

MV-7/77/777

Video Cassette Recorder Deck: Turbo Drive

QUEEN volume

Service Service Service



VRx71, VRx75



VR276, VR476



VR277, VR477, VR676



SB100, SBx05



DVx05, xxDV7, MV1971

VR171/02/13/16/58

VR175/02/05/13/16/39

VR276/02/39

VR277/02/05

VR475/02/16/39/58

VR476/39

VR477/02/39/58

VR675/02/05/16/39

VR676/02/05/39

SB100/03/11/38

SB105/03/11/38

SB205/02

SB405/11/38

SB505/38

SB605/03/11/38

SB705/38

DV105/05

DV605/05

20DV7/39

25DV7/39

45DV7/39

65DV7/39

MV1971

Service Manual

Evolution: AA

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/05	PAL I, UK
/07	PAL I, Ireland
/08	PAL B/G, Italy
/11	PAL B/G Belgium
/13	PAL B/G, Nordic
/16	PAL B/G, Spain
/38/39	SECAM L, L' & PAL B/G, I
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SB100/03/11, SB105/03/11, SB205/02, SB405/11, SB605/03/11, DV105/05, DV605/05, MV1971	RT170/301	4822 219 10255
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VR276/39, VR476/39, VR477/39, VR676/39	RT174/104	4822 218 10251

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



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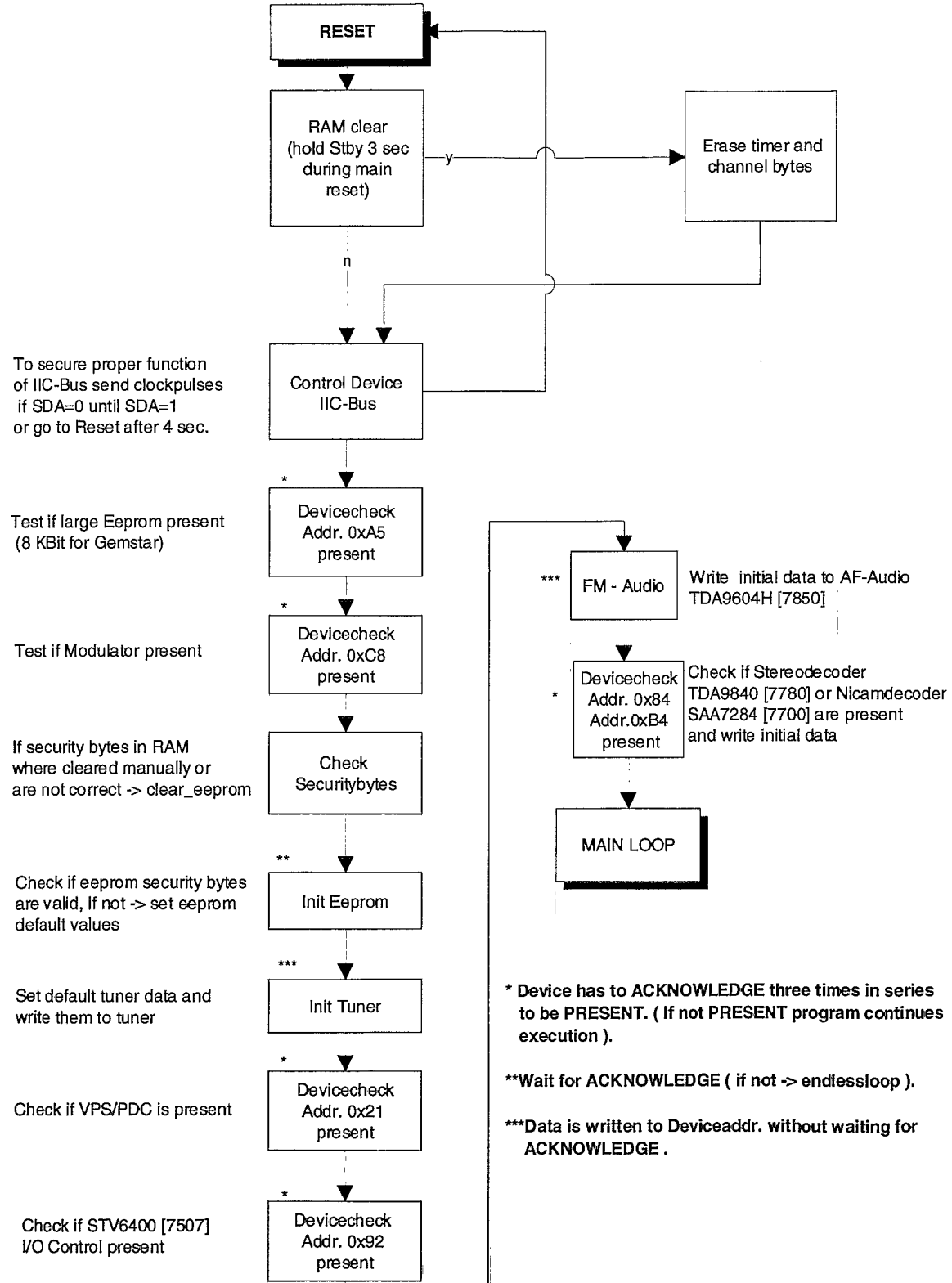
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Start - up software from the display control - μP

Survey of sets and PCB's with software versions



* Device has to ACKNOWLEDGE three times in series to be PRESENT. (If not PRESENT program continues execution).

**Wait for ACKNOWLEDGE (if not -> endlessloop).

***Data is written to Deviceaddr. without waiting for ACKNOWLEDGE .

Page 3 -	QMB - MOTHERBOARD																TAPE DECK							
	12	14	15	16	17	18	18	19	20	21	22	23	16	17	18	25	26	Chapter 4						
	-QMB layout	-PS Power supply	-HA Head amplifier	-DE Deck electronics	-DC Display control	-VS Signal electronic	-AL Audio linear	-IO IN/OUT	-VS-SEC Signal electronic	-FV Frontend	-AF Audio FM	-OSD, FOME, VPS Part	Deck Control-μP Pos. 7400	Display Control-μP Pos. 7201	-CINCH Board rear	-QNIC NICAM Board	-QKP21 Shuttle Board	2 video heads, PAL, SECAM	2 video heads, longplay PAL	4 video heads, PAL	4 video heads, SECAM	4 video, 2 audio heads, PAL	4 video, 2 audio heads, SECAM	
VR171/02	✓												✓	✓					✓					
VR171/13	✓												✓	✓					✓					
VR171/16	✓												✓	✓					✓					
VR171/58	✓												✓	✓					✓					
VR175/02	✓												✓	✓					✓					
VR175/05	✓												✓	✓					✓					
VR175/13	✓												✓	✓					✓					
VR175/16	✓												✓	✓					✓					
VR175/39	✓												✓	✓					✓					
VR276/02	✓												✓	✓					✓					
VR276/39	✓												✓	✓					✓					
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VR477/39	✓												✓	✓					✓					
VR477/58	✓												✓	✓					✓					
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VR675/39	✓												✓	✓					✓					
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SB105/03	✓												✓	✓					✓					
SB105/11	✓												✓	✓					✓					
SB105/38	✓												✓	✓					✓					
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45DV7/39	✓												✓	✓					✓					
65DV7/39	✓												✓	✓					✓					
MV1971	✓												✓	✓					✓					

GB

TECHNICAL DATA

Mains voltage	Netzspannung
Mains frequency	Netzfrequenz
Power consumption:	Leistungsaufnahme:
without Low Power Standby	Standby
with Low Power Standby	Standby mit geringem Verbrauch
Ambient temperature	Raumtemperatur
Relative humidity	Relative Luftfeuchtigkeit
Dimensions	Abmessungen
Weight	Gewicht
Fast forward/rewind time (turbo) ...	Vor-/Rückspulzeit (turbo)
Position of use	Betriebslage
Video resolution	Video-Auflösung
Audio	Audio

D

TECHNISCHE DATEN

F

CARACTERISTIQUES

Tension secteur	220 - 240 V, +/- 10%
Fréquence	45 - 65 Hz
Puissance absorbée:	mono 12.5 W during operation
mode veille normal	HiFi 16 W during operation
mode veille faible consommation ..	mono 9.5 W
< 6 W standby	HiFi 11 W
Température ambiante	+10°C to +35°C
Humidité relative	20 - 80 %
Encorement	380 x 260 x 94 mm
Poids	3,7 kg
Temps (re-)bobinage (turbo)	typ. 100s (E180 cass.)
Position d'emploi	horizontally, max. 15°
Puissance absorbée	≥240 lines
Audio SP: Linear Audio	80Hz - 10kHz (≤8dB)
Audio LP: Linear Audio	80Hz - 5kHz (≤8dB)
Stereo FM Audio	20Hz - 20kHz (≤3dB)

NL

TECHNISCHE GEGEVENS

E

DATOS TECNICOS

I

DATI TECNICI

Netzspannung	Tensión de red	Tensione di alimentazione	220 - 240 V
Netfrequentie	Frecuencia de red	Frequenza di rete	45 - 65 Hz
Opgenomen vermogen:	Consumo de potencia:	Potenza assorbita:	mono 12.5 W during operation
zonder Low Power Standby	sin standby de bajo consumo	in attesa non a basso consumo	HiFi 16 W during operation
met Low Power Standby	con standby de bajo consumo	in attesa a basso consumo	mono 9.5 W during standby
Omgevingstemperatuur	Temperatura ambiente	Temperatura ambiente	HiFi 11 W during standby
Relatieve vochtigheid	Humedad relativa	Umidità relativa	< 6 W standby
Afmetingen	Dimensiones	Dimensioni	+10°C to +35°C
Gewicht	Peso	Peso	20 - 80 %
Vooruit/terugspoeltijd (turbo)	tiempo de (re-)bobinado (turbo)	Tempo di (ri-)avvolgimento (turbo) ..	380 x 260 x 94 mm
Gebbruikpositie	Posición de uso	Posizione di funzionamento	3,7 kg
Opplossend vermogen	Resolución video	Risoluzione video	typ. 100s (E180 cass.)
Audio	Audio	Audio	horizontally, max. 15°
			≥240 lines
			Audio SP: Linear Audio
			80Hz - 10kHz (≤8dB)
			Audio LP: Linear Audio
			80Hz - 5kHz (≤8dB)
			Stereo FM Audio
			20Hz - 20kHz (≤3dB)

Euroconnector (AV1) SCART plug 1

Connection to TV, monitor, projection TV ...

Pin 1 ARO (audio right out)	500 mV _{rms} +/- 3 dB	R _{out} 1 kOhm
Pin 2 ARI (audio right in)	0,2 V _{rms} to 2 V _{rms}	R _{in} 10 kOhm
Pin 3 ALO (audio left out)	500 mV _{rms} +/- 3 dB	R _{out} 1 kOhm
Pin 6 ALI (audio left in)	0,2 V _{rms} to 2 V _{rms}	R _{in} 10 kOhm
Pin 7 Blue (out) **)		
Pin 8 Switching output:	(with R _{load} = 10kOhm, C _{load} < 2nF)	
	low: 2 V	
	high: 9.5 V	
	rise time: 5 ms	

Pin 11 Green (out) **)

Pin 15 Red (out) **)

Pin 16 Blanking (out) **)

loop through enabled during standby, view-mode

Pin 19 CVBS II (video out) 1 V_{pp} +/- 2dB R_{out} 75 OhmPin 20 CVBS I (video in) 1 V_{pp} +/- 3dB R_{in} 75 Ohm

**) passive loop through from AV2

Euroconnector (AV2) SCART plug 2

Connection to decoder, SAT tuner, video disc, 2nd VCR

Pin 1 ARO (audio right out)	500 mV _{rms} +/- 3 dB	R _{out} 1 kOhm
Pin 2 ARI (audio right in)	0,2 V _{rms} to 2 V _{rms}	R _{in} 10 kOhm
Pin 3 ALO (audio left out)	500 mV _{rms} +/- 3 dB	R _{out} 1 kOhm
Pin 6 ALI (audio left in)	0,2 V _{rms} to 2 V _{rms}	R _{in} 10 kOhm
Pin 7 Blue (in) *)		
Pin 8 Switching input only	low: 2 V (low)	R _{in} 10 kOhm
	high: 4.5 V (high)	R _{in} 10 kOhm

Pin 11 Green (in) *)

Pin 15 Red (in) *)

Pin 16 Blanking (in) *)

loop through enabled during standby, view-mode

Pin 19 CVBS II (video out) 1 V_{pp} +/- 2dB R_{out} 75 OhmPin 20 CVBS I (video in) 1 V_{pp} +/- 3dB R_{in} 75 Ohm

*) passive loop through to Euroconnector AV1

Cinch Audio/Video input on front panel (OPTION)

Audio:

AINFR (audio right in) red	0.2 V _{rms} to 2 V _{rms}	typ. 500 mV _{rms}
AINFL (audio left in) white	0.2 V _{rms} to 2 V _{rms}	typ. 500 mV _{rms}
Input impedance	47 kOhm	

Video:

VFR yellow	1 V _{pp} + 3 / -3 dB
Input impedance	75 Ohm

Cinch Audio Out Rear (OPTION)

AOUT1R (audio right out) red	500 mV _{rms} +/- 3 dB	R _{out} 1 kOhm
AOUT1L (audio left out) white	500 mV _{rms} +/- 3 dB	R _{out} 1 kOhm

This outputs are in parallel with the corresponding outputs on Euroconnector 1.

TUMOD

Modulator:

Frequency range loop through	45 MHz - 860 MHz
Gain: ANT IN - TV OUT	2 dB + 3 / -2 dB
ANT IN - TUN OUT	2 dB + 3 / -2 dB
Switch for RF input attenuation	NO
Frequency range out (tuned by IIC bus) Ch 21 - Ch55	

Tuner:

Frequency range	43 MHz - 860 MHz
for UK	450 MHz - 860MHz

Input voltage max.	< 100 dBμV
min.	> 60 dBμV

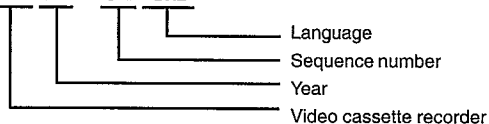
Modifications

Description of the system used for publishing modification data and supplements to the service manual.

All modification data and supplements to the Service Manual are published by means of Service Information bulletins.

Each Service information has a number, for example :

VR 97 - 01 GB



A Service Information bulletin consists of a front sheet, as the case may be followed by supplementary and/or replacement sheets.

Replacement sheets serve to replace existing sheets in the Service Manual. These sheets are identified by an additional letter after the page number, for example 5-1a. Page 5-1a then takes the place of page 5-1.

Supplementary sheets are inserted between the existing sheets in the Service Manual. These sheets can be identified by an additional figure following the page number, for example 5-1-1.

Sheet 5-1-1 should be inserted after page 5-1.

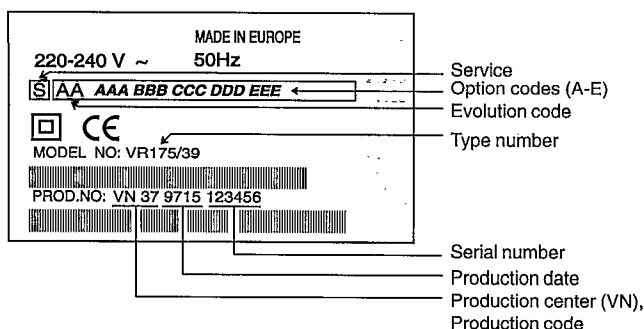
Description of the system by means of which modifications are indicated in the recorder.

All important parts of the recorder, such as tape deck, p.c. boards and modules, are provided with a sticker. These stickers specify a number of product data. The meaning of this data will now be explained for the most important sections.

The complete recorder

The type plate is located at the back of the recorder, below an example of such a type plate is given.

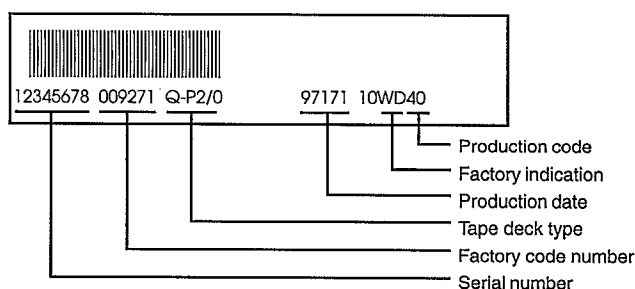
Type plate :



Note :

- In the case of an important modification to the recorder the production code on the type plate is increased by one. E.g. 37 becomes 38.
- In the case of an important modification to the service documentation the evolution code on the type plate is increased by one. E.g. AA becomes AB.

Tape deck



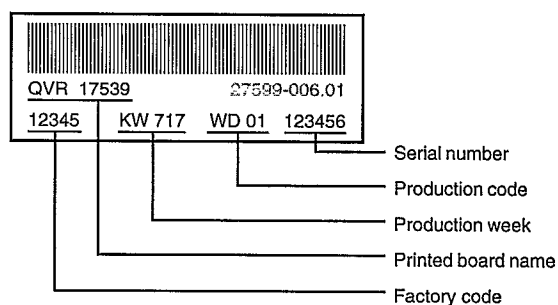
Note :

The production code and the serial number on the tape deck need not correspond to the production code and the serial number on the type plate.

Printed panels

The stickers are generally located on the track side of the module.

Example :



Remarks :

The production code number will not always be mentioned.

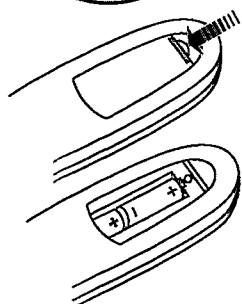
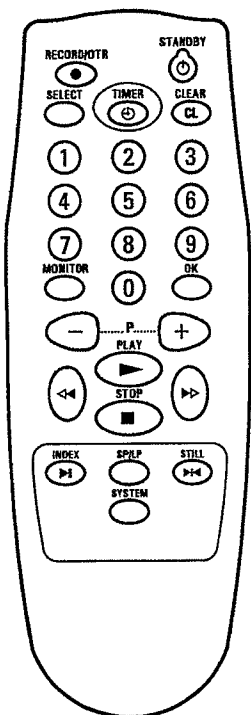
In case of an important modification, the last figure of the factory code number (point number) is increased by one. E.g. 6635.1 becomes 6635.2.

Direction for Use - Table of contents

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OPERATING INSTRUCTIONS IN BRIEF

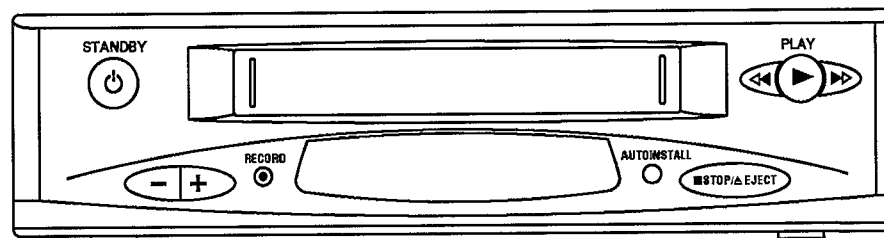
The remote control



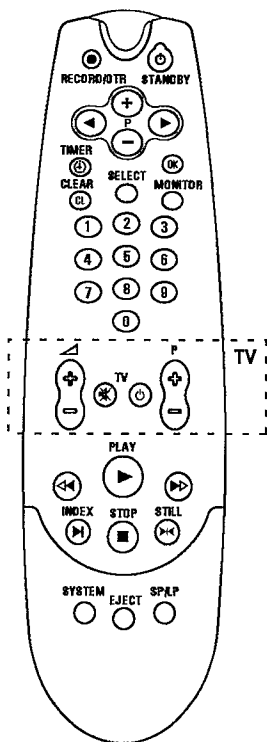
- RECORD/OTR** Record
- STANDBY** Standby
- SELECT** Function selector
- TIMER** 'SHOWVIEW' or 'TIMER' programming
- CLEAR (CL)** Reset, clear
- 0-9** Digit buttons 0-9
- MONITOR** TV monitor function
- OK** Confirm button
- P-** Down/Minus, programme number
- P+** Up/Plus, programme number
- PLAY** Playback
- ◀◀** Rewind/Reverse scanning
- ▶▶** Forward wind/ Forward scanning
- STOP** Pause/Stop, Tuner-mode
- INDEX** Index search
- SP/LP** (SP/LP) selection
- STILL** Still picture
- SYSTEM** TV system selection

Front of the set

- STANDBY** Standby switch
- Down/Minus, programme number
- +** Up/Plus, programme number
- RECORD** Record
- AUTOINSTALL** Installation
- STOP/EJECT** Stop/Cassette eject
- ◀◀** Rewind/Reverse scanning
- PLAY** Playback
- ▶▶** Forward wind/ Forward scanning



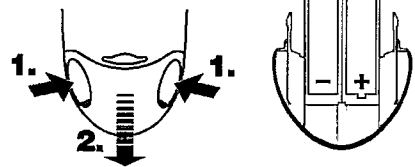
The remote control



- RECORD/OTR** ● Record
- STANDBY** ☐ Standby
- ◀ Menu left
- P+** Up/Plus, programme number
- P-** Down/Minus, programme number
- ▶ Menu right
- TIMER** ☐ 'TIMER' programming
- OK** Confirm button
- CLEAR (CL)** Reset, clear
- SELECT** No function
- MONITOR** TV monitor function
- 0-9** Digit buttons 0-9
- ◀◀ Rewind/Reverse scanning
- PLAY** ▶ Playback
- ▶▶ Forward wind/ Forward scanning
- INDEX** ▶ Index search
- STOP** ■ Pause/Stop, Tuner-mode
- STILL** ◀◀ Still picture
- SYSTEM** Special function
- EJECT** Eject
- SP/LP** No function

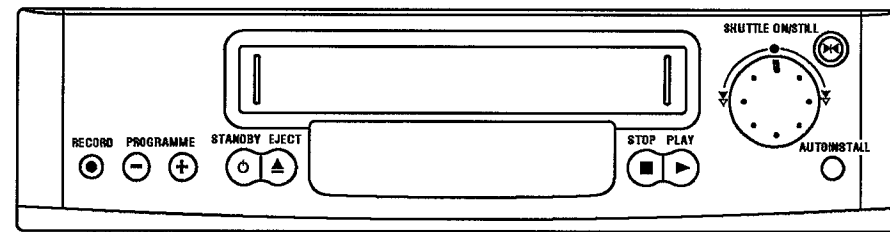
Additional TV functions: Only function with televisions with the same remote control code.

