1 Press **TAPE** (TAPE 1•2) to select tape deck 2.
2 Load the prerecorded tape into tape deck 1 and a blank tape into tape deck 2 with full spool to the left.
3 Press **DUBBING**.
➜ "DUB" with ">" scrolling right will be displayed.
- Dubbing will start immediately.
➜ The **REC** starts flashing.

4 Press ■ to stop dubbing.

Notes:

– At the end of side A, flip the tapes to side B and repeat the procedure.

– Dubbing of tapes is only possible from tape deck 1 to tape deck 2.

– To ensure good dubbing, use tapes of the same length.

– You can switch to other source while dubbing.

Recording from other sources

(only on tape deck 2)

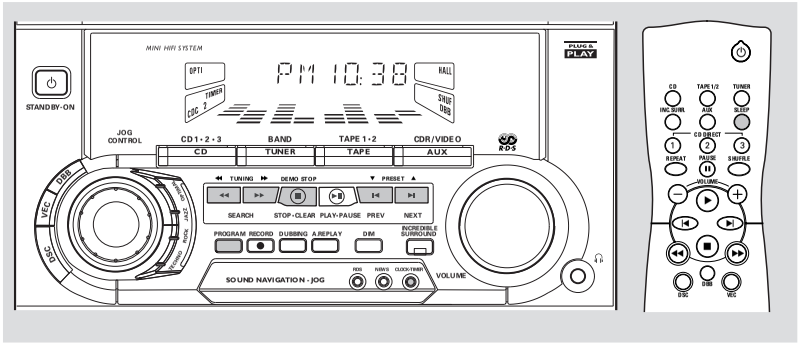
1 Load a blank tape into tape deck 2 with the open side downward.
2 Press **CD**, **TUNER** or **AUX**.
- Start playback of the selected source.

3 Press **RECORD** to start recording.
➜ The **REC** starts flashing.
4 Press ■ to stop recording.

Notes:

– During recording, it is not possible to listen to another source.

Clock/Timer



View Clock

You can view the clock (if it is set) if the system is in Standby mode or when any sound source is selected (CD, TUNER, etc.). The clock will be displayed for about seven seconds.

- Press **CLOCK•TIMER** briefly *(on the system only)*.
  ➜ "PM 10:38 or 22:38" (the current time) will be displayed depending on whether you have selected 12- or 24-hour mode.
  ➜ "--:--" will be displayed if the clock is not set.

Clock Setting

The clock can be set in either 12- or 24-hour mode, e.g. "AM 12:00" or "00:00". Before setting the clock, you must be in the View Clock mode.

1 Press **CLOCK•TIMER** to select clock mode.
2 Press **PROGRAM** to select 12- and 24- hour mode.
  ➜ If 12-hour mode is selected, "AM 12:00" starts flashing.
  ➜ If 24-hour mode is selected, "00:00" starts flashing.
3 Set the hour with ◀◀ or ▶▶ on the system.
4 Set the minute with ⏮ or ⏭ on the system.
5 Press **CLOCK•TIMER** again to store the setting.
  ➜ The clock starts.

- To exit without storing the setting, press ■ on the system.

Notes:
– During clock setting, if no button is pressed within 90 seconds, the system will exit clock setting mode automatically.
– When a power interruption occurs, the clock setting is erased.

Timer Setting

- The system can switch on to CD , TUNER or TAPE 2 mode automatically at a preset time. It can serve as an alarm to wake you up.
- Before setting the timer, make sure the clock is set correctly.
- The timer will always be switched on once it is set.
- **The volume of the timer will increase from the minimum level to the most recently selected volume level.**

1 Press and hold **CLOCK•TIMER** for more than ***2 seconds*** to select timer mode.
  ➜ "AM 12:00" or "00:00" or the last timer setting starts flashing depending on whether you have selected 12- or 24-hour mode.
  ➜ The **TIMER** starts flashing.
  ➜ The selected source is lit while other available sources are flashing.
2 Press **CD** , **TUNER** or **TAPE** to select the desired source.

- Before selecting CD or TAPE, make sure a disc or tape is loaded in the CD tray or tape deck 2.

3 Press ◀◀ or ▶▶ on the system to set the hour for the timer to start.
4 Press ⏮ or ⏭ on the system to set the minute for the timer to start.
5 Press **CLOCK•TIMER** to store the start time.
  ➜ The timer is now set.
  ➜ The **TIMER** remains on the display.

- At the preset time, the timer will be activated.
  ➜ The selected source will be played.

Notes:
– During timer setting, if no button is pressed within 90 seconds, the system will exit timer setting mode automatically.
– If the source selected is TUNER, the last tuned frequency will be switched on.
– If the source selected is CD, playback will begin with the first track of the selected disc or programme. If the disc trays are empty, the TUNER will be selected instead.
– The timer will not activate if a recording is in progress.

To switch off the TIMER

1 Press and hold **CLOCK•TIMER** for more than ***2 seconds***.
2 Press ■ on the system to cancel the timer.
  ➜ The timer is now switched off.
  ➜ The display will show "OFF" and the **TIMER** disappears.

To start the TIMER again *(for the same preset time and source)*

1 Press and hold **CLOCK•TIMER** for more than ***2 seconds***.
2 Press **CLOCK•TIMER** again to store the start time.
  ➜ The timer is now on.
  ➜ The **TIMER** appears on the display.

Sleep Timer *(only on remote control)*

This feature allows you to select a length of time after which the system will switch to the standby mode automatically.

1 Press **SLEEP** on the remote control repeatedly to select a period of time.
  ➜ The selections are as follows (time in minutes): 15 ➜ 30 ➜ 45 ➜ 60 ➜ OFF ➜ 15 ...
  ➜ "SLEEP xx" or "OFF" will be displayed. "xx" is the time in minutes.
2 When you reach the desired length of time, stop pressing the **SLEEP** button.
  ➜ The **SLEEP** display lights up.
  ➜ The Sleep Timer is now set. Before the system switches to standby mode, a countdown of 10 seconds will be displayed.
  "SLEEP 10" ➜ "SLEEP 9".... ➜ "SLEEP 1" ➜ "SLEEP"

While SLEEP mode is activated

- Press **SLEEP** once to view the remaining length of time.
- Press **SLEEP** twice to change the pre-selected period of time.
  ➜ The display will show the remaining time followed by the sequence of sleep timer options.

To switch off the Sleep Timer

- Press **SLEEP** repeatedly until "OFF" is displayed, or press the **STANDBY-ON** button.

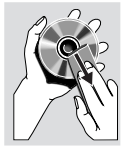
Maintenance

English

Cleaning the Cabinet

- Use a soft cloth slightly moistened with a mild detergent solution. Do not use a solution containing alcohol, spirits, ammonia or abrasives.

Cleaning Discs



- When a disc becomes dirty, clean it with a cleaning cloth. Wipe the disc from the center out.
- Do not use solvents such as benzine, thinner, commercially available cleaners, or antistatic spray intended for analog records.

Cleaning the DISC lens

- After prolonged use, dirt or dust may accumulate at the disc lens. To ensure good playback quality, clean the disc lens with Philips CD Lens Cleaner or any commercially available cleaner. Follow the instructions supplied with cleaner.

Cleaning the Heads and the Tape Paths

- To ensure good recording and playback quality, clean the heads, the capstan(s), and pressure roller(s) after every 50 hours of tape operation.
- Use a cotton swab slightly moistened with cleaning fluid or alcohol.
- You can also clean the heads by playing a cleaning tape once.

Demagnetizing the heads

- Use a demagnetizing tape available at your dealer.

Troubleshooting

WARNING

Do not open the player as there is a risk of electric shock! Under no circumstances should you try to repair the player yourself, as this will invalidate the warranty

If a fault occurs, first check the points listed below before taking the player for repair. If you are unable to remedy a problem by following these hints, consult your dealer or service centre.

Symptom	Remedy
"NO DISC" **is displayed.**	– If the disc is inserted upside down. – Moisture condensation at the lens. – There is no disc in the CD tray. – The disc is dirty, badly scratched or warped. – The disc lens is dirty or dusty, refer to section under Maintenance.
"DISC NOT FINALIZED" **is displayed.**	– The CD-RW or CD-R disc is not properly recorded for use with a standard CD player. – The disc is badly scratched or dirty.
Poor radio reception.	– The signal is too weak, adjust the antenna or connect an external antenna for better reception. – The TV or VCR is too close to the stereo system.

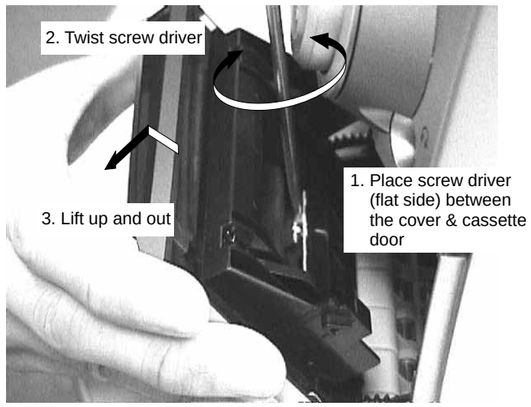
Troubleshooting

English

Recording or playback cannot be made or there is a decrease in audio level.	– Dirty tape heads, capstans or pressure rollers, refer to section under Maintenance. – Magnetic build-up in the record/playback head, use demagnetizing tape.
Tape deck door cannot open.	– Reconnect the AC power plug and switch on the system again.
System does not react when any button is pressed.	– Press STANDBY-ON to switch the system off. Remove the AC power plug from the wall outlet, then reconnect the power plug and switch on the system again.
No or poor sound.	– Adjust the volume. – Disconnect the headphones. – Check that the speakers are connected correctly. – Check if the stripped speaker wire is clamped.
Reversed left and right sound.	– Check the speaker connections and location.
Lack of bass sound or apparently imprecise physical location of musical instruments.	– Check the speaker connection for proper phasing, colored/black wires to colored/ black terminals.
Remote control has no effect on the system.	– Select the source (CD,TUNER, etc.) before pressing the function button (▶, ⏮, ⏭, etc.). – Reduce the distance to the system. – Insert the batteries with their polarities (+/– signs) as indicated. – Replace the batteries.
Timer is not working.	– Set the clock. – Press CLOCK•TIMER to switch on the timer. – If recording is in progress, stop recording.
Clock setting is erased.	– Reset the clock.
System displays features automatically; button flash continously.	– Press and hold ■ (on the system) for five seconds to switch off the demonstration.
All lighted buttons are not lit.	– Press DIM until DIM OFF display mode is shown.

DISMANTLING INSTRUCTIONS

Dismantling of the Cassette Cover

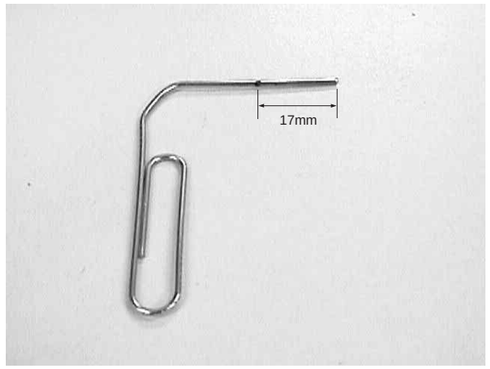


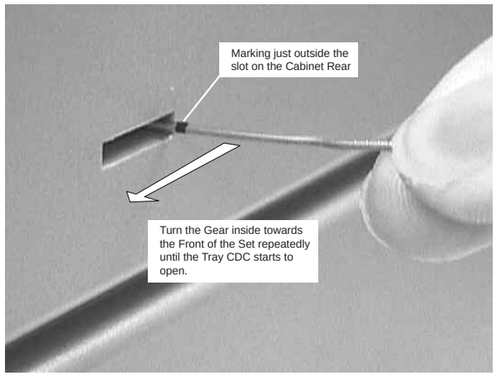
Cassette door

Opening the CDC Tray manually

1) Take a paper clip or any stiff wire diameter of 1mm -1.5mm and make a marking about 17mm from the tip.
2) Place the set in an upright position and insert the paper clip into the slot on the right side of the Cabinet Rear.
3) With the marking just outside the Cabinet Rear, you should be able to engage the gear on the side of the 3CDC-LC Module. Because of the distance between the gear and the Cabinet Rear the chance of the paper clip slipping above or below the gear is high, therefore you have to feel and adjust slightly to engage the gear correctly.
4) Push the gear slowly towards the front as shown until the Tray CDC starts to move out of the Front Cabinet. The Tray CDC is now disengage and can be pulled out completely

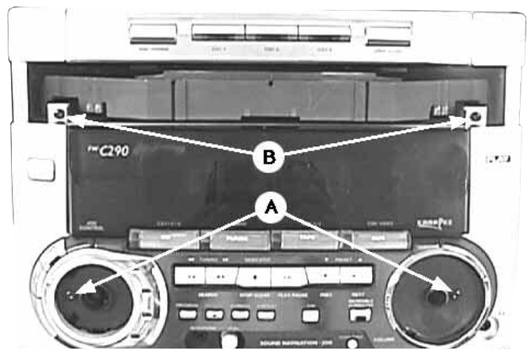
Note: ***If the Cabinet Rear has to be replaced, it has to be replaced by one that has a similar slot on the right side of the Cabinet otherwise there is no possibility to disassemble the same set in the future.***

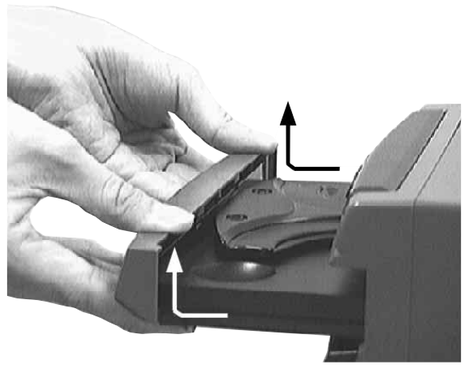




Dismantling of the Front Panel

1) With the CDC tray opened remove the Cover Tray CDC (pos 107) as indicated.
2) Loosen the 8 screws to separate the Front Panel from the rear portion.
   - 2 screws B on the front
   - 2 screws each on the left & right side
   - 2 screws at the bottom

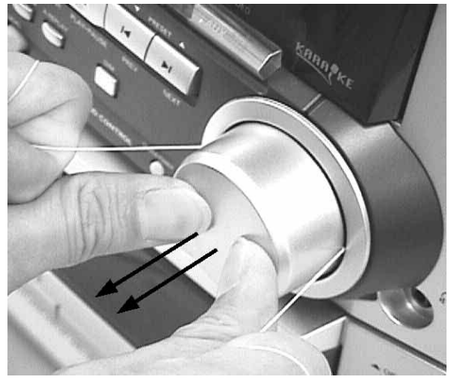




Dismantling of the Cover Control on the Front (see Notes)

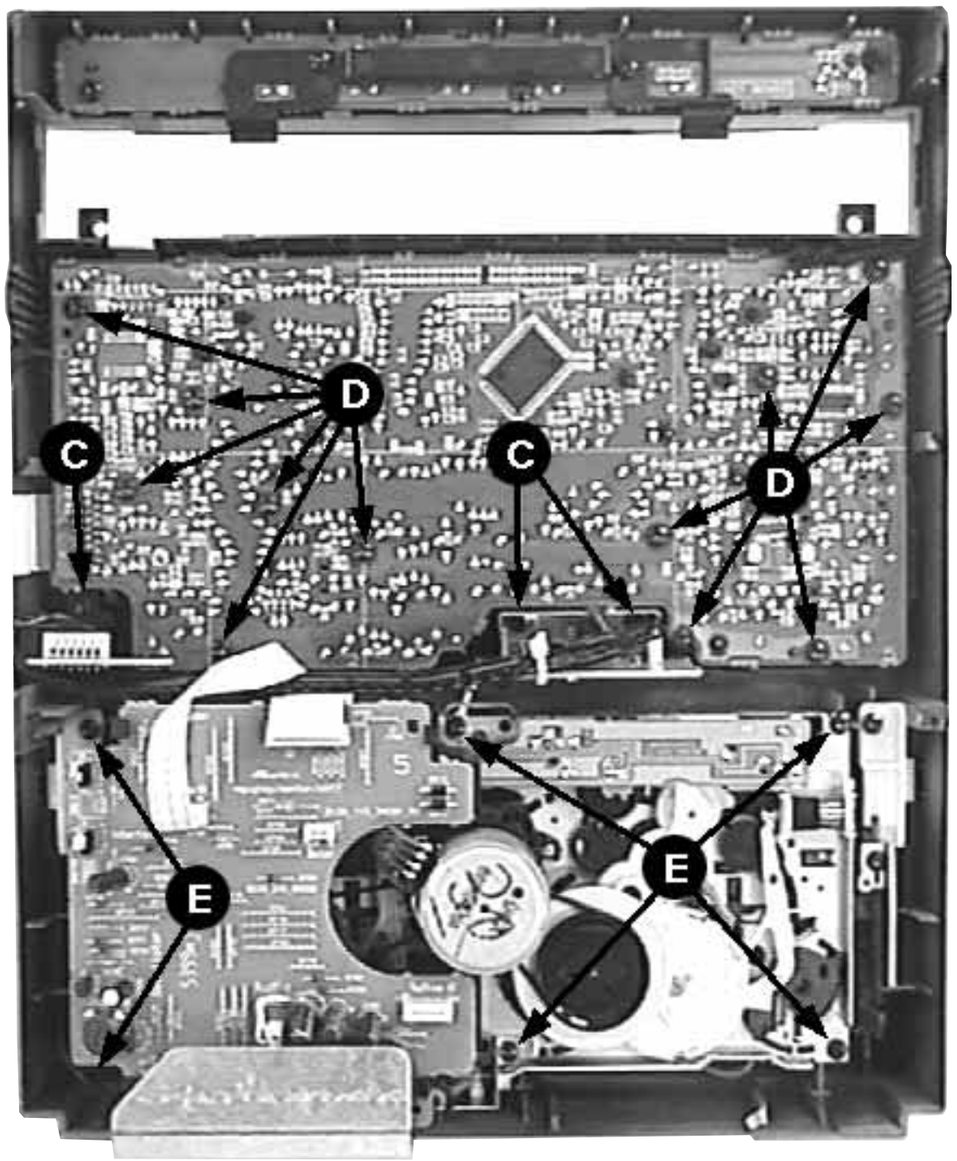
1) Insert a strong string into the slot between the Volume knob (pos 146) and Cover Ring Volume (pos 144), looped it 1,5 turns securely around the Volume knob and pulled it out as shown.
2) Do likewise for the Jog Rotary knob (pos 145).
3) Remove the 2 hidden screws A to take out the Cover Control assembly (pos 153 + 143 + 144).

Note*: Only the Lightguide DSC (pos 127) is sandwiched between the Front Cabinet (pos 101) & Cover Control (pos 153).*



Dismantling of Assemblies on the Front Panel

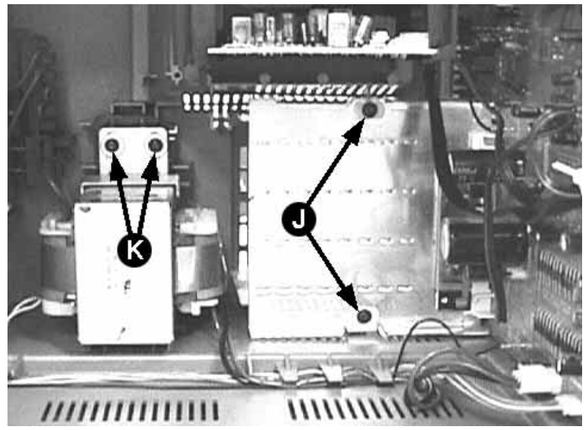
1) Remove the Volume and Jog Rotary knobs (pos 145 & 146) as per step 1 and 2 of ***Dismantling of the Cover Control on the Front***.
2) Remove 3 screw C to loosen the Headphone board (1x) and the Karaoke board (2x).
   Note: *Karaoke board is for some version only.*
2) Remove 12 screws D as indicated to loosen the Front board.
3) Remove 6 screws E to loosen the ETF7 Module.

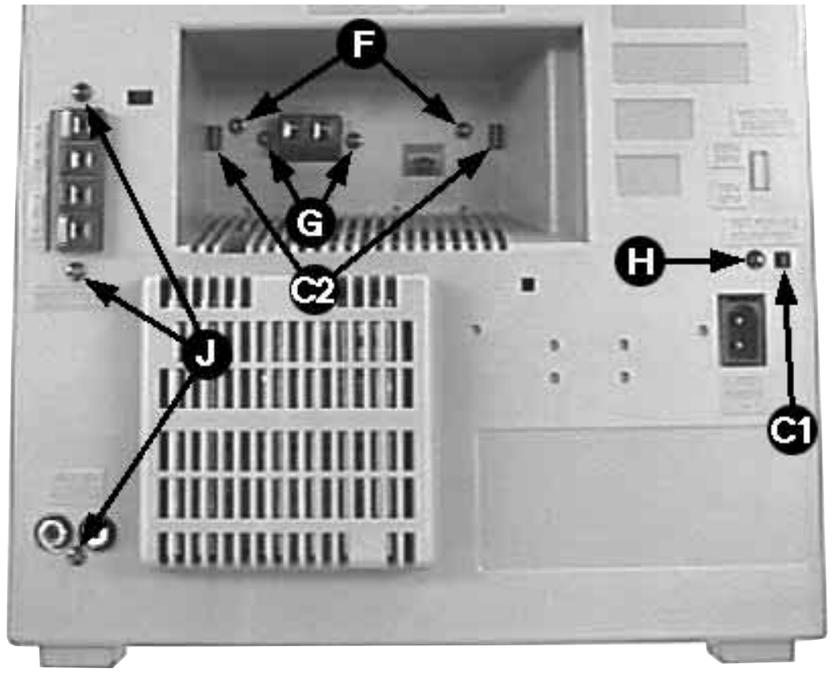


3-2

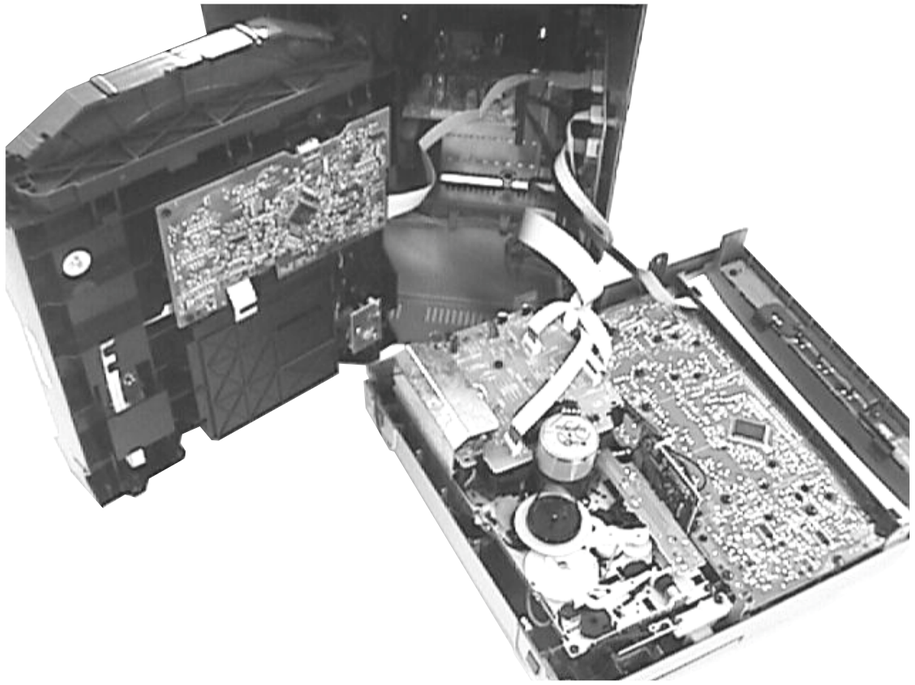
Dismantling of Rear Portion

1) Remove 1 screw H & uncatch C1 to loosen the Mains socket board.
2) Remove 2 screws F, 2 screws G and uncatch C2 to loosen the Tuner board assembly.
3) Remove 5 screws J (3x on the rear and 2x on the heatsink) to loosen the Combi board (Main part).
4) Remove 2 screws K to loosen the Mains Transformer.