- TV** ◀/▶ TV volume
- TV** ✖ TV sound off
- TV** ☐ Switch off TV
- TV/P** +/- Programme number +/-



Front of the set

- RECORD** ● Record
- PROGRAMME** -- Down/Minus, programme number
- PROGRAMME** + Up/Plus, programme number
- STANDBY** ☐ Standby
- EJECT** ▲ Cassette eject
- STOP** ■ Pause/Stop
- PLAY** ▶ Playback
- SHUTTLE ON/STILL** ◀◀ Still picture
- ◀+ Rotary control for Rewind/Reverse scanning or Forward wind/ Forward scanning
- AUTOINSTALL** Installation button



Saving energy

You can choose between two methods of switching to standby.

1. Normal method - switch to standby using the **STANDBY** button. The clock time remains displayed. If the clock has not been set, '---' appears in the display.
2. To save energy - Press the **STANDBY** button twice. The clock time disappears from the display.

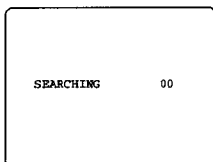
Emergency interrupt

Both the set and the remote control have an 'Emergency interrupt' button. You can use the **STANDBY** button to interrupt any function.

Whenever you have operating problems you can simply interrupt the function and start again. You can practise operating your set without any worries. No matter which buttons you press, you cannot damage it.

Automatic Channel Search

- 1 Press the **AUTOINSTALL** button on the video recorder.
- 2 Select the required OSD language. The video recorder display always shows English text.
- 3 Confirm with the **OK** button.
- 4 The automatic channel search starts.



- 5 Wait until all the TV channels have been found. This may take several minutes.
- 6 Adjust 'TIME', 'YEAR', 'MONTH', 'DATE' if required.
- 7 Confirm each entry with the **OK** button.

How to search for a TV channel manually, you read in chapter 4 'SPECIAL FEATURES', 'Manual channel search'.

Note: If TV channels have been stored already, select and confirm the 'AUTOSEARCH' line after step 1. The following procedure will be reduced to steps 4 and 5.

Autoinstall (only for UK)

The video recorder will search for all TV programmes. It stores TV programmes found in the following sequence: BBC 1, BBC 2, ITV, CH 4, CH 5, SKY, others.

Setting the clock

Time/Date Download:

If a television programme which transmits TXT/PDC is stored with programme number 'P 01', time (from TXT) and date (from PDC) will automatically be taken from the TXT/PDC information.

Synchro Time:

If a television programme which transmits TXT (videotext/teletext/top/flot/fasttext/supertext and so forth) is stored with programme number 'P 01', the correct time will automatically be taken from the TXT information.

- 1 Press the **AUTOINSTALL** button on the videorecorder.
- 2 Confirm the line 'CLOCK'.
- 3 Adjust 'TIME', 'YEAR', 'MONTH', 'DATE' if required.
- 4 Confirm each entry.

Automatic Channel Allocation FOLLOW TV

With this function the video recorder maintains the same programme sequence as on the TV set. This only functions if the video recorder (socket **EXT.1**) and the TV set are connected via a scart cable.

- 1 Switch on the TV set.
- 2 Press the **AUTOINSTALL** button on your video recorder.

- 3 Select and confirm 'FOLLOW TV'.
If the video recorder recognizes that the TV set has been connected via a scart cable, 'TV01' appears in the display.
- 4 Select programme number '1' on the TV set.
- 5 Confirm using the video recorder-remote control. The video recorder compares the TV channels on the TV set and the video recorder.
If the video recorder found the same TV channel as the TV set, then it stores it at 'P 01'.
- 6 Wait until e.g.: 'TV02' appears in the display.
- 7 Select, on the TV set, the next programme number, e.g.: '2'.
- 8 Confirm with the video recorder-remote control.
- 9 Repeat steps 6 to 8 until all TV channels have been allocated.
To finish, press the **STANDBY** button.

Note: If, at step 3 'NOTV' (no signal from TV set) appears in the display, the TV channels can not be allocated automatically. Then read further in chapter 4, section 'Manual channel number allocation'.
* If you allocated the wrong TV-channel at step 5 or 6 you can go back one step with the **CLEAR (CL)** button.

PLAYBACK

Instant View

If, during wind/rewind, you want to have a quick access to picture scanning, use the 'Instant View' function. If you hold the **<<<** (Rewind) or **>>>** (Wind) button during wind or rewind, you will switch to picture scanning. If you release the buttons, the video recorder will automatically switch back to rewind or wind again.

Notes: Some functions switch off automatically after a while (e.g.: Pause, Still Picture, Scanning). This helps to protect the cassette and prevent unnecessary power consumption.

* The picture quality will deteriorate during Picture Scanning. The sound is turned off.
* With this set you can play back cassettes that have been recorded on other video recorders in the NTSC standard. This only works for television sets which are suitable for a picture frequency of 60 Hz.
During NTSC-play back some special features (e.g. still picture) are not possible.

Still picture (2 Video Heads)

- 1 Press the **STILL** button. You see a still picture. Interference stripes will appear on the screen.
- 2 Each time you press **STILL** again, the picture will move on one step.

Still picture/Slow motion (4 Video Heads)

- 1 Press the **STILL** button. A still picture appears on the screen.
- 2 Each time you press **STILL** again the picture will move on one step.
- 3 Hold the **STILL** button. The picture will be played in super-slow motion.
- 4 Press the **>>>** button several times. You have a choice of several playback speeds. When you press the **<<<** button several times you will return to the still picture. There is no sound during slow motion playback.

Note: If the still picture vibrates vertically, hold the **P-** or the **P+** button at step 1 until the vibration is minimal. This setting will be stored automatically. Please note, however, that interference may still occur with poor quality cassettes.

Tape position/Index search

Tape position: The elapsed playback time, given to the hour and minute, appears in the display.

Relative Linear Counter:

If you want to set the indicator to '0:00', press the **CLEAR (CL)** button.

When you insert a cassette, the indicator is automatically set to '0:00'.

Absolute Linear Counter:

When you load a cassette, the video recorder must first calculate the playing time. Therefore, '---' appears first and only after the tape has been running for a few seconds the playing time will be shown.

The playback time displayed can be incorrect when using camcorder cassettes or with cassettes made for NTSC-VHS equipment.

Index search: At the beginning of each recording, the video recorder marks the tape with a code mark. You can search for these code marks on the tape. Once the video recorder finds the code mark or a blank space it will automatically switch to playback.

- 1 Press the **INDEX** button and then press the **▶▶** button to select the next code mark or the **◀◀** button for the previous code mark.

Note: You cannot use the function 'Index search' with recordings made on another video recorder that does not have this code mark function.

Eliminating picture interference/ Cleaning function

- 1 During playback, hold the **P+** button until 'TRAC' (tracking) appears in the display.
- 2 Hold the **P+** or **P-** button until the playback quality is at its best.
- 3 Wait a few seconds, until 'TRAC' disappears from the display. This setting will remain until you remove the cassette.

- 4 If horizontal lines still appear on the screen, use the Cleaning function:



Cleaning function: During playback, hold the **PLAY▶** 'HEAD' (video head cleaning) appears in the display. The video heads are being cleaned. The video recorder automatically switches back to playback.

Note: Some hired cassettes may have a poor picture/sound quality. This is not a fault in your set.

Note: During picture scanning, still picture and slow motion colour playback may be poor.
* You will obtain the best picture quality when recording at standard speed ('SP').

RECORDING

OTR - recording:

If you do not want to record to the end of the cassette, press the **RECORD** button again. The display shows at what time the recording will stop. With each subsequent press of the **RECORD** button you can add 30 minutes to this time.

You can return to the normal recording status by pressing the **CLEAR (CL)** button. During playback, search for the correct position on the tape and then press the **STOP/EJECT** button. **II** will appear in the display. Now you can start recording as usual by pressing the **RECORD** button.

Display:

During Stop **■** or Pause **II** you can switch between the display for TV-channel name and tape position, using the **OK** button.

Direct Record

Do you want to record a television transmission which you are just viewing?

Press the **RECORD** button with the video recorder switched to standby. The video recorder takes the current channel number of the television by means of the scart cable and starts recording.

Note: For 'Direct Record' to function, it must be switched on. To do so, press the **AUTOINSTALL** button. Select and confirm 'DIRECT RECORD'. Select and confirm 'ON'. After the confirmation the video recorder switches to standby automatically.

* Not all external equipment is suitable for using the 'Direct Record'-function (e.g. some satellite receivers, decoders).

* Don't select another programme number on your television set, until 'OK' appears in the display of your video recorder. This can take up to one minute.

How to programme a recording

The video recorder needs the following information for every programmed recording:

- * the date on which the recording is to be made
- * the programme number for the TV channel
- * the start and stop time of the recording
- * 'PDC' or 'VPS' on or off

The set stores all the information mentioned above in what is known as a TIMER block. You can programme up to 6 TIMER blocks, one month in advance.

With 'PDC' (Programme Delivery Control) or 'VPS' (Video Programming System), the TV station controls the beginning and the length of the programmed recording. This means that the video recorder switches itself on and off at the right time even if a TV programme you have programmed begins earlier or finishes later than expected.

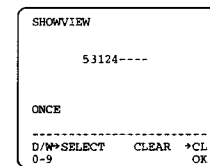
Usually the start time is the same as the PDC or VPS time. If, however, in the TV guide, in addition to a TV programme's start time, a different PDC or VPS time is given, e.g.: '20.15 (PDC or VPS 20.14)', you have to enter '20.14' as the start time exactly to the minute.

If you want to enter a time that differs from the PDC or VPS time, you have to switch off 'PDC' or 'VPS'.

Programming with 'SHOWVIEW'

All the information required for a programming is contained encoded in the SHOWVIEW code.

- 1 Switch on the TV set.
- 2 Press the **TIMER** button on the remote control.
- 3 Please enter the SHOWVIEW code (up to 9 digits) printed in your TV guide next to the start time of a TV programme. If you make a mistake, clear with the **CLEAR (CL)** button.



- 4 If you want to programme at daily or weekly intervals, press the **SELECT** button until 'D-DAILY' (daily intervals) or 'W-WEEKLY' (weekly intervals) appears on the TV screen. The 'daily intervals' function can only be used for recordings to be made from Mondays to Fridays inclusive.
- 5 Confirm the entries with the **OK** button. The resultant data appear on the TV screen.

Note: If you use SHOWVIEW for the first time for this TV channel, the 'SELECT PROG' line appears when you confirm the SHOWVIEW code. Select and confirm the programme number for the TV programme required.

* Switch 'PDC' or 'VPS' (V/P) on or off with the **SELECT** button.

* If you wish to set a later end time for a recording, press the **P+** button at step 5. With each press on the **P+** button you add 15 minutes to the time.

* If e.g.: '20:00' appears in the display, please set the clock.

- 6 Finally, press the **OK** button. Programming is now complete. The data has been stored in a TIMER block.

- 7 Make sure that a cassette without erase protection has been loaded. Switch to standby with the **STANDBY** button.

A programmed recording will only function when the video recorder is switched to standby with the **STANDBY** button.

Note:

* SHOWVIEW Aerial-code numbers: With this set, SHOWVIEW aerial-code numbers will be allocated automatically.

Programming recordings manually (SHOWVIEW/VIDEOplus +)

- 1 Switch on the TV set. Press the **TIMER** button twice.

Programming recordings manually (without SHOWVIEW/VIDEOplus +)

- 1 Switch on the TV set. Press the **TIMER** button.
- 2 Select a free TIMER block. Press the **TIMER** button.
- 3 With the **TIMER** button you can select between the entries 'DATE' (date), 'PROG' (programme number), 'START' (start time) and 'END' (stop time). You can enter or adjust data. Confirm each entry with the **TIMER** button.
You can switch 'VPS/PDC' (V/P) on and off at step 'START' with the **SELECT** button.
You can select between 'D' (daily intervals) or 'W' (weekly intervals) at step 'DATE' with the **SELECT** button.
- 4 Finally, press the **OK** button. Programming has now been completed.
- 5 Make sure that a cassette without erase protection has been loaded. Switch to standby with the **STANDBY** button.

Note:

* Clear a TIMER block: At step 1 select the TIMER block that you want to clear. Press the **CLEAR (CL)** button.
If e.g.: '20:00' appears in the display, the clock must be set.

Important programming notes

When recordings have been programmed, **TIMER** appears in the display.

The programmed recording will always be made at the recording speed (SP/LP) that at the time has been selected on the video recorder.

You cannot operate the set manually while a programmed recording is being made. If you want to interrupt the programmed recording, press the **STANDBY** button. If the video recorder is switched on a few minutes before a programmed recording is due to take place, 'TIMER RECORD' will flash on the TV screen.

If the end of the cassette is reached during a programmed recording, the video recorder automatically ejects the cassette.

If you forget to load a cassette, after programming the recording, 'NO CASSETTE' will appear on the TV screen for a few seconds.

If you insert a cassette with erase protection, after programming the recording, 'PROTECTED CASSETTE' will appear on the TV screen for a few seconds. The cassette will then be ejected.

When all TIMER blocks have been programmed, 'TIMER FULL' appears on the TV screen at step 1. If 'CODE ERROR' appears on the TV screen, the SHOWVIEW code was incorrect or the date was incorrectly entered. Repeat the entry or end with the **STANDBY** button.

With programming at daily intervals, the first recording must take place within a week. If 'DAILY ERROR' appears on the TV screen, the date was incorrectly entered. Programming at daily intervals can only be used for recordings to be made from Mondays to Fridays inclusive.

Programme number 'E1' is provided for programmed recordings from external sources (via the **EXT.1** scart socket).

Programme numbers 'E1' and 'E2' are provided for programmed recordings from external sources (via the **EXT.1** or **EXT.2** scart socket).

SPECIAL FEATURES

Tuner mode

You can also use your video recorder as a TV receiver (tuner).

- 1 Hold the **STOP** button, until [] appears in the display.
- 2 Choose the required programme number with the **P-** or **P+** button or with the **0-9** buttons.
- 3 Switch the video recorder to standby by pressing the **STANDBY** button when you no longer want to watch television.

Sound track selection (only HiFi sets)

You can select the sound track. This is of particular interest when the audio transmissions are multilingual.

- 1 Press the **SELECT** button. The current setting will appear in the display. By pressing the **SELECT** button several times you can select from the four possibilities displayed ('STEREO', 'RIGHT', 'LEFT', 'MONO').

Note: During playback you can select a fifth possibility: the 'MIXED' mode. In this mode you can play back the mono sound of the normal (linear) audio track together with the sound of the stereo audio track. This can be used for playing back a recording dubbed on another video recorder.
* If there is no stereo sound recorded on the cassette, the video recorder automatically switches over to mono sound.

Changing the TV system

If you play back recordings made on other video recorders or if you record from an external source, the automatic TV system switch-over may not always work properly.

- 1 Before recording, or during playback, select the TV system with the **SYSTEM** button.

- 2 If you select a different programme number, or eject the cassette, the video recorder switches back to 'automatic'.

Externally controlled TIMER recording

Do you have another device, e.g. a satellite receiver, which can control other equipment by a Programming function? This video recorder can be remote-controlled via socket **EXT.2**, by means of a scart cable.

- 1 Insert a cassette. Switch to standby with the **STANDBY** button.
- 2 Hold the **MONITOR** button until 'REC.P' appears in the display.
- 3 If you want to interrupt this function before the recording has actually started, hold the **MONITOR** button until the video recorder switches to standby.
- 4 If you want to interrupt this function while a recording is being made, press the **STANDBY** button.

Child lock (RT174)

- 1 With the video recorder switched on, press the **STANDBY** button on the remote control for a few seconds until **CL** appears in the video recorder display. Keep the remote control in a safe place.
- 2 When you want to switch off the child lock, press the **STANDBY** button again for a few seconds until **CL** disappears from the video recorder display.

Note: If a button is pressed with activated child lock, **CL** appears in the display for a few seconds.
* Programmed recordings are made despite the child lock and cannot be interrupted.

Child lock (RT170)

- 1 With the video recorder switched on, press the **STANDBY** and the **SELECT** button on the remote control for a few seconds until σ appears in the video recorder display. Keep the remote control in a safe place.

- 2 When you want to switch off the child lock, press the **STANDBY** and the **SELECT** button again simultaneously, for a few seconds until σ appears in the video recorder display.

Note: If a button is pressed with activated child lock, σ appears for a few seconds in the display.

* Programmed recordings are made despite the child lock and cannot be interrupted.

On Screen Display (OSD)

You can switch the On Screen Display (OSD) on or off.

- 1 Press the **AUTOINSTALL** button on the video recorder.
- 2 Select and confirm 'OSD'.
- 3 Select and confirm 'ON' or 'OFF'.

Note: With the **OK** button you can superimpose the actual operating mode on the TV screen.

Channel number or frequency display

You can switch between the display for 'channel number' or 'frequency' for manual channel search.

- 1 Press the **AUTOINSTALL** button.
- 2 Select and confirm 'CHANNEL/FREQUENCY'.
- 3 Select and confirm 'CHANNEL' or 'FREQUENCY'.

Manual channel search

In certain cases the Automatic Channel Search may not be able to find all of the TV channels (e.g. coded TV channels). You can then use this manual method to set the channels.

- 1 Press the **AUTOINSTALL** button on the video recorder.
- 2 Select and confirm 'MANUAL SEARCH'.
- 3 Hold the **P+** button until you have found the right TV channel. A changing channel number or frequency will appear on the TV screen.
- 4 Confirm with the **OK** button.
- 5 Select and confirm the programme number that you wish to allocate to this TV channel (e.g.: 'P 01').
- 6 If you want to allocate more TV channels, repeat steps 3 to 5 until all TV channels have been stored.
- 7 To end, press the **STANDBY** button.

Note: Channel number or frequency can also be entered directly at step 3, using the **0-9** buttons.

* To enter a special/hyperband channel, first enter the channel digit '9'. The indication changes from 'CH' to 'CA'. For example, for special channel 'S 30', enter '9 30'.

* **Allocating a decoder:** If you want to allocate a decoder, press the **INDEX** button at step 5 until 'DEC' appears in the display.

* This video recorder can receive HI-FI sound transmissions in 'NICAM'. At step 5, you can switch 'NICAM' off or on with the **SELECT** button.

* If the picture or sound quality is poor, you might have selected the wrong TV system. Press the **SYSTEM** button at step 3 to change the TV system.