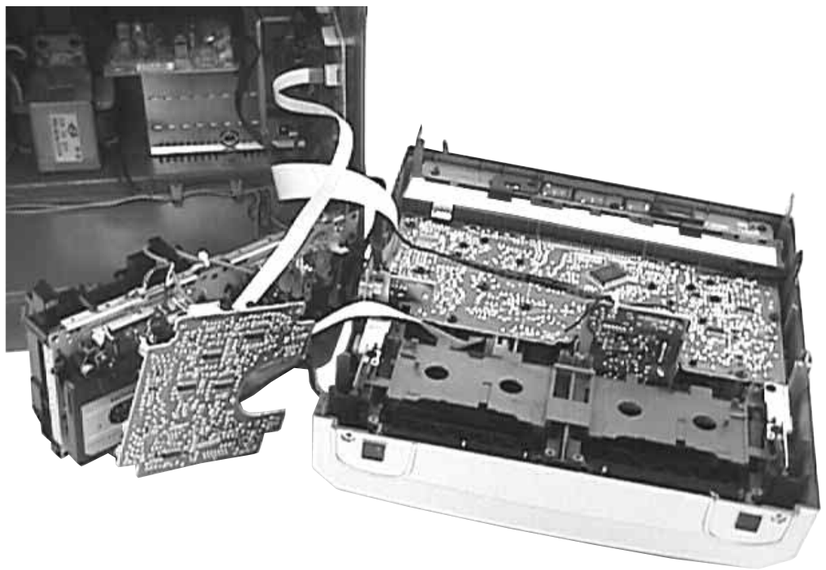




Service pos A



Service pos B

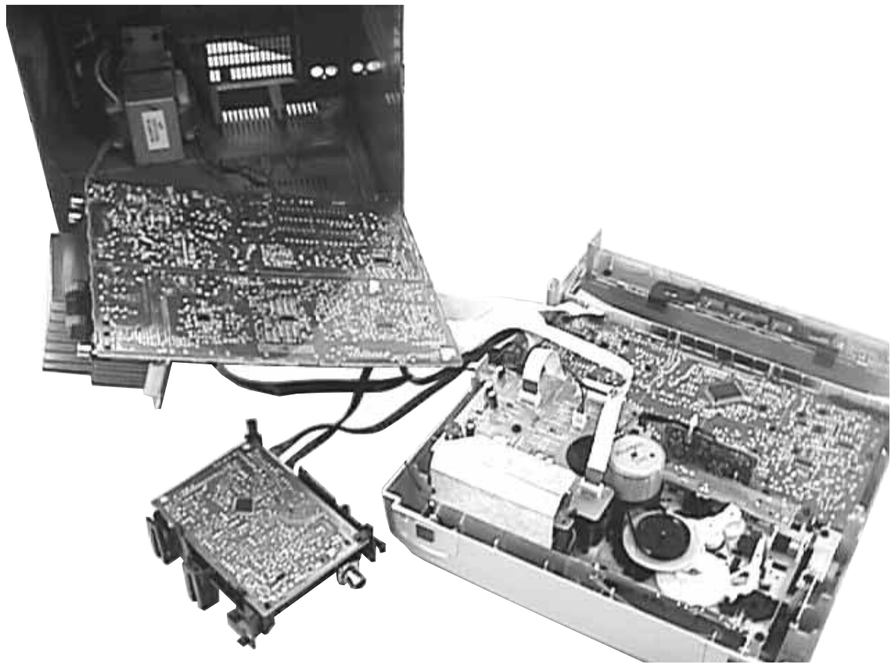


Note:

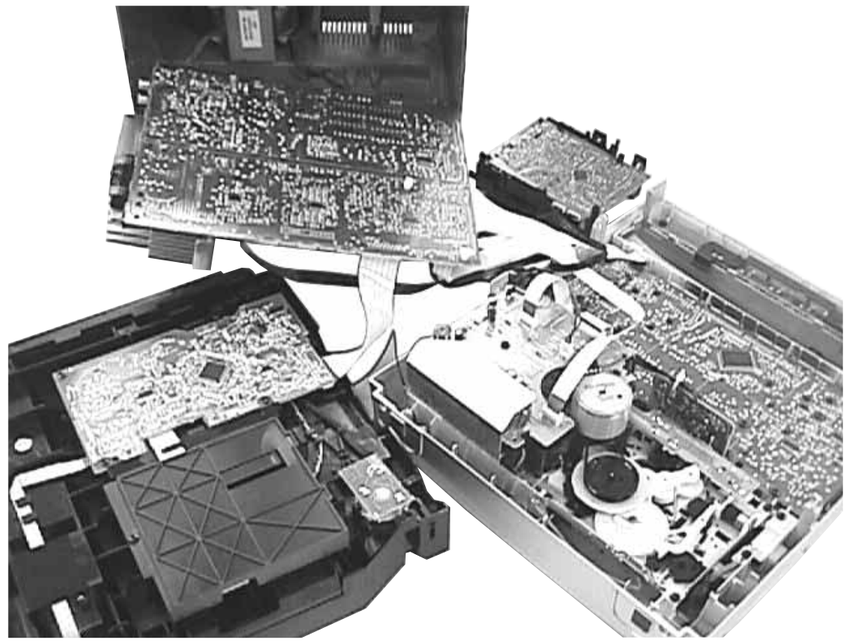
1. During repair it is possible to disconnect the following assemblies or modules while working on other areas:
   - Tuner Board
   - 3CDC Module
2. Flex cables are very fragile, care should be taken not to damage them during repair. After repair, be very sure that the flex cables are inserted properly into the flex sockets before encasing, otherwise faults may occurs.

3-3

Service pos C

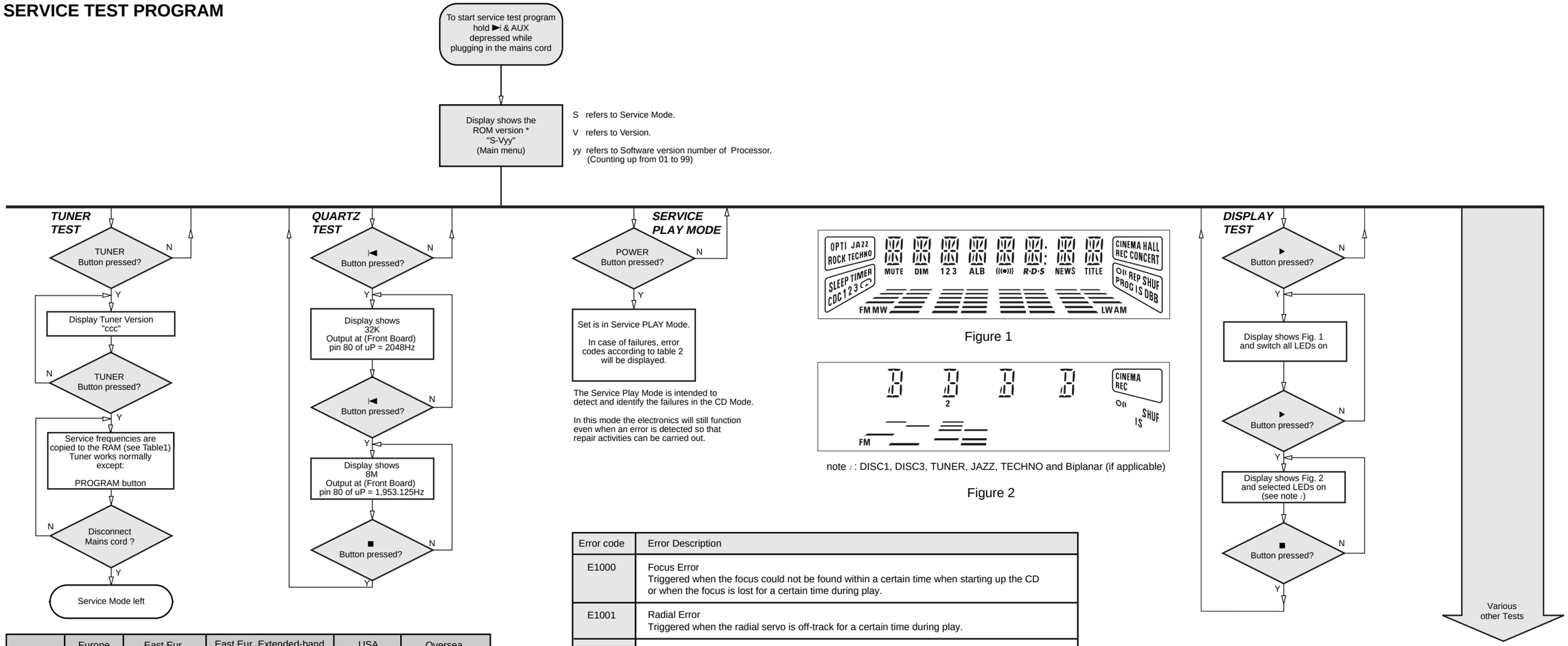


Service pos D



3-4

SERVICE TEST PROGRAM



PRESET	Europe "EUR"	East Eur. "EAS"	East Eur. Extended-band "EAS"	USA "USA"	Oversea "OSE"
1	87.5MHz	87.5MHz	65.81MHz	87.5MHz	87.5MHz
2	108MHz	108MHz	108MHz	108MHz	108MHz
3	531kHz	531kHz	74MHz	530kHz	531/530kHz*
4	1602kHz	1602kHz	87.5MHz	1700kHz	1602/1700kHz*
5	558kHz	558kHz	531kHz	560kHz	558/560kHz*
6	1494kHz	1494kHz	1602kHz	1500kHz	1494/1500kHz*
7	153kHz	87.5MHz	558kHz	98MHz	87.5/98MHz*
8	279kHz	87.5MHz	1494kHz	87.5MHz	87.5MHz
9	198kHz	87.5MHz	98MHz	87.5MHz	87.5MHz
10	98MHz	87.5MHz	70.01MHz	87.5MHz	87.5MHz
11	87.5MHz	98MHz	65.81MHz	87.5MHz	98/87.5MHz*

Table 1

Note: * Depending on the selected grid frequency (9 or 10kHz)
By holding the TUNER and ►► buttons depressed while switching on the Mains supply, one of the undermentioned features will be activated:
- the tuning grid frequency is toggled between 9kHz and 10kHz for the Oversea (/21) version.
- the extended FM1 (65.81MHz - 74MHz) is toggled on and off for East Eur. (/34) version.

Figure 1

note ♪: DISC1, DISC3, TUNER, JAZZ, TECHNO and Biplanar (if applicable)

Figure 2

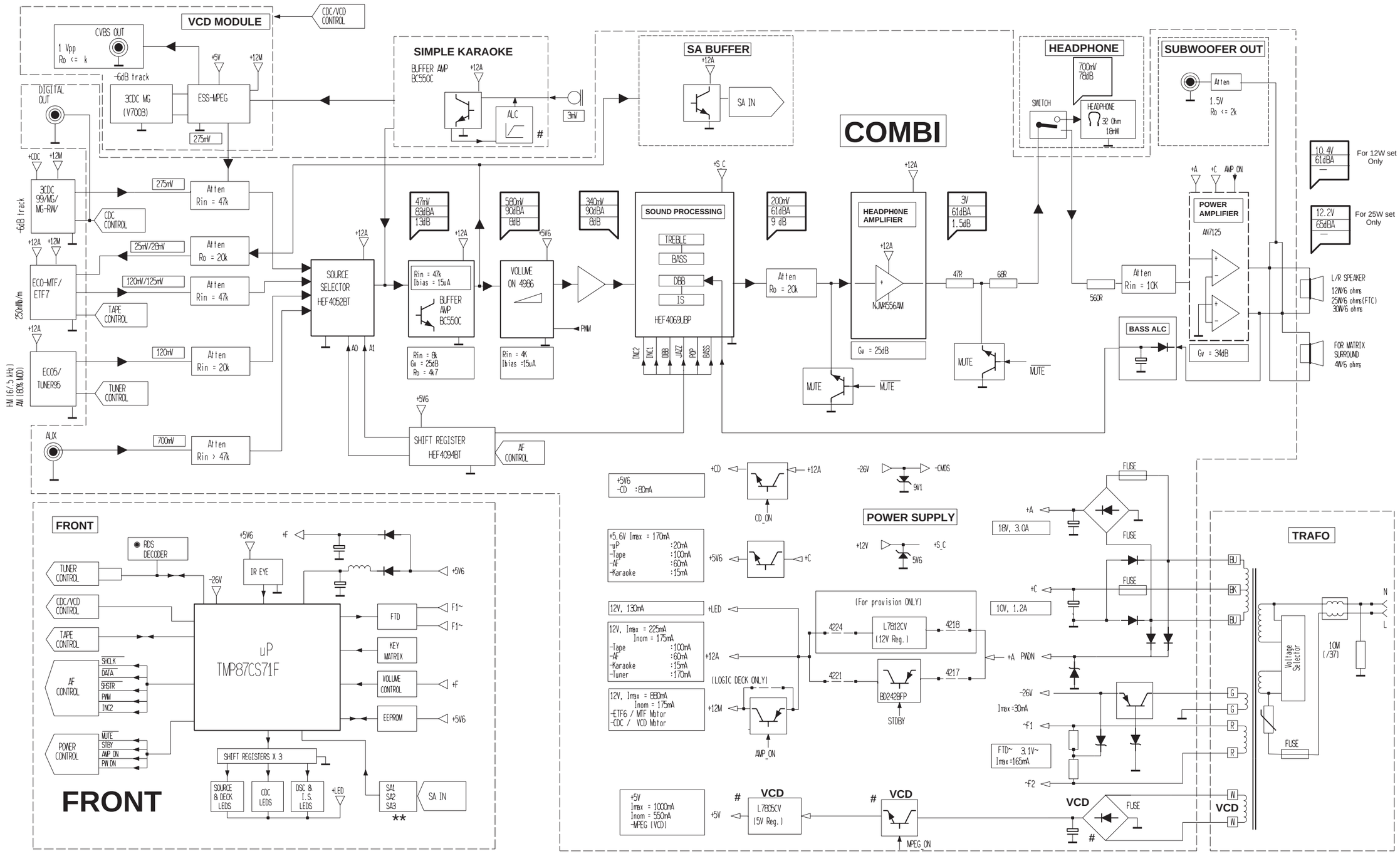
Error code	Error Description
E1000	Focus Error Triggered when the focus could not be found within a certain time when starting up the CD or when the focus is lost for a certain time during play.
E1001	Radial Error Triggered when the radial servo is off-track for a certain time during play.
E1002	Sledge In Error The sledge did not reach its inner position (inner-switch is still close) before approximately 6 Sec. have passed by. Inner-switch or sledge motor problem.
E1003	Sledge Out Error The sledge did not come out of its inner position (inner-switch is still open) before approximately 250 mSec. have passed by. Inner-switch or sledge motor problem.
E1005	Jump-offtrack error Triggered in normal play when the jump destination could not be found within a certain time. When this error occurred, software will try to recover by initiating the jump command again. If it is recoverable, the disc will continue to play.
E1006	Subcode Error Triggered when a new subcode was missing for a certain time during play.
E1007	PLL Error The Phase Lock Loop could not lock within a certain time.
E1008	Turntable Motor Error Generated when the CD could not reached 75% of speed during startup within a certain time. Discmotor problem.
E1020	Focus Search Error The focus point has not been found within a certain time.
E1070	The carousel switch is not open within certain time. This can happen when either the switch is defective and closed all the time, or when the carousel is blocked when located exactly at a disc position.
E1071	The carousel position switch did not close within a certain time. This can happen when the switch is defective and never closes electrically, or when the carousel is blocked in between two disc positions. The time-out is approximately 5 Sec.
E1079	The drawer could not enter the inside position and is opening again. This happen when the drawer is blocked and cannot go fully inside or when the drawer switch is defective and does not close.

Table 2

TEST	***Activated with***	***ACTION***
EEPROM TEST	►► ■ to Exit	A test pattern will be sent to the EEPROM. "PASS" is displayed if the uProcessor read back the test pattern correctly, otherwise "ERROR" will be displayed.
EEPROM FORMAT	◄◄	Load default data. Display shows "NEW" for 1 second. ***Caution!*** ***All presets from the customer will be lost!!***
ENCODER TEST	Volume Knob or Jog Shuttle knob	Display shows value for 2 seconds. Values increases or decreases in steps of 1 until 0 (Min.) or 40 (Max.) is reached.
LEAVE SERVICE TESTPROGRAM	Disconnect mains cord	

4-1

SET BLOCK DIAGRAM



NOTE :

MAIN SIGNAL PATH

MEASUREMENTS ARE IN AUX MODE

XX mV	LEVELS AT MAX VOL
YY dBA	S/N AT 500mW
ZZ dB	HEADROOM (1% thd) WRT TO LEVEL AT MAX VOL,

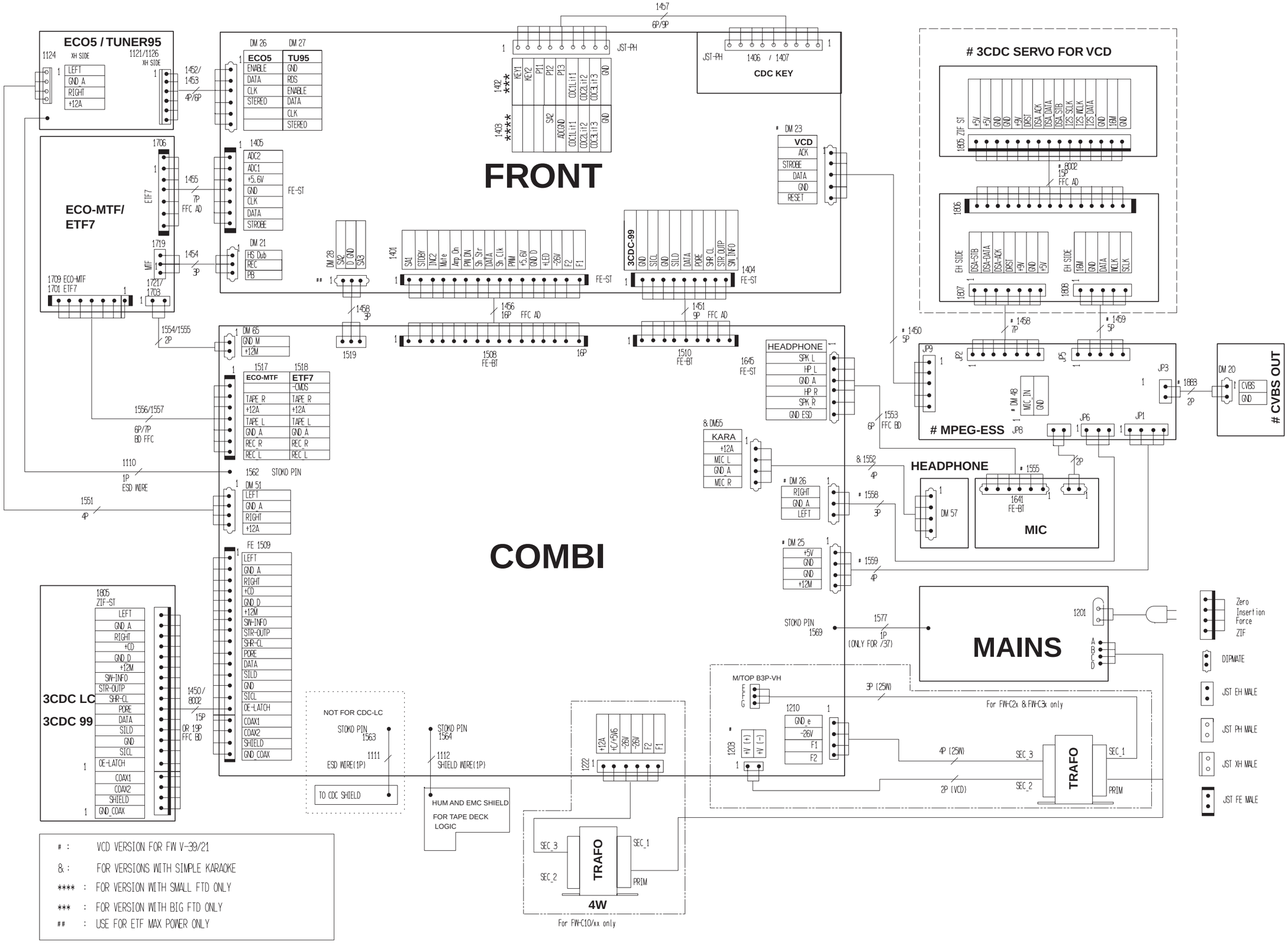
** For version with small FTD, only SA3 is use.

\# Provision for VCD

Updated on 10-06-99

5-1

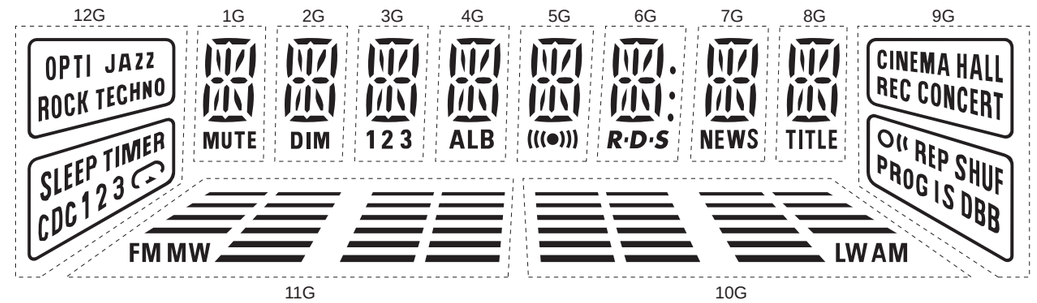
SET WIRING DIAGRAM

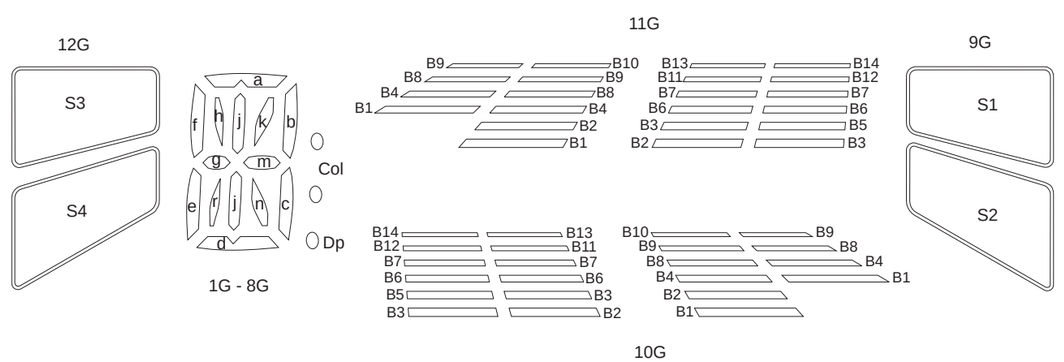


FRONT BOARD

TABLE OF CONTENTS

FTD DISPLAY PIN CONNECTIONS





	1G	2G	3G	4G	5G	6G	7G	8G	9G	10G	11G	12G		
P1	a	a	a	a	a	a	a	a	CINEMA	B1	B1	OPTI		
P2	h	h	h	h	h	h	h	h	HALL	B2	B2	JAZZ		
P3	j , p	j , p	j , p	j , p	j , p	j , p	j , p	j , p	REC	B3	B3	ROCK		
P4	k	k	k	k	k	k	k	k	CONCERT	B4	B4	TECHNO		
P5	b	b	b	b	b	b	b	b	O((	B5	B5	SLEEP		
P6	f	f	f	f	f	f	f	f	REP	B6	B6	TIMER		
P7	m	m	m	m	m	m	m	m	SHUF	B7	B7	CDC		
P8	g	g	g	g	g	g	g	g	PROG	B8	B8	1		
P9	c	c	c	c	c	c	c	c	IS	B9	B9	2		
P10	e	e	e	e	e	e	e	e	DBB	B10	B10	3		
P11	r	r	r	r	r	r	r	r	S1	B11	B11	)		
P12	n	n	n	n	n	n	n	n	S2	B12	B12	▸		
P13	d	d	d	d	d	d	d	d	-	B13	B13	S3		
P14	MUTE	DIM	1	ALB	((●))	R·D·S	NEWS	TITLE	-	B14	B14	S4		
P15	-	-	2	-	-	Col	-	-	-	LW	FM	-		
P16	-	-	3	-	-	Dp	-	-	-	AM	MW	-		

Front Board application

A53920	FW-C200/21/21M, FW-C220/21K
A53930	FW-C220/22/34
A53940	FW-C200/33
A53950	FW-C100/21/21M/22/30/33/34/37, FW-C105/21
A53970	FW-C250/37
A53980	FW-C250/21
A53990	FW-C280/22/34
A54000	FW-C290/21
A54340	FW-C200/30
A54450	FW-C150/37

FEATURES:	A53920	A53930	A53940	A53950	A53970	A53980	A53990	A54000	A54340	A54450
RDS	-	x	-	-	-	-	x	-	-	-
Rotary Encoder	x	x	x	-	x	x	x	x	x	-
Jog Encoder	-	-	-	-	x	x	x	x	-	-
Spectrum Analyzer	-	-	-	-	-	-	x	x	-	-
Biplaner LED	-	-	-	-	-	-	x	x	-	-
Small FTD	x	x	x	x	x	x	-	-	x	x
Large FTD	-	-	-	-	-	-	x	x	-	-
NTC	-	-	-	-	-	x	-	x	-	-
LED Control	x	x	x	-	x	x	x	x	x	-

Variations table for Front Board

ITEM NO.	A53920	A53930	A53940	A53950	A53970	A53980	A53990	A54000	A54340	A54450
DM21	-	-	-	x	x	x	-	-	-	x
DM23	-	-	-	-	-	-	-	-	-	-
DM26	x	-	x	x	x	x	-	x	x	x
DM27	-	x	-	-	-	-	x	-	-	-
DM29	-	-	-	-	-	x	-	x	-	-
1402	-	-	-	-	-	-	x	x	-	-
1403	x	x	x	x	x	x	-	-	x	x
1404	x	x	x	x	x	x	x	x	x	x
1405	x	x	x	-	-	-	x	x	x	-
1418	-	-	-	-	-	-	x	x	-	-
1419	-	-	-	-	-	-	x	x	-	-
1420	-	-	-	-	-	-	x	x	-	-
1421	x	x	x	-	-	-	x	x	x	-
1423	x	x	x	-	-	-	x	x	x	-
1425	-	x	-	-	-	-	x	-	-	-
1426	x	x	x	-	-	-	x	x	x	-
1427	-	x	-	-	-	-	x	-	-	-
1428	-	-	-	x	-	-	-	-	-	x
1429	-	-	-	x	-	-	-	-	-	x
1430	x	x	x	x	-	-	-	-	x	x
2417	220µF	220µF	220µF	-	220µF	220µF	220µF	220µF	220µF	-
2421	22µF	22µF	22µF	2,2µF	22µF	22µF	22µF	22µF	22µF	2,2µF
2432	-	100pF	-	-	-	-	100pF	-	-	-
2433	-	47pF	-	-	-	-	47pF	-	-	-
2462	220nF	220nF	220nF	-	220nF	220nF	220nF	220nF	220nF	-
3407	-	-	-	-	-	-	1k	1k	-	-
3417	820R	820R	820R	-	820R	820R	820R	820R	820R	-
3419	820R	820R	820R	-	820R	820R	820R	820R	820R	-
3433	820R	820R	820R	-	820R	820R	820R	820R	820R	-