Manual Channel Number Allocation

You can allocate any desired programme number to the TV channels stored by the 'Automatic Channel Search'.

- 1 Press the **AUTOINSTALL** button.
- 2 Select and confirm 'CHANNEL ALLOCATION'.

- 3 Use the **P-** or **P+** button, to select the TV channel on the TV screen, to which you wish to allocate a programme number (starting with 'P 01').

- 4 Confirm this allocation. If you wish to allocate further programme numbers, repeat step 3 and step 4 until you allocated a programme number to all the required TV channels.

- 5 To end press the **STANDBY** button.

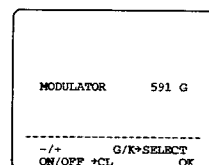
Note: If you want to delete an unwanted TV channel, press the **CLEAR (CL)** button at step 3.

* **Monitor function:** You can switch to and fro between TV reception and video recorder reception with the **MONITOR** button. This only functions when you used a scart cable to connect the video recorder to your TV set and if your TV set responds to this switch-over.

Playback via the aerial cable

If you do not wish to use a scart cable, the aerial cable which is already connected will act as the connection between your TV set and the video recorder. Ensure that the video recorder is connected to the mains supply.

- 1 Switch on your TV set and select the programme number that you have earmarked for video playback. (see operating manual for your TV set).
- 2 Ensure that no cassette has been loaded. With the video recorder switched to standby, hold the **SYSTEM** button for a few seconds until a modulator frequency e.g.: 'G591' (UHF-channel 36) appears in the display. The video recorder transmits a test picture.
- 3 Tune in the TV set in the UHF wave band until this picture appears.



- 4 Switch the video recorder to standby with the **STANDBY** button.

If you have interrupted making standard settings as described in Chapter 1, 'INSTALLATION', turn to that chapter to continue making the standard settings.

Note: This modulator frequency might already be occupied by another TV station in your reception area, e.g. 'Channel 5'. In this case you will find that the picture quality on your TV set will be poor when receiving one or more TV channels.

* **Adjusting the modulator frequency:** If the picture quality only deteriorates when the video recorder is switched on, adjust the modulator frequency. The frequency can be adjusted at step 2 with the **P-** or the **P+** button. Confirm the adjusted frequency with the **OK** button.

* **Switching off the modulator:** If you cannot eliminate picture or sound interference using the above method you can switch off the built-in modulator. You should only do this if you have connected the video recorder to the TV set using a scart cable. 'Playback via the aerial cable' is not possible when the modulator is switched off.

At step 2, press the **CLEAR (CL)** button for several seconds until 'MOFF' (modulator switched off) appears in the display. You can switch back again in the same way.

* **The GK switch:**

If you don't have sound during playback, switch to the other TV system on the video recorder. At step 2, select between e.g.: 'K591' (TV system SECAM-D,K) and e.g.: 'G591' (TV system PAL-B,G) with the **SELECT** button.

TOOLS FOR ERROR DIAGNOSIS

Replacement procedure for leadless components (chip)

The following procedures are recommended for replacing leadless components used in this unit.

1. Preparation for replacement

a. Soldering iron

Use a pencil-type soldering iron that uses less than 30W.

b. Solder

Use Eutectic solder
(Tin 63%, Lead 37%)

c. Soldering time

Maximum 4 seconds.

Note:

- a. Leadless components must not be re-used after removal.
- b. Excessive mechanical stress and rubbing of the component electrode must be avoided.

2. Removing the leadless components

Grasp the leadless component body with tweezers and alternately apply heat to both electrodes. When the solder on both electrodes has melted, remove leadless component with a twisting motion.

Note:

- a. Do not attempt to lift the component off the board until the component is completely disconnected from the board with a twisting motion.
- b. Be careful not to break the copper foil on the printed circuit board.

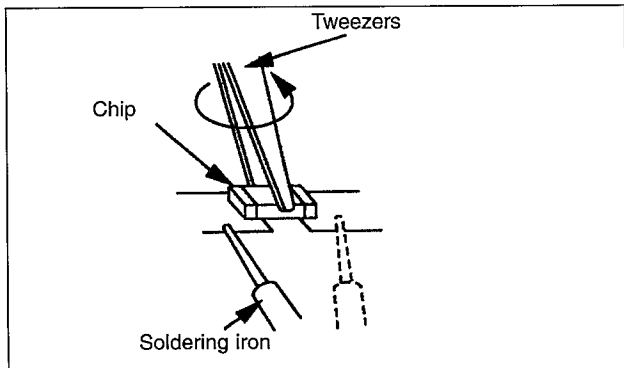


Fig. 2-1

3. Installation of leadless components

- a. Presolder the contact points on the circuit board.

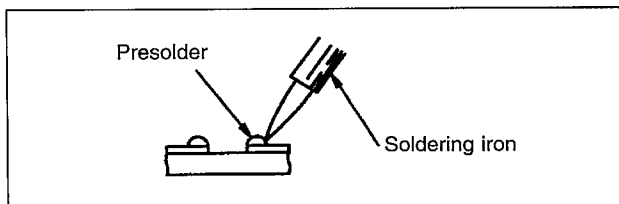


Fig. 2-2

- b. Using tweezers press down the part and solder both electrodes as shown below.

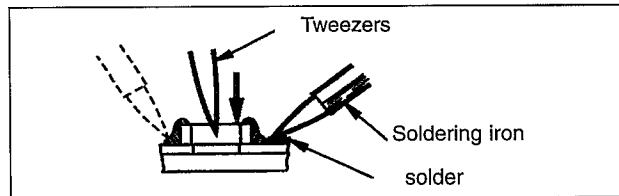


Fig. 2-3

Note:

Do not glue the replacement component to the circuit board.

How to remove/install the FLAT PACK IC

1. How to remove the Flat Pack IC

- *Using a hot air Flat Pack IC unsoldering equipment*

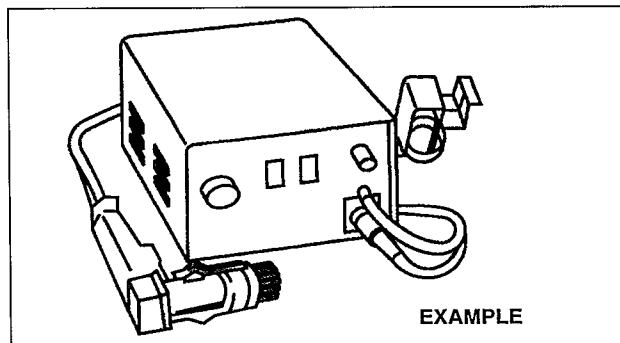


Fig. 2-4

a. Prepare the hot air Flat Pack IC unsoldering equipment. Then apply hot air to Flat Pack IC for 5 - 8 seconds.

b. Remove the Flat Pack IC with tweezers while applying the hot air.

CAUTION:

To avoid damage, do not apply the hot air to the chip parts around the Flat Pack IC for long periods.

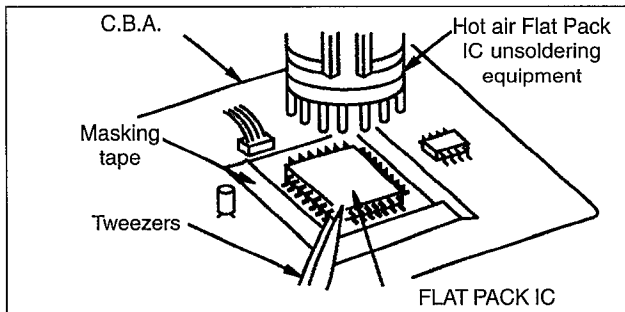


Fig. 2-5

Put masking tape around the Flat Pack IC to protect adjacent parts.

2. The Flat Pack IC is fixed to the P.C.B. with glue; therefore take care not to break or damage any foil under the IC or on each pin when removing it.

• Using a soldering iron

a. Use unsoldering braid to remove the solder from all pins of the Flat Pack IC. Apply solder flux to all pins of the Flat Pack IC, to allow easy removal.

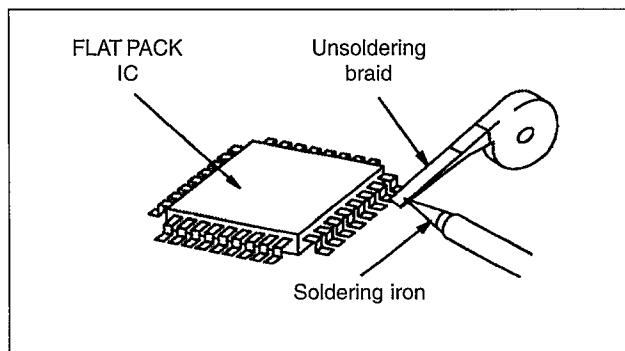


Fig. 2-6

b. Lift up each lead of the Flat Pack IC individually, using a sharp pin or non-solder wire (iron wire), while heating the pins using a fine tip soldering iron or a hot air blower.

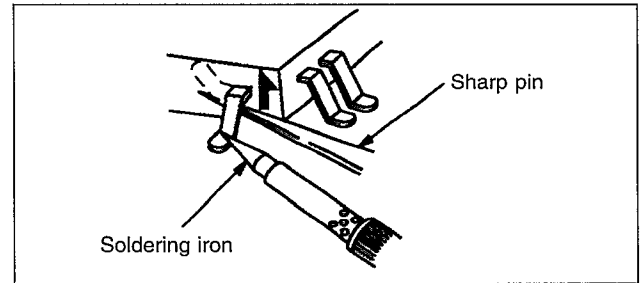


Fig. 2-7

• Using iron wire

a. Use unsoldering braid to remove the solder from all pins of the Flat Pack IC. Apply solder flux to all pins of the Flat Pack IC, to allow easy removal.

b. Affix the wire to workbench or solid mounting point (see Fig. 2-8)

c. Pull up the wire as the solder melts in order to lift the IC lead from the P.C.B. contact pad, while heating the pins using a fine-tip soldering iron or hot air blower.

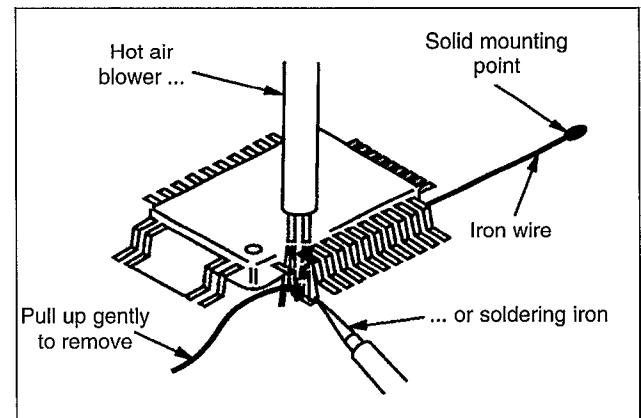


Fig. 2-8

Note:

When using a soldering iron care must be taken to ensure that the Flat Pack IC is not held by glue or the P.C.B. may be damaged if force is used.

If the IC is glued, heat the IC with hot air to loosen the glue.

2. How to install the FLAT PACK IC

a. Use unsoldering braid to remove the solder from the foil of each pin of the Flat Pack IC on the P.C.B. in order to install the replacement Flat Pack IC more easily.

b. The "•" mark on the Flat Pack IC indicates pin 1. Make sure this mark matches the 1 on the P.C.B. when positioning for installation. Then pre-solder the four corners of the Flat Pack IC. (see Fig. 2-9).

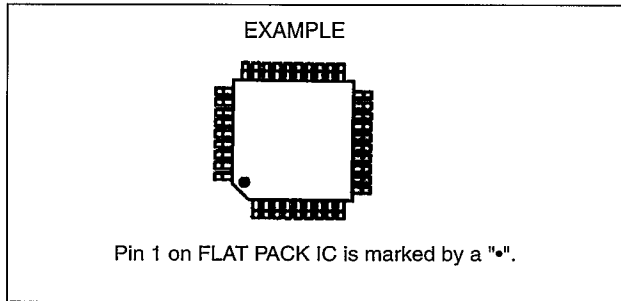


Fig. 2-9

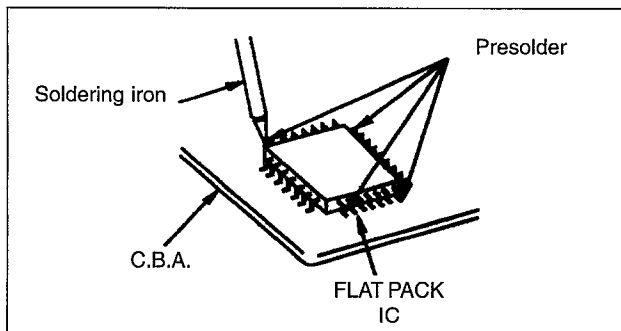


Fig. 2-10

c. Solder all pins of the Flat Pack IC. Make sure that none of the pins have solder bridges between pins on the Flat Pack IC.

Note

All integrated circuits and many other semiconductor devices are electrostatically sensitive and therefore require the special handling techniques described in the "SAFETY INSTRUCTIONS" section of this manual.

Voltage measurements

Color bar signal in SP REC and PB modes.

Note:

Voltage indications for the REC. and PB mode on the schematic diagrams are shown below:

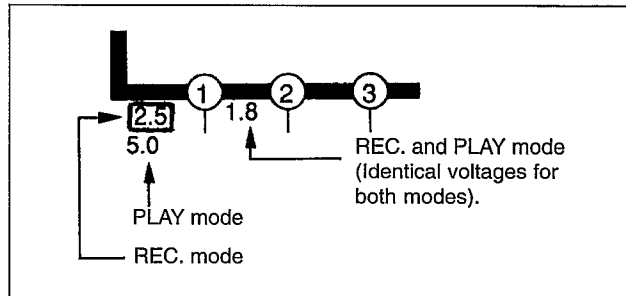


Fig. 2-11

How to read wave forms

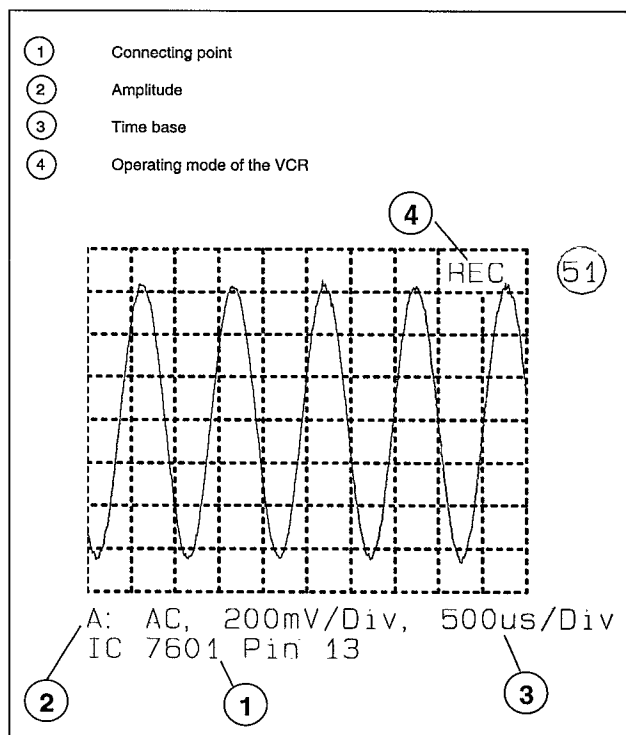


Fig. 2-12

Voltage indication of Zener diodes

The Zener voltage of Zener diodes is indicated as such on schematic diagrams:

Example:

BZX79C20.....Zener voltage: 20 Volts

How to identify connectors on schematic diagrams

Each connector is labeled with a connector number and a pin number indicating to what component it is connected; in other words, its counterpart.

Use the Connecting Wiring Diagram to find the connections between associated connectors.

Example:

The connections between C.B.A.s are shown below:

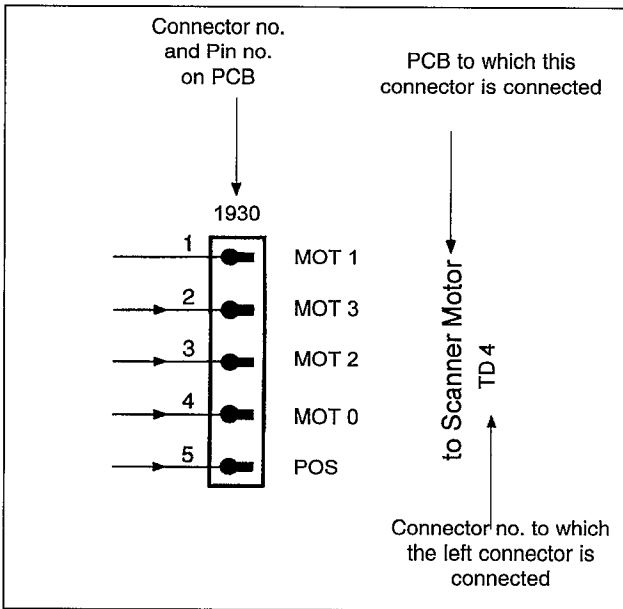


Fig. 2-13

Test point information

With this model, test pin or components leads are used as contact points for adjustment and checking. In case of other test points with no test pin or components leads, use the foil solder pad to connect the measuring equipment.

Removal or installation of flat cables

a. Removal

Pull out the flat cable, holding it securely to avoid damaging individual wires (see fig. 2-14).

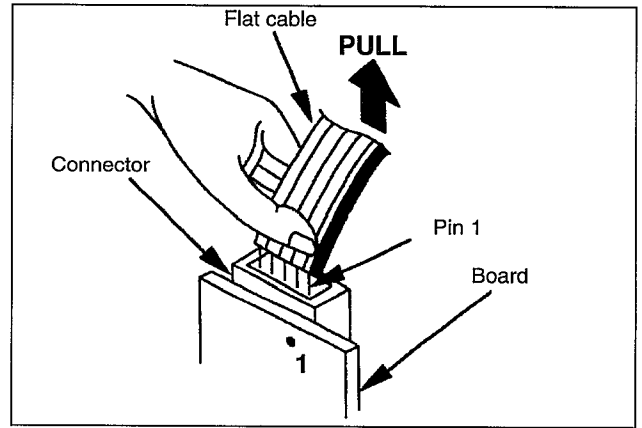


Fig. 2-14

b. Installation

1. Adjust the position of the flat cable so that the lines on the flat cable align with the pins X of the trap connector (see fig. 2-14).
2. Align individual wires with its individual trap connector hole. Then insert the flat cable wire into the trap connector.

CAUTION: After installation, inspect the connection to insure that individual wires are not bent or touching other wires.

Dismantling instructions

General guidelines for dismantling housing components, electronic parts and the drive mechanism

Always disconnect from mains before dismantling or assembly.

Due to the supply voltages (hot circuit) on the primary side of the switched-mode power supply, an isolating transformer is required for the operation of the device.

The drive or the drive/motherboard unit must not be pulled out by the cross struts!

Components placed below the tape deck has to be inserted exactly.

The use of a regulating isolating transformer is recommended for detecting faults around the power supply.

All screws of the video recorder can be removed or tightened with a 10* torx screwdriver .

1. Housing cover (Fig. 1)

- Remove the four screws (A).
- Push catch (S) inwards, lifting lid at the same time to move out of groove.
- Slide housing cover back by approx. 1 cm.
- Push centre of housing cover sides on underside approx. 1 cm outwards and lift up the housing cover.

Assembly

Assemble in reverse order.

2. Base plate (Fig. 2)

The base plate may not be removed from the frame!

3. Front panel (Fig. 2)

Preparation

Dismantle the housing lid as described in section 1.

- Position the device with the base plate facing upwards.
- Undo the six catches (S) one after the other, starting from the left or the right.
- Remove the front panel by pulling it forwards.
- For devices with shuttle print or socket print, disconnect the cabling to the motherboard.

Assembly

Assemble in reverse order (device in operational position).

Important

- The lift flap lever should be connected to the lift flap guide.
- Check that all catches are engaged.

4. Dismantling of the motherboard/drive combination (Fig. 3) (Fig. 4)

Preparation

- Remove the housing cover as described in section 1.
- Remove the front panel as described in section 3.