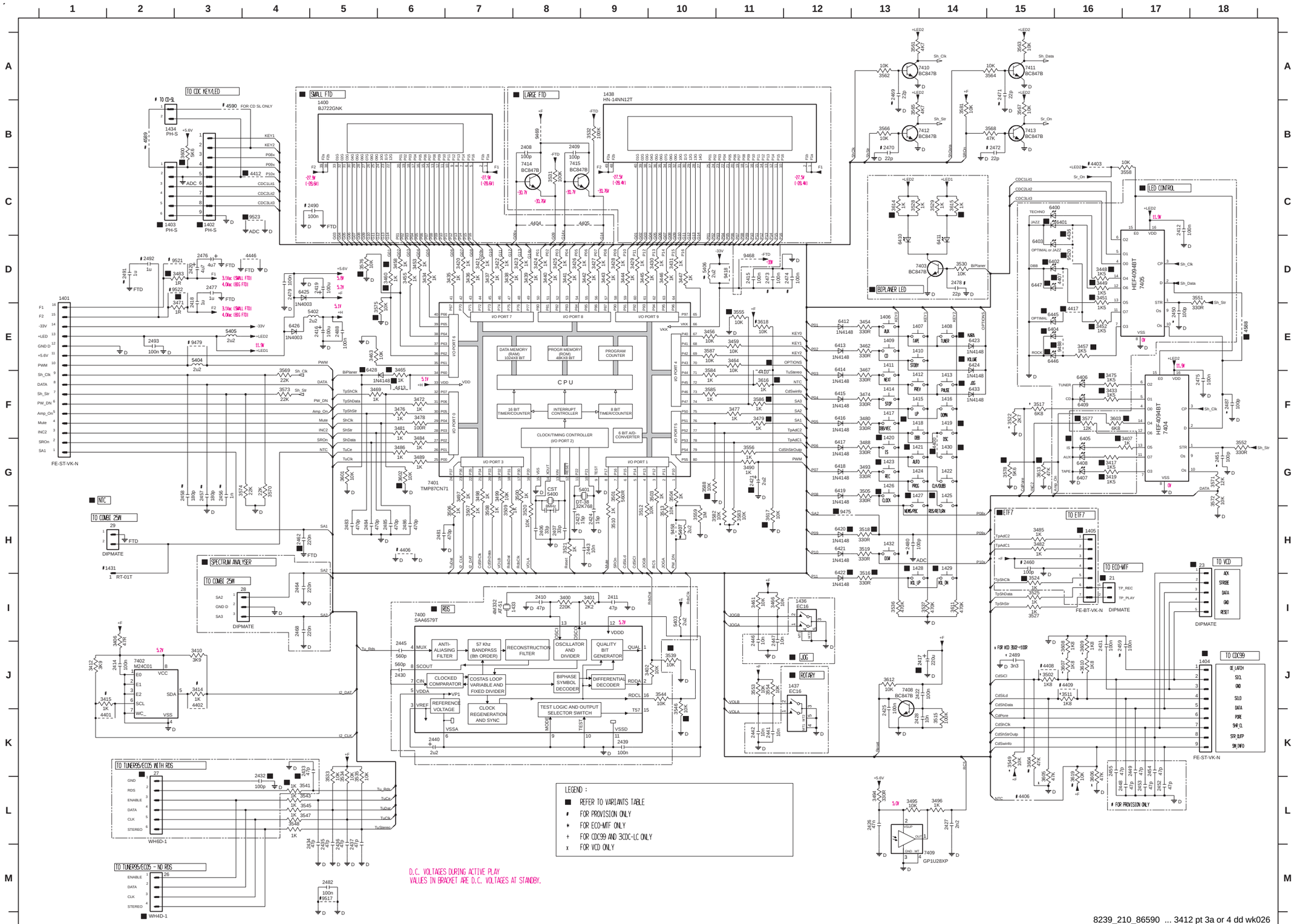
6-2

ITEM NO.	A53920	A53930	A53940	A53950	A53970	A53980	A53990	A54000	A54340	A54450
3448	820R	820R	820R	-	820R	820R	820R	820R	820R	-
3449	820R	820R	820R	-	820R	820R	820R	820R	820R	-
3451	820R	820R	820R	-	820R	820R	820R	820R	820R	-
3452	820R	820R	820R	-	820R	820R	820R	820R	820R	-
3457	820R	820R	820R	-	820R	820R	820R	820R	820R	-
3458	-	-	-	-	-	-	1k	1k	-	-
3460	-	-	-	-	-	-	1k	1k	-	-
3465	1k	1k	1k	-	1k	1k	1k	1k	1k	-
3471	4R7	4R7	4R7	4R7	4R7	4R7	1R	4R7	4R7	4R7
3475	820R	820R	820R	-	820R	820R	820R	820R	820R	-
3479	1k	1k	1k	-	1k	1k	1k	1k	1k	-
3483	4R7	4R7	4R7	4R7	4R7	4R7	1R	4R7	4R7	4R7
3516	-	-	-	330R	-	-	-	-	-	330R
3518	-	-	-	-	-	-	330R	330R	-	-
3524	1k	1k	1k	-	-	-	1k	1k	1k	-
3539	10k	-	10k	10k	10k	10k	-	10k	10k	10k
3541	-	1k	-	-	-	-	1k	-	-	-
3546	10k	-	10k	10k	10k	10k	-	10k	10k	10k
3555	10k	10k	10k	10k	10k	10k	-	-	10k	10k
3575	10k	10k	10k	10k	10k	10k	-	-	10k	10k
3576	10k	10k	10k	10k	10k	10k	-	-	10k	10k
3577	-	-	-	-	-	-	12k	12k	-	-
3578	-	-	-	-	-	-	5k6	5k6	-	-
3586	-	-	-	-	-	-	1k	1k	-	-
3588	-	-	-	10k	-	-	-	-	-	10k
3600	5k6	5k6	5k6	5k6	5k6	5k6	-	-	5k6	5k6
3602	-	-	-	10k	10k	10k	-	-	-	10k
3603	10k	10k	10k	6k8	10k	10k	10k	10k	10k	10k
3613	12k	12k	12k	47k	12k	12k	12k	12k	12k	12k
3614	-	-	-	-	-	-	820R	820R	-	-
3615	-	-	-	-	-	-	820R	820R	-	-
3616	-	-	-	-	-	1k	-	1k	-	-
3617	10k	10k	10k	10k	10k	-	10k	-	10k	10k
4400	x	x	x	x	-	-	-	-	x	x
4407	x	x	x	-	x	x	-	-	x	-
4410	x	x	x	x	x	-	x	-	x	x
4412	-	-	-	-	-	-	x	x	-	-
4413	-	-	-	x	-	-	-	-	-	x
4417	x	x	x	-	-	-	-	-	x	-
4436	x	x	x	-	-	-	-	-	x	-
4588	-	-	-	x	-	-	-	-	-	x
6401	-	-	-	-	x	x	x	x	-	-
6402	-	-	-	-	-	-	x	x	-	-
6404	-	-	-	-	x	x	x	x	-	-
6405	-	-	-	-	-	-	x	x	-	-
6420	-	-	-	-	-	-	x	x	-	-
6422	-	-	-	x	-	-	-	-	-	x
6423	x	-	x	-	-	x	-	x	-	-
6424	-	-	-	-	x	x	-	-	-	-
6428	x	x	x	-	x	x	x	x	x	-
6433	-	-	-	-	x	x	-	-	-	-
6445	x	x	x	-	-	-	-	-	x	-
6446	x	x	x	-	-	-	-	-	x	-
6447	x	x	x	-	x	x	-	-	x	-
9475	x	x	x	x	x	x	-	-	x	x
9488	-	-	-	-	x	x	x	x	-	-
9520	-	-	-	-	x	x	x	x	-	-
9523	x	x	x	x	x	x	-	-	x	x

x = Item in use.

6-3

CIRCUIT DIAGRAM

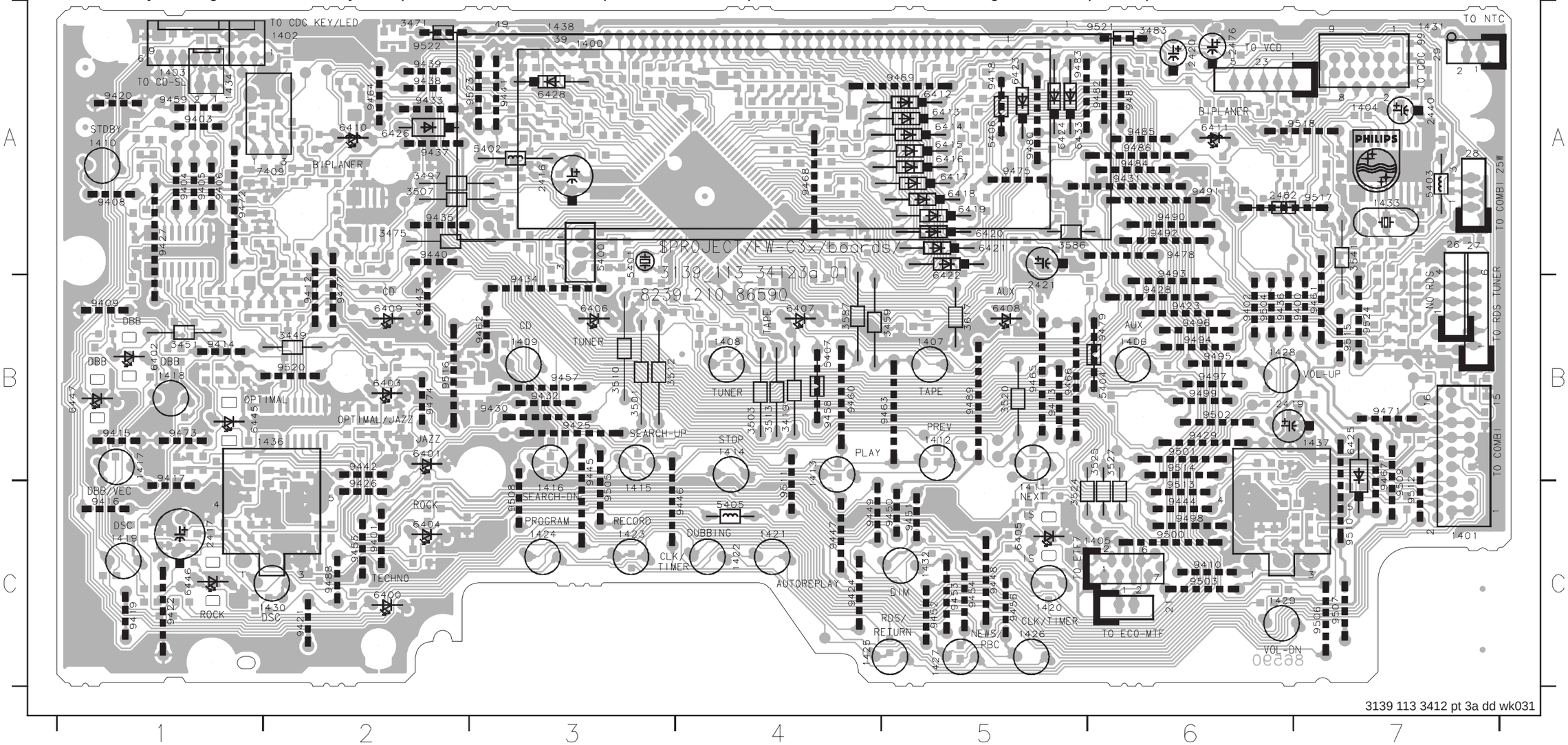


6-4

COMPONENT LAYOUT

21	C6	1406	B6	1418	B1	1430	C2	2421	B5	3501	B3	3587	B4	6402	B1	6414	A5	6426	A2	9405	A1	9419	C1	9431	A6	9443	B2	9455	C2	9467	B7	9481	A6	9494	B6	9506	C7	9518	A7
23	A6	1407	B5	1419	C1	1431	A7	2440	A7	3503	B4	3617	B5	6403	B2	6415	A5	6428	A3	9406	A1	9420	A1	9432	B3	9444	C6	9456	C5	9468	A4	9482	A6	9495	B6	9507	C7	9520	B2
26	A7	1408	B4	1420	C5	1432	C5	2476	A6	3507	A2	5400	A3	6404	C2	6416	A5	6433	A5	9408	A1	9421	C2	9433	A2	9445	B3	9457	B3	9469	A5	9483	A5	9496	B6	9508	C3	9521	A6
27	A7	1409	B3	1421	C4	1433	A7	2482	A6	3510	B3	5401	A3	6405	C5	6417	A5	6445	B1	9409	B1	9422	C1	9434	B3	9446	C4	9458	B4	9471	B7	9484	A6	9497	B6	9509	C7	9522	A2
28	A7	1410	A1	1422	C4	1434	A1	3419	B4	3512	B3	5402	A3	6406	B3	6418	A5	6446	C1	9410	C6	9423	B6	9435	A2	9447	C4	9459	A1	9472	A1	9485	A6	9498	C6	9510	C7	9523	A3
29	A7	1411	C5	1423	C3	1436	B2	3449	B2	3513	B4	5403	A7	6407	B4	6419	A5	6447	B1	9412	B2	9424	C4	9436	B6	9448	C5	9460	B4	9473	B1	9486	A6	9499	B6	9511	C4	9524	B7
1400	A3	1412	B5	1424	C3	1437	B7	3451	B1	3520	B5	5404	B6	6408	B5	6420	A5	7409	A2	9413	B5	9425	B3	9437	A2	9449	C4	9461	B7	9474	B2	9488	C2	9500	C6	9512	C7		
1401	C7	1413	B4	1425	C4	1438	A3	3459	B5	3524	C5	5405	C4	6409	B2	6421	A5	9400	B7	9414	B1	9426	C2	9438	A2	9450	C5	9462	B3	9475	A5	9489	B5	9501	B6	9513	C6		
1402	A2	1414	B4	1426	C5	2416	A3	3471	A2	3525	B6	5406	A5	6410	A2	6422	B5	9401	C2	9415	B1	9427	A1	9439	A2	9451	C5	9463	B5	9477	B2	9490	A6	9502	B6	9514	B6		
1403	A1	1415	C3	1427	C5	2417	C1	3475	A2	3527	B6	5407	B4	6411	A6	6423	A5	9402	B6	9416	C1	9428	B6	9440	A2	9452	C5	9464	A2	9478	A6	9491	A6	9503	C6	9515	B7		
1404	A7	1416	C3	1428	B6	2419	B6	3483	A6	3541	A7	6400	C2	6412	A5	6424	A5	9403	A1	9417	B1	9429	B6	9441	A3	9453	C5	9465	B5	9479	B6	9492	A6	9504	B6	9516	B2		
1405	C6	1417	B1	1429	C6	2420	A6	3497	A2	3586	A5	6401	B2	6413	A5	6425	B7	9404	A1	9418	A5	9430	B3	9442	B2	9454	C5	9466	B5	9480	A5	9493	A6	9505	C3	9517	A7		

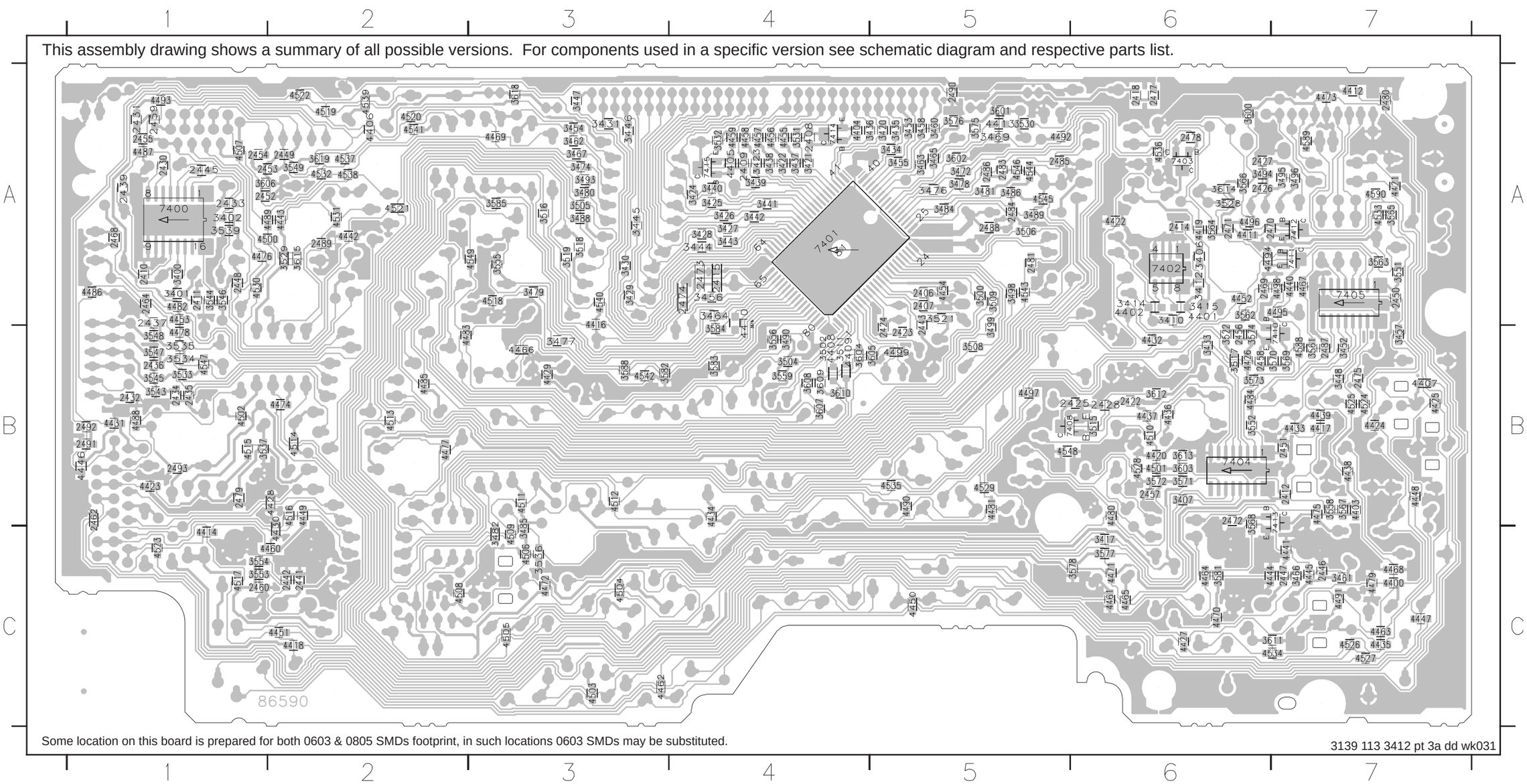
This assembly drawing shows a summary of all possible versions. For components used in a specific version see schematic diagram and respective parts list.



6-5

CHIP LAYOUT

2406	A5	2432	B1	2454	A1	2479	B1	3410	A6	3435	A5	3457	B7	3482	C3	3509	A5	3539	A1	3564	A6	3585	A3	3618	A3	4418	C2	4437	B6	4456	A4	4475	B7	4494	A6	4513	B2	4532	A2	4589	A7
2407	A5	2433	A1	2455	A1	2480	A7	3412	A6	3436	A4	3458	A5	3484	A5	3511	B4	3543	B1	3565	A7	3588	B3	3619	A2	4419	A6	4438	B7	4457	A4	4476	A1	4495	A7	4514	B2	4533	A7	4590	A7
2408	A4	2434	B1	2456	B6	2481	A5	3414	A6	3437	A4	3460	A5	3485	C3	3515	B6	3544	A1	3566	A6	3600	A6	4400	C7	4420	B6	4439	B7	4458	A4	4477	B2	4496	A6	4515	B1	4534	C7	7400	A1
2409	A4	2435	B1	2457	B6	2483	A5	3415	A6	3438	A4	3461	C7	3486	A5	3516	A3	3545	B1	3567	B7	3601	A5	4401	A6	4421	A7	4440	A7	4459	A4	4478	B1	4497	B5	4516	B2	4535	B5	7401	A4
2410	A1	2436	B1	2458	B6	2484	A5	3417	C6	3439	A4	3462	A3	3488	A3	3517	B6	3546	A1	3568	B6	3602	A5	4402	A6	4422	A6	4441	C7	4460	C2	4479	C7	4498	A7	4517	C1	4536	A6	7402	A6
2411	A1	2437	A1	2459	A1	2485	A5	3420	A5	3440	A4	3463	A5	3489	A5	3518	A3	3547	B1	3569	B7	3603	B6	4403	B7	4423	B1	4442	A2	4461	C6	4480	B6	4499	B5	4518	A3	4537	A2	7403	A6
2412	B7	2439	A1	2460	C1	2486	A5	3421	A4	3441	A4	3464	A4	3490	B4	3519	A3	3548	B1	3570	B7	3604	B4	4404	A4	4424	B7	4443	A2	4462	C3	4481	B5	4500	A1	4519	A2	4538	A2	7404	B6
2414	A6	2441	C2	2462	B1	2487	B7	3422	A4	3442	A4	3465	A5	3493	A3	3521	A5	3549	A2	3571	B6	3605	B5	4405	A4	4425	B7	4444	C6	4463	C7	4482	A1	4501	B6	4520	A2	4539	A2	7405	A7
2415	A4	2442	C2	2464	A1	2488	A5	3423	A4	3443	A4	3466	C7	3494	A6	3522	B6	3551	A7	3572	B6	3606	A1	4406	A2	4426	B6	4445	C7	4464	C6	4483	B2	4502	B1	4521	A2	4540	A3	7408	B5
2418	A6	2443	A5	2468	A1	2489	A2	3424	A4	3444	A4	3467	A3	3495	A7	3528	A6	3552	B6	3573	B6	3607	B4	4407	B7	4427	C6	4446	B1	4465	C6	4484	B6	4503	C3	4522	A2	4541	A2	7410	B7
2422	B6	2445	A1	2469	A6	2490	A5	3425	A4	3445	A3	3469	A5	3496	A7	3529	A2	3553	C1	3574	B6	3608	B4	4408	B4	4428	B2	4447	C7	4466	B3	4485	B2	4504	C3	4523	C1	4542	B3	7411	A7
2423	B5	2446	C7	2470	A6	2491	B1	3426	A4	3446	A3	3472	A5	3498	A5	3530	A5	3554	C1	3575	A5	3609	B4	4409	B4	4429	B3	4448	B7	4467	A7	4486	A1	4505	C3	4524	B7	4543	A5	7412	A7
2424	B5	2447	C7	2471	A6	2492	B1	3427	A4	3447	A3	3474	A3	3499	B5	3531	A4	3555	A3	3576	A5	3610	B4	4410	A4	4430	C2	4449	B2	4468	C7	4487	A1	4506	C3	4525	B7	4544	A5	7413	B7
2425	B6	2448	A1	2472	B6	2493	B1	3428	A4	3448	B7	3476	A5	3500	A5	3532	A4	3556	B4	3577	C6	3611	C7	4411	A6	4431	B1	4450	C5	4469	A3	4488	B1	4507	A1	4526	C7	4545	A5	7414	A4
2426	A6	2449	A2	2473	A4	3400	A1	3429	A3	3452	B7	3477	B3	3502	B4	3533	B1	3558	B7	3578	C6	3612	B6	4412	A7	4432	B6	4451	C2	4470	C6	4489	A1	4508	C2	4527	C7	4546	A5	7415	A4
2427	A6	2450	A7	2474	A4	3401	A1	3430	A3	3453	A5	3478	A5	3504	B4	3534	B1	3559	B4	3581	C6	3613	B6	4413	A5	4433	B7	4452	A6	4471	C6	4490	B5	4509	C3	4528	B6	4547	B1		
2428	B6	2451	B7	2475	B7	3402	A1	3431	A3	3454	A3	3479	A3	3505	A5	3535	B1	3561	B7	3582	B3	3614	A6	4414	C1	4434	B4	4453	A1	4472	C3	4491	C7	4510	B6	4529	B5	4548	B5		
2430	A1	2452	A1	2477	A6	3406	A6	3433	B6	3455	A5	3480	A3	3506	A5	3536	C3	3562	A6	3583	B4	3615	A2	4416	A3	4435	C7	4454	A5	4473	A7	4492	A1	4511	B3	4530	A1	4549	A3		
2431	A1	2453	A1	2478	A6	3407	B6	3434	A5	3456	A4	3481	A5	3508	B5	3537	B1	3563	A7	3584	B4	3616	A4	4417	B7	4436	B6	4455	A4	4474	B2	4493	A1	4512	B3	4531	A2	4588	B7		



6-6

ELECTRICAL PARTS LIST - FRONT BOARD

ELECTRICAL PARTS LIST - FRONT BOARD

MISCELLANEOUS

1401	2422 025 14546	Flex Socket 16pin Hort.
1404	4822 265 11531	Flex Socket 9pin Hort.
1405	4822 267 10953	Flex Socket 7pin Vert.
1406	4822 276 13775	Tact Switch
1407	4822 276 13775	Tact Switch
1408	4822 276 13775	Tact Switch
1409	4822 276 13775	Tact Switch
1410	4822 276 13775	Tact Switch
1411	4822 276 13775	Tact Switch
1412	4822 276 13775	Tact Switch
1413	4822 276 13775	Tact Switch
1414	4822 276 13775	Tact Switch
1415	4822 276 13775	Tact Switch
1416	4822 276 13775	Tact Switch
1417	4822 276 13775	Tact Switch
1418	4822 276 13775	Tact Switch
1419	4822 276 13775	Tact Switch
1420	4822 276 13775	Tact Switch
1421	4822 276 13775	Tact Switch
1422	4822 276 13775	Tact Switch
1423	4822 276 13775	Tact Switch
1424	4822 276 13775	Tact Switch
1425	4822 276 13775	Tact Switch
1426	4822 276 13775	Tact Switch
1427	4822 276 13775	Tact Switch
1432	4822 276 13775	Tact Switch
1433	4822 242 72195	Quartz 4,332MHz
1436	4822 273 10366	Rotary Encoder 24pin
1437	4822 273 10365	Rotary Encoder 24pin
1438	3139 110 52640	FTD Display BJ796GNK