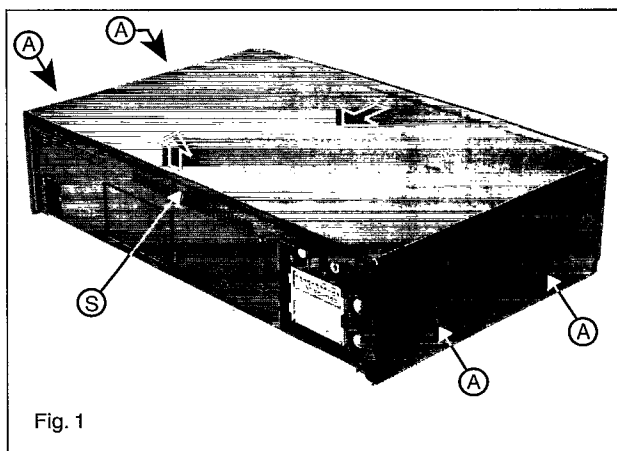


Fig. 1

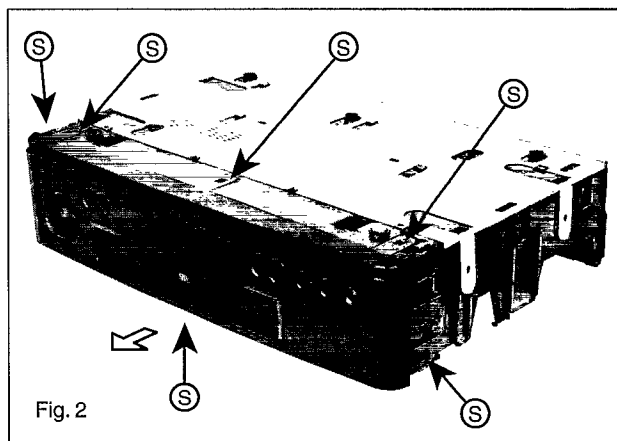


Fig. 2

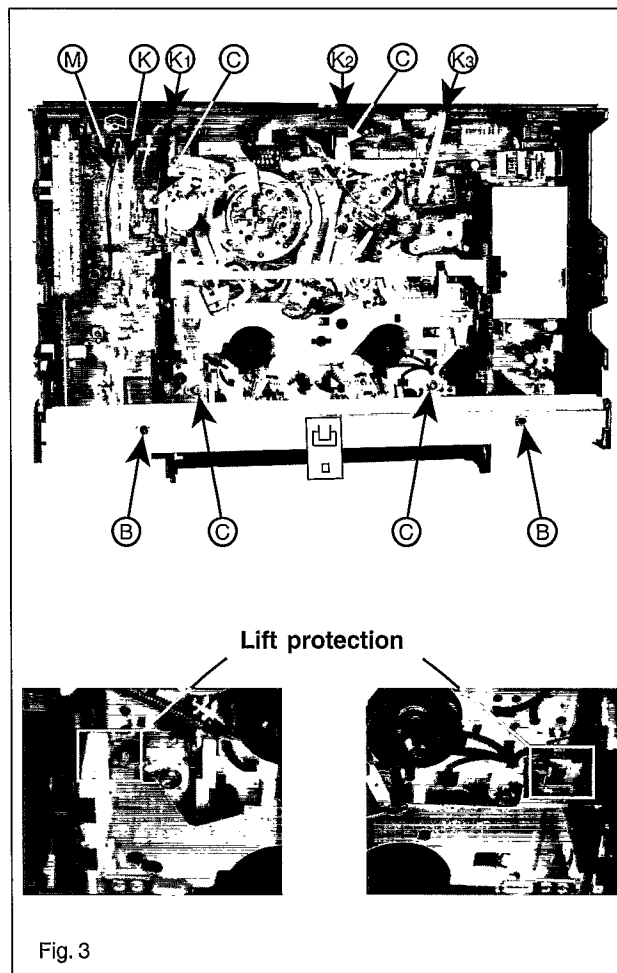


Fig. 3

* ...available from dealers

- Move device into operational position (Fig. 3).
- Undo the two screws (B) of the stay and pull it up to remove it.
- Push back the lift by 5 cm after releasing both lift stops.
- Undo and remove the four fastening screws (C) of the drive.
- Detach the Cinch socket cable (K) and ground cable (M) from the socket print (if present).
- Remove the cables (K1; K2; K3) from the guides on the rear of the frame.
- Pull the Cinch socket holder with the socket and print up and out of the frame (if present).
- Position the device with the base plate facing up.
- Undo the 10 catches (S) from the rear right to the rear front and then from the rear left to the front left.
- After the weight of the motherboard/drive unit has released it from the frame, the catch (S) at the mains socket has to be released for a second time.
- The frame can be removed by lifting it off.
- Turn the motherboard/drive unit and move it into the service position (Fig. 5), if necessary.
The device is operational in this position
"Eject" must NOT be used !!!

Caution:

Adjustments can not be made in the service position.
"Eject" must NOT be used !!!

Assembly

- Position the frame with the top open onto a level surface.
- Hold the drive on the side at the lift and insert the motherboard/drive unit into the frame, pushing it down lightly. Observe that the power supply and Scart sockets are positioned in openings.
- Check that all 10 catches (S) are engaged.
- Secure the drive with the four holding screws (C).
- Move the lift into the "Eject" position.
- Push the stay onto the frame with the chamfered side facing to the rear and secure with both screws (B).
- Insert the Cinch socket into the opening and ensure that it engages.
- Connect the Cinch socket and the ground cable (K ; M) (if present).
- **Insert the cables (K1; K2; K3) into the supports provided in the frame.**
- Replace the front panel and the housing cover.

5. Dismantling the drive (Fig. 3)(Fig. 5)(Fig. 6)

Preparation

Remove the housing cover as described in section 1.
Remove the front panel as described in section 3.

- Undo the two screws (B) of the stay and pull it up to remove it.
- Push back lift by 5 cm after releasing both lift stops.
- Undo and remove the four fastening screws (C) of the drive.
- Undo and remove the ground screw (D) at the rear.
(For this purpose, insert the screwdriver through the hole in the back panel).
- Remove the cables from the drive.
- Bend back the guard of the scanner cable.
- Remove the scanner cable from the socket.
- Return the lift into the "Eject" position.
- Slightly lift the left rear side of the drive to undo the connector to the capstan motor.
- Press both catches (S) together with fine pliers and lift the drive around the snapholders.
- The drive may be separated from the motherboard.

Assembly

Assemble in reverse order.

Important

Observe that the cables (K1; K2; K3) are positioned in the supports on the rear of the frame and that the ground screw (D) is screwed in!

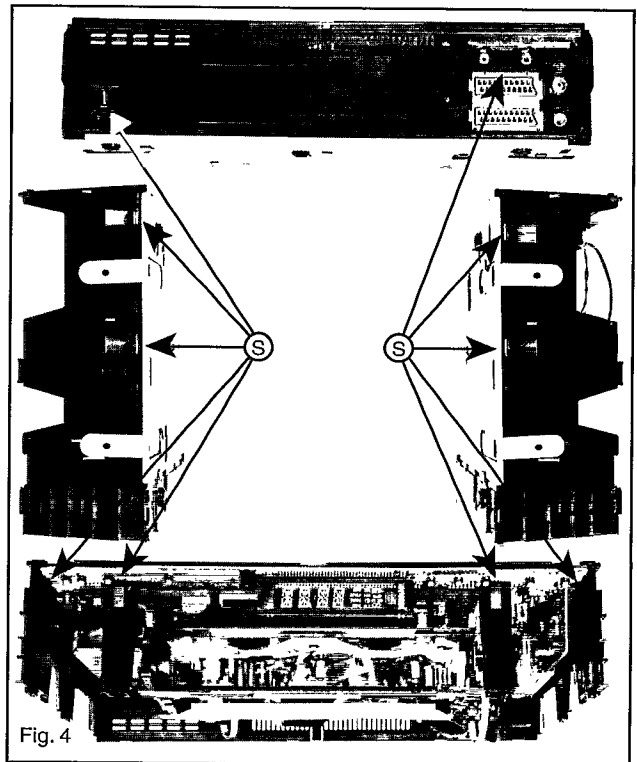


Fig. 4

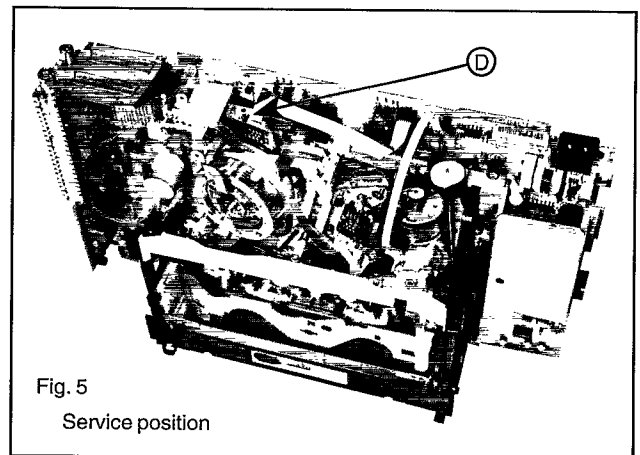


Fig. 5

Service position

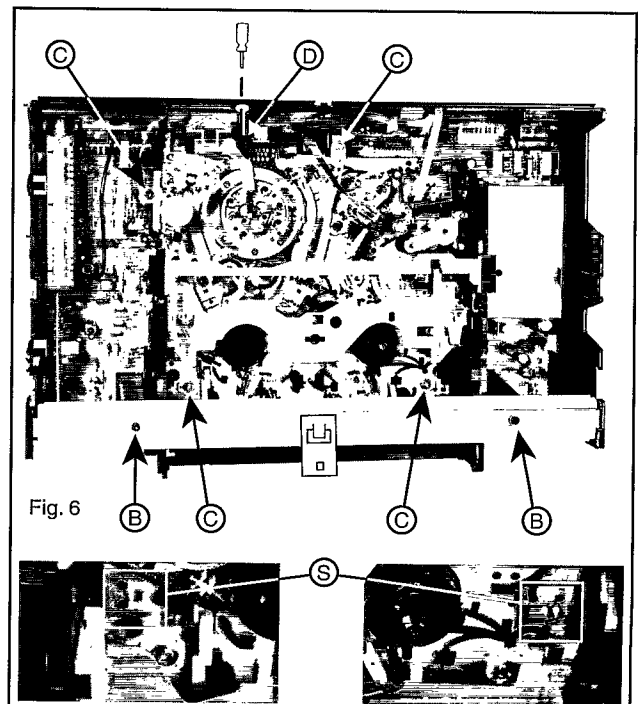


Fig. 6

Circuit description

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1. Switched-mode power supply PS (PS - Part)

1.1 Technical data:

Mains voltage:	187-264 Vrms
Maximum output:	40W
Operating frequency:	100 kHz
Efficiency:	approx. 80 % at max. output

1.2 Functional principle (Blocking Oscillator principle):

During the conductive phase of the switching transistor, energy from the mains is transferred to the transformer. This energy is released to the load during the blocking phase. The switch-on time regulates the energy transferred in each cycle in such a way that the output voltages are not affected by load or input voltage changes. The integrated circuit [7354] controls the power transistor.

1.3 Low power stand-by mode:

The 5VASW and the 12SW are switched off with ISTBY and the switched-mode power supply operates with a controlled low frequency of approx. 50 kHz to minimise switching losses. The power consumption is less than 6 W.

1.4 Reversal point:

At this point of the output characteristic, the maximum power is transferred.

1.5 Overload:

The power supply operates in burst mode. The energy in every cycle is limited, resulting in low output power (Fig.1).

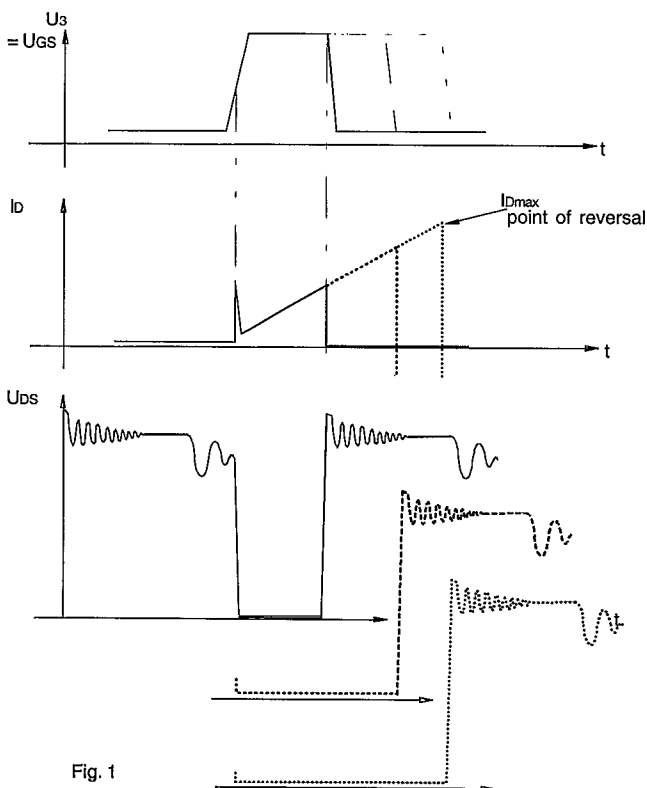


Fig. 1

1.6 Circuit description:

A filter around spool [5352] protects the mains against any interferences generated in the power supply. The mains voltage is rectified by the bridge rectifier [6360] and is filtered by the electrolytic capacitor [2362]. The electrolytic capacitor [2361] charges itself from [3370, 3369] and supplies the IC [7354] during the start-up phase. The supply is then provided by the transformer winding 4-6 with diode [6350]. During the switch-on time of the switching transistor, current from the rectified mains voltage flows through the primary winding of the transformer, the transistor [7350] and the resistor [3363] to earth. As the positive voltage at point 7 of the transformer is constant (for this example), the current increases linearly and forms a ramp, depending on the mains voltage and inductivity of the primary winding. A magnetic field representing a certain volume of energy is formed inside the transformer. The secondary voltages are polarised in such a way that the diodes block. A voltage image of the primary current is passed to pin 7 of the IC [7354] via resistors [3363, 3359]. This is checked and, as soon as it reaches a certain value, depending on the control voltage at pin 14 of the IC, the transistor [7350] is switched off.

Once the switching transistor is switched off, no further energy is transmitted to the transformer. The inductivity of the transformer now endeavours to maintain the current that has passed through it at a constant level ($U=L \cdot di/dt$). The current reduces, however, di/dt becomes negative and the polarity of the voltages at the transformer reverses, resulting in a current which flows through the secondary winding of the transformers, the diodes, the electrolytic capacitors and the load. This current, too, is ramp-shaped (but decreasing).

The switched-mode power supply is controlled by changing the conductive phase of the switching transistor so that either more or less energy from the mains is taken over into the transformer. The control information is provided by the control element [7352]. This element compares the 5V with an internal 2.5V reference voltage. The output voltage of [7352] is passed to pin 14 of IC [7354] via an optocoupler (for galvanic isolation). It compares the voltage to an internal reference value. The resulting value changes the level with which the voltage at pin 7 (image of primary current!) is compared. The voltage at pin 5 of the IC [7354] is used for FOLD BACK in case of overloading. The maximum available secondary power is determined by the resistor [3363]. At a certain voltage (normally 1V) at pin 7 of the IC, the power supply enters the reversal point. The protective circuit at pin 11 is an option of the IC. The start-up phase is carried out with shortened pulses by [2356] so that the operating frequency lies outside the audible range.

On the secondary side, six voltages are available, which are rectified by [6371, 6355, 6356, 6357, 6358, 6359]. The capstan motor voltage 9/14M2 (turbo) is changed over with control line CSW and transistor [7358].

1.7 Description of the start-up phase

After connection to the mains, the following voltages at the pins of IC [7354] (Fig.2) rise at time t_0 . V_{cc} (pin 1) corresponding to the half-wave loading via resistors [3369, 3370] to $V_{ccstart}$. In this case, the current input is normally 0.3 mA. The internal reference voltage V_{ref} of the IC is activated upon reaching $V_{ccstart}$ (approx. 13V). The oscillator starts to oscillate. The frequency is determined with the capacitor at pin 10 (approx. 100 kHz), which is charged/discharged via current sources. The current take-up then rises up to 17 mA.

The voltage at pin 11 rises linearly (soft start). The IC starts with shortened pulses until pin 11 has reached a voltage of 2.4V. If V_{cc} falls below the limit V_{dis2} before the reversal point is reached, or if V_{cc} rises to V_{ccprot} (normally 16V) (fault in the control loop), the start-up is stopped (pin 3 is switched off) and the IC (U_{ref}) is switched off. V_{cc} increases in accordance with a half-wave loading, a new start-up cycle commences (Fig. 2).

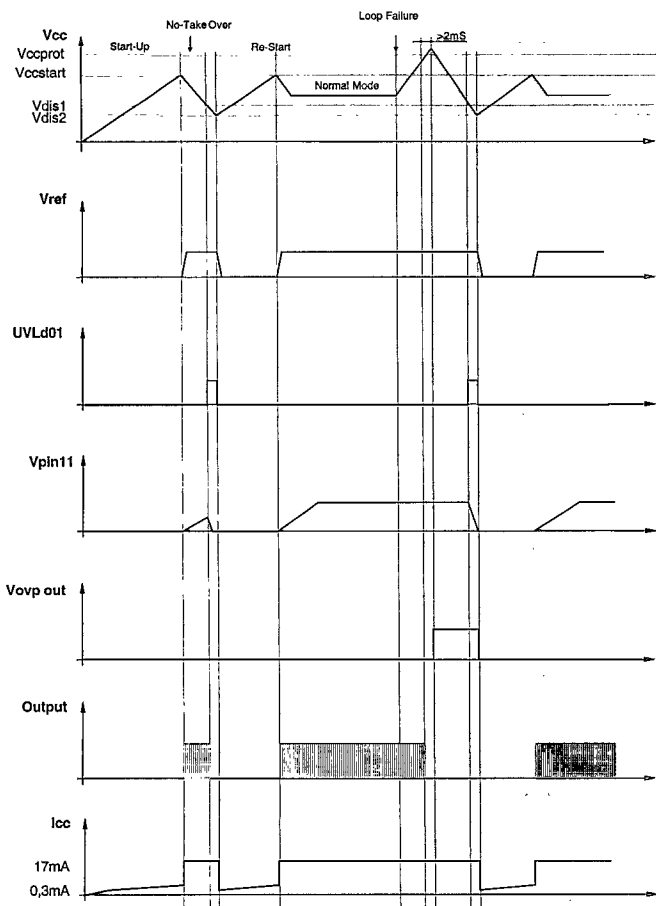


Fig. 2

1.8 Normal operation, overload, standby

After the start-up, IC [7354] is inside the control range. The voltage at pin 14 is normally 2,5V. If the load increases on the secondary side, the switch-on time is increased. The peak voltage value at pin 7 (drain current image) is also increased.

If the load increases further, the overload amplifier of the IC (normally 1V at pin 7) starts to reduce the pulse width of U_s (reversal point). The IC supply V_{cc} behaves like the secondary voltages. Consequently, V_{cc} also decreases with increasing load. In the condition $V_{cc} < V_{dis1}$ (approx. 9V), the IC changes to burst mode (query range). The short-circuit capacity is low because the interval between the half-wave start-ups is large.

In case of decreasing load, the switch-on time is shortened. If the load decreases further, the IC switches the frequency back to approx. 50 kHz (standby mode) from a certain voltage threshold at pin 7 (depending on the protective circuits at pins 12,15). This keeps the switching losses at the transistor to a minimum.

1.9 Overheating

The IC [7354] contains overheating protection, blocking the logic in case of excessive chip temperatures (normally 155 °C). Once the temperature has been reduced, a renewed start-up is possible.

2. Deck electronics DE (DE-, DC - part)

2.1 General :

The TVC (Toshiba Video Controller) is a single-chip micro-controller with the following functions:

- 12k byte ROM (242)
- 16k byte ROM (642)
- 320 byte RAM
- 8-bit A/D converter
- 2 serial bus interface
- 2x12-bit PWM outputs
- 1x8-bit PWM output
- Composite sync input
- special aux. inputs

The TVC contains two serial interfaces suitable for data exchange with other μ Ps. The component is supplied in QFP (64 pin) or SDIP cases (64 pin).

8+4 analogue inputs are available. The resolution of the converter is 8 bit. The max. processable input voltage range is 0...5V (determined by the reference voltages AVSS and AVCC). Three analogue outputs are available, two with 12 bit and one with 8 bit resolution. The outputs supply a signal with a constant frequency (PWM8 approx. 20kHz, PWM1, PWM2 approx. 39kHz) with a variable duty cycle.

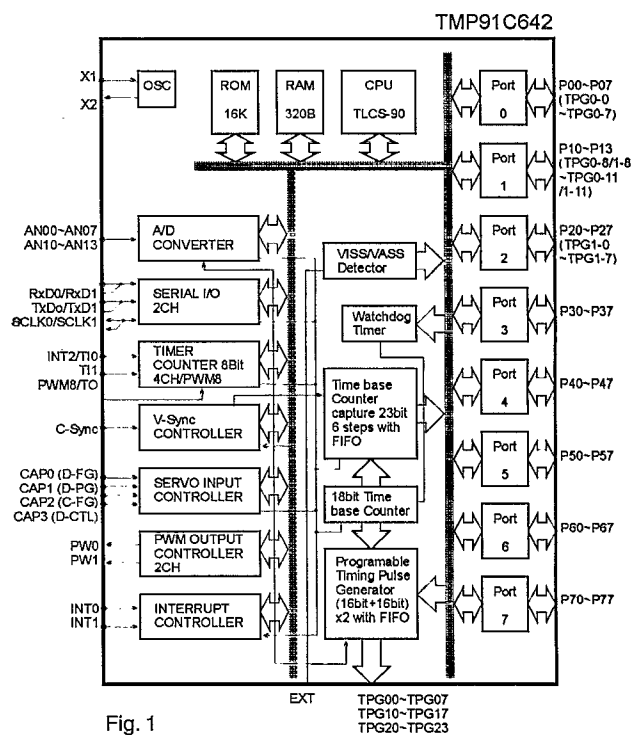


Fig. 1

2.2 SAA 1310 Interface DM - DE :

2.2.1 CTL stage

The IC SAA 1310 contains a read/write- stage for the CTL track with the option of overwriting an existing CTL track without any interference. The playback stage contains a 'digital' two-stage AGC. This switching logic detects the size of the output signal supplied by the CTL head via comparators and then selects the best amplification factor in the playback stage.

The CTL head voltage can therefore vary considerably if V_{max} / V_{min} is \gg . The LP mode has the slowest tape speed. The fastest speed is achieved during FAST WIND or FAST SEARCH. To ensure that the duty cycle of the tape sync is always correctly reproduced under the previously-mentioned conditions (important for the detection of VISS markings), the amplifier may not be overdriven.

The two-stage AGC cannot process the large dynamic range of the input voltage on its own. Consequently, the amplifier contains an additional low pass characteristic (normally $f_g = 3\text{kHz}$) (internal). Furthermore, the transistor [7469] is used to further reduce the amplification for all WIND modes.

In this case, the signal IWIND is low and T7469 is blocked. The transistor is purposely inversely polarised, as the inverse operation has better attenuation characteristics for this application. If T7469 is blocked, the amplification is mainly determined by the internal negative feedback resistors of the SAA 1310, [7460] and the external resistor pos 3488. By short-circuiting R3488 with T7469, the amplification can be reduced in the following ratio :

$$V_{on} / V_{off} = 1 + R3488 / 100.$$

The RC element comprising capacitor pos 2464 and resistor pos 3489 is connected in parallel to the CTL head. Together with the CTL head inductivity, the capacitor causes an increased resonance at approx. 10 kHz. This is attenuated by R3489 which causes an aperiodic transient response from the resonance. Beyond the resonance frequency, the frequency transfer characteristic shows a steep drop. This achieves an effective suppression of high-frequency interference. The CTL head signal amplitude during SP is approx. 1mVp (normal).

Consequently, the amplification of the playback amplifier must be correspondingly high. To avoid offset problems, a 47 μF electrolytic capacitor [2463] is installed in the negative feedback branch for DC decoupling.

The polarity of the playback amplifier can be switched with the Video - Index - Search - System (VISS) voltage. Only in this way can the TVC write a VISS marking without spikes onto the tape. The signal Write/Read (W/R) is used to switch between recording and playback:
Write : High
Read : Low

2.2.2 POR (Power On Reset) - Generator :

The POR generator contained in the SAA1310 [7460] only requires an external capacitor [2467], which determines the length of the POR pulse.

With a 33 nF, t_{POR} is approx. 30 msec. The response threshold of the reset circuit lies between 4.5 and 4.8 V. Supply fluctuations that are shorter than $t_{POR}/100$ and do not fall below 3.5 V, do not activate a POR.

2.2.3 The sensor interface :

The four comparators in the SAA 1310 [7460] are used for the conversion of sensor signals onto logic levels. Two of these comparators contain open-collector outputs (pin 11 and 13), which can switch a current of 100 mA. The outputs are overload-protected by current limiting and thermal overload protection. Only the non-inverted input of every comparator is externally accessible. The other inputs lie on the internal reference of a nominal 2.5 V. The fixed hysteresis of the comparators of approx. 10 mV is also located internally.

The comparators are connected as follows :

Comparator 1 : In = FTA, pin 5; Out = FTAD, pin 15:

FTA = Threading tachometer. This signal is generated by the butterfly photoelectric barrier in the deck. An infrared beam is interrupted by a 4-section butterfly unit. For a correct evaluation, the output amplitude of the photoelectric barrier must fluctuate at least between the voltage levels 1.5 V and 3.5 V. An additional hysteresis is created with resistor [3492].

Comparator 2 : In = WTR, pin 6; Out = WTRD, pin 14 :

WTR = Winding tachometer right, from a reflection photoelectric barrier. The same applies for the levels as with the FTA.

Comparator 3 : In = WTL, pin 7; Out = WTLD, pin 13 :

WTL = Winding tachometer left, see above (not for BASIC).

Comparator 4 : In = FG, pin 8; Out = FGD, pin 11 :

FG = Capstan tachometer. This signal stems from an amplifier for the tachometer hall sensor on the motor unit. The output impedance is 10 k Ω . The amplitude of the near sinusoidal signal is normally 1 Vp. It may not fall below 300 mVpp. It is AC coupled via a capacitor [2468]. In order for a bias current to flow, the input pin 8 must be passed via a resistor [3491] to the reference voltage at pin 3. A capacitor [2465] for filtering out high-frequency interference is arranged in parallel to the bias resistor.

2.3 Interface to the head-drum motor driver:

The head-drum motor driver IC TDA5241 contains a fully integrated 'start-up' circuit.

The connection of the HMO driver TDA5241 [7300] between the motherboard print and the head-drum motor is provided by a connector pos.1930.

- REEL is the Speed-Phase control signal.
The resolution is 14 bit.

- PG/FG is the combined Speed-Position signal of the TDA5241.

The current input of the +14M1 is 70mA (normal) at room temperature. During acceleration of the motor, approx. 0.5A may flow for a short period.

2.4 Capstan motor interface:

The driver IC of the capstan motor is activated via connector 1946. CAP is the CAPstan speed control signal, which varies without load between 0 and 5V.

The rotational direction of the motor is determined with CREV (capstan reverse) The maximum current input of the motor is limited to 1A. Typical values in PLAY mode are 0.2...0.3 A.

2.5 Loading motor driver :

The TMO driver uses a bridged dual-power opamp L2722. The IC can supply +/-1 A output current. It contains short-circuit and thermal overload protection and integrated flyback diodes at the outputs. The output current is limited by the internal resistance of the pin-wound motor (normally 18 Ohm) to approx. 0.7 A (start-up or motor is blocked).

Between the IC outputs (pin 1 and 3), a Boucherot element (1.5 Ω , 100 nF) is arranged to suppress a 3 MHz-oscillating tendency at the output stage. One half of the bridge is controlled via the TMO line and functions as a comparator. The other half is an amplifier-integrator with a gain of 3.9. A change of the input voltage (THIO) between 0 and 5 V results in a voltage variation of between 0 V and nearly U_b at the output. With a 50% modulation (THIO = 2,5 V), pin 3 has approx. 7 V. The capacitor in the negative-feedback of the opamp filters out the PWM frequency of approx. 21.5kHz. During a Power On Reset (POR), the TVC sets the THIO line to Low whereas TMO is set to High. In order to ensure that no current flows in the motor during the POR pulse, the aforementioned polarity must be maintained. This prevents the motor's destruction in case of prolonged triggering or blockage. This circuit, however, also has the disadvantage that, if the 5V fails (e.g. blown fuse pos1402), residual voltages may be passed to the IC inputs via the 14V. These residual voltages trigger the comparator and the amplifier in opposite ways, causing a short-circuit of the loading-motor's coil. In order to avoid this, a separate reference voltage divider [3445,3446] is used for the comparator section. Both outputs of the L2722 [7440] are then in common mode, therefore protecting the motor.

2.6 Analogue interface to the TVC :

The following analogue levels are supplied to the TVC's internal A/D converter:

- TRIV Tracking Information Video
- TAE/TAS Tape End/ Tape Start Detection
- I/R Logic Information from INIT and Record protection
- AGC Automatic Gain Control

2.7 Tape end - LED control :

The LED current is controlled with the transistor pos 7463. The ON time is approx. 1 msec with an ON/OFF ratio of 0.09.

The LED current is normally 180 mA. In order to prevent interference from the relatively high pulsed current 'spreading' through the entire unit, the LED is fed from the +14M1, and filtered by 2 NFR's [3414, 3415] with 10R each and a 220µF electrolytic capacitor [2459].

2.8 Evaluation of the drive switch:

The drive contains two switches :

- INIT Initialisation switch
- RECP Record protection

The conditions of these two switches can be passed into one of the analogue inputs of the TVC with a single line (I/R). For this purpose, all switch outputs whose levels could be either "H" (5V) or "L" (0 V) are connected to one another via a resistance weighting network. Each possible switch condition combination therefore has a corresponding direct voltage at the I/R line.

2.9 Test picture generation:

The test picture generation (sync, black and white) is carried out with the resistor network [3430, 3431, 3437 and 3471] and is fed into the signal electronics IC [7007].

2.10 Version definition :

Various ROM masks are used. All relevant settings are stored in the EE-PROM in the form of option bytes.

2.11 EE-PROM :

An EE-PROM is an electrically erasable and writable, non-volatile ROM (information remains if operating voltage fails). The R/W cycle is carried out via the serial bus SDA, SCL. It is now possible to store, unit or deck-specific parameters such as X distance, gap position, tuning limits and possibly also differences between TAE and TAS, left - right tolerance of the tape end photoelectric barriers (previously paired photo-transistors were used) in the EE-PROM.

The adjustment of the gap position is carried out automatically in the service test programme with the aid of a test cassette. The preset stations and some options are also stored in the EE-PROM.

2.12 CMT detection :

This was extended due to identification problems caused by weak transmission signals and NON-STANDARD video signals. The CSYNC line is offered to the TVC on pin 6. A hardware integration of the picture pulse compensates the perturbations generated by the "strong" channels on the "weak" channels.

3. Operating unit DC (DE-, DC - Part)

The front controller [7201] is the core element of the operating unit, fulfilling the following tasks with the respective function groups:

- Shuttle evaluation
- Evaluation of keyboard matrix
- Decoding of remote control commands from the infrared receiver pos 7203
- Quartz timer
- OSD
- Integrated RAM for storing timer data
- Activation of the display
- Bi-directional serial interface for data exchange between the front controller and the deck µP (CLKD1 port P32, DATD1 port P34, DATD2 port P33)
- I²C bus interface (SDA port P50, SCL port P36) to TUMOD [1701], VPS/PDC decoder [7540] and EEPROM [7890] on the motherboard

The drifting of the tuner or the aerial signal generates the control voltage AFC in the receiving circuit element (FV) on the motherboard. This voltage is passed to port P53 and the front controller readjusts the tuner tuning voltage.

In case of a power failure, the back-up cell supplies the timer and the RAM via pin 33 for 30 minutes or 7 hours, depending on the model [2997, 220mF gold capacity]. A diode [6299] prevents the back-up cell from discharging. During this time, pin 2 is at LOW level, so that further functions of the IC are switched off by the quartz [1298] at pin 13 / 14.

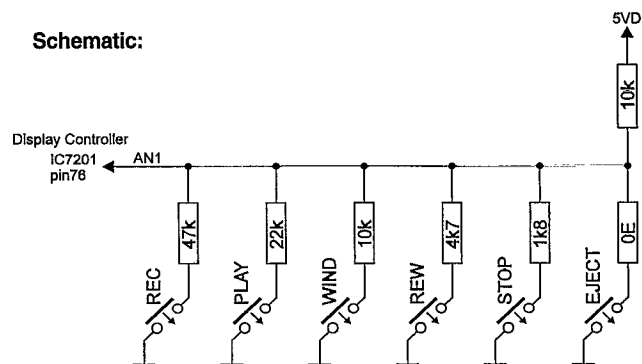
3.1 Shuttle:

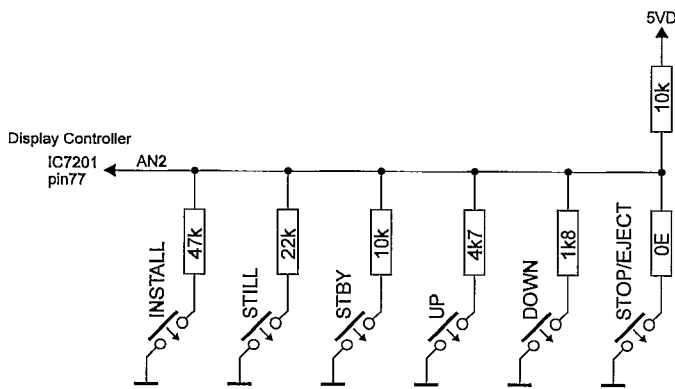
The shuttle EVQ WLG 001, which is electrically connected to the Print QMB1 via connector 1945 represents a binary coded rotary switch with a rotation angle of +/- 70 degrees and 16 switching positions. A spring returns it to its centre position once released. From this position, it can be moved in both directions by 7 or 8 switching positions. All switching conditions are realised by the various electrical connections of the four different shuttle outputs B1 - B4 with a voltage of 5VD (level lift 0V/5V). These shuttle signals are read and evaluated at the input ports P01, P03, P04, P05 of the front controller. A shuttle function is only possible in the NORMAL operating mode.

3.2 Evaluation of keyboard matrix:

There are 12 different keys which are decoded by 2 ports (P51, P52) via 6 assigned DC values each. Each mechanical key position at the print can adopt any key function via 2 coding resistors. The simultaneous pressing of keys may lead to an undesired function. Critical functions such as RECORD and INSTALL cannot be accidentally activated by simultaneously pressing several keys.

Schematic:





3.3 IR receiver and signal evaluation

The IR receiver [7203], which is only operational if the voltage 5Vd is present, contains a selectively controlled amplifier and a photo-diode. The photo-diode changes the received radiation (approx. 940nm) into electrical pulses which are then amplified and demodulated. At the output of the IR receiver [7203], a pulse sequence (level lift 0V/5V) corresponding to the envelope curve of the IR remote control command to be received can be measured. This pulse sequence is read into the front controller via the interrupt input P30/INT3 for further signal evaluation.

3.4 Generating the clock pulse:

In the operating modes NORMAL, LOW POWER, STANDBY and POWER OFF, the front controller and the sub-oscillator [1297] generate the clock pulse as the basis for the internal clock and date function. At port P22/XTOUT, a sinusoidal oscillation of 32.768kHz with a level of approx. >3 Vss can be measured with a 10:1 probe. With the backup capacitor fully charged [2297], the backup time is 7 hrs.

3.5 OSD:

The front controller activates the OSD-IC (LC74781 [7800]) via 3 lines (OCLOCK P35, ODAT P37, OCS P20).

3.6 Activation and function of the VFD display:

In principle, the VFD display [7202] is a tube triode in which the heating filaments serve as cathodes (F1, F2). The activation of the 7 VFD grid (G1 - G7) is carried out via P71 - P77 of the front controller, and that of the 16 anodes (P1 - P16) via ports P80 - P87 and P90 - P97 of the front controller, each with a positive potential compared to the cathode.

The grids and anodes (digits and symbols to be displayed) are activated in the time-multiplex procedure (duty 1:16, scanning period 3.9 ms (16 x 244,14 μs), voltage lift 5V/-28V). A dimmer function is achieved by pulse-width modulation of the grid-activation signals. In case of maximum display brightness, the pulse-width for each grid is 214 μs. With the help of software, this can be reduced in several stages to 30 μs, which visually reduces the brightness of the VFD display.

A digit or symbol is only illuminated if the corresponding anode and the surrounding grid are switched simultaneously to 5V for a certain period within a scanning period. The electrons emitted from the cathode are accelerated by the positively charged grid and hit the luminous layer of the anode which is also positively charged.

During the remainder of the scanning period the corresponding grid and parts of the anode are at -28V, due to the internal pull-down resistors. This potential is lower than the average cathode potential of approx. -16V, prevents the acceleration of electrons, thus causing the relevant grid and anode segments to go dark.

The direct heating voltage of the display (U = 6.5V) is supplied from the power supply to pins F1 and F2 of the VFD display via lines HELO or HEHI and via limiting resistors [3253,3254]. The Z diode [6070] clamps the heating voltage to approx. -16V via resistor [3074]. The heating voltage measured between pins F1 and F2 is normally +3.5Vdc.

4. VPS/PDC-, OSD-, Follow me - Part

4.1 VPS :

The VPS-IC SDA5642-6 [7540] reads the data sent by the station from line 16 of the video signal (VREC) and issues the information required for the timer start to the front controller. In addition, data such as station name, country recognition, etc., are passed on to the μP.

4.2 PDC/VPS:

The VPS/PDC decoder IC SDA5650 [7540] reads the VPS and also the PDC data from the vertical blanking gap and provides these to the front controller via the IIC bus.

In addition, the time can be read out from the TXT header line (necessary for 'time download').

The date is not queried from the TXT header but via the PDC format 1 (different writing versions of the stations).

4.2.1 The following modes (data formats) are available:

- VPS (Timer data and station name)
- PDC Format 2 (Timer data and station name)
- PDC Format 1 (Station name and date)
- TXT Header line (Time for 'time download')

4.3 Follow Me - Part:

The video signals from the internal frontend of the VCR (VFV) and the VBS signal, which, when compared, corresponds to the TV frontend video signal connected to the Scart1-Input (VIN1), are 'digitalised' via comparators and are then compared. A low at the output of the circuit shows that the picture contents of both video signals are identical and it must consequently be the same station.

4.4 OSD-Part:

The front controller controls the OSD-IC LC74781 [7800] via 3 lines (Clock: OCLK; Data: ODAT; Select: OCS). The video signal VSB is passed from the signal electronics to the input of the OSD-IC [7800 pin 15]. At the same time, the CSYNC is offered to the IC via an inverter [7801] for synchronisation.

From the video output of the OSD-IC pin 13, the signal passes to the I/O part. In the case of Secam signal entries, the front controller activates a bypass between the video-in and video-out via the OSD-IC [7810, 5810, 2810].

With the aid of a LC oscillator [5800, 2800, 2801], the IC generates its internal reference for the entry time, character size, etc. From the TVC (Deck-μP), a frame pulse (OFF) is supplied for vertical synchronisation and is passed to pin 20 of the IC.

To generate a coloured background in case of a full page (i.e. blue back) or for internal command processing (OSD system clock), the colour sub-carrier frequency from the signal electronic is doubled (2Fsc: 8.86 MHz) and applied to pin 2 of the OSD-IC.

For units without OSD, the signal electronic (VSB) switches the video signal directly via the resistor [3805] to the I/O part (VOUT). During full page OSD, the video signal (VSB) is muted via the FFP pulse to improve the crosstalk attenuation.

5. Frontend FV (FV - Part)

5.1 The frontend consists of the following elements :

- TUMOD = Tuner + modulator
- IF amplifier & video demodulator IC TDA 9800 incl. FM demodulator
- IF amplifier & video demodulator IC TDA 9812, 9813, 9814 incl. FM and AM demodulator
- FM stereo decoder TDA 9840
- NICAM decoder

5.2 The frontend was designed for the reception of the following systems:

- PAL B/G with FM stereo
 - PAL I or PAL BG with NICAM stereo
 - PAL BG with NICAM and FM stereo
 - PAL BG/I SECAM L/L' with NICAM and FM stereo
 - PAL BG SECAM DK with FM stereo
-
- PAL B/G = /01, /02/03/11/13/16
 - PAL I = /05 Pal I with UHF reception
 - PAL I Ireland = /07 Pal I with VHF/UHF reception
 - SECAM L, L', PAL BG/I = /39
 - PAL B/G, SECAM DK = /59

All frontend variations are according to the norm EN 55020.