CAPACITORS

2406	5322 122 32659	33pF 5% 50V
2407	5322 122 32659	33pF 5% 50V
2408	5322 122 32531	100pF 5% 50V
2409	5322 122 32531	100pF 5% 50V
2410	4822 126 13692	47pF 1% 63V
2411	4822 126 13692	47pF 1% 63V
2412	4822 126 14585	100nF 10% 50V
2414	4822 126 13838	100nF +80/-20% 50V
2415	4822 126 14585	100nF 10% 50V
2416	4822 124 23432	100µF 20% 10V
2417	4822 124 12245	220µF 20% 16V
2418	4822 126 14043	1µF +80/-20% 16V
2419	4822 124 41584	100µF 20% 10V
2420	4822 124 12032	4,7µF 20% 50V
2421	4822 124 81151	22µF 20% 50V
2422	4822 126 14585	100nF 10% 50V
2423	4822 126 13486	15pF 2% 63V
2424	4822 126 13486	15pF 2% 63V
2425	4822 126 13838	100nF +80/-20% 50V
2426	4822 126 13751	47nF 10% 63V
2427	4822 122 33127	2,2nF 10% 63V
2428	4822 122 33177	10nF 20% 50V
2430	5322 116 80853	560pF 5% 63V
2431	4822 126 14585	100nF 10% 50V
2432	5322 122 32531	100pF 5% 50V
2433	4822 126 13692	47pF 1% 63V
2434	4822 126 13692	47pF 1% 63V
2435	4822 126 13692	47pF 1% 63V
2436	4822 126 13692	47pF 1% 63V
2437	4822 126 13692	47pF 1% 63V
2439	4822 126 14585	100nF 10% 50V
2440	4822 124 22652	2,2µF 20% 50V
2441	4822 122 33177	10nF 20% 50V
2442	4822 122 33177	10nF 20% 50V
2443	4822 122 33177	10nF 20% 50V
2445	5322 116 80853	560pF 5% 63V
2446	4822 122 33177	10nF 20% 50V
2447	4822 122 33177	10nF 20% 50V
2462	4822 126 14076	220nF +80/-20% 25V
2464	4822 126 14076	220nF +80/-20% 25V
2468	4822 126 14076	220nF +80/-20% 25V
2475	4822 126 14585	100nF 10% 50V
2476	4822 124 12032	4,7µF 20% 50V
2477	4822 126 14043	1µF +80/-20% 16V
2479	4822 126 14585	100nF 10% 50V
2481	5322 122 32268	470pF 5% 63V
2482	4822 126 12882	100nF +80/-20% 50V
2483	5322 122 32268	470pF 5% 63V
2484	5322 122 32268	470pF 5% 63V
2485	5322 122 32268	470pF 5% 63V
2486	5322 122 32268	470pF 5% 63V
2488	4822 126 14585	100nF 10% 50V
2489	4822 122 33891	3,3nF 10% 63V
2493	4822 126 14585	100nF 10% 50V

RESISTORS

3400	4822 117 13579	220k 1% 0,1W
3401	4822 117 11449	2k2 5% 0,1W
3402	4822 117 10833	10k 1% 0,1W
3406	4822 051 20479	47R 5% 0,1W
3407	4822 051 10102	1k 2% 0,25W
3410	4822 051 20392	3k9 5% 0,1W
3412	4822 051 20392	3k9 5% 0,1W
3417	4822 117 11454	820R 1% 0,1W
3419	4822 116 52231	820R 5% 0,5W
3420	4822 051 10102	1k 2% 0,25W
3421	4822 051 10102	1k 2% 0,25W
3422	4822 051 10102	1k 2% 0,25W
3423	4822 051 10102	1k 2% 0,25W
3424	4822 051 10102	1k 2% 0,25W
3425	4822 051 10102	1k 2% 0,25W
3426	4822 051 10102	1k 2% 0,25W
3427	4822 051 10102	1k 2% 0,25W
3428	4822 051 10102	1k 2% 0,25W
3429	4822 051 10102	1k 2% 0,25W
3430	4822 051 10102	1k 2% 0,25W
3431	4822 051 10102	1k 2% 0,25W
3433	4822 117 11454	820R 1% 0,1W
3434	4822 051 10102	1k 2% 0,25W
3435	4822 051 10102	1k 2% 0,25W
3436	4822 051 10102	1k 2% 0,25W
3437	4822 051 10102	1k 2% 0,25W
3438	4822 051 10102	1k 2% 0,25W
3439	4822 051 10102	1k 2% 0,25W
3440	4822 051 10102	1k 2% 0,25W
3441	4822 051 10102	1k 2% 0,25W
3442	4822 051 10102	1k 2% 0,25W
3443	4822 051 10102	1k 2% 0,25W
3444	4822 051 10102	1k 2% 0,25W
3445	4822 051 10102	1k 2% 0,25W
3446	4822 051 10102	1k 2% 0,25W
3447	4822 051 10102	1k 2% 0,25W
3448	4822 117 11454	820R 1% 0,1W
3449	4822 116 52231	820R 5% 0,5W
3451	4822 116 52231	820R 5% 0,5W
3452	4822 117 11454	820R 1% 0,1W
3453	4822 051 10102	1k 2% 0,25W
3454	4822 117 13577	330R 1% 0,1W
3455	4822 051 10102	1k 2% 0,25W
3456	4822 117 10833	10k 1% 0,1W
3457	4822 117 11454	820R 1% 0,1W
3458	4822 051 10102	1k 2% 0,25W
3459	4822 050 21003	10k 1% 0,6W
3460	4822 051 10102	1k 2% 0,25W
3461	4822 117 10833	10k 1% 0,1W
3462	4822 117 13577	330R 1% 0,1W
3463	4822 117 10833	10k 1% 0,1W
3464	4822 117 10833	10k 1% 0,1W
3465	4822 051 10102	1k 2% 0,25W
3466	4822 117 10833	10k 1% 0,1W
3467	4822 117 13577	330R 1% 0,1W
3469	4822 051 10102	1k 2% 0,25W
3471	4822 050 24708	4R7 1% 0,6W
3472	4822 051 10102	1k 2% 0,25W
3474	4822 117 13577	330R 1% 0,1W
3475	4822 116 52231	820R 5% 0,5W
3476	4822 051 10102	1k 2% 0,25W
3477	4822 051 10102	1k 2% 0,25W
3478	4822 117 11373	100R 1% 0,1W
3479	4822 051 10102	1k 2% 0,25W
3480	4822 117 13577	330R 1% 0,1W
3481	4822 051 10102	1k 2% 0,25W
3482	4822 051 10102	1k 2% 0,25W
3483	4822 050 24708	4R7 1% 0,6W
3484	4822 051 10102	1k 2% 0,25W
3485	4822 051 10102	1k 2% 0,25W
3486	4822 051 10102	1k 2% 0,25W
3488	4822 117 13577	330R 1% 0,1W
3489	4822 051 10102	1k 2% 0,25W
3490	4822 051 10102	1k 2% 0,25W
3493	4822 117 13577	330R 1% 0,1W
3494	4822 117 13577	330R 1% 0,1W
3495	4822 117 10833	10k 1% 0,1W
3496	4822 051 10102	1k 2% 0,25W
3497	4822 050 11002	1k 1% 0,4W
3498	4822 051 10102	1k 2% 0,25W
3499	4822 117 10833	10k 1% 0,1W
3500	4822 051 10102	1k 2% 0,25W
3501	4822 116 52226	560R 5% 0,5W
3502	4822 051 20182	1k8 5% 0,1W
3503	4822 050 11002	1k 1% 0,4W
3504	4822 051 10102	1k 2% 0,25W
3505	4822 117 13577	330R 1% 0,1W
3506	4822 051 10102	1k 2% 0,25W
3507	4822 050 11002	1k 1% 0,4W
3508	4822 051 10102	1k 2% 0,25W
3509	4822 051 10102	1k 2% 0,25W
3510	4822 050 11002	1k 1% 0,4W
3511	4822 051 20182	1k8 5% 0,1W
3512	4822 050 21003	10k 1% 0,6W
3513	4822 050 21003	10k 1% 0,6W
3515	4822 117 10837	100k 1% 0.1W
3517	4822 117 11507	6k8 1% 0,1W
3518	4822 117 13577	330R 1% 0,1W
3519	4822 117 13577	330R 1% 0,1W
3520	4822 050 21003	10k 1% 0,6W
3521	4822 051 10102	1k 2% 0,25W
3522	4822 117 12955	2k7 1% 0,1W
3524	4822 050 11002	1k 1% 0,4W
3525	4822 050 11002	1k 1% 0,4W
3527	4822 050 11002	1k 1% 0,4W
3528	4822 051 10102	1k 2% 0,25W
3529	4822 051 10102	1k 2% 0,25W
3530	4822 117 10833	10k 1% 0,1W
3531	4822 117 10837	100k 1% 0.1W
3532	4822 117 10837	100k 1% 0.1W
3533	4822 117 10833	10k 1% 0,1W
3534	4822 117 10833	10k 1% 0,1W
3535	4822 117 10833	10k 1% 0,1W
3536	4822 051 20474	470k 5% 0,1W
3537	4822 051 20474	470k 5% 0,1W
3541	4822 050 11002	1k 1% 0,4W
3543	4822 051 10102	1k 2% 0,25W
3544	4822 117 10833	10k 1% 0,1W
3545	4822 051 10102	1k 2% 0,25W
3547	4822 051 10102	1k 2% 0,25W

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ELECTRICAL PARTS LIST - FRONT BOARD

ELECTRICAL PARTS LIST - FRONT BOARD

RESISTORS

3548	4822 051 10102	1k 2% 0,25W
3549	4822 117 10833	10k 1% 0,1W
3551	4822 117 13577	330R 1% 0,1W
3552	4822 117 13577	330R 1% 0,1W
3553	4822 117 10833	10k 1% 0,1W
3554	4822 117 10833	10k 1% 0,1W
3556	4822 051 10102	1k 2% 0,25W
3558	4822 117 10833	10k 1% 0,1W
3559	4822 051 20105	1M 5% 0,1W
3561	4822 051 20472	4k7 5% 0,1W
3562	4822 117 10833	10k 1% 0,1W
3563	4822 117 10833	10k 1% 0,1W
3564	4822 117 10833	10k 1% 0,1W
3565	4822 051 20472	4k7 5% 0,1W
3566	4822 117 10833	10k 1% 0,1W
3567	4822 117 10833	10k 1% 0,1W
3568	4822 117 10834	47k 1% 0,1W
3569	4822 051 20223	22k 5% 0,1W
3570	4822 051 20223	22k 5% 0,1W
3571	4822 117 11383	12k 1% 0,1W
3572	4822 117 10833	10k 1% 0,1W
3573	4822 051 20223	22k 5% 0,1W
3574	4822 051 20223	22k 5% 0,1W
3577	4822 117 11383	12k 1% 0,1W
3578	4822 051 20562	5k6 5% 0,1W
3581	4822 117 10833	10k 1% 0,1W
3584	4822 051 10102	1k 2% 0,25W
3585	4822 051 10102	1k 2% 0,25W
3586	4822 050 11002	1k 1% 0,4W
3587	4822 050 21003	10k 1% 0,6W
3601	4822 117 10833	10k 1% 0,1W
3603	4822 117 10833	10k 1% 0,1W
3607	4822 051 20182	1k8 5% 0,1W
3608	4822 051 20182	1k8 5% 0,1W
3609	4822 051 20182	1k8 5% 0,1W
3610	4822 051 20182	1k8 5% 0,1W
3611	4822 051 20474	470k 5% 0,1W
3612	4822 117 10833	10k 1% 0,1W
3613	4822 117 11383	12k 1% 0,1W
3614	4822 117 11454	820R 1% 0,1W
3615	4822 117 11454	820R 1% 0,1W
3617	4822 050 21003	10k 1% 0,6W
4401	4822 051 20008	0R Jumper 0805
4402	4822 051 20008	0R Jumper 0805
4410	4822 051 20008	0R Jumper 0805
4411	4822 051 20008	0R Jumper 0805
4412	4822 051 20008	0R Jumper 0805
4414	4822 051 20008	0R Jumper 0805
4416	4822 051 20008	0R Jumper 0805
4418	4822 051 20008	0R Jumper 0805
4419	4822 051 20008	0R Jumper 0805
4420	4822 051 20008	0R Jumper 0805
4421	4822 051 20008	0R Jumper 0805
4422	4822 051 20008	0R Jumper 0805
4423	4822 051 20008	0R Jumper 0805
4424	4822 051 20008	0R Jumper 0805
4425	4822 051 20008	0R Jumper 0805
4426	4822 051 20008	0R Jumper 0805
4427	4822 051 20008	0R Jumper 0805
4428	4822 051 20008	0R Jumper 0805
4429	4822 051 20008	0R Jumper 0805
4430	4822 051 20008	0R Jumper 0805
4431	4822 051 20008	0R Jumper 0805
4432	4822 051 20008	0R Jumper 0805
4433	4822 051 20008	0R Jumper 0805
4434	4822 051 20008	0R Jumper 0805
4435	4822 051 20008	0R Jumper 0805
4437	4822 051 20008	0R Jumper 0805
4438	4822 051 20008	0R Jumper 0805
4439	4822 051 20008	0R Jumper 0805
4440	4822 051 20008	0R Jumper 0805
4441	4822 051 20008	0R Jumper 0805
4442	4822 051 20008	0R Jumper 0805
4443	4822 051 20008	0R Jumper 0805
4444	4822 051 20008	0R Jumper 0805
4445	4822 051 20008	0R Jumper 0805
4446	4822 051 20008	0R Jumper 0805
4447	4822 051 20008	0R Jumper 0805
4448	4822 051 20008	0R Jumper 0805
4449	4822 051 20008	0R Jumper 0805
4450	4822 051 20008	0R Jumper 0805
4451	4822 051 20008	0R Jumper 0805
4452	4822 051 20008	0R Jumper 0805
4453	4822 051 20008	0R Jumper 0805
4454	4822 051 20008	0R Jumper 0805
4455	4822 051 20008	0R Jumper 0805
4456	4822 051 20008	0R Jumper 0805
4457	4822 051 20008	0R Jumper 0805
4458	4822 051 20008	0R Jumper 0805
4459	4822 051 20008	0R Jumper 0805
4460	4822 051 20008	0R Jumper 0805
4461	4822 051 20008	0R Jumper 0805
4462	4822 051 20008	0R Jumper 0805
4463	4822 051 20008	0R Jumper 0805
4464	4822 051 20008	0R Jumper 0805
4465	4822 051 20008	0R Jumper 0805
4466	4822 051 20008	0R Jumper 0805
4467	4822 051 20008	0R Jumper 0805
4468	4822 051 20008	0R Jumper 0805
4469	4822 051 20008	0R Jumper 0805
4470	4822 051 20008	0R Jumper 0805
4471	4822 051 20008	0R Jumper 0805
4472	4822 051 20008	0R Jumper 0805
4473	4822 051 20008	0R Jumper 0805
4474	4822 051 20008	0R Jumper 0805
4475	4822 051 20008	0R Jumper 0805
4476	4822 051 20008	0R Jumper 0805
4477	4822 051 20008	0R Jumper 0805
4478	4822 051 20008	0R Jumper 0805
4479	4822 051 20008	0R Jumper 0805
4480	4822 051 20008	0R Jumper 0805
4481	4822 051 20008	0R Jumper 0805
4482	4822 051 20008	0R Jumper 0805
4483	4822 051 20008	0R Jumper 0805
4484	4822 051 20008	0R Jumper 0805
4485	4822 051 20008	0R Jumper 0805
4486	4822 051 20008	0R Jumper 0805
4487	4822 051 20008	0R Jumper 0805
4488	4822 051 20008	0R Jumper 0805
4489	4822 051 20008	0R Jumper 0805
4490	4822 051 20008	0R Jumper 0805
4491	4822 051 20008	0R Jumper 0805
4492	4822 051 20008	0R Jumper 0805
4493	4822 051 20008	0R Jumper 0805
4494	4822 051 20008	0R Jumper 0805
4495	4822 051 20008	0R Jumper 0805
4496	4822 051 20008	0R Jumper 0805
4497	4822 051 20008	0R Jumper 0805
4498	4822 051 20008	0R Jumper 0805
4499	4822 051 20008	0R Jumper 0805
4500	4822 051 20008	0R Jumper 0805
4501	4822 051 20008	0R Jumper 0805
4502	4822 051 20008	0R Jumper 0805
4503	4822 051 20008	0R Jumper 0805
4504	4822 051 20008	0R Jumper 0805
4505	4822 051 20008	0R Jumper 0805
4506	4822 051 20008	0R Jumper 0805
4508	4822 051 20008	0R Jumper 0805
4509	4822 051 20008	0R Jumper 0805
4510	4822 051 20008	0R Jumper 0805
4511	4822 051 20008	0R Jumper 0805
4512	4822 051 20008	0R Jumper 0805
4513	4822 051 20008	0R Jumper 0805
4514	4822 051 20008	0R Jumper 0805
4515	4822 051 20008	0R Jumper 0805
4516	4822 051 20008	0R Jumper 0805
4517	4822 051 20008	0R Jumper 0805
4518	4822 051 20008	0R Jumper 0805
4519	4822 051 20008	0R Jumper 0805
4520	4822 051 20008	0R Jumper 0805
4521	4822 051 20008	0R Jumper 0805
4522	4822 051 20008	0R Jumper 0805
4523	4822 051 20008	0R Jumper 0805
4524	4822 051 20008	0R Jumper 0805
4525	4822 051 20008	0R Jumper 0805
4526	4822 051 20008	0R Jumper 0805
4527	4822 051 20008	0R Jumper 0805
4528	4822 051 20008	0R Jumper 0805
4529	4822 051 20008	0R Jumper 0805
4530	4822 051 20008	0R Jumper 0805
4531	4822 051 20008	0R Jumper 0805
4532	4822 051 20008	0R Jumper 0805
4533	4822 051 20008	0R Jumper 0805
4534	4822 051 20008	0R Jumper 0805
4535	4822 051 20008	0R Jumper 0805
4536	4822 051 20008	0R Jumper 0805
4537	4822 051 20008	0R Jumper 0805
4538	4822 051 20008	0R Jumper 0805
4539	4822 051 20008	0R Jumper 0805
4540	4822 051 20008	0R Jumper 0805
4541	4822 051 20008	0R Jumper 0805
4542	4822 051 20008	0R Jumper 0805
4543	4822 051 20008	0R Jumper 0805
4544	4822 051 20008	0R Jumper 0805
4545	4822 051 20008	0R Jumper 0805
4546	4822 051 20008	0R Jumper 0805
4547	4822 051 20008	0R Jumper 0805
4549	4822 051 20008	0R Jumper 0805

COILS & FILTERS

5400	4822 242 72066	Ceram Resonator 8MHz
5401	2422 543 01069	X'tal Resonator 32,768kHz
5402	4822 157 62552	Coil 2,2µH 5%
5403	4822 157 62552	Coil 2,2µH 5%
5404	4822 157 62552	Coil 2,2µH 5%
5405	4822 157 62552	Coil 2,2µH 5%

DIODES

6400	4822 130 11589	LTL-1CHAE
6401	4822 130 11589	LTL-1CHAE
6402	4822 130 11589	LTL-1CHAE
6403	4822 130 11589	LTL-1CHAE
6404	4822 130 11589	LTL-1CHAE
6405	4822 130 10791	LTL-1CHGE
6406	4822 130 11589	LTL-1CHAE
6407	4822 130 11589	LTL-1CHAE
6408	4822 130 11589	LTL-1CHAE
6409	4822 130 11589	LTL-1CHAE
6410	9322 161 99676	LTL-2R3VYKNT
6411	9322 161 99676	LTL-2R3VYKNT
6412	4822 130 30621	1N4148
6413	4822 130 30621	1N4148
6414	4822 130 30621	1N4148
6415	4822 130 30621	1N4148
6416	4822 130 30621	1N4148
6417	4822 130 30621	1N4148
6418	4822 130 30621	1N4148
6419	4822 130 30621	1N4148

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ELECTRICAL PARTS LIST - FRONT BOARD

DIODES

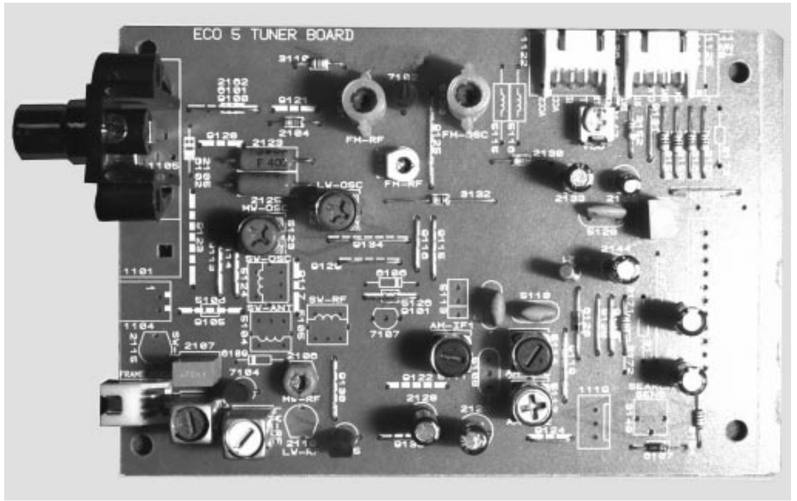
6420	4822 130 30621	1N4148
6421	4822 130 30621	1N4148
6425	4822 130 31878	1N4003G
6426	4822 130 31878	1N4003G
6428	4822 130 30621	1N4148

TRANSISTORS & INTEGRATED CIRCUITS

7400	4822 209 31981	SAA6579T
7401	3139 110 52521	TMP87CS71F “290S52521”
7402	9965 000 04931	M24C01-WMN6
7403	5322 130 60159	BC847B
7404	5322 209 11306	HEF4094BT
7405	5322 209 11306	HEF4094BT
7408	5322 130 60159	BC847B
7409	4822 130 10165	GP1U28XP
7410	5322 130 60159	BC847B
7411	5322 130 60159	BC847B
7412	5322 130 60159	BC847B
7413	5322 130 60159	BC847B
7414	5322 130 60159	BC847B
7415	5322 130 60159	BC847B

Note: Only the parts mentioned in this list are normal service spare parts.

7B-1
7B-1



TUNER BOARD ECO5

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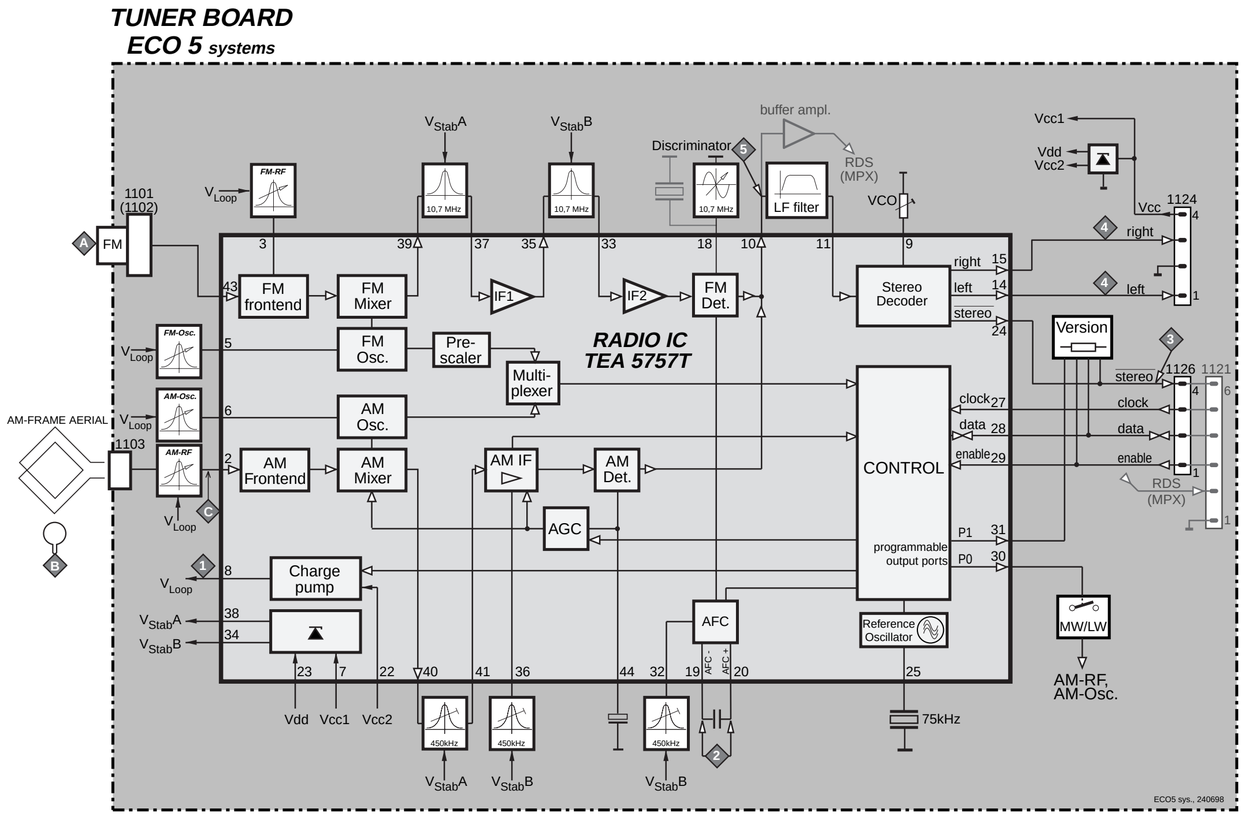
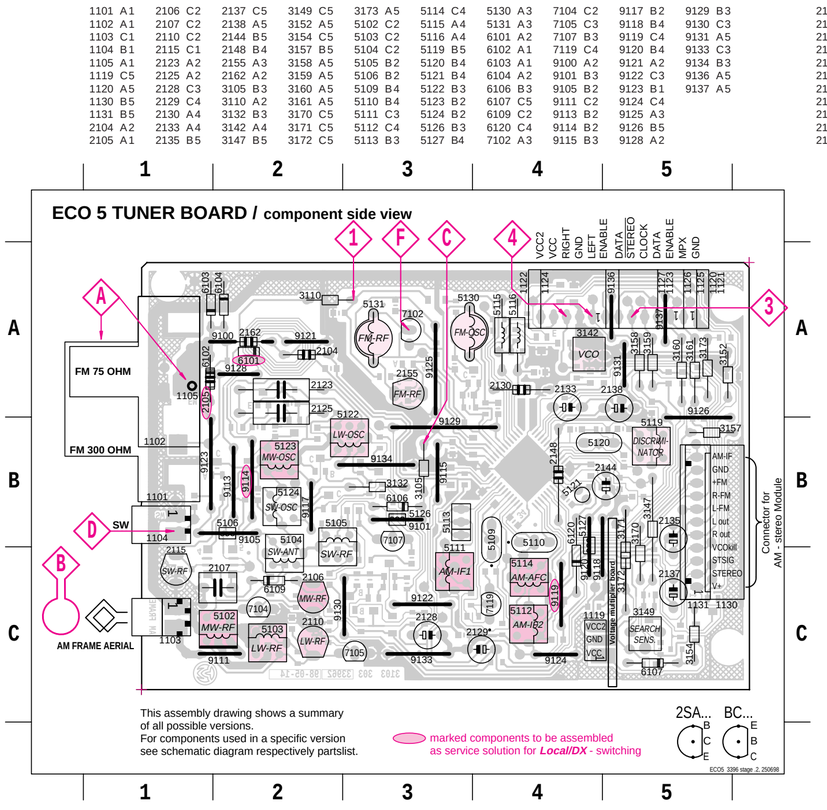
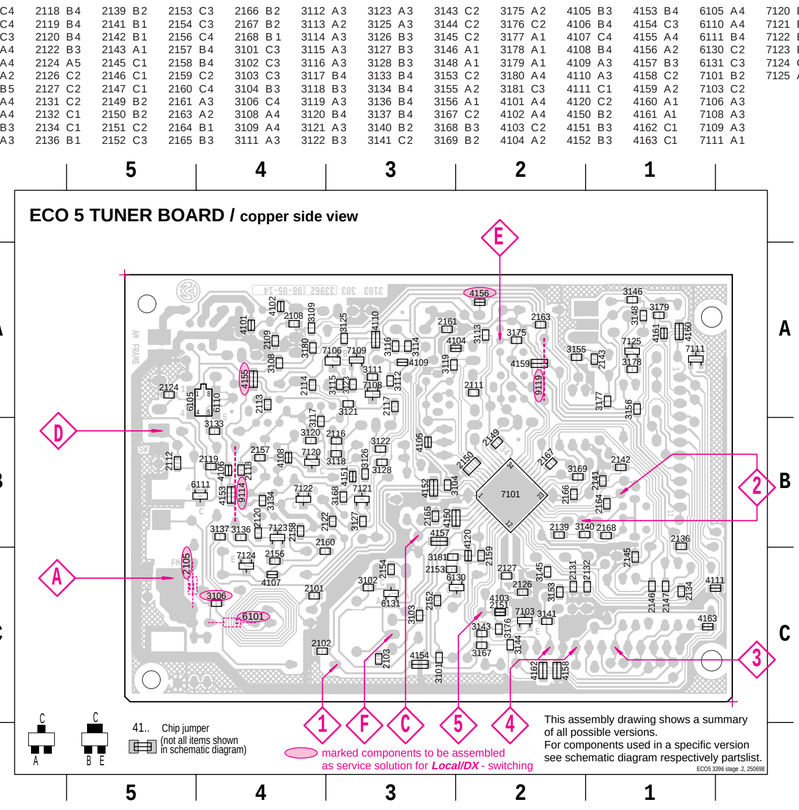
BLOCKDIAGRAM



7B-2

7B-2





TUNER ADJUSTMENT TABLE (ECO5 FM/MW- and FM/MW/LW - versions with AM-frame aerial)

Waverange	Input frequency	Input	Tuned to	Adjust	Output	Scope/Voltmeter
VARICAP ALIGNMENT						
FM 87.5 - 108MHz (65.81 - 74, 87.5 - 108MHz)			108MHz	5130		8V ±0.2V
			87.5MHz (65.81MHz)	check		4.3V ±0.5V (1.2V ±0.5V)
MW FM/AM-version, 10kHz grid 530 - 1700kHz			1700kHz	5123		8V ±0.2V
			530kHz	check		1.1V ±0.4V
FM/MW-version, 9kHz grid 531 - 1602kHz			1602kHz	5123	◇1	6.9V ±0.2V
			531kHz	check		1.1V ±0.4V
LW 153 - 279kHz			279kHz	5122		8V ±0.2V
			153kHz	check		1.1V ±0.4V
MW FM/MW/LW- version, 9kHz grid 531 - 1602kHz			1602kHz	5123		8V ±0.2V
			531kHz	check		1.1V ±0.4V
FM IF						
FM	10.7MHz, 50mV continuous wave	◇F	IC 7101 21 shortcircuit to block AFC 2141	5119	◇2	0 ± 3 mV DC
FM RF						
FM 87.5 - 108MHz (65.81 - 74, 87.5 - 108MHz)	108MHz	◇A mod=1kHz Δf=±22.5kHz	108MHz	2155	◇4	MAX
	87.5MHz (65.81MHz)		87.5MHz (65.81MHz)	5131		
VCO						
FM	98MHz, 1mV continuous wave	◇A	98MHz	3142	◇3	152kHz ±1kHz [1]
AM IF						
MW	450kHz connect pin 6 of IC 7101 (AM Osc.) with short wire to ground (pin 4)	◇C Δf=±15kHz V_{RF} = 3mV	IC 7101 36 220R 100nF	5111	◇4	max. f_o symmetric
			IC 7101 40 see remark [2] 220R 100nF	5112		
AM AFC **MW**		◇C continuous wave V_{RF} = 10mV		5114	◇2	0 ± 2 mV DC
AM RF [3]						
MW [4] FM/MW/LW- and FM/MW-version (9kHz grid) 531 - 1602kHz	1494kHz	◇B Δf = ±30kHz V_{RF} as low as possible	1494kHz	2106	◇4	max. f_o symmetric
	558kHz		558kHz	5102		
LW	198kHz		198kHz	5103		
MW FM/AM-version, 10kHz grid 530 - 1700kHz	1500kHz		1500kHz	2106		
	560kHz		560kHz	5102		

ECO5, discr. coil, 090797

Use service test program. By selecting the TUNER TEST test frequencies will be stored as preset frequencies automatically.

1) If sensitivity of frequency counter is too low adjust to max. channel separation (input signal: stereo left 90% + 9%, adjust output on right channel to minimum)

2) RC network serves for damping the IF-filter while adjusting the other one.

3) For AM RF adjustments the original frame antenna has to be used !

4) MW has to be aligned before LW.

↕ Repeat

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TUNER BOARD ECO5 / Systems

VERSION PROGRAMMING COMPONENTS					
	6120	3156	3157	3170	remark
/00 FM/MW/LW	x	-	-	-	7111 not mounted
/00 FM/MW/LW/SW-Eu	-	-	-	-	
/01 FM/MW-Stereo	-	-	x	-	SW
/01 FM/MW	-	x	-	x	
/01 FM/MW/SW-Ov	-	x	-	-	
/06 FM-Japan/MW-stereo	-	-	-	x	
/13 FM/MW-Stereo	-	-	x	-	SW
/14 FM-OIRT/MW/LW	x	-	x	x	
/14 FM-OIRT/MW	x	-	x	-	
/17 FM/AM-Stereo	-	-	x	-	SW
/17 FM/AM	x	-	-	x	
/.. FM/MW/2xSW	-	-	x	x	
/15 FM/MW/SW-Eu	-	x	x	x	

x = component mounted
SW = Software initialisation

2140 exchanged by 2164 (SMD type 0805) from layout stage 3317.9 onwards respectively 3103 303 3380.1 and 3103 308 3396.1

3140 and 5120 provisional as alternative

r....for RDS version only
s...for East European version (/14/34) only
t....for Japanese version (/06/26) only
u...for 2-band (FM/AM) version only
v...for SW-version 3.9-12.1MHz only
w...for LW only
x....not for all versions
y....for USA version (/17/37) only
z....for AM-STEREO (/06/13/26/33) versions only

Signal path: FM, AM, MPX (Audio Frequency), AF - left/right

Vdc FM mode stereo
Vdc MW mode
Vdc LW mode

Voltages measured while set is tuned to a strong transmitter

ECO5 systems, discr.coil, 030998

7B-4

ELECTRICAL PARTS LIST - ECO5 TUNER BOARD

ELECTRICAL PARTS LIST - ECO5 TUNER BOARD

MISCELLANEOUS

1101	4822 267 31505	Antenna Socket 300R	
1102	4822 267 10283	Antenna Socket Coax IEC 75R	

CAPACITORS

2101	5322 122 32531	100pF 5% 50V	
2101	4822 126 13692	47pF 1% 63V	for USA
2102	4822 122 33177	10nF 20% 50V	
2103	5322 122 34123	1nF 10% 50V	
2104	4822 122 33195	100pF 10% 50V	
2106	4822 125 50355	Trimmer 4-20pF	for LW version
2106	4822 125 60101	Trimmer 3-11pF 100V	
2107	4822 121 51319	1µF 10% 63V	
2108	5322 122 32531	100pF 5% 50V	for LW version
2109	5322 122 32448	10pF 5% 50V	for LW version
2120	4822 126 13691	27pF 1% 63V	for LW version
2120	5322 122 32658	22pF 5% 50V	
2122	4822 122 33891	3,3nF 10% 63V	for LW version
2125	4822 121 51381	560pF 5% 400V	
2126	5322 122 31863	330pF 5% 50V	
2127	4822 126 13473	220nF +80/-20% 50V	
2128	4822 124 41579	10µF 20% 50V	
2129	4822 124 41584	100µF 20% 10V	
2130	4822 126 11585	22nF+80/- 20% 25V	
2131	4822 122 33325	470nF 16V	
2131	4822 126 13482	470nF +80/- 20% 16V	
2132	4822 126 13482	470nF +80/- 20% 16V	
2133	4822 124 40242	1µF 20% 63V	
2134	4822 126 13188	15nF 5% 63V	
2134	5322 122 32654	22nF 10% 63V	for USA
2135	4822 124 40746	0,22µF 20% 63V	
2136	4822 126 13188	15nF 5% 63V	
2136	5322 122 32654	22nF 10% 63V	for USA
2137	4822 124 40746	0,22µF 20% 63V	
2138	4822 124 41576	2,2µF 20% 50V	
2139	4822 126 14236	50V 15pF 5%	
2140	4822 121 51252	470nF 5% 63V	
2141	4822 126 10002	100nF 20% 25V	
2142	4822 126 10002	100nF 20% 25V	
2143	4822 126 13473	220nF +80/-20% 50V	
2144	4822 124 40242	1µF 20% 63V	
2145	4822 122 33575	220pF 5% 50V	
2146	4822 122 33575	220pF 5% 50V	
2147	4822 122 33575	220pF 5% 50V	
2148	4822 126 11585	22nF+80/- 20% 25V	
2149	5322 122 32654	22nF 10% 63V	
2150	4822 122 31947	100nF 20% 63V	
2152	5322 116 80853	560pF 5% 63V	for East. Europe
2152	4822 126 12105	33nF 5% 63V	
2153	4822 122 32139	12pF 2% 63V	for East. Europe
2153	4822 122 32504	15pF 2% 63V	
2155	4822 125 60101	Trimmer 3-11pF 100V	
2158	5322 122 32448	10pF 5% 50V	for LW version
2159	5322 122 32659	33pF 5% 50V	
2160	5322 122 32654	22nF 10% 63V	
2161	4822 126 10002	100nF 20% 25V	
2163	4822 126 10002	100nF 20% 25V	
2164	4822 126 13482	470nF +80/- 20% 16V	
2165	4822 126 10002	100nF 20% 25V	
2166	5322 122 34123	1nF 10% 50V	
2167	4822 122 32139	12pF 2% 63V	
2168	4822 126 13695	82pF 1% 63V	

RESISTORS

3101	4822 051 20562	5k6 5% 0,1W	for East. Europe
3101	4822 051 20333	33k 5% 0,1W	
3102	4822 051 20104	100k 5% 0,1W	
3103	4822 117 10965	18k 1% 0,1W	
3104	4822 117 11448	180R 1% 0,1W	
3105	4822 116 83872	220R 5% 0,5W	
3108	4822 117 11449	2k2 1% 0,1W	for LW version
3109	4822 051 20472	4k7 5% 0,1W	for LW version
3110	4822 116 52195	47R 5% 0,5W	
3120	4822 051 20008	0R Jumper 0805	
3123	4822 051 20472	4k7 5% 0,1W	for LW version
3125	4822 117 10833	10k 1% 0,1W	for LW version
3128	4822 117 11449	2k2 1% 0,1W	for LW version
3132	4822 116 52195	47R 5% 0,5W	
3134	4822 051 20223	22k 5% 0,1W	
3137	4822 051 20223	22k 5% 0,1W	for LW version
3140	4822 051 20008	0R Jumper 0805	
		5120=CDA10.7MG40K	
3140	4822 117 10353	150R 1% 0,1W	
		5120=CDA10.7MG61KA	
3141	4822 051 20563	56k 5% 0,1W	
3142	4822 100 11163	Trimmer 100k 30% 0,1W	
3143	4822 051 20223	22k 5% 0,1W	for RDS version
3144	4822 051 10102	1k 2% 0,25W	for RDS version
3145	4822 117 11449	2k2 1% 0,1W	
3146	4822 051 20229	22R 5% 0,1W	
3152	4822 116 83883	470R 5% 0,5W	
3153	4822 051 20471	470R 5% 0,1W	
3154	4822 116 83868	150R 5% 0,5W	
3155	4822 051 20471	470R 5% 0,1W	
3156	4822 051 20104	100k 5% 0,1W	for /21/30/33 only
3157	4822 116 52234	100k 5% 0,5W	for East. Europe
3158	4822 116 83883	470R 5% 0,5W	
3159	4822 116 83883	470R 5% 0,5W	
3160	4822 116 83883	470R 5% 0,5W	
3161	4822 116 83883	470R 5% 0,5W	
3167	4822 117 11503	220R 1% 0.1W	
3169	4822 051 20154	150k 5% 0,1W	
3170	4822 116 52234	100k 5% 0,5W	
3171	4822 116 52219	330R 5% 0,5W	
3176	4822 051 10102	1k 2% 0,25W	for RDS version
3180	4822 051 20223	22k 5% 0,1W	for LW version
4101	4822 051 20008	0R Jumper 0805	for 2-Band only
4102	4822 051 20008	0R Jumper 0805	for 2-Band only
4103	4822 051 20008	0R Jumper 0805	
4104	4822 051 20008	0R Jumper 0805	
4105	4822 051 20008	0R Jumper 0805	
4106	4822 051 20008	0R Jumper 0805	
4108	4822 051 20008	0R Jumper 0805	
4111	4822 051 20008	0R Jumper 0805	
4120	4822 051 20008	0R Jumper 0805	
4150	4822 051 10008	0R Jumper 1206	
4151	4822 051 20008	0R Jumper 0805	
4152	4822 051 10008	0R Jumper 1206	
4153	4822 051 10008	0R Jumper 1206	
4154	4822 051 10008	0R Jumper 1206	
4155	4822 051 10008	0R Jumper 1206	
4156	4822 051 20008	0R Jumper 0805	
4157	4822 051 10008	0R Jumper 1206	
4158	4822 051 10008	0R Jumper 1206	
4159	4822 051 10008	0R Jumper 1206	
4162	4822 051 10008	0R Jumper 1206	

COILS & FILTERS

5102	4822 157 71634	MW RF Coil	
5103	4822 157 71635	LW RF Coil	for LW version
5109	4822 242 70665	Ceram Filter 10,7MHz	
5110	4822 242 70665	Ceram Filter 10,7MHz	
5111	4822 158 60511	AM-IF Filter 450kHz	
5112	4822 157 70302	AM-IF Filter 450kHz	
5114	4822 157 70302	AM-IF Filter 450kHz	
5119	4822 157 11443	Discriminator 10,7MHz	
5120	4822 242 82065	Cer. Disc. 10,7MG40K	
5120	4822 242 10251	Cer. Disc.10,7MG61KA-TF21	
5121	4822 242 10261	Quartz 75kHz	
5122	4822 157 60517	Osc. Coil LW	for LW version
5123	4822 157 60517	Osc. Coil MW	
5130	4822 156 30947	RF-Coil 1.5T	
5131	4822 156 30947	RF-Coil 1.5T	

DIODES

6103	4822 130 30621	1N4148	
6104	4822 130 30621	1N4148	
6105	4822 130 83075	HN1V02H-B	
6106	4822 130 30621	1N4148	
6107	4822 130 34488	BZX79-B11	
6120	4822 130 30621	1N4148	not for /21/30/33
6130	4822 130 82833	1SV228	
6131	4822 130 82833	1SV228	

TRANSISTORS & INTEGRATED CIRCUITS

7101	4822 209 90924	TEA5757H/V1	
7102	4822 130 60093	2SA838B	
7103	4822 130 42513	BC858C	for RDS version
7104	5322 130 44779	BC338-40	for LW version
7105	5322 130 44779	BC338-40	for LW version
7109	5322 130 41983	BC858B	for LW version
7111	5322 130 42136	BC848C	
7122	5322 130 42136	BC848C	for LW version
7124	5322 130 42136	BC848C	for LW version

Note: Only the parts mentioned in this list are normal service spare parts.

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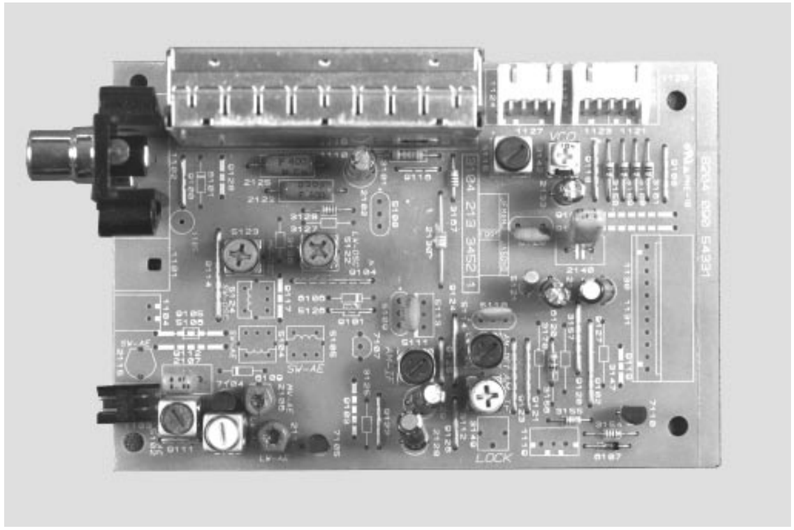
7D-1



TUNER 95 BOARD

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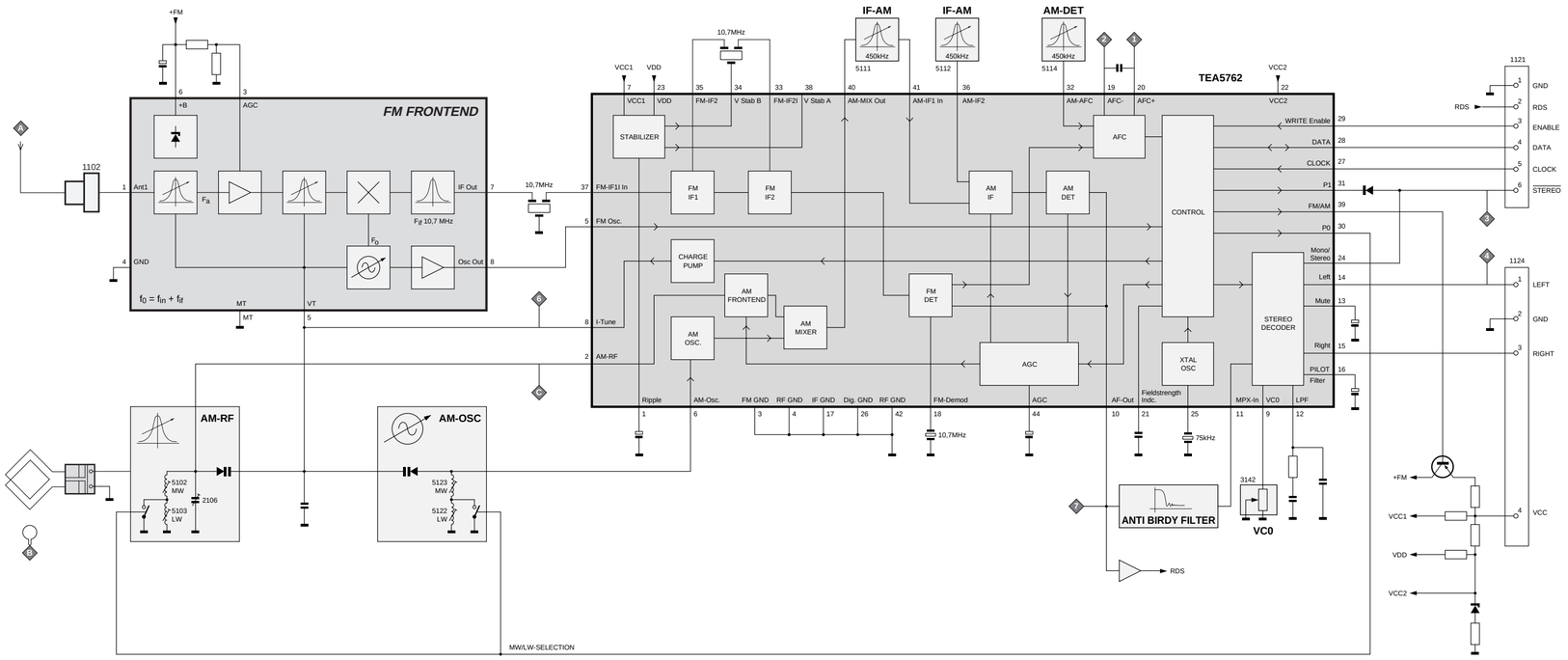
BLOCKDIAGRAM



TUNER 95 bis Adjustment Table (FM, MW, LW with Frame antenna)