The individual components are listed in the respective version of the circuit diagram.

5.3 Tuner modulator (TUMOD)

The tuner and modulator are fitted in the same housing. Both the tuner and the modulator are PLL controlled. The reception frequency or modulation frequency is set with the IIC bus. The amplification is determined by the AGC voltage at pin 5 [1701] (for operation, see AGC section).

5.4 IF selection

The IF frequency of the picture carrier is 38.9 MHz for all systems with the exception of SECAM L' (33.9MHz). For PAL BG-SECAM DK and PAL BG/I-SECAM L/L', a quasi-split-sound system is used; i.e. separate surface wave filters (SWF) [1719, 1720] are required for the picture and sound carrier. For all other standards, an intercarrier system is used; i.e. a mutual SWF incl. sound carrier attenuation [1721 for TDA 9800 or 1720 for TDA 9813]. can be used for the picture and sound carrier.

The used sound SWF (K9456M and K9460M) have two different filter characteristics which can be switched.

For the PAL BG/I-SECAM L/L' model, an additional circuit for suppressing the adjacent channel sound carrier is provided, which is set with the coil [5721] to maximum suppression at 40.4MHz.

5.5 IF demodulator

5.5.1 TDA 9800T

The output signal of the SWF is initially amplified and then synchronously demodulated. The carrier required for this purpose is regenerated from the input signal via a PLL. The integrated VCO oscillates at double the picture carrier frequency (77.8MHz) and this frequency is internally divided. The loop filter for the PLL is connected to pin 6. The offset current of the phase comparator is compensated with a potentiometer [3748] (tuning to max. audio S/N) to achieve the best possible demodulation. At pin 15, an AFC (Automatic Frequency Control) voltage is available, which is evaluated for station tuning.

At pin 13, a demodulated video signal and the sound carriers at 6.0MHz and 5.5MHz (FM sound) or at 6.552MHz or 5.85MHz (see NICAM sound) are available. After a 6.0MHz or 5.5MHz sound trap, the video signal passes to an internal 6dB buffer (pin 14). A voltage divider and an emitter follower for level adaptation (1Vpp) are arranged at the output of the buffer (pin 7).

An additional widening of the sound trap consisting of pos. 5741, 2793, and 3987, suppresses the second FM or NICAM sound carrier in the video for intercarrier or multi-standard models.

The FM sound carrier passes from pin 13 to output pin 9 of the internal FM PLL demodulator via a 6.0MHz or 5.5MHz sound filter. An external transistor amplifier provides the FM deemphasis and the level adaptation in two Scart models (500mVeff at 27kHz lift, 1kHz audio).

5.5.2 TDA 9813T

The TDA9813T is selectively operated in QSS and intercarrier (PAL BG only, pin 28 to earth). For the IF signal processing of picture and sound, separate internal elements are available.

For video input stage, see TDA9800T. This IC does not require the setting of the phase offset. The loop filter is connected to pin 5. The AFC is available at pin 20. As with the TDA9800T, the video branch is analogue; the second sound trap is not required.

The IC contains an output for the sound carrier at 5.5MHz (6.5MHz) and 5.74MHz (6.258MHz). These are connected to the FM demodulators via filters (pin 14, 15). The audio signals are passed to the stereo decoder TDA9840T for stereo decoding (see below). For NICAM, a second IF is passed to the QNIC subunit via a jumper. In the BG/DK stereo model, the second sound IF is selectively passed to the sound filter pair 5.5/5.74 MHz or 6.5/6.25 MHz via a HEF IC [7722].

5.5.3 TDA 9814T

This IC is operated exclusively in QSS. In addition to the TDA 9813, it also contains an AM demodulator for Sec L, L'. The second sound IF is selectively passed to the sound filter pair for FM stereo 5.5/5.74 MHz or 6.5/6.25 MHz for PAL I reception via a HEF IC [7722].

5.5.4 AGC

The two-stage AGC is the same for all ICs. For small signals, the control is only carried out in the IF IC whilst the tuner operates with maximum amplification. From a certain take over point, the IF IC issues a control signal for the tuner. From this input voltage onwards, the control is basically only carried out by the tuner. The take over point is set with the potentiometer AGC-Adj. [3742] to the best sensitivity and input interference immunity.

The IF AGC voltage is supplied to the deck microprocessor via transistor [7724], which passes the information to the front controller via the signal level.

This is used to determine the sequence of the programs to be stored in autostore mode.

5.5.5 FM stereo decoder TDA 9840T

For FM stereo, the signals L+R or 2R are transmitted by the sound carriers. To arrive at the L and R signals, a decoding circuit is required. This computing circuit is implemented in the TDA9840T. The input attenuators can be set with the IIC bus and serve for adjustment of the level and for setting the channel separation.

The frequencies containing the stereo recognition or dual tone recognition are filtered out via a LC network. For dual tone or MONO, the aforementioned computing circuit is deactivated.

The deemphasis is carried out internally by the capacitors [2789 and 2790].

In the NICAM and FM stereo models, the output signals of the NICAM part are passed to the output selection switch of the TDA9840T (pin 9,10) and the audio signal is selected in the TDA9840T (outputs pin 13,14) via the IIC bus with the aid of software.

9.4 Audio: 1-Scart mono

The input select is IIC bus controlled in the signal electronics IC [7007]. For this purpose, a selection can be made between the AIN1 pin 71 and AF1 pin 73 and AIN1 pin 75 signals.

The output signal AMLP pin 77 is applied to Scart 1 and the modulator.

9.5 Audio: 2-Scart mono

The input select is IIC bus controlled in the signal electronics IC [7007]. For this purpose, a selection can be made between the AIN1 pin 71 and AF1 pin 73 and AIN1 pin 75 signals. The output signal AMLP pin 77 is always applied to the modulator.

The output signal for Scart 1 is selected with 1/3 HEF4053 [7513] by the control line MON pin 9 from AMLP pin 5 and AIN2 pin 3.

The output signal for Scart 2 is selected with 1/3 HEF4053 [7513] by the control line DEC pin 10 from AIN1 Pin2 and AF1 pin 1

9.6 Decoder operation: (REC or STOP)

9.6.1 Program position with decoder (Frontend)

The frontend signal is supplied to the decoder connected to Scart 2 and from there via VIN2 or AIN2 back to the VCR.

9.6.2 is not possible for these program positions.

9.6.2 External input with decoder

The signal from Scart 1 (normally TV set) is supplied to the decoder connected to Scart 2. For scrambled programs, the decoder switches pin 8 to high. The VCR then passes the decoded signal from Scart2 to Scart1.

10. Audio AF-, I/O part for stereo sets (AF part)

10.1 General:

All audio input and output selection switches as well as the linear audio and the hi-fi FM audio signal processing are arranged in the TDA9604 [7850]. This IC is exclusively controlled by the IIC bus. The carrier frequencies and band pass filters for the FM audio part are independently adjusted by the TDA9604. This adjustment is started via the IIC bus after a mains reset. The HP2 signal is used as a reference for this purpose (pin 40).

10.2 Audio IO

The input and output selection switches are exclusively controlled by the IIC bus. Audio signals from the frontend, both Scart sockets and the front sockets are passed via pins 1 to 8 to the two input selection switches, which select the respective signals for the FM and linear audio part. The output selection switch for Scart1 and Scart2 (pins 9,10 or 15, 16) independently select the respective signal sources. The RFAGC limits the maximum amplitude of the signal to the modulator (AMCO) to prevent overmodulation.

The TRIA / ALI line passes (controlled via IIC) the size of the audio signals or the level of the playback envelope curve (3.5 nominal at PB) to the deck processor. These audio levels are required for recording from the SCART and front sockets to prevent overmodulation of the FM carrier. (In case of excessive audio signals, these are attenuated via the IIC bus with the aid of the VOLUME regulator).

10.3 FM audio

10.3.1 Recording:

The signal from the input selection switch (INPUT SEL) is passed via a level adjuster (VOLUME) and a low pass filter (fg> 30kHz) to the NOISE REDUCTION block, compressing the dynamics during recording. The compressed signal is passed to both FM modulators (1.4MHz and 1.8MHz carrier frequencies). Both carriers are added and are passed to the head amplifier via pin 36.

10.3.2 Playback:

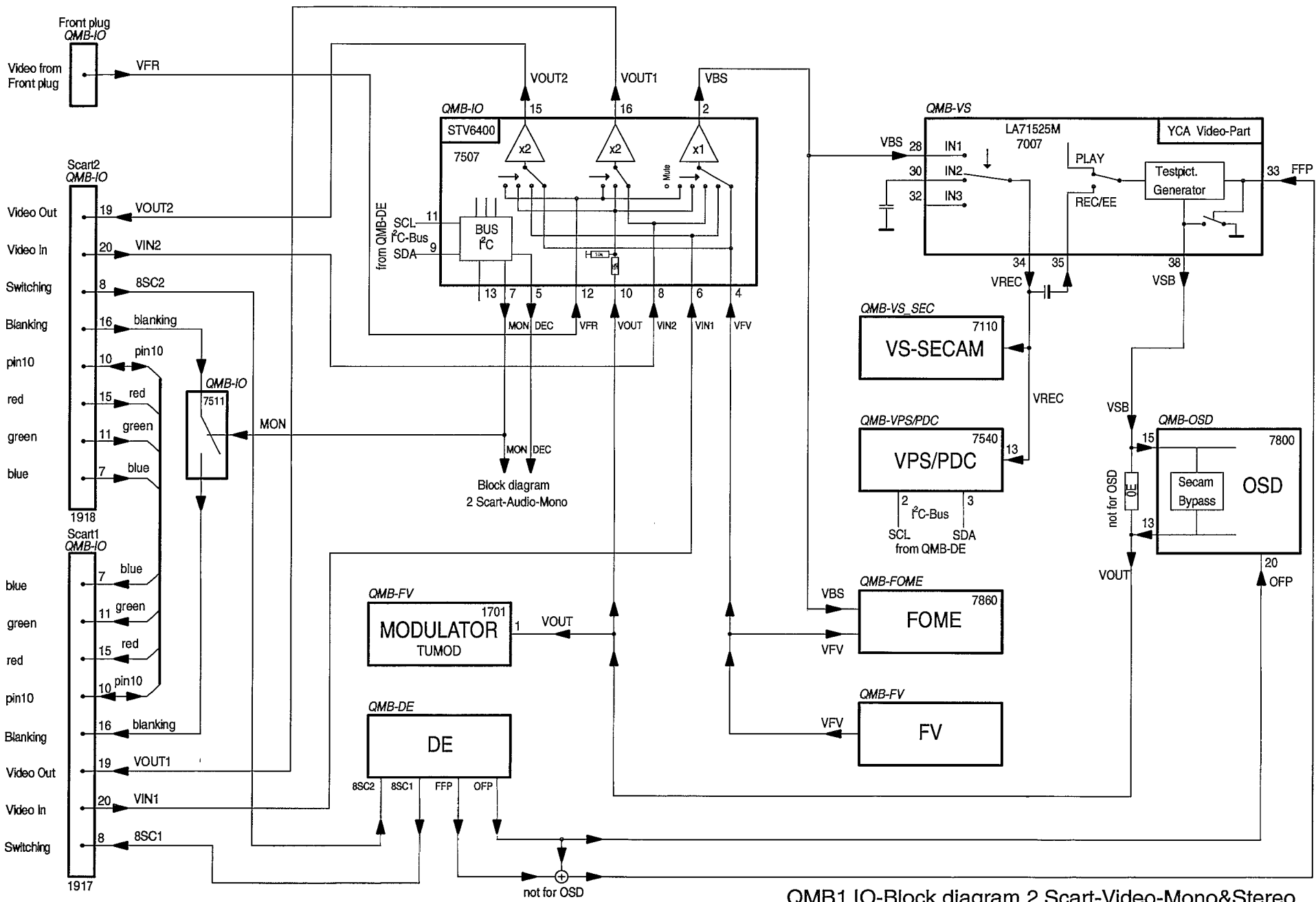
The signal from the head amplifier is passed to the HF-AGC via pin 37 where the tape and heads tolerances are compensated. The FM signals are passed to the PLL demodulators via both band pass filters and the limiter. Using a Sample & Hold stage, head switching noise is cancelled (triggered by HP2 signal). The demodulated signals are then expanded in the Noise Reduction stage. Next, the hi-fi signals are available at the output selection switches. If no FM playback is present, the IC automatically switches the output selection switches to linear audio.

10.4 Linear audio interface

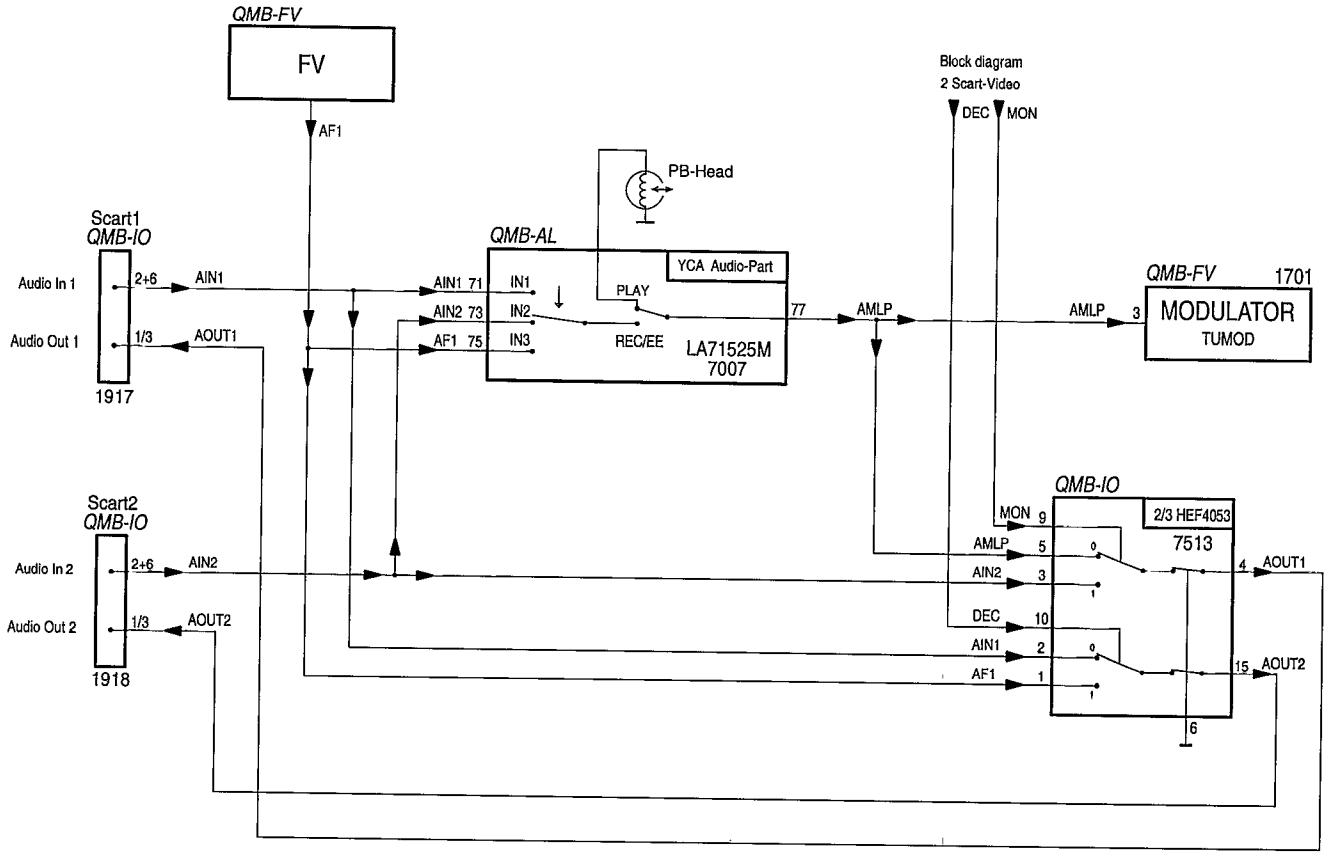
In recording mode, the input selection switch NORMAL SEL in the TDA9604 [7850] selects the audio source for the linear audio part in the signal electronics IC (LA72525) and passes this signal to pin 17 (AMLR).

In stereo sets, the input selection switch of the signal electronics IC LA71525 [7007] is always set to IN2 (pin 73).

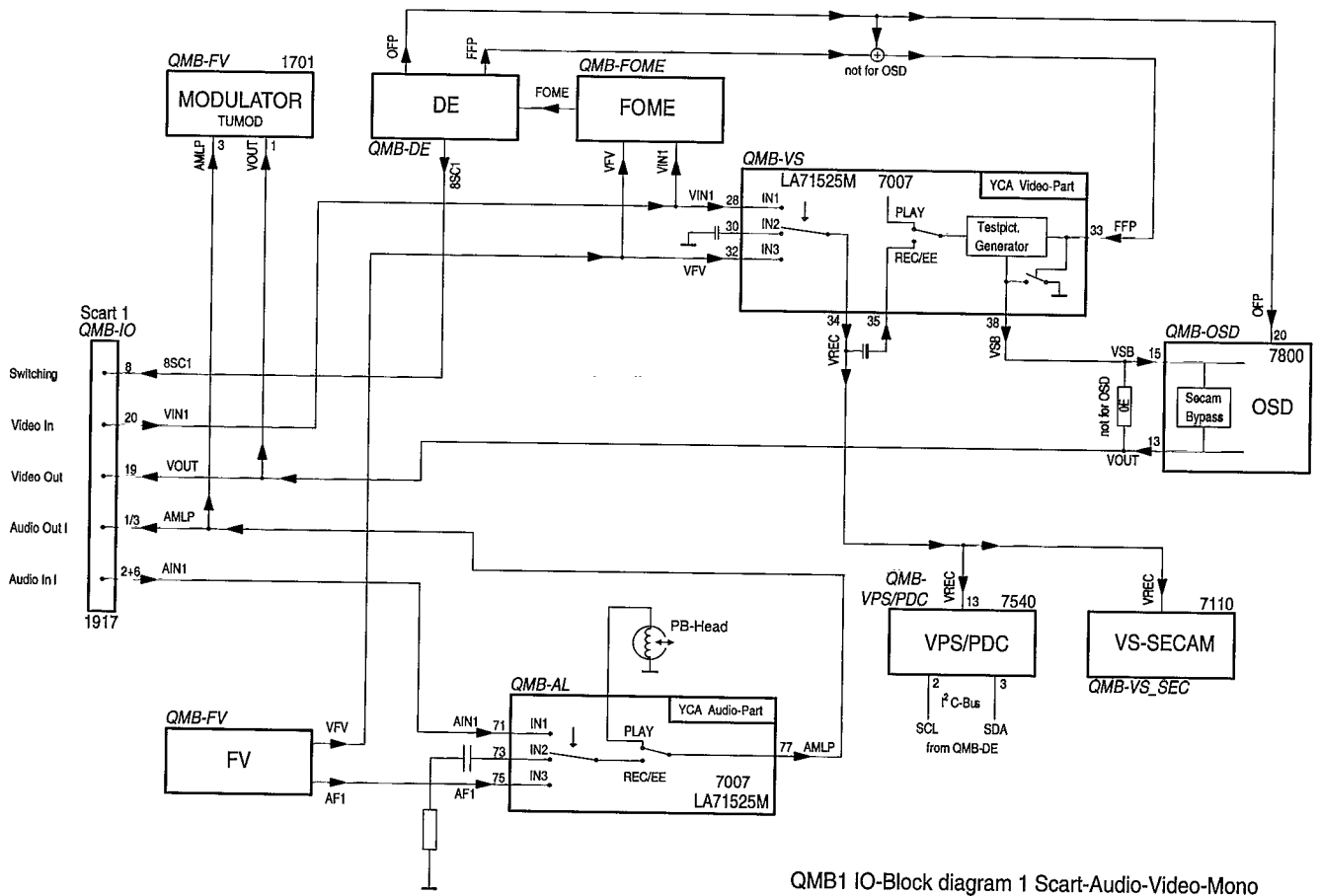
During playback, the AMLP signal is passed from the linear audio part in the signal electronics IC pin 77 via pin 19 of TDA9604 [7850] to the PB level adjuster (NILLevel), which can be adjusted via the IIC bus in the service mode.