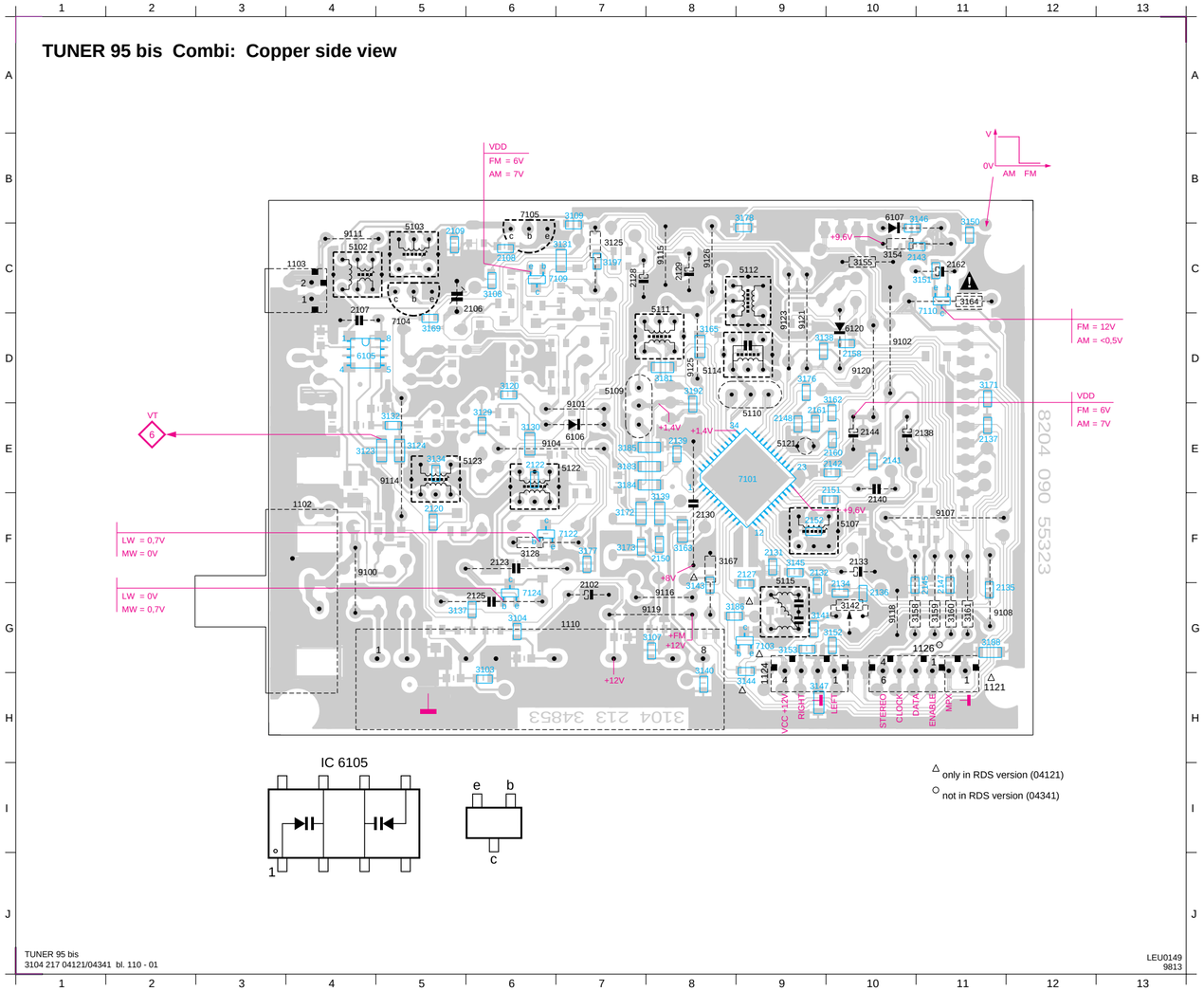
Waverange	Input frequency	Input	Set tuned to	Adjust	Output	Scope / Voltmeter
VARICAP ALIGNMENT						
FM (50)			108 MHz	check		7 ... 9V
87.5 - 108 MHz			87.5 MHz	check		1.3 ... 2V
MW (9)			1602 kHz	5123		8.3V ± 0.2V
531 - 1602 kHz			531 kHz	check	◇6	1V ± 0.4V
LW (3)			279 kHz	5122		8.3V ± 0.2V
153 - 279 kHz			153 kHz	check		1V ± 0.4V
FM – DETECTION						
FM	98 MHz 1mV continuous wave ***short pin 21 (IC7101) to ground***	◇A	98 MHz	5107	◇1 ◇2	0mV ± 3mV
FM – VCO						
FM	98 MHz 1 mV continuous wave	◇A	98 MHz	3142	◇3	152kHz ± 1 kHz
DISTORTION						
FM	98 MHz 1 mV 90 % L + 9 % pilot mod = 1kHz	◇A	98MHz	mixcoil inside Tuner 1110	◇4	Distortion minimum
AM – IF						
MW	450kHz Δf = 10kHz Low as possible Swept signal	100nF 50E	MW	5111	◇7	symmetrical and max. height
				5112		
	450kHz continuous wave	◇C		5114	◇1 ◇2	0mV ± 2mV
AM - RF						
MW	558kHz Mod = 1kHz 30 % AM 1494 kHz	◇B	558kHz	5102	◇7	MAX
			1494kHz	2106		
LW	198kHz mod = 1kHz 30 % AM	*	198kHz	5103		MAX

adjtable for 3104 217 04121/04341

* Signal send via a frame antenna
(..) = tuning grid in kHz

↕ repeat

1102	F4	2107	C4	2128	C7	2136	G10	2144	E10	2160	E9	3120	D6	3132	E5	3143	G8	3153	G9	3163	F8	3176	D9	3188	G11	5111	C8	6106	E7	7110	D11	9108	G11	9121	D9
1103	C4	2108	C6	2129	C8	2137	E11	2145	G11	2161	E9	3123	E4	3134	E5	3144	H9	3154	C10	3164	C11	3177	F7	3192	D8	5112	C9	6107	B10	7122	F7	9111	C4	9123	D9
1110	G7	2109	C5	2130	F8	2138	E10	2147	G11	2162	C11	3124	E5	3137	G5	3145	F9	3155	C10	3165	D8	3178	B8	3197	C7	5114	D8	6120	D10	7124	G6	9114	E5	9125	D8
1121	H11	2120	F5	2131	F9	2139	E8	2148	E9	3103	H6	3125	C7	3138	D9	3146	B10	3158	G11	3167	F8	3181	D8	5102	C4	5115	G9	7101	E9	9100	F4	9115	C8	9126	C8
1124	H9	2122	E6	2132	F9	2140	F10	2150	F8	3104	G6	3128	F6	3139	F8	3147	H9	3159	G11	3169	D5	3183	E7	5103	C5	5121	E9	7103	G9	9101	E7	9116	G8		
1126	G10	2123	F6	2133	F10	2141	E10	2151	F9	3107	G7	3129	E6	3140	H8	3150	C11	3160	G11	3171	D11	3184	E7	5107	F10	5122	E7	7104	D5	9102	D10	9118	G10		
2102	G7	2125	G6	2134	G10	2142	E9	2152	F9	3108	C6	3130	E6	3141	G9	3151	C10	3161	G11	3172	F7	3185	E7	5109	D7	5123	E5	7105	B6	9104	E6	9119	G7		
2106	C5	2127	F9	2135	G11	2143	C10	2158	D10	3109	B7	3131	C6	3142	G10	3152	G9	3162	D9	3173	F7	3186	G8	5110	E9	6105	D4	7109	C6	9107	F11	9120	D10		



1102	D1
1103	G2
1110	D4
1121	C21
1124	F21
1126	E20
2102	C2
2106	J4
2107	J6
2108	L2
2109	L3
2120	K7
2122	M7
2123	L7
2125	L7
2127	H16
2128	I13
2129	I8
2130	J20
2131	I17
2132	I17
2133	G18
2134	G19
2135	F19
2136	H19
2137	G19
2138	H18
2139	I7
2140	C14
2141	H15
2142	K19
2143	K20
2144	K20
2145	E19
2147	E19
2148	E19
2150	C6
2151	H12
2152	I11
2158	L18
2160	I15
2161	I15
2162	H20
3103	G3
3104	G4
3107	C6
3108	J1
3109	K1
3120	H5
3123	I6
3124	K7
3125	L11
3128	L9
3129	K8
3130	K8
3131	M10
3132	J7
3134	L6
3137	L5
3140	F7
3141	I16
3142	I16
3143	K17
3144	K17
3145	I17
3146	L20
3147	N20
3150	H19
3151	I20
3152	F20
3153	G20
3154	J20
3155	J20
3158	E19
3159	E19
3160	D19
3161	D19
3162	I15
3163	J8
3164	I20
3167	I20
3169	L5
3172	B6
3173	B6
3177	M10
3178	N20
3181	C7
3183	I13
3184	I8
3185	I13
3186	K16
3188	M20
3192	C12
3197	L11
5102	I3
5103	L4
5107	J12
5109	B6
5110	C9
5111	C11
5112	C12
5114	C13
5115	J15
5121	I15
5122	L7
5123	K7
6105a	I5
6105b	I6
6106	H5
6107	K20
6120	E17
7101	C15
7103	K17
7104	J2
7105	K2
7109	L10
7110	I19
7122	L9
7124	L6

TUNER 95 bis

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ELECTRICAL PARTS LIST - TUNER 95 BOARD

ELECTRICAL PARTS LIST - TUNER 95 BOARD

MISCELLANEOUS

1102	4822 267 10283	Socket Coaxial IEC 75R
1103	4822 265 31184	JST Connector 2 pin
1110	4822 210 10739	Frontend Assembly FE415-G23

CAPACITORS

2102	4822 124 40433	47µF 20% 25V
2106	4822 125 60102	Trimmer 5,2-30pF 100V
2107	4822 121 51252	470nF 5% 63V
2108	4822 126 13695	82pF 1% 63V
2109	4822 126 13691	27pF 1% 63V
2120	5322 122 32659	33pF 5% 50V
2122	5322 126 10465	3,9nF 10% 50V
2123	4822 121 10766	390pF 1% 630V
2125	4822 121 10578	560pF 1% 630V
2127	4822 122 32927	220nF +80/-20% 50V
2128	4822 124 41579	10µF 20% 50V
2129	4822 124 40242	1µF 20% 63V
2130	4822 126 11585	22nF +80/-20% 25V
2131	4822 122 33325	470nF 16V
2132	4822 122 33325	470nF 16V
2133	4822 124 40242	1µF 20% 63V
2134	4822 126 13188	15nF 5% 63V
2135	4822 122 32927	220nF +80/-20% 50V
2136	4822 126 13188	15nF 5% 63V
2137	4822 122 32927	220nF +80/-20% 50V
2138	4822 124 41576	2,2µF 20% 50V
2139	4822 126 10002	100nF 20% 25V
2140	4822 121 51252	470nF 5% 63V
2141	4822 122 31947	100nF 20% 63V
2142	4822 122 31947	100nF 20% 63V
2143	4822 122 32927	220nF +80/-20% 50V
2144	4822 124 40242	1µF 20% 63V
2145	4822 122 33575	220pF 5% 50V
2147	4822 122 33575	220pF 5% 50V
2148	4822 122 33809	22nF 20% 50V
2150	4822 122 31947	100nF 20% 63V
2151	4822 126 14236	15pF 5% 50V
2152	4822 126 13695	82pF 1% 63V
2158	4822 122 31947	100nF 20% 63V
2160	4822 122 32139	12pF 2% 63V
2161	5322 122 34123	1nF 10% 50V
2162	4822 124 81151	22µF 50V

RESISTORS

3103	4822 051 20008	0R Jumper 0805
3104	4822 051 10102	1k 2% 0,25W
3107	4822 051 20829	82R 5% 0,1W
3108	4822 117 11449	2k2 1% 0,1W
3109	4822 117 11449	2k2 1% 0,1W
3120	4822 051 20008	0R Jumper 0805
3123	4822 051 10008	0R Jumper 1206
3124	4822 051 10008	0R Jumper 1206
3125	4822 116 83864	10k 5% 0,5W
3128	4822 116 52256	2k2 5% 0,5W
3129	4822 051 20008	0R Jumper 0805
3130	4822 051 10008	0R Jumper 1206
3131	4822 051 10008	0R Jumper 1206
3132	4822 051 20008	0R Jumper 0805
3134	4822 051 20223	22k 5% 0,1W
3137	4822 117 10833	10k 1% 0,1W
3138	4822 051 20008	0R Jumper 0805
3139	4822 051 10008	0R Jumper 1206
3140	4822 051 20331	330R 5% 0,1W
3141	4822 117 11148	56k 1% 0,1W
3142	4822 100 11163	Trimmer 100k 30% 0,1W
3143	4822 051 20223	22k 5% 0,1W
3144	4822 051 10102	1k 2% 0,25W
3145	4822 117 11449	2k2 1% 0,1W
3146	4822 051 20479	47R 5% 0,1W
3147	4822 051 10008	0R Jumper 1206
3150	4822 051 20472	4k7 5% 0,1W
3151	4822 051 20683	68k 5% 0,1W
3152	4822 051 20471	470R 5% 0,1W
3153	4822 051 20471	470R 5% 0,1W
3154	4822 116 83872	220R 5% 0,5W
3155	4822 116 52219	330R 5% 0,5W
3158	4822 116 83883	470R 5% 0,5W
3159	4822 116 83883	470R 5% 0,5W
3160	4822 116 83883	470R 5% 0,5W
3161	4822 116 83883	470R 5% 0,5W
3162	4822 117 13579	220k 1% 0,1W
3163	4822 051 10008	0R Jumper 1206
3164	4822 052 10478 ⚠	4R7 5% 0,33W
3165	4822 051 10008	0R Jumper 1206
3167	4822 116 83872	220R 5% 0,5W
3169	4822 051 20008	0R Jumper 0805
3171	4822 051 20008	0R Jumper 0805
3172	4822 051 10008	0R Jumper 1206
3173	4822 051 20008	0R Jumper 0805
3176	4822 051 20008	0R Jumper 0805
3177	4822 051 20223	22k 5% 0,1W
3178	4822 051 10008	0R Jumper 1206
3181	4822 051 10008	0R Jumper 1206
3183	4822 051 10008	0R Jumper 1206
3184	4822 051 10008	0R Jumper 1206
3185	4822 051 10008	0R Jumper 1206
3186	4822 051 10102	1k 2% 0,25W
3188	4822 051 10008	0R Jumper 1206
3192	4822 051 20008	0R Jumper 0805
3197	4822 051 20472	4k7 5% 0,1W

COILS & FILTERS

5102	4822 157 71634	MW Aerial
5103	4822 157 71635	LW Aerial
5107	4822 157 11443	FM Discriminator 10,7MHz
5109	4822 157 71639	Ceram Filter 10,7MHz
5110	4822 242 70665	Ceram Filter 10,7MHz
5111	4822 158 60511	AM-IF Filter 450kHz
5112	4822 157 70302	AM-IF Filter 450kHz
5114	4822 157 70302	AM_IF Filter 450kHz
5115	4822 157 71636	Anti-Birdy Filter
5121	4822 242 10261	X'tal Resonator 75kHZ
5122	4822 157 60517	RF Coil AM
5123	4822 157 60517	RF Coil AM

DIODES

6105	4822 130 83075	HN1V02H-B
6106	4822 130 30621	1N4148
6107	4822 130 34488	BZX79-C11
6120	4822 130 30621	1N4148

TRANSISTORS & INTEGRATED CIRCUITS

7101	4822 209 90315	TEA5762H/V1
7103	4822 130 42513	BC858C
7104	5322 130 44779	BC338-40
7105	5322 130 44779	BC338-40
7109	5322 130 41983	BC858B
7110	5322 130 41983	BC858B
7122	5322 130 42136	BC848C
7124	5322 130 42136	BC848C

Note : Only the parts mentioned in this list are normal service spare parts.

ETF7 TAPE MODULE

(Non-Dolby Version)

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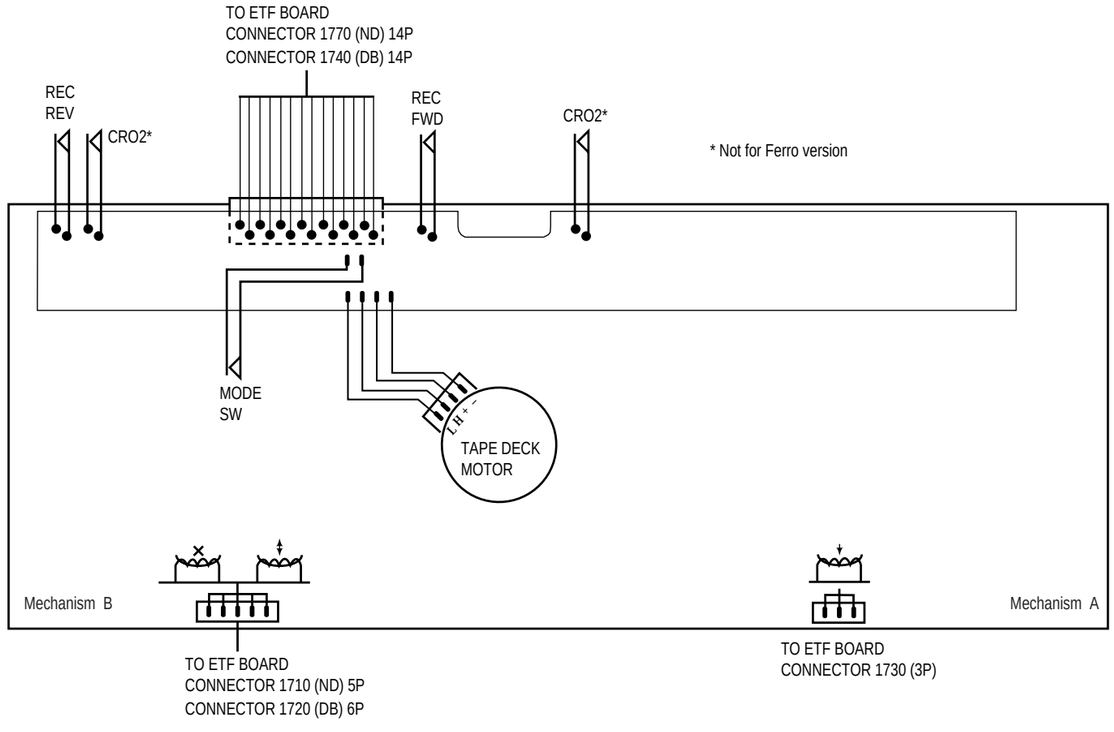
Tapedeck wiring (Double deck)



Variations table for Analog Circuit

	Autoreverse ND/DD/FR	Non-autoreverse ND/DD/FF	
	Chrome/Ferro	Chrome/Ferro	Ferro
2624	-	-	100nF
2701 , 2702	150pF	270pF	270pF
2703 , 2704	100pF	220pF	220pF
2717 , 2718	10nF	15nF	15nF
2721 , 2722	6,8nF	6,8nF	-
2727 , 2728	470pF	1nF	1nF
3616	10k	1k	1k
3618	6k8	-	-
3620	10k trimmer	-	-
3622	-	10k trimmer	10k trimmer
3672	4k7	-	-
3676	47k	-	-
3687	220R	220R	-
3688	680R	-	-
3723 , 3724	15k	18k	18k
3725 , 3726	10R	10R	-
3727 , 3728	5k6	6k8	6k8
3729 , 3730	3k3	4k7	4k7
3743 , 3744	1k5	2k2	2k2
3745 , 3746	3k3	5k6	5k6
3754 , 3755	1M	47R	47R

	Autoreverse ND/DD/FR	Non-autoreverse ND/DD/FF	
	Chrome/Ferro	Chrome/Ferro	Ferro
3769	12k	8k2	8k2
3772	6k8	5k6	5k6
4785	-	-	0R jumper
3774	15k	8k2	8k2
6614	1N4148	-	-
7616	BC857B	-	-
7622	BC847B	-	-

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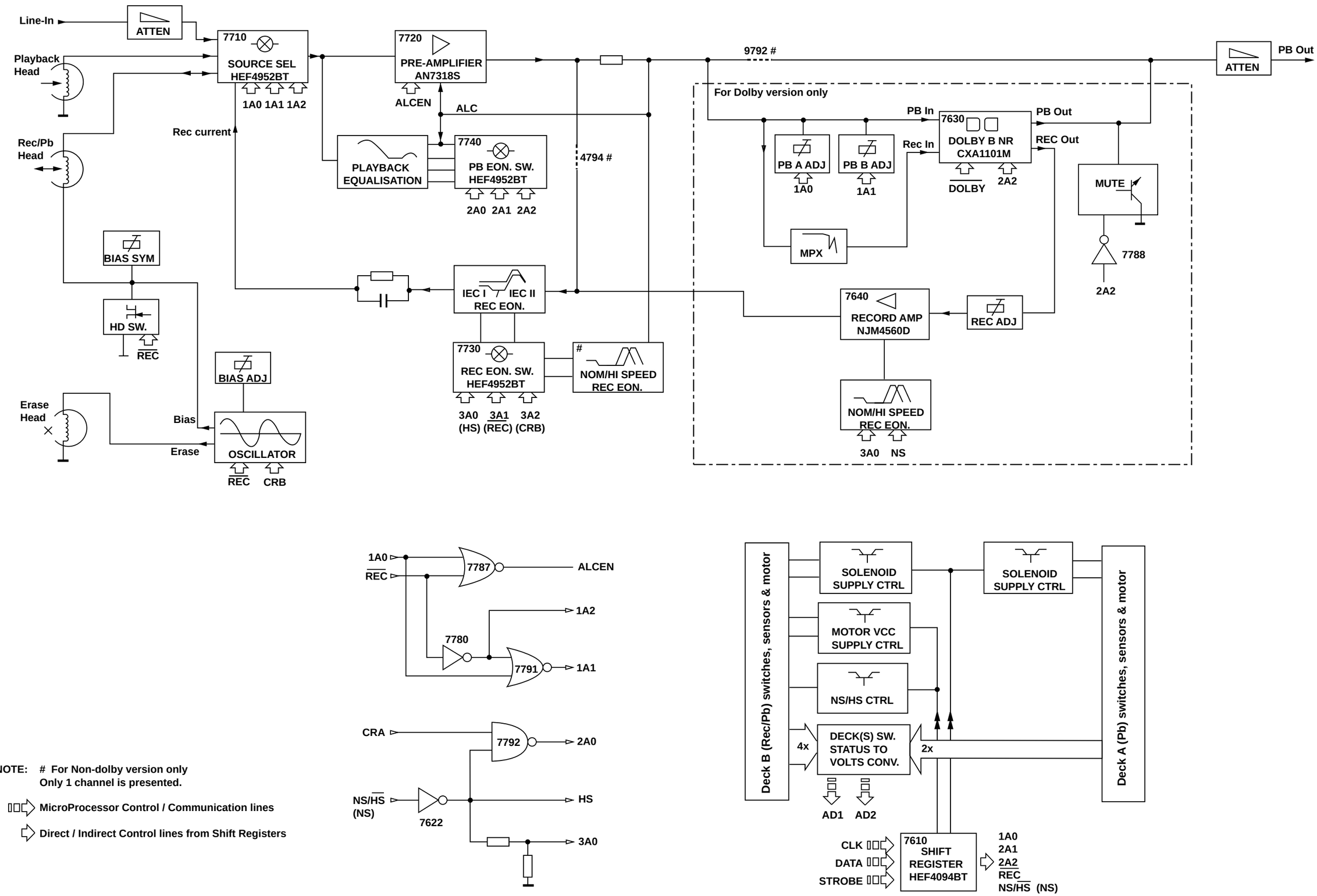
BLOCK DIAGRAM



NOTE: # For Non-dolby version only
Only 1 channel is presented.

MicroProcessor Control / Communication lines

Direct / Indirect Control lines from Shift Registers

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Brief introduction

General

1. Playback Mode
   Signal from the playback head Deck A or Deck B is selected and fed through by the Mode Selector IC7710 (HEF4952BT). The signal is amplified by amplifier IC7720 (AN7323S) before feeding to the IC7740 (HEF4952BT) and out to the AF Board via connector 1701.

2. Recording Mode
   Recording Signal is selected and fed through by the Mode Selector IC7710 (HEF4952BT) which is then amplified by the amplifier IC7720 (AN7323S). The amplified output signal will pass through IC7730 (HEF4952BT) for record equalization and back to IC7710 (HEF4952BT) before registered into the Rec/PB Head of Deck B.

3. Dubbing Mode
   In Dubbing mode, signal from the playback head Deck A is selected and fed through by the Mode Selector IC7710 (HEF4952BT) which is then equalised for playback mode by the amplifier IC7720 (AN7323S) so that a flat response is obtained after the pre-amp. The equalised signal will then follow the same path as in the Recording mode.

4. Mode Selector
   The Mode Selector IC7710 (HEF4952BT) caters for 4 inputs signal, namely Playback Signal from Deck A, Playback Signal from Deck B, Recording Signal and Dubbing Signal.

5. Amplifier PB/REC
   Amplifier IC7720 (AN7323S) is for the purpose of amplifying the Playback and Recording signal from the Mode Selector.

6. Automatic Level Control (ALC)
   ALC circuit consists of resistors (3760, 3765, 3766, 3767), capacitors (2762 , 2763) and control by transistor 7787 (BC847B). ALC limits the amplifier output to a constant value when input signal becomes too large, thus limiting recording current to below saturation level, to prevent recording distortion.

7. Muting Circuit (For Non-Dolby version only)
   Switch S4 of the IC7740 (HEF4952BT) is for the purpose of muting the output during Recording mode. During Recording mode, S4 is closed and shorted to the ground.

8. IC7740 (HEF4952BT)
   The function of the IC7740 (HEF4952BT) is to change time constant between 120us Ferro (IEC I) and 70us Chrome (IEC II) during playback mode. It will automatically determined whether the tape type is 120us Ferro (IEC I) or 70us Chrome (IEC II). This IC will switch to Flat Gain during the Recording mode.

9. IC7730 (HEF4952BT)
   The function of the IC7730 (HEF4952BT) is to change gain and time constant according to tape type and recording speed to boost recording current at higher frequency during recording to compensate for head loss. It will automatically determined whether the tape type is 120us Ferro (IEC I) or 70us Chrome (IEC II).

10. Bias Level
    Bias Level making use of the Variable resistor (3773) for adjusting the optimal level of the bias current for Ferro or Chrome.

11. Bias Symm (For Dolby B NR version only)
    Bias Symm making use of the Variable resistor (3785) to adjust the bias current for the left and the right channel to be equal.

12. PB Switch
    Playback Switch which consists of the FETs 7785 (For Dolby B NR version only) & 7786 (J111) is for the purpose of providing a virtual ground for the Rec/PB Head (Deck B) during Playback mode. During the Playback mode, the FETs are turn on and shorted pin 2 and 4 of connector 1720 to the ground. During Recording mode, the FETs are turn off to allow the oscillator signal to be superposition onto the Recording signal for recording.

13. Motor Speed (For FR versions only)
    During High speed dubbing, a feedback signal from the uP through pin 03 of the IC7610 (HEF4094BT) will trigger the transistors 7622 (BC847B) and 7616 (BC857B) to cause a change in the voltage level between High and Low, thus changing the speed of the motor.

14. IC7610 (HEF4094BT)
    IC7610 (HEF4094BT) is a Shift Register use for issues the logic for cmos switch ICs (HEF4952BT) via 1A0, 2A1 and 2A2. It also issues logic to On/Off SOL_A, SOL_B and MOT. Recording speed is controlled via NS/HS.

Dolby Circuit (For sets with Dolby B NR version only)

15. IC7630 (CXA1551M)
    IC7630 (CXA1551M) in the Dolby circuit is a Dolby Noise Reduction Type B IC for the Playback and Recording signal. Noise Reduction ON/OFF are controlled by $\overline{\text{DOLBY}}$, which is from CLK, direct from uP. After clocking in DATA, CLK is set to HIGH/LOW for NR OFF/ON.

16. 19kHz Filter
    The 19kHz filters 5631 & 5632 (LXD-210) in the Dolby circuit is for the purpose of filtering the 19kHz Pilot Tone (for Tuner signal only) of the Recording signal.

17. Level Adjust
    The Variable resistor 3635, 3636,3641 and 3642 in the Dolby circuit is for adjusting the playback level of the Dolby reference (400Hz , 200nWb/m). Transistor 7631, 7632 are ON to enable adjustment of 3641, 3642 during Playback Deck A. Transistor 7633, 7634 and 3635, 3636 are active for Playback Deck B.

18. Amplifier IC7640 (NJM4560M)
    The Amplifiers 7640A & 7640B (NJM4560M) in the Dolby circuit is for the purpose of amplified the Recording signal.

19. Muting Circuit
    The muting circuit which consists of transistors 7788, 7789 and 7790 (BC847B) is for the purpose of muting the output during Recording mode.

NOTATIONS & ABBREVIATIONS USED IN THIS DOCUMENT

CR	Chrome (IEC type II)
DB	Dolby NR type B
DD	Double Deck
DM	Double Motor
FE	Ferro (IEC type I)
FF	Non-Autoreverse
FR	Autoreverse Deck B
Gnd x	Ground x
HSD	High speed dubbing
ND	Non Dolby
NR	Noise Reduction
NSD	Normal speed dubbing
PB	Playback
REC	Record
S/A	Sub-assy
SD	Single Deck
SM	Single Motor

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CONNECTORS ASSIGNMENTS:

CONNECTOR 1701 — INTERCONNECTION TO AF BOARD

1	REC-L	Record input left
2	REC-R	Record input right
3	GND A	AF Ground
4	TAPE-L	Playback output left
5	+12V	D.C. supply (+12V) for AF electronics
6	TAPE-R	Playback output right
7	-CMOS	Negative d.c. supply (-9V) for CMOS ICs

CONNECTOR 1703 — INTERCONNECTION TO AF BOARD

1	GND M	Motor Ground
2	+MOTOR	D.C. supply (+12V) for tape deck motor & solenoid

CONNECTOR 1706 — INTERCONNECTION TO FRONT BOARD

1	AD2	Deck sensing switches output voltage / Deck A EOT
2	AD1	Deck sensing switches output voltage / Deck B EOT
3	+5V	DC supply +5V for ADC network
4	GND P	Control & Oscillator Ground
5	CLK	HEF4094BT shift register Clock line
6	DATA	HEF4094BT shift register Data line
7	STROBE	HEF4094BT shift register Strobe line

CONNECTOR 1710 — DECK B HEADS CONNECTON ***(For Non-Dolby version only)***

1	B R/P HD L+	R/P Head left channel positive
2	GND A	R/P Head return ground
3	B R/P HD R+	R/P Head right channel positive
4	ERASE HEAD	Erase Head
5	GND A	Erase Head ground

CONNECTOR 1720 — DECK B HEADS CONNECTON ***(For Dolby B NR version only)***

1	B R/P HD L+	R/P Head left channel positive
2	B R/P HD L-	R/P Head left channel negative
3	B R/P HD R+	R/P Head right channel positive
4	B R/P HD R-	R/P Head right channel negative
5	ERASE HEAD	Erase Head
6	GND A	Erase Head ground

CONNECTOR 1730 — DECK A HEAD CONNECTIONS ***(For Double Deck versions only)***

1	A PB HD L+	Pb Head left channel positive
2	GND A	Pb Head return ground shield
3	A PB HD R+	Pb Head right channel positive

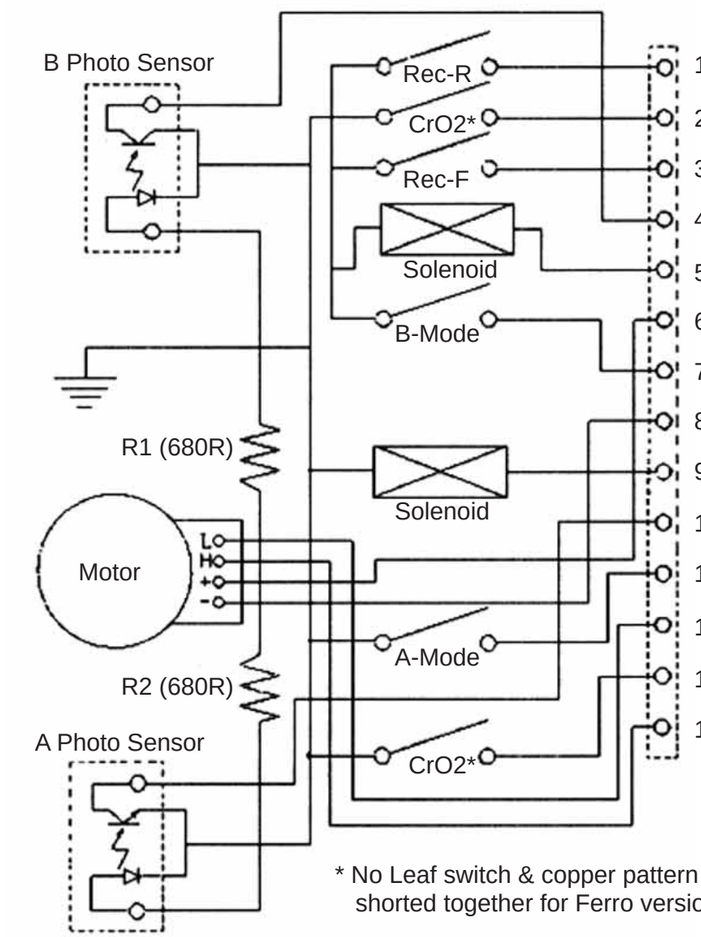
CONNECTOR 1740 — DECK A & B CONTROL INTERFACE ***(For Dolby B NR version only)***

1	REC REW	Record tab protection status switch (reverse)	[open=on: close=off]
2	CrO2 B	Chrome tape detection switch deck B	[open=Cr: close=Fe]
3	REC FWD	Record tab protection status switch (forward)	[open=on: close=off]
4	PHOTO B	Photo sensor output (tape movement indication)	
5	SOL B	Solenoid supply for deck B	
6	Vcc	Deck / Motor supply	
7	MODE B	Mode switch (head engagement)	[open=off: close=engaged]
8	GND M	Deck / Motor ground	
9	SOL A	Solenoid supply for deck A	
10	PHOTO A	Photo sensor output (tape movement indication)	
11	MODE A	Mode switch (head engagement)	[open=off: close=engaged]
12	L	L pin for motor	
13	CrO2 A	Chrome tape detection switch deck A	[open=Cr: close=Fe]
14	H	H pin for motor	

CONNECTOR 1770 — DECK A & B CONTROL INTERFACE ***(For Non-Dolby version only)***

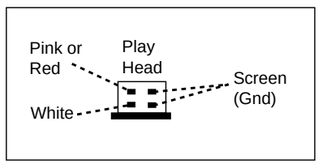
1	REC REW	Record tab protection status switch (reverse)	[open=on: close=off]
2	CrO2 B	Chrome tape detection switch deck B	[open=Cr: close=Fe]
3	REC FWD	Record tab protection status switch (forward)	[open=on: close=off]
4	PHOTO B	Photo sensor output (tape movement indication)	
5	SOL B	Solenoid supply for deck B	
6	Vcc	Deck / Motor supply	
7	MODE B	Mode switch (head engagement)	[open=off: close=engaged]
8	GND M	Deck / Motor ground	
9	SOL A	Solenoid supply for deck A	
10	PHOTO A	Photo sensor output (tape movement indication)	
11	MODE A	Mode switch (head engagement)	[open=off: close=engaged]
12	L	L pin for motor	
13	CrO2 A	Chrome tape detection switch deck A	[open=Cr: close=Fe]
14	H	H pin for motor	

TAPE MECHANISM ELECTRONICS

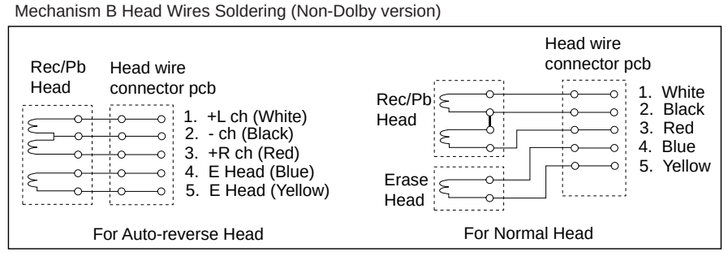


* No Leaf switch & copper pattern shorted together for Ferro version

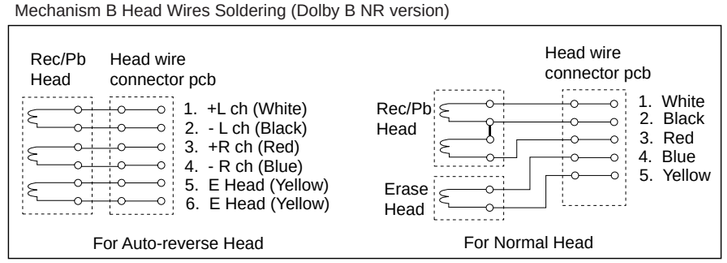
Mechanism A Head Wires Soldering



Mechanism B Head Wires Soldering (Non-Dolby version)



Mechanism B Head Wires Soldering (Dolby B NR version)



TAPE ADJUSTMENT & CHECK TABLE

	TEST CASSETTE	RECORDER MODE	MEASURE ON	READ ON	ADJUST with	ADJUST to
ADJUST MOTOR SPEED						
NORMAL SPEED	SBC420 3150Hz	PLAY B	◇1 or ◇2 LEFT RIGHT	frequency counter	3620	3150Hz – 0.5%
		PLAY A			check	3150Hz -0.8/+1.8%
CHECK WOW & FLUTTER						
DECK A & B	SBC420 3150Hz	PLAY	◇1 or ◇2 LEFT RIGHT	W&F-meter	check	†0.4 % DIN
ADJUST AZIMUTH						
DECK A & B	SBC420 10kHz	PLAY FWD	◇1 or ◇2 LEFT RIGHT	mV-meter	left hand screw	max. output level & left=right
		PLAY REV #			right hand screw	
CHECK PLAYBACK FREQUENCY RESPONSE						
DECK A & B	SBC420	PLAY	◇1 or ◇2 LEFT RIGHT	mV-meter	check	limits see fig.1
ADJUST BIAS CURRENT						
DECK B	SBC419A^	RECORD	◇5 or ◇6 LEFT RIGHT	mV-meter	3773	995mV
	SBC420				check	750mV – 1.5dB
CHECK OVERALL FREQUENCY RESPONSE AND DISTORTION						
Inject 3mV signals 100Hz, 250Hz, 1kHz, 10kHz, 12.5kHz via ◇3 or ◇4	SBC419A^ or SBC420	RECORD B				
	RECORDED CASSETTE	PLAY B	◇1 or ◇2 LEFT RIGHT	mV-meter	check	limits see fig. 2 *
Inject 1kHz 8.85mV via ◇3 or ◇4	SBC419A^ or SBC420	RECORD B				
	RECORDED CASSETTE	PLAY B	◇1 or ◇2 LEFT RIGHT	THD-meter	check	†3% *

SBC419A^ : 4822 397 30069
SBC420 : 4822 397 30071

\# For Auto-reverse version only
* If high frequencies are not within limits, decrease bias and re-measure.
If distortion is too high, increase bias and re-meaure
^ Not applicable for Ferro version

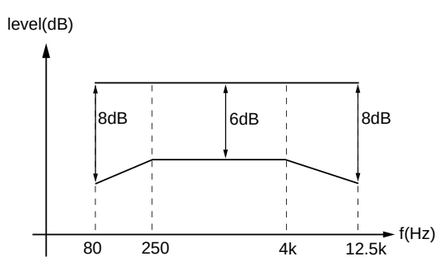


figure. 1

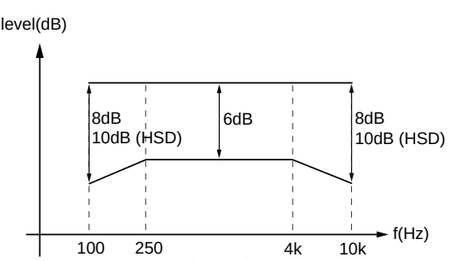
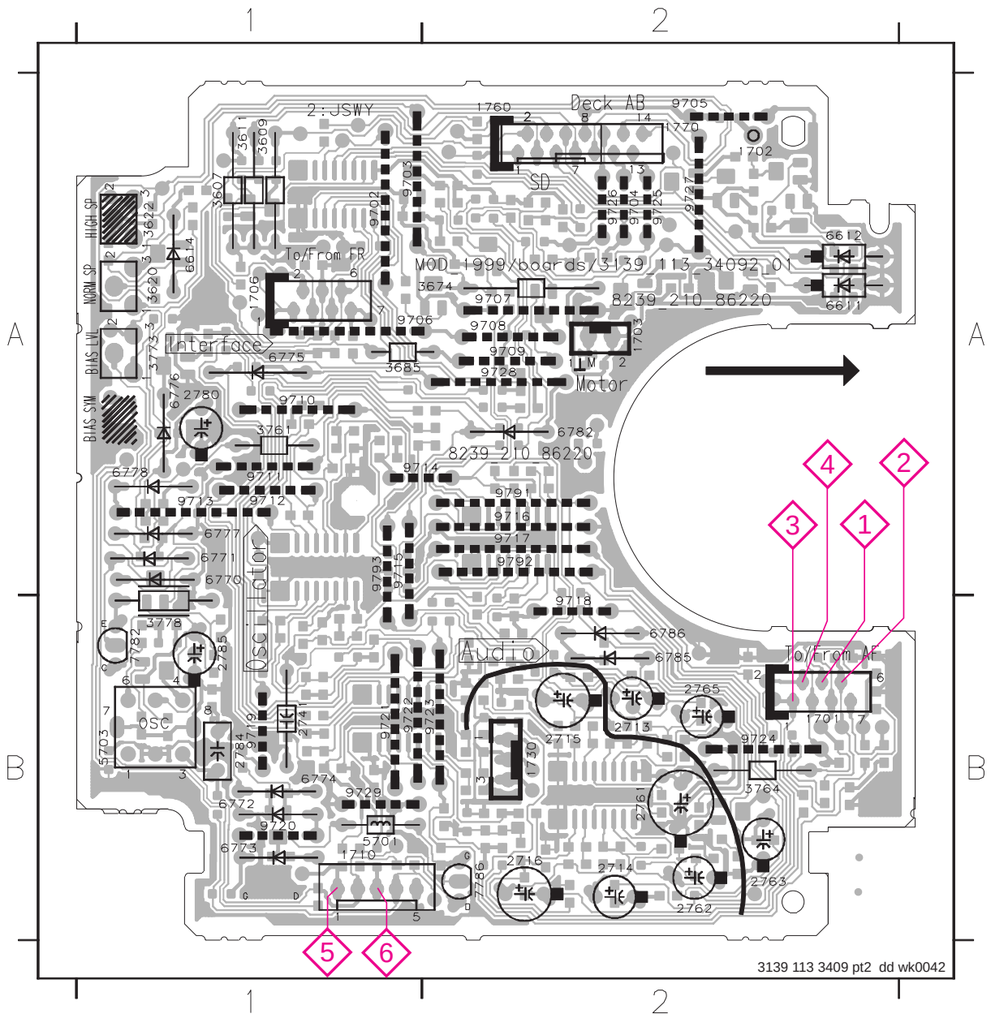


figure. 2

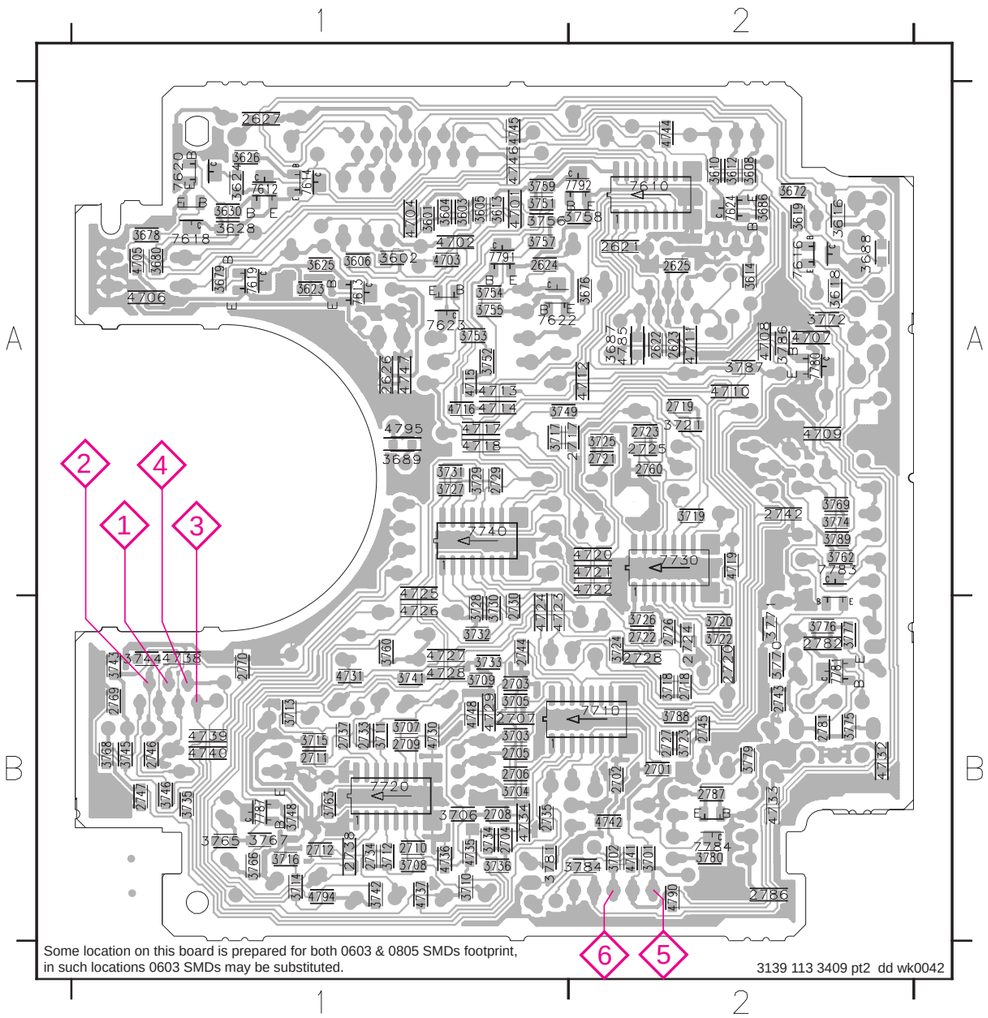
COMPONENT LAYOUT

1701 B2	2714 B2	2784 B1	3761 A1	6770 A1	6782 A2	9706 A1	9715 A1	9724 B2
1702 A2	2715 B2	2785 B1	3764 B2	6771 A1	6785 B2	9707 A2	9716 A2	9725 A2
1703 A2	2716 B2	3607 A1	3773 A1	6772 B1	6786 B2	9708 A2	9717 A2	9726 A2
1706 A1	2741 B1	3609 A1	3778 B1	6773 B1	7782 B1	9709 A2	9718 B2	9727 A2
1710 B1	2761 B2	3611 A1	5701 B1	6774 B1	7786 B2	9710 A1	9719 B1	9728 A2
1730 B2	2762 B2	3620 A1	5703 B1	6775 A1	9702 A1	9711 A1	9720 B1	9729 B1
1760 A2	2763 B2	3622 A1	6611 A2	6776 A1	9703 A1	9712 A1	9721 B1	9791 A2
1770 A2	2765 B2	3674 A2	6612 A2	6777 A1	9704 A2	9713 A1	9722 B1	9792 A2
2713 B2	2780 A1	3685 A1	6614 A1	6778 A1	9705 A2	9714 A1	9723 B2	9793 A1



CHIP LAYOUT

2621 A2	2724 B2	3602 A1	3688 A2	3725 A2	3757 A1	4701 A1	4727 B1	7612 A1
2622 A2	2725 A2	3603 A1	3689 A1	3726 B2	3758 A2	4702 A1	4728 B1	7613 A1
2623 A2	2726 B2	3604 A1	3701 B2	3727 A1	3759 A1	4703 A1	4729 B1	7614 A1
2624 A1	2727 B2	3605 A1	3702 B2	3728 B1	3760 B1	4704 A1	4730 B1	7616 A2
2625 A2	2728 B2	3606 A1	3703 B1	3729 A1	3762 A2	4705 A1	4731 B1	7618 A1
2626 A1	2729 A1	3608 A2	3704 B1	3730 B1	3763 B1	4706 A1	4732 B2	7619 A1
2627 A1	2730 B1	3610 A2	3705 B1	3731 A1	3765 B1	4707 A2	4733 B2	7620 A1
2701 B2	2733 B1	3612 A2	3706 B1	3732 B1	3766 B1	4708 A2	4734 B1	7622 A1
2702 B2	2734 B1	3613 A1	3707 B1	3733 B1	3767 B1	4709 A2	4735 B1	7623 A1
2703 B1	2735 B1	3614 A2	3708 B1	3734 B1	3768 B1	4710 A2	4736 B1	7624 A2
2704 B1	2737 B1	3616 A2	3709 B1	3735 B1	3769 A2	4711 A2	4737 B1	7710 B2
2705 B1	2738 B1	3618 A2	3710 B1	3736 B1	3770 B2	4712 A2	4738 B1	7720 B1
2706 B1	2742 A2	3619 A2	3711 B1	3741 B1	3771 B2	4713 A1	4739 B1	7730 A2
2707 B1	2743 B2	3623 A1	3712 B1	3742 B1	3772 A2	4714 A1	4740 B1	7740 A1
2708 B1	2744 B1	3624 A1	3713 B1	3743 B1	3774 A2	4715 A1	4741 B2	7780 A2
2709 B1	2745 B2	3625 A1	3714 B1	3744 B1	3775 B2	4716 A1	4742 B2	7781 B2
2710 B1	2746 B1	3626 A1	3715 B1	3745 B1	3776 B2	4717 A1	4744 A2	7783 A2
2711 B1	2747 B1	3628 A1	3716 B1	3746 B1	3777 B2	4718 A1	4745 A1	7784 B2
2712 B1	2760 A2	3630 A1	3717 A1	3748 B1	3779 B2	4719 A2	4746 A1	7787 B1
2717 A2	2769 B1	3672 A2	3718 B2	3749 A1	3780 B2	4720 A2	4747 A1	7791 A1
2718 B2	2770 B1	3676 A2	3719 A2	3751 A1	3781 B1	4721 A2	4748 B1	7792 A2
2719 A2	2781 B2	3678 A1	3720 B2	3752 A1	3784 B2	4722 A2	4785 A2	
2720 B2	2782 B2	3679 A1	3721 A2	3753 A1	3786 A2	4723 B1	4790 B2	
2721 A2	2786 B2	3680 A1	3722 B2	3754 A1	3787 A2	4724 B1	4794 B1	
2722 B2	2787 B2	3686 A2	3723 B2	3755 A1	3788 B2	4725 A1	4795 A1	
2723 A2	3601 A1	3687 A2	3724 B2	3756 A1	3789 A2	4726 B1	7610 A2	



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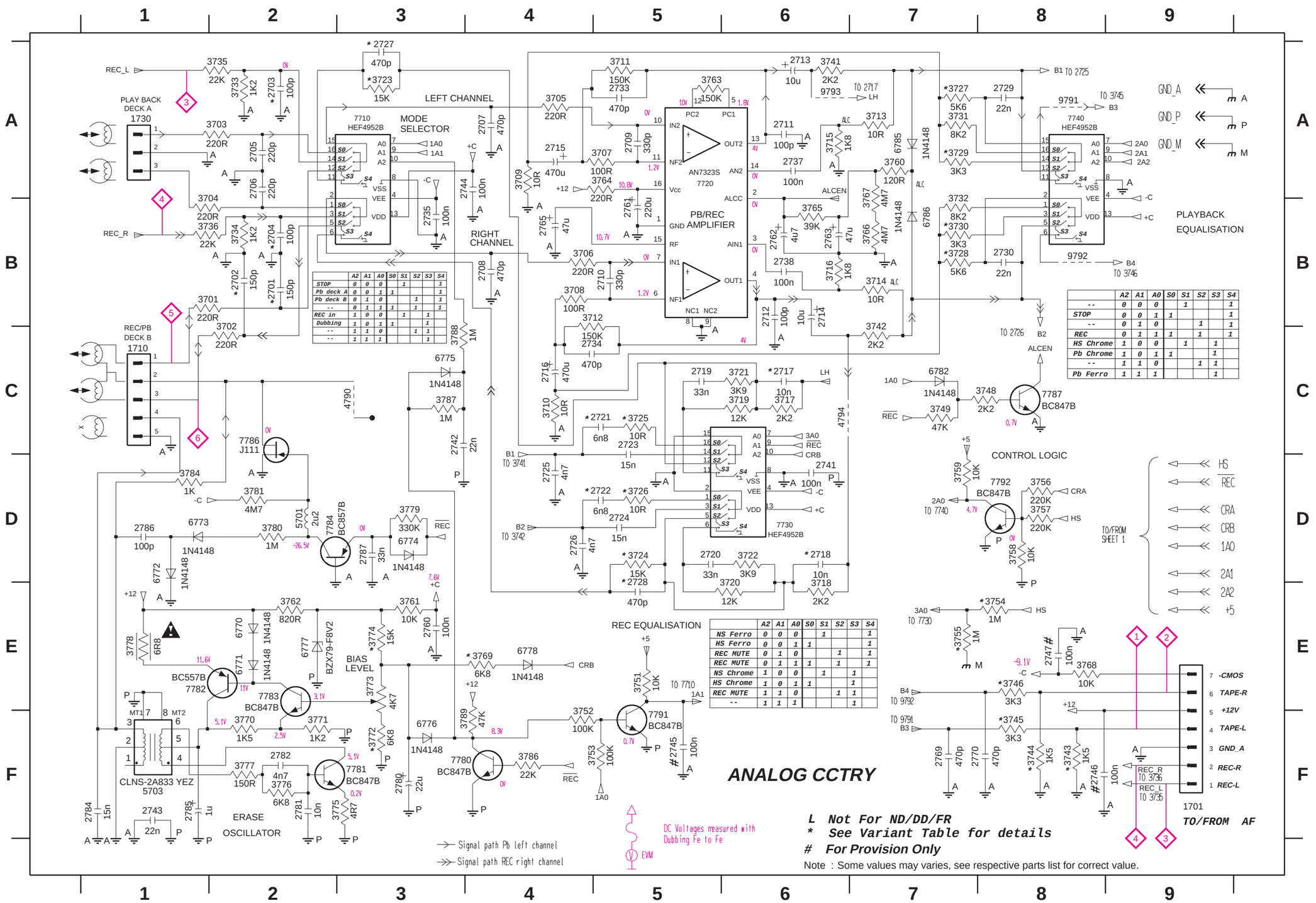
ANALOG CIRCUIT