QMB1 IO-Block diagram 2 Scart-Video-Mono&Stereo



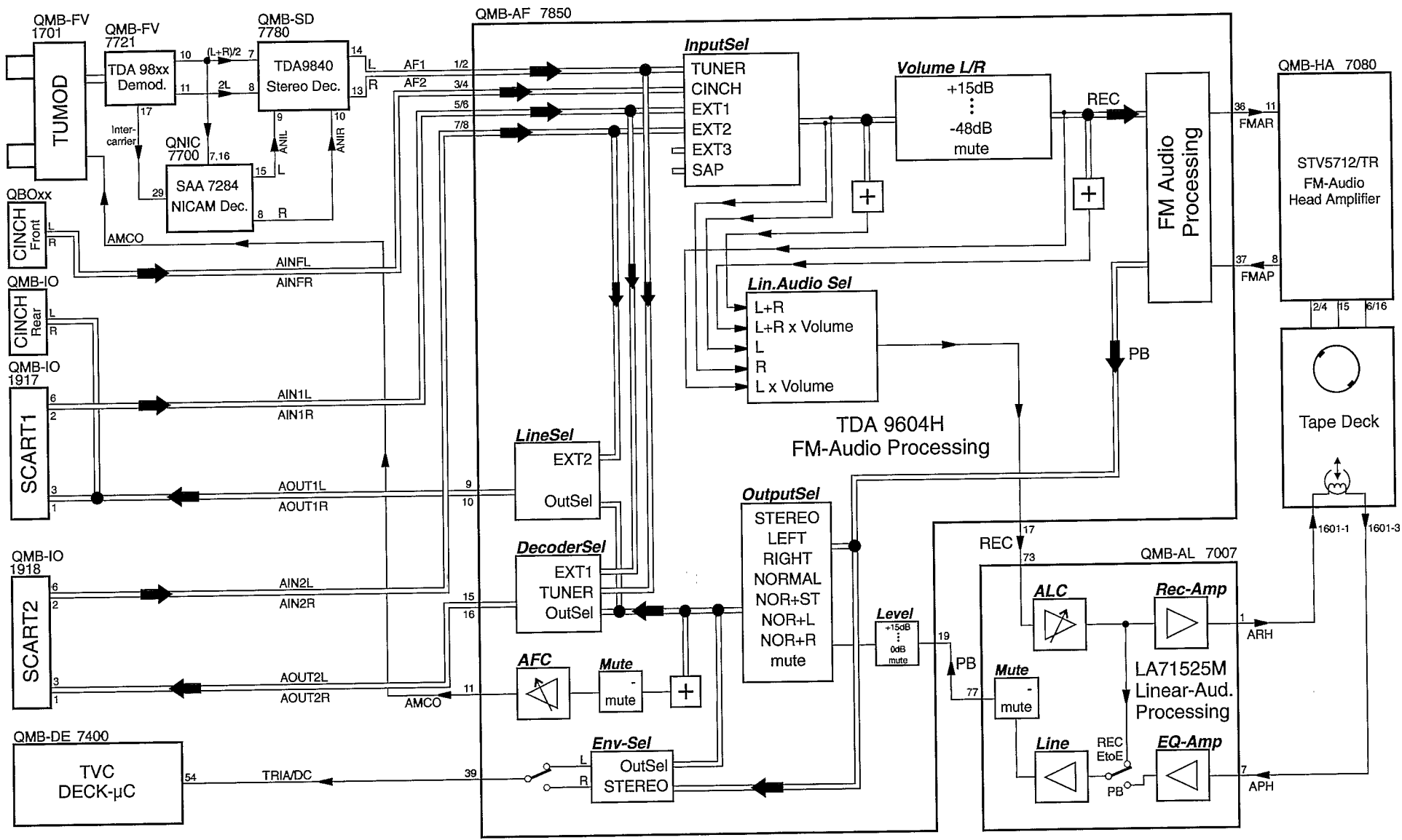
QMB1 IO-Block diagram 2 Scart-Audio-Mono



QMB1 IO-Block diagram 1 Scart-Audio-Video-Mono

Simple Blockdiagram FM Audio / Linear Audio processing

POS 7712/72



SERVICE MODES

1. Special functions

Erasing the EEPROM

- Disconnect from mains
- Push and hold down the Standby key, reconnect to mains and keep the Standby key depressed for a further 3 sec.

All EEPROM data will then be erased and initialised (timer and transmitter channels). The internal processor RAM will also be erased, but the option codes, deck parameters and adjustment values are maintained.

After changing the EEPROM or MOBO

the following steps must be carried out:

- Step 40:** Option code input
- Step 51:** Gap position adjustment
- Step 52:** 'Studio Picture control' adjustment
- Step 53:** Input of clock correction
- Step 60:** Level adjustment - Stereo (optional)
- Step 61:** Channel separation adjustment - Stereo (optional)
- Step 62:** Adjustment of Audio Linear Playback Level (optional)
- Step 99:** Clock frequency output

Video head cleaning

With the recorder set to PLAY, the video heads can be cleaned by pressing the PLAY key again for more than 5 sec. The recorder then moves to STOP and the video head cleaning roll is pressed against the running head drum for 10 sec. The recorder automatically returns to PLAY.

The display shows:



2. Service test program

2.1 Introduction

The software program for the control, deck and operating microprocessors includes a service test program. It was divided into the following steps, with the following 'modes':

- Step 00:** Display of mask version number
- Step 01:** Check of the drive positions
- Step 02:** Display of the deck - error codes
- Step 03:** Deck - sensors and manual tracking
- Step 04:** Display of operating hours counter
- Step 10:** Operation without drive - dummy mode
- Step 40:** Option code input
- Step 51:** Gap position adjustment
- Step 52:** 'Studio Picture control' adjustment
- Step 53:** Input of clock correction
- Step 60:** Level adjustment - Stereo (optional)
- Step 61:** Adjustment of channel separation - Stereo (optional)
- Step 62:** Adjustment of Audio Linear Playback Level (optional)
- Step 99:** Clock frequency output

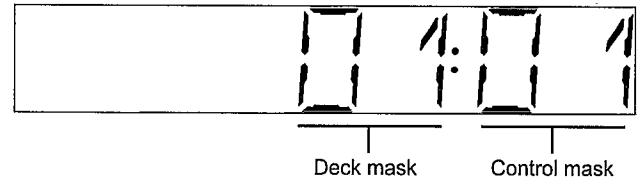
In the service test program, all drive functions apart from the channel search and channel change mode can be carried out. The program position set **before** entering the service test program is maintained.

2.2 Activating the service test program

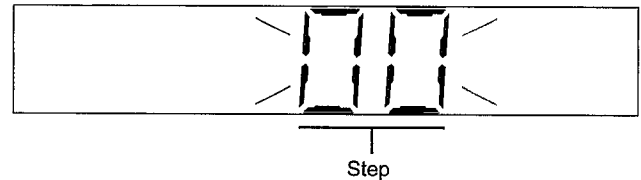
Press and hold down the STOP key on the remote control. Then press the PLAY key on the recorder and keep it depressed for at least 5 sec. The STOP key on the remote control may be released whilst the PLAY key on the recorder is pressed.

The service test program can be selected in any operating mode apart from the channel search, install, clock set-up and cassette length calculation mode. The recorder and all drive functions are fully operational in the service mode.

The display shows, for instance:

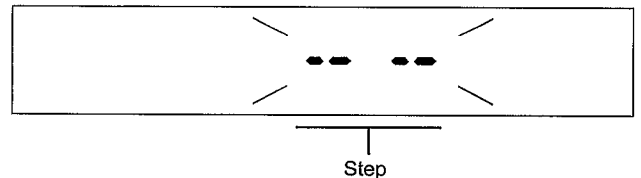


By pressing the SELECT key on the remote control, all step modes may be left and the currently selected step number appears and flashes.



Other service steps are selected with the UP and DOWN keys or the numerical remote control keys. By pressing the SELECT key on the remote control whilst the Step is flashing, the respective mode can be entered or left.

If a step is selected to which no mode is assigned, the displays shows -- and flashes.



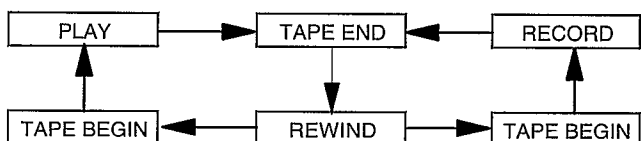
To leave the service program, press the STAND-BY key or disconnect recorder from mains.

2.3 Service mode functions

Endurance test

In the service test program, the recorder can be endurance tested. For this purpose, use a cassette and activate "PLAY" or "REC". The functions are then repeated continuously. In RECORD, the recorder does not move to EJECT at the tape end, but to REWIND, after which it starts to RECORD again. This test serves to detect intermittent faults. The last error is stored in the EEPROM. (The fault remains stored even after a power failure).

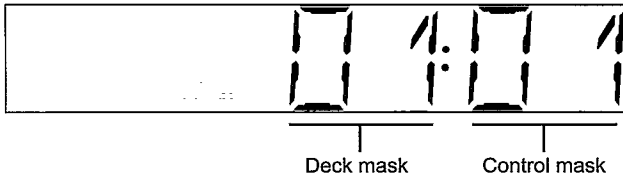
The endurance test is ended by pressing STOP or leaving the service test program.



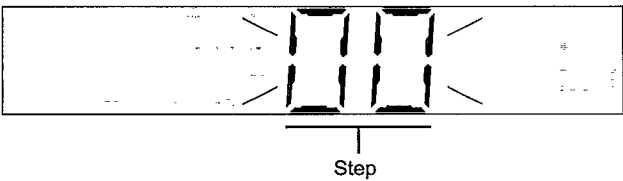
2.4 Description of steps with modes:

Step 00: Display of mask version number

After activating the service test program, step 00 and the mask version number are automatically displayed.



The mode can be left again by pressing the SELECT key on the remote control. The currently selected position number appears and flashes on the display.



A step between 00 and 99 can now be selected.

Step 01: Checking the drive positions

By pressing the SELECT key whilst Step 01 is flashing, the drive position appears on the display. The FTA signal from the photoelectric barriers which controls the revolutions of the loading motor is used to check the drive condition. The drive position is shown as a 3-digit decimal number by counting the FTA pulses on the display.

(e.g. 213 = Play)



Table of drive positions:

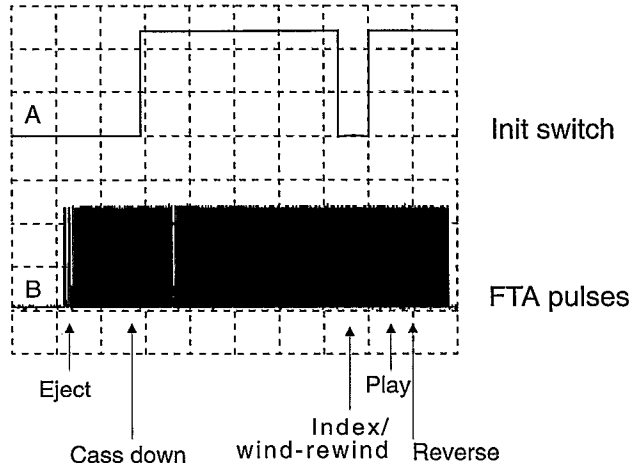
Status	Position (FTA dec)
Eject	007 +2/-2
Index	191 +0/-2
Stop	200 +4/-4
Play	213 +4/-4
Reverse	237 +2/-0

Function of the Init switch:

The diagram shows the function of the Init switch, depending on the position of the deck. The number of FTA pulses is important for the position of the drive.

A: DC, 2 V/Div, 0.5 s/Div

B: DC, 2 V/Div, 0.5 s/Div



Step 02: Display of the deck error codes

By pressing the SELECT key whilst Step 02 is flashing, the deck error code is shown on the display.

Checking the drive function Loading and unloading time

The signal (FTA) of the photoelectric barrier which controls the revolutions of the loading motor is used as a reference for the loading and unloading time.

Stopping of supply or take-up reels

The tach signals of the left (WTL) and right (WTR) winding disks are used as control reference.

Stopping of head drum motor

This is monitored with the PG/FG signal. The signal is discharged from the e.m.f. of the non-conducting spools of the head cylinder motor, showing the position of the head cylinder.

Capstan motor fault

This is monitored with the FGD signal.

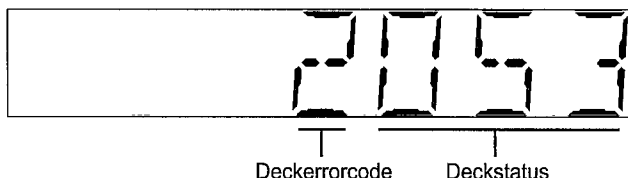
If one of the above sensor signals is not available, the recorder tries to put the lift into the "EJECT" position.

Explanation of deck error codes and deck error status

The last error code is stored and remains in the EEPROM, even if the recorder is disconnected from the mains.

The error code can be **erased** by pushing the CLEAR button on the remote control.

The display shows, for instance:



The left digit shows the error:
(e.g.: Error 2 = Capstan error)

Error table:

0	no error
1	threading error
2	no capstan pulses
3	tape broken
4	no pulses left reel
5	no pulses right reel
6	head motor error

The 3 digits on the right represent the deck error condition:
(e.g.: 053 = during Play)

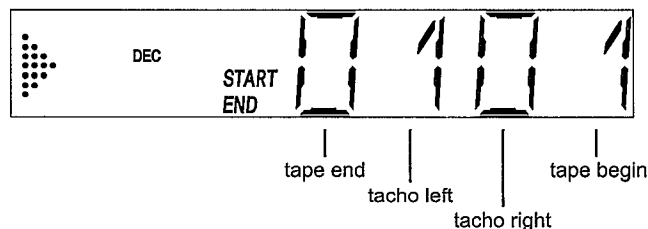
Functiontable:

012	Standby	114	VISS write	211	Slowmotion 1/24
014	Autotracking	115	Viss erase	212	" " 1/14
031	Play-3	125	Tuner - Stopout	215	" " 1/7
034	Slow_reverse	126	Auto Remain Funct.	216	" " 1/2
041	Still Picture	130	ATTS Function	217	" " -1/24
042	Fast	168	Frame+	218	" " -1/14
044	Play-9	169	Frame-	219	" " -1/7
045	Eject	170	Play-11	220	" " -1/2
046	Play9	171	Play-7	222	Edit Record
047	Play-1	172	Play-5	223	Align of Gap
048	Pause	173	Play5	238	Pause
050	Rewind	174	Play7	239	SPC align
052	Wind	175	Play11	246	Edit Pause
053	Play	196	Tuner - Eject	247	Slow motion 1/10
054	Stop out	197	Standby Eject	248	" " 1/18
055	Record	199	Audio Dubbing	249	" " -1/10
112	Index next	202	Audio Dubb. Pause	250	" " -1/18
113	Index previous	206	Reset Tapecounter	253	Key Released

The error code can be reset in this step with the CLEAR key.

Step 03: Deck sensors and manual tracking

By pressing the SELECT key whilst step 03 is flashing, the deck sensors will be displayed in one digit as either 1 or 0.



■ ● ◀ ▶ are used to display the deck status.

- START init switch (INIT)
- END record protection (RECP)
- DEC Loading pulses (FTA)

In the service test program, the tracking is always in the centre position. Only in this step can the value for the required tape running setting be changed, manually in the PLAY function with the UP / DOWN keys. After leaving the mode with the SELECT key, the tracking value always resets itself to the centre position and cannot be changed.

Step 04: Display of the operating hours counter:

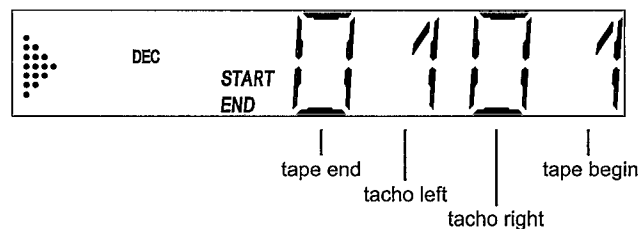
By pressing the SELECT key whilst step 04 is flashing, the operating hours counter shows how many hours the head disk has turned. The hours are displayed as a 4-digit decimal number.



Step 10: Operation without drive - dummy mode

Before activating this mode with the SELECT key, the recorder must be in the EJECT position.

Enter the mode by pressing the SELECT key. The motors are then switched off and the sensors will be ignored by the deck microprocessor. The drive can now be dismantled from the motherboard (see dismantling instructions). **Only install drive if recorder is disconnected from mains.** For signal tracking, the recorder can be set to all drive conditions, i.e. signal electronics, audio and IO processing are switched to the respective operating mode.



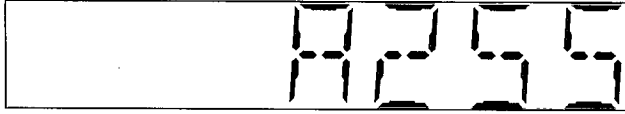
■ ● ◀ ▶ are used to show the deck status

- START init switch (INIT)
- END record protection (RECP)
- DEC loading pulses (FTA)

Step 40: Option code input

If a new EEPROM is installed in the course of repairs, it must be initialised.

By pressing the SELECT key whilst step 40 is flashing, the decimal option A appears in the display.



By entering a 3-digit decimal code, the correct features are set.

These codes are shown on the type-plate of the recorder.

After pressing the OK key on the remote control, the entered code is saved. The display shows OK for approx. 3 sec. and then the stored value in decimal format.



By pressing the UP and DOWN keys, the available options (A to E) can be selected. The display shows the last stored value in decimal format.



In case of an invalid entry (value >255) the activation of the OK key causes the content of the last stored option to be displayed and OK does not appear in the display.

Depending on the model, some bits are software or default protected and cannot be changed by an entry. In this case, the display shows OK, but the display returns to the default value.

3. Adjustments in the service test program

Step 51: Setting the gap position (GAP)

Purpose: To determine the correct head switching point during playback.

Symptom if incorrectly set:

Head switching fault and/or vertical picture flickers.

- Enter the service test program whilst step display is flashing, and enter the step number using the numerical keys.
- Insert a test cassette (e.g. 4822 397 30103) with the standard video signal in the VCR.
- By pressing the SELECT key whilst step 51 is flashing, the automatic adjustment is triggered and stored in the EEPROM.

After a correct adjustment, the display shows 1;0 when incorrect. To leave the step, press Select.



Causes of incorrect adjustment : Incorrect standard video signal.
Scanner fault.
Microprocessor fault.

Step 52: "Studio Picture control" adjustment

Purpose: Adjustment of the reference level for the SPC.

Symptom if incorrectly set:

The picture is played back at a lower resolution than would be possible.

TP	ADJ.	MODE	INPUT
/	/	Stop Service Mode	RF or A1- input, black picture without BURST
TAPE		MEAS. EQ.	SPEC.
SPC Alignment Tape		/	Call up Step 52 of Service Mode

- Video signal via Scart or aerial
- Enter the service test program and, whilst the step is flashing, input the step number 52, using the numerical keys.
- Insert cassette (not a SVHS cassette).
- By pressing the SELECT key whilst step 52 is flashing, the recorder makes a recording in SP mode (approx. 10 sec.) and in LP mode (approx. 10 sec.), rewinds and carries out a playback with automatic adjustment.
- After a correct adjustment, the display shows 1 and 0 for incorrect adjustments.



To leave the step press SELECT.

Step 53: Inputting the clock correction

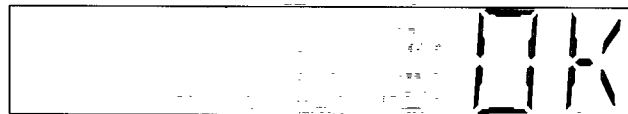
Before carrying out step 53, the correction value must be established in step 99.

By pressing the SELECT key whilst step 53 is flashing, the display shows, for instance:



Using the numerical keys of the remote control, the established correction value from Step 99 is entered as a 3-digit number (value must be between 0 and 255).

After pressing the OK key on the remote control, the entered code is stored, the display shows OK for approx. 3 seconds and then the stored value in decimal format.



In case of an invalid entry (value >255), the activation of the OK key causes the content of the last stored value to be displayed and OK does not appear in the display. To leave the step press Select.

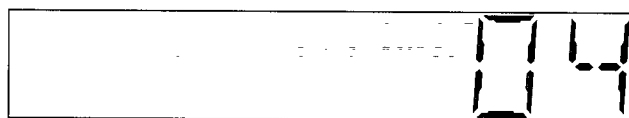
Step 60: Level adjustment of Stereo TDA9840 (only for stereo units)

Purpose: Amplification adjustment of stereo demodulator TDA9840 [7780].