1701 F9	2705 A2	2712 B6	2719 C5	2726 D4	2735 B3	2745 F5	2765 B4	2785 F1	3705 A4	3712 B4	3719 C6	3726 D5	3733 A2	3744 F8	3753 F5	3760 A7	3767 A7	3774 E3	3781 D2	4794 C6	6774 D3	6786 B7	7782 E1	9791 A8
1710 C1	2706 A2	2713 A6	2720 D5	2727 A3	2737 A6	2746 F8	2769 F7	2786 D1	3706 B4	3713 A7	3720 E6	3727 A7	3734 B2	3745 F8	3754 E8	3761 E3	3768 E8	3775 F3	3784 D1	5701 D2	6775 C3	7710 A3	7783 E2	9792 B8
1730 A1	2707 A4	2714 B6	2721 C5	2728 E5	2738 B6	2747 E8	2770 F8	2787 D3	3707 A5	3714 B7	3721 C6	3728 B7	3735 A2	3746 E8	3755 E7	3762 E2	3769 E4	3776 F2	3786 F4	5703 F1	6776 F3	7720 A5	7784 D2	9793 A6
2701 B2	2708 B4	2715 A4	2722 D5	2729 A8	2741 D6	2760 E3	2780 F3	3701 B1	3708 B4	3715 A6	3722 D6	3729 A7	3736 B1	3748 C8	3756 D8	3763 A5	3770 F2	3777 F2	3787 C3	6770 E2	6777 E2	7730 D6	7786 C2	
2702 B2	2709 A5	2716 C4	2723 C5	2730 B8	2742 C3	2761 B5	2781 F2	3702 C2	3709 A4	3716 B6	3723 A3	3730 B7	3741 A6	3749 C7	3757 D8	3764 A5	3771 F2	3778 E1	3788 C3	6771 E2	6778 E4	7740 A8	7787 C8	
2703 A2	2710 B5	2717 C6	2724 D5	2733 A5	2743 F1	2762 B6	2782 F2	3703 A2	3710 C4	3717 C6	3724 D5	3731 A7	3742 C7	3751 E5	3758 D8	3765 B6	3772 F3	3779 D3	3789 F4	6772 D1	6782 C7	7780 F4	7791 F5	
2704 B2	2711 A6	2718 D6	2725 D4	2734 C4	2744 A4	2763 B6	2784 F1	3704 B1	3711 A5	3718 E6	3725 C5	3732 B7	3743 F8	3752 F4	3759 D7	3766 B7	3773 E3	3780 D2	4790 C3	6773 D1	6785 A7	7781 F3	7792 D8	



	A2	A1	A0	S0	S1	S2	S3	S4
STOP	0	0	0		1			1
Pb deck A	0	0	1	1				1
Pb deck B	0	1	0			1		1
--	0	1	1	1		1		1
REC in	1	0	0		1		1	
Dubbing	1	0	1	1				1
--	1	1	0			1	1	
--	1	1	1					1

	A2	A1	A0	S0	S1	S2	S3	S4
--	0	0	0		1			1
STOP	0	0	1	1				1
--	0	1	0			1		1
REC	0	1	1	1		1		1
HS Chrome	1	0	0		1		1	
Pb Chrome	1	0	1	1			1	
--	1	1	0			1	1	
Pb Ferro	1	1	1				1	

	A2	A1	A0	S0	S1	S2	S3	S4
NS Ferro	0	0	0		1			1
HS Ferro	0	0	1	1				1
REC MUTE	0	1	0			1		1
REC MUTE	0	1	1	1		1		1
NS Chrome	1	0	0		1		1	
HS Chrome	1	0	1	1			1	
REC MUTE	1	1	0			1	1	
--	1	1	1				1	

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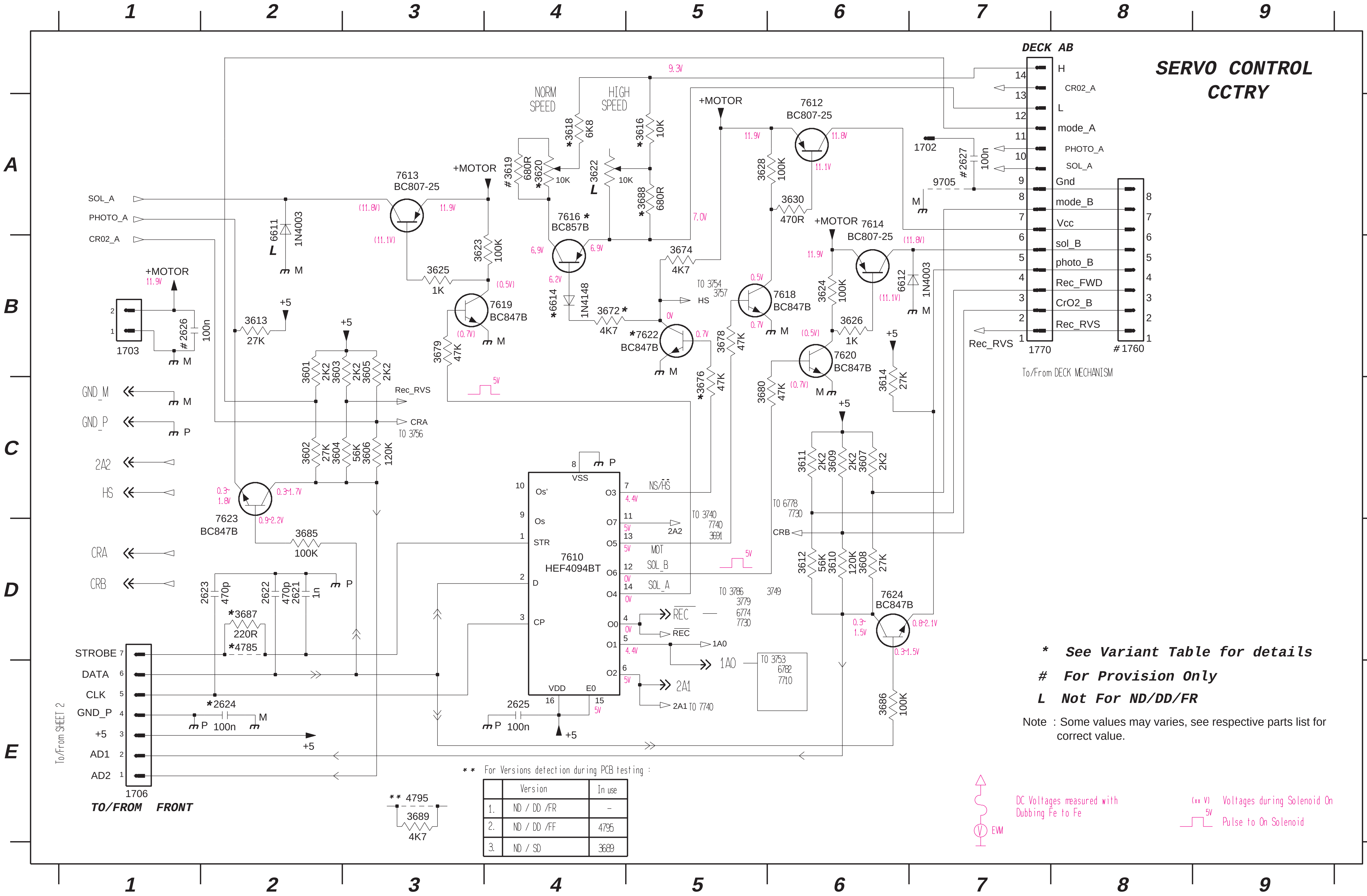
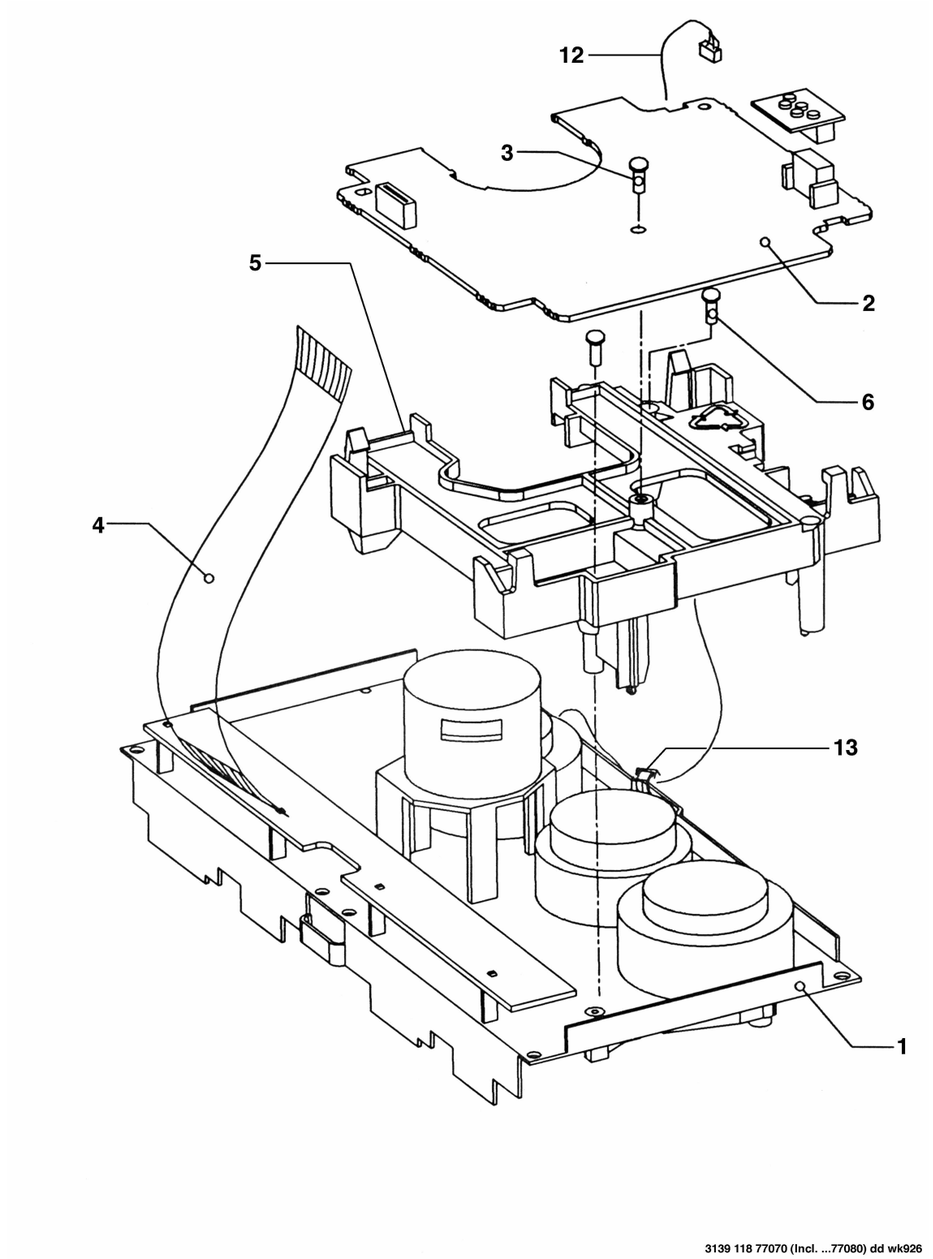
SERVO CONTROL CIRCUIT

1702 A7	1760 B8	2622 D2	2625 E4	3601 B2	3604 C2	3607 C6	3610 D6	3613 B2	3618 A4	3622 A4	3625 B3	3630 A6	3676 C5	3680 C5	3687 D2	4785 D2	6612 B6	7612 A6	7616 A4	7620 B6	7624 D6
1703 B1	1770 B7	2623 D2	2626 B1	3602 C2	3605 B3	3608 D6	3611 C6	3614 C6	3619 A4	3623 B3	3626 B6	3672 B4	3678 B5	3685 D2	3688 A5	4795 E3	6614 B4	7613 A3	7618 B6	7622 B5	9705 A7
1706 E1	2621 D2	2624 E2	2627 A7	3603 B2	3606 C3	3609 C6	3612 D6	3616 A5	3620 A4	3624 B6	3628 A5	3674 B5	3679 B3	3686 E6	3689 E3	6611 A2	7610 D4	7614 A6	7619 B4	7623 D2	



	Version	In use
1.	ND / DD /FR	–
2.	ND / DD /FF	4795
3.	ND / SD	3689



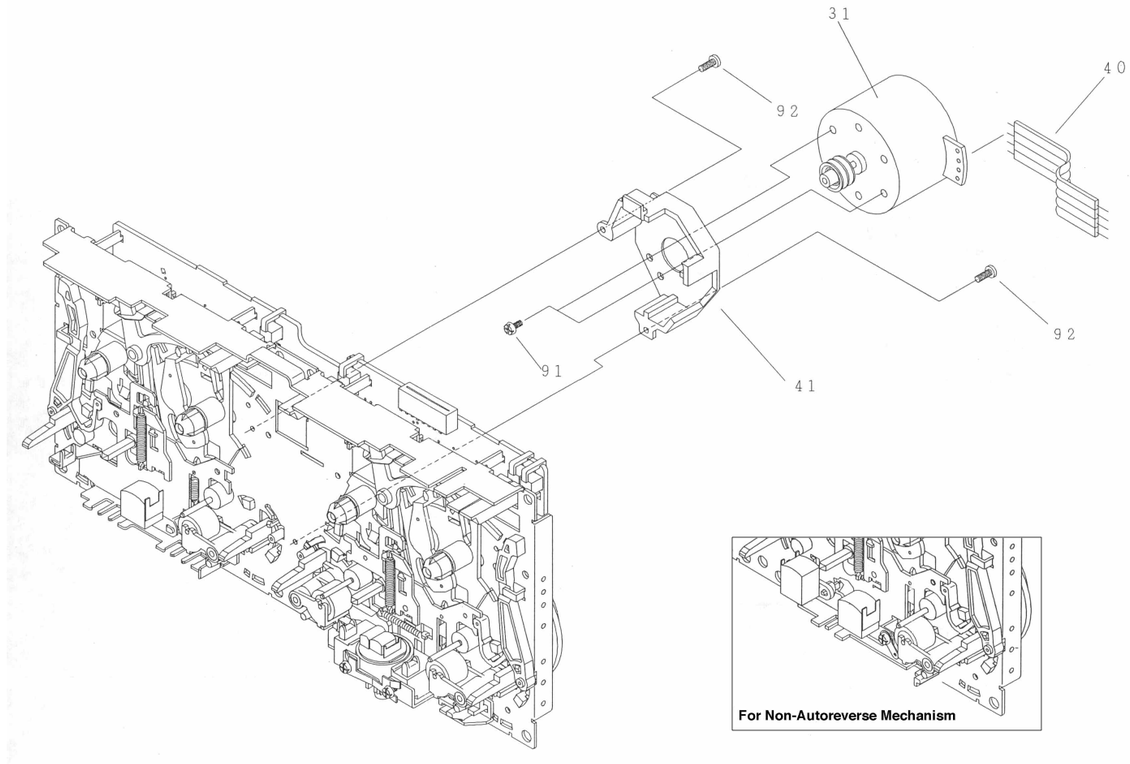
3139 118 77070 (Incl. ...77080) dd wk926

TAPE MODULE EXPLODED VIEW

1	3139 118 77130	Autoreverse Mech. CWE44FR01
1	3139 118 77140	Non-Autoreverse Mech. CWE44FF02 Chrome/Ferro
1	3139 118 77950	Non-Autoreverse Mech. CWE44FF05 Ferro
3	-	Screw D3 x 10
6	-	Screw M2 x 16
7	3139 110 34080	Flex Cable 14 pin 7,5 cm

Note: Only the parts mentioned in this list are normal service spare parts.

9-9



TAPE MECHANISM - MOTOR EXPLODED VIEW

31	4822 361 11055	Motor Assembly
91	-	Screw M2,6 x 5
92	-	Screw M2 x 5

Note: Only the parts mentioned in this list are normal service spare parts.

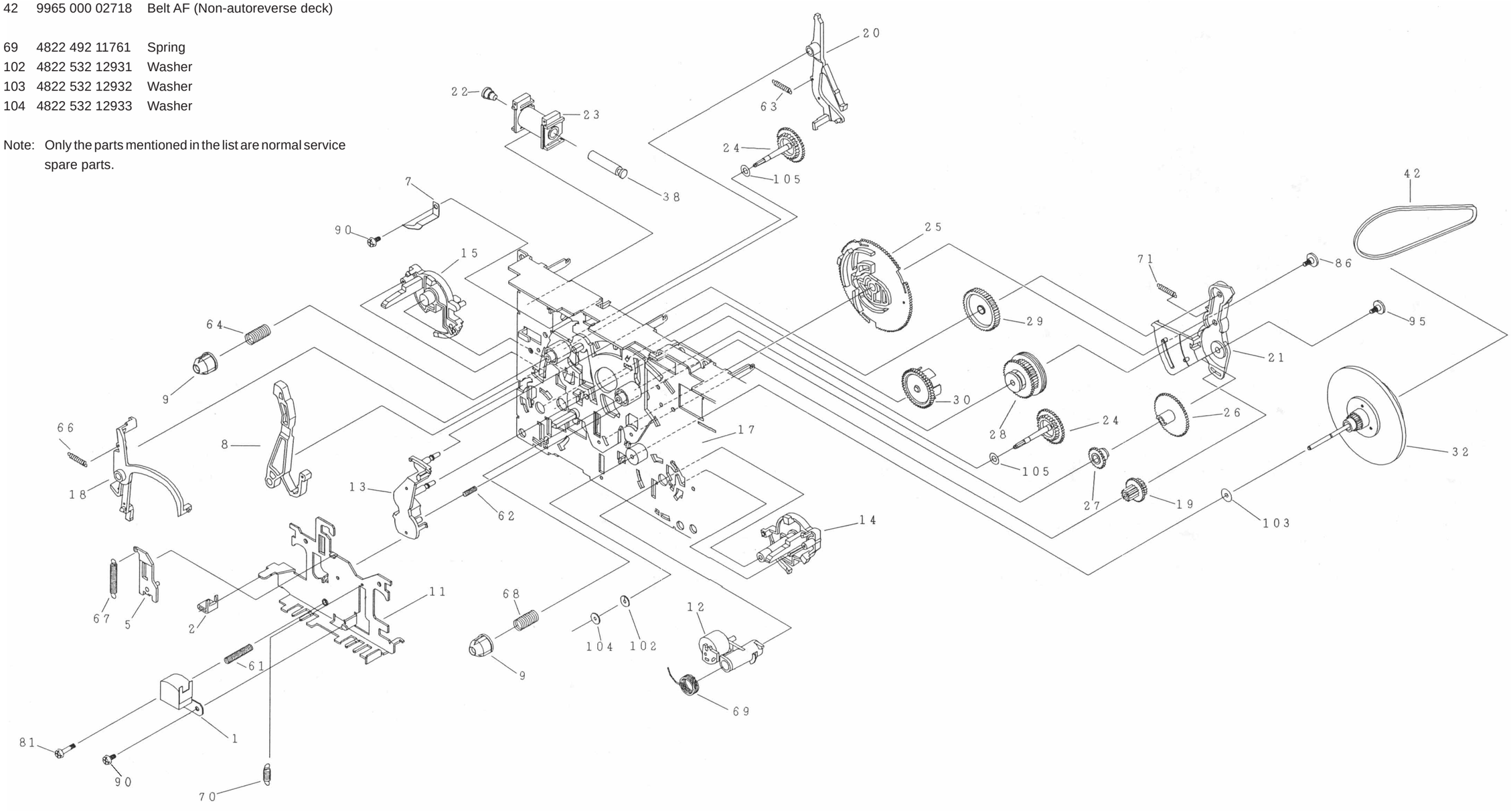
9-10

TAPE MECHANISM A - PLAY

MECHANICAL PARTS - PLAY MECHANISM

1	9965 000 02313	Play Head (Non-Autoreverse deck)
1	9965 000 02321	Play Head (Autoreverse deck)
12	4822 402 10972	Pinch Arm Assembly R
23	9965 000 02314	Coil Assembly
25	9965 000 06443	Cam Gear
32	4822 528 11209	Flywheel Assembly RV
42	9965 000 02315	Belt AF (Autoreverse deck)
42	9965 000 02718	Belt AF (Non-autoreverse deck)
69	4822 492 11761	Spring
102	4822 532 12931	Washer
103	4822 532 12932	Washer
104	4822 532 12933	Washer

Note: Only the parts mentioned in the list are normal service spare parts.



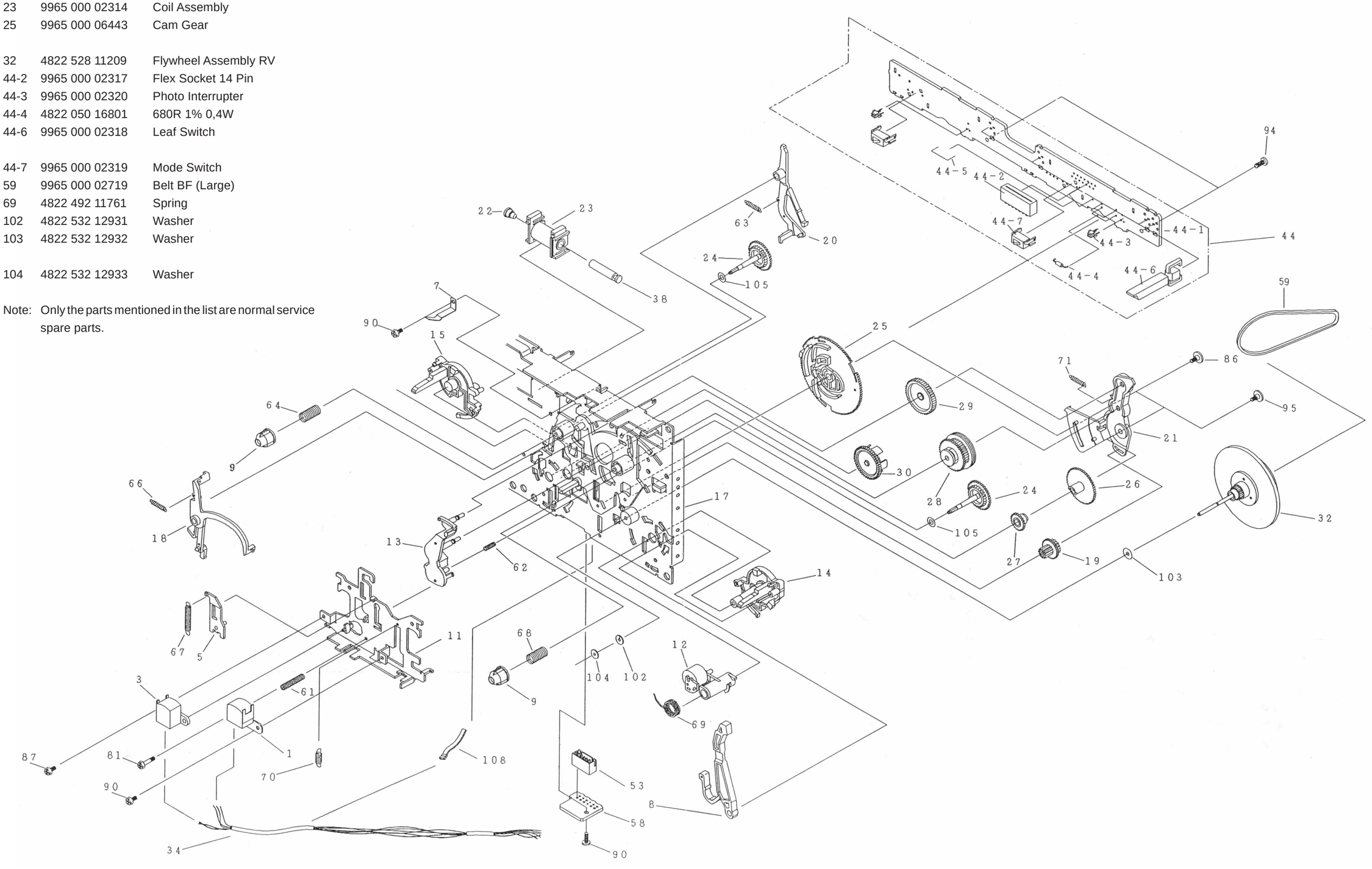
9-11

TAPE MECHANISM B - RECORD/PLAYBACK *(Non-Autoreverse version)*

MECHANICAL PARTS - REC/PB MECHANISM

1	9965 000 02313	Play Head
3	9965 000 02600	Head, Erase
12	4822 402 10972	Pinch Arm Assembly R
23	9965 000 02314	Coil Assembly
25	9965 000 06443	Cam Gear
32	4822 528 11209	Flywheel Assembly RV
44-2	9965 000 02317	Flex Socket 14 Pin
44-3	9965 000 02320	Photo Interrupter
44-4	4822 050 16801	680R 1% 0,4W
44-6	9965 000 02318	Leaf Switch
44-7	9965 000 02319	Mode Switch
59	9965 000 02719	Belt BF (Large)
69	4822 492 11761	Spring
102	4822 532 12931	Washer
103	4822 532 12932	Washer
104	4822 532 12933	Washer

Note: Only the parts mentioned in the list are normal service spare parts.



9-12

TAPE MECHANISM B - RECORD/PLAYBACK *(Autoreverse version)*

MECHANICAL PARTS - REC/PB MECHANISM

12	4822 402 10972	Pinch Arm Assembly R
23	9965 000 02314	Coil Assembly
25	9965 000 06443	Cam Gear
32	4822 528 11209	Flywheel Assembly RV
39	9965 000 02322	Belt AF
44-2	9965 000 02317	Flex Socket 14 Pin
44-3	9965 000 02320	Photo Interrupter
44-4	4822 050 16801	680R 1% 0,4W
44-6	9965 000 02318	Leaf Switch
44-7	9965 000 02319	Mode Switch
45	9965 000 02323	Rec/Pb Head Assembly
50	4822 402 10973	Pinch Arm Assembly L
54	9965 000 02324	Flywheel Assembly L
69	4822 492 11761	Spring
73	4822 492 11762	Spring
101	9965 000 02325	Washer
102	4822 532 12931	Washer
103	4822 532 12932	Washer
104	4822 532 12933	Washer
107	9965 000 02326	Washer
109	9965 000 02327	Washer

Note: Only the parts mentioned in the list are normal service spare parts.