Symptom if incorrectly set:
Sound is too low or too loud

TP	ADJ.	MODE	INPUT
Pin 1 of Scart 1 (Audout)	refer to description	Stop Stereo	RF - input, white picture, 1kHz sound only on right channel +/-27kHz deviation
TAPE		MEAS. EQ.	SPEC.
/		AC Millivoltmeter	500mV _{RMS} ±50mV

By pressing the SELECT key whilst step 60 is flashing, the output select is switched to stereo and the display shows, for instance:



- Connect the millivoltmeter to Scart1 pin1 (Audio out right).
- The level on Scart 1, Pin1 (Audio out) can be adjusted to the set value by pressing the UP (value increases) or DOWN key (value decreases).
(The amplitude changes by 0.5 dB each time the key is pressed).
The range is shown in the display with the numbers 1-9.
- The value is automatically stored in the EE-PROM each time the key is depressed.

After leaving the step with SELECT, the last value will be stored in the EE-PROM.

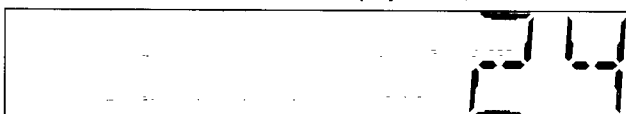
Step 61: Adjustment of stereo channel separation Stereo TDA9840

Purpose: Adjustment of channel separation of the stereo demodulator TDA9840 [7780].

Symptom if incorrectly set:
Crosstalk between left and right channel.

TP	ADJ.	MODE	INPUT
Pin 3 of Scart 1 (Audout left)	refer to description	Stop Stereo	RF - input, white picture, 1kHz sound only on right channel +/-27kHz deviation
TAPE		MEAS. EQ.	SPEC.
/		AC Millivoltmeter or Oscilloscope	lowest value

By pressing the SELECT key whilst step 61 is flashing, the output select is switched to stereo and the display shows, for instance:



- Connect Millivoltmeter to Scart1 Pin 3 (Audio out left).
- The noise amplitude on Scart 1 Pin 3 (Audio out left) can be adjusted to the lowest value by pressing the UP(+) or DOWN (-) keys.
(The amplitude changes by 0.1 dB each time the key is pressed).
The range is shown in the display with the numbers 0...49.
- The value is automatically stored in the EE-PROM each time the button is pressed.

After leaving the step with SELECT, the last value remains stored in the EE-PROM.

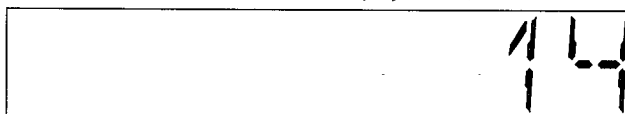
Step 62: Adjustment of the Audio-Linear-Playback level (only for stereo units)

Purpose: Adjustment of the amplification of the audio linear playback level TDA9604H [7850].

Symptom if incorrectly set:
The linear playback sound is too low or too loud.

TP	ADJ.	MODE	INPUT
Pin 1 of Scart 1 (Audout)	refer to description	SP Self-recording and Playback	(AUDIO IN E1) 700mV _{RMS} 1kHz
TAPE		MEAS. EQ.	SPEC.
Blank Tape		AC Millivoltmeter	500mV _{RMS} ±50mV

By pressing the SELECT button whilst step 62 is flashing, the output select is switched to Mono and the display shows, for instance:



- Make a recording of the audio signal on E1.
- Connect the millivoltmeter to Scart1 Pin1 (Audio out) and play the recording back.
- The level on Scart 1, Pin1 (Audio out) can be adjusted to the set value by pressing the UP (value increases) or DOWN keys (value decreases).
(The amplitude changes by 1 dB each time the key is pressed).
The range is shown in the display by the numbers 0...15.
- The value is automatically stored in the EE-PROM each time the button is pressed.

Step 99: Clock frequency output

Purpose: Setting the exact clock function.

Symptom, if incorrectly set:
The clock is too fast or too slow.

After entering with SELECT, the display is switched off and no further function can be carried out. At the HEST measuring point [7201 pin 80], the uncorrected clock frequency of approx. 2048 Hz is always output.

Measure the output frequency with the calibrated counter (minimum resolution of 6 digits) and note down the value (f_{mess}).

Determining the deviation (in ppm):

f_{mess}measured frequency
 f_{nom}set frequency (2048,000 Hz)

$$\text{Deviation} = 1 \times 10^6 \times (f_{mess} - f_{nom}) / f_{nom}$$

Determining the correction value for Step 53:

Correction value = Deviation / 0.763 + 128 (round off to whole number)

The calculated **correction value** must be between 0 and 255 (change quartz otherwise), and must be entered in Step 53 and saved.

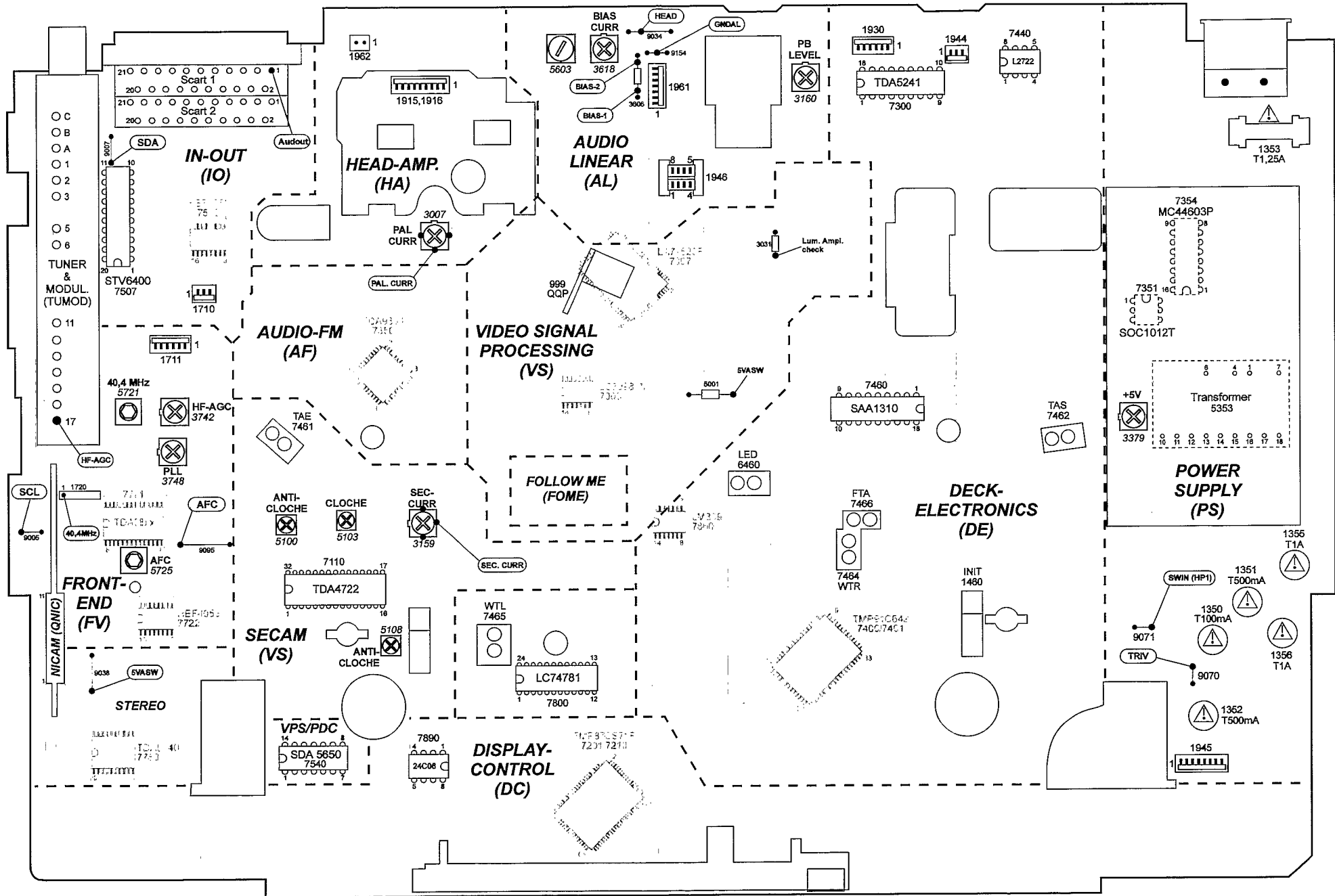
This Step can only be left by performing a **mains reset**, after which the service program must be entered again before Step 53 can be called up.

Example:

f_{mess} = 2047.97Hz f_{nom} = 2048.00Hz

$$\text{Deviation} = 1 \times 10^6 \times (2047.97 - 2048) / 2048 = -14.648$$

$$\text{Correction value} = -14.648 / 0.763 + 128 = 108.80 = 109$$

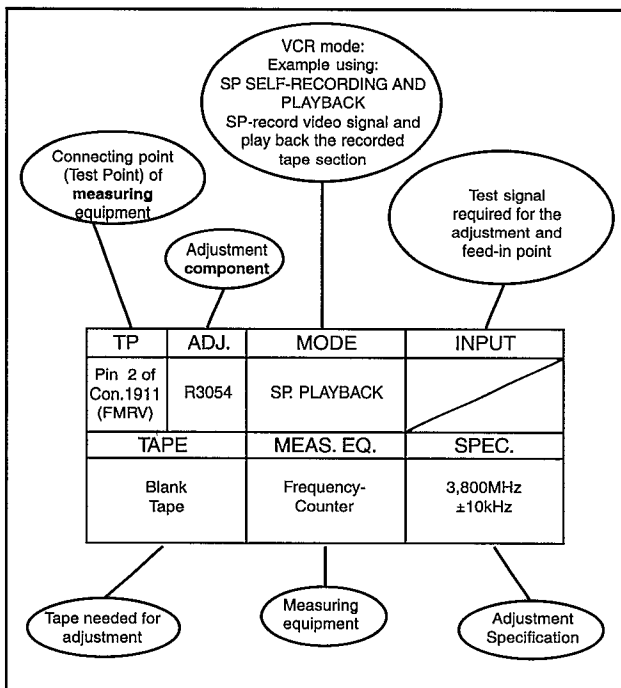


ADJUSTMENT INSTRUCTIONS

Test equipment:

1. Dual-trace oscilloscope
Voltage range : 0.001 ~ 50 V/div
Frequency : DC ~ 50 MHz
Probe : 10:1, 1:1
2. DVM (Digital voltmeter)
3. Frequency counter
4. Sinus generator
Sinus : 0 ~ 50 MHz
5. Test pattern generator
6. VHS Alignment Tape 4822 397 30103

How to read the adjustment procedures:



1. Power supply - QMB (PS)

Service tasks after repairing the power supply:

1.1 Setting the output voltage +5VASW [3379]:

Purpose: To set the correct supply voltage.

Symptom, if incorrectly set:

VCR functions are not operating correctly.

TP	ADJ.	MODE	INPUT
wire +5VASW	R3379	Playback	
TAPE		MEAS. EQ.	SPEC.
Any tape		DC Voltmeter	5,3V ±0.03V

2. Video signal processing-QMB (VS,AL,I/O)

Service tasks after replacement of ICs 7007, 7110:

Purpose: To set the optimum record PAL or SECAM chroma level.
Symptom, if incorrectly set:

If the record level is too high, beats may appear on the picture. If the level is too low, the colour may be degraded.

Before commencing adjustment:

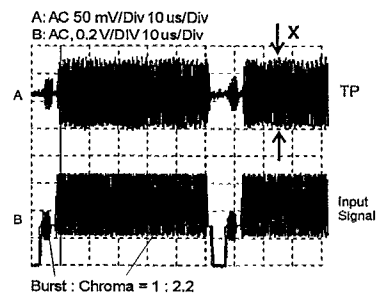
Call the service test program and enter Step 10 (Dummy mode). Remove the drive from the motherboard. Control the luminance amplitude on TP R3031:

TP	ADJ.	MODE	INPUT
Pos. R3031 (emitter side)		Dummy mode Record Preset E1	(VIDEO IN E1) Red Picture PAL 75% Saturation
TAPE		MEAS. EQ.	SPEC.
Blank Tape		Oscilloscope Video Pattern Generator	420 mV _{pp} ± 40 mV _{pp}

2.1 PAL chrominance record current adjustment [3007]:

Connect resistor R3031 on the emitter side (T7006) with 5VASW of coil L5001.

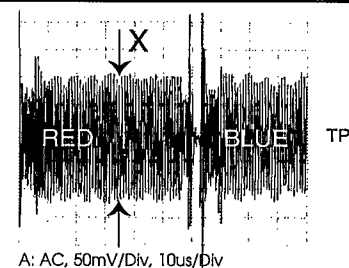
TP	ADJ.	MODE	INPUT
Pos. R3007 (slider)	R3007	Dummy mode Record Preset E1	(VIDEO IN E1) Red Picture PAL 75% Saturation
TAPE		MEAS. EQ.	SPEC.
Blank Tape		Oscilloscope Video Pattern Generator	X=160 ± 20 mV _{pp} , for 2 heads VCR X=130 ± 20 mV _{pp} , for 4 heads VCR



2.2 SECAM chrominance record current adjustment [3159]:

Connect resistor R3031 on the emitter side (T7006) with 5VASW of coil L5001.

TP	ADJ.	MODE	INPUT
Pos. R3159 (slider)	R3159	Dummy mode Record of Preset E1	(VIDEO IN E1) Red Picture SECAM 75% Saturation
TAPE		MEAS. EQ.	SPEC.
Blank Tape		Oscilloscope Video Pattern Generator	X=210 ± 30 mV _{pp} , measured in red line



3. Audio linear - QMB (VS, AL, I/O)

Service tasks after replacement of coil L5603, IC7007 or the audio heads:

3.1 Adjusting the erasing frequency [5603]:

Purpose: To set the correct recording erasing frequency.

Symptom, if incorrectly set:

Erasing frequency or its harmonics cause audio faults.

TP	ADJ.	MODE	INPUT
wire 9034 (HEAD)	L5603	Set tuned to channel 27 Record	PAL white picture, audio IF and modulation on
TAPE		MEAS. EQ.	SPEC.
Blank Tape		Frequency Counter	70kHz ±10kHz

3.2 Adjustment of playback amplitude [3160]: (mono only)

Purpose: To set audio part amplification

Symptom, if incorrectly set:

Playback sounds too faint or too loud.

TP	ADJ.	MODE	INPUT
Pin 1 of Scart 1 (Audout)	R3160	SP Self-recording and Playback	(Video white picture) Audio in Scart 1, 700mV _{RMS} , 1kHz
TAPE		MEAS. EQ.	SPEC.
Blank Tape		AC Millivoltmeter, Video Pattern Generator	500mV _{RMS} ±50mV

3.3 Adjustment of bias current [3618]:

Purpose: To set the optimum record bias current.

Symptom, if incorrectly set:

If the audio level is too high, the higher frequencies of the linear sound are too low.

If the level is too low, the higher frequencies are too strong and sound distortions increase.

TP	ADJ.	MODE	INPUT
R3606 (difference measurement BIAS1 - BIAS2)	R3618	Set tuned to channel 27 Record	PAL white picture, audio IF and modulation on
TAPE		MEAS. EQ.	SPEC.
Blank Tape		AC Millivolmeter	15mV _{RMS} ±1mV _{RMS} (70kHz)

Checking the 'bias' adjustment:

After the bias has been adjusted to the indicated level, record some music, play back the recording, and adjust the audio switch to "MONO".

Only use brand name cassettes, but not chrome dioxide tapes.

Check if sufficient treble is reproduced and for any audio distortion. In case of insufficient treble, reduce 'bias' current a little. In case of excessive distortion, increase 'bias' current a little.

4. Front End - QMB (VS, AL, I/O)

Service tasks after replacement of ICs 7720, 7721, coil L5725 and TUMOD:

4.1 AFC Adjustment:

Purpose: Correct adjustment of demodulator AFC - circuit

Symptom, if incorrectly set:

Bad or disturbed TV channel reception.

4.1.1 PAL - AFC adjustment [5725]:

TP	ADJ.	MODE	INPUT
IC 7720 Pin 15	L5725	E to E	38,9MHz 500mV _{pp} at Tuner 1701 Pin 17
TAPE		MEAS. EQ.	SPEC.
		DC Voltmeter Freq. Generator	2,5V ±0,2V

4.1.2 PAL/SECAM - AFC adjustment [5725] :

TP	ADJ.	MODE	INPUT
IC 7721 Pin 20	L5725	E to E	38,9MHz 500mV _{pp} at Tuner 1701 Pin 17
TAPE		MEAS. EQ.	SPEC.
		DC Voltmeter Freq. Generator	2,5V ±0,2V

4.2 SECAM band 1 - AFC adjustment [3748]: (SECAM L / L' only)

Before commencing adjustment:

— Switch VCR to SECAM with SYSTEM key.

TP	ADJ.	MODE	INPUT
IC 7721 Pin 20	R3748	E to E, SECAM L' tuned on this preset	33,9MHz 500mV _{pp} at Tuner 1701 Pin 17
TAPE		MEAS. EQ.	SPEC.
		DC Voltmeter Freq. Generator	2,5V ±0,2V

4.3 Phase offset adjustment [3743]: (TDA9800T only)

After replacement of the IC TDA9800T [7720], the potentiometer pos. 3748 has to be removed from the motherboard. The demodulator IC TDA9800T [7720] is automatically adjusted to a default value.

4.4 HF - AGC adjustment [3742]:

Service tasks after replacement of ICs 7720, 7721 or TUMOD:

Purpose: Set amplifier control.

Symptom, if incorrectly set:

Picture jitter if input level is too low and picture distortion if input level is too high.

TP	ADJ.	MODE	INPUT
Tuner 1701 Pin 17	R3742	Set tuned to channel 27	4,5mV(74dB μ V) on aerial input PAL white picture, audio IF on, no modulation
TAPE		MEAS. EQ.	SPEC.
		Oscilloscope Video Pattern Generator	550mV _{pp} +/-50mV (use a 10:1 probe)

4.5 Attenuating the 40.4 MHz [5721]: (SECAM only)

Service tasks after replacement of coil 75721:

Purpose: To attenuate the band I carrier rests.

Symptom, if incorrectly set:

Bad picture quality when the filter attenuates the picture carrier (38.9MHz).

TP	ADJ.	MODE	INPUT
OFW 1720 Pin 1	L5721	E to E	40.4 MHz, 300mV _{rms} at Tuner 1701 Pin 17
TAPE		MEAS. EQ.	SPEC.
		Oscilloscope, Sinus Generator, Counter	adjust minimum amplitude

If the adjustment is correct the signal at pin 1 of SFW [1720] must be smaller than the input signal amplitude by at least 5 dB.

Software adjustments in the service test program

5. Deck electronics - QMB (DE, DC)

Service tasks after replacement of the head drum or EEPROM:

5.1 Software adjustment of gap positions:

Information about this adjustment is contained in the Fault Locating document, Chapter 2-20, and in the service test program in Step 51.

5.2 "Studio Picture control" adjustment:

Information about this adjustment is contained in the Fault Locating document, Chapter 2-20, and in the service test program in Step 52.

6. Stereo demodulator TDA9840 - QMB (FV)

Service tasks after replacement of IC7780 or the EEPROM:

6.1 Stereo level adjustment [7780]:

Information about this adjustment is contained in the Fault Locating document, Chapter 2-20, in the service test program in Step 60.

6.2 Stereo channel separation adjustment [7780]:

Information about this adjustment is contained in the Fault Locating document, Chapter 2-20, in the service test program in Step 61.

7. Audio HIFI TDA9604H - QMB (AF)

Service tasks after replacement of the audio heads, IC 7007 or the EEPROM:

7.1 Audio Linear playback level adjustment TDA9604H [7850]:

Information about this adjustment is contained in the Fault Locating document, Chapter 2-20, in the service test program in Step 62.

8. Display Control - QMB (DE, DC)

Service tasks after replacement of the clock quartz [1297] or the EEPROM:

8.1 Clock frequency adjustment:

The clock is corrected via software with the measurement of a frequency at the HEST measuring point [7201, pin 80] and computation of a correction factor.

Information about this adjustment is contained in the Fault Locating document, Chapter 2-20, in the service test program in Steps 53 and Step 99.



List of abbreviations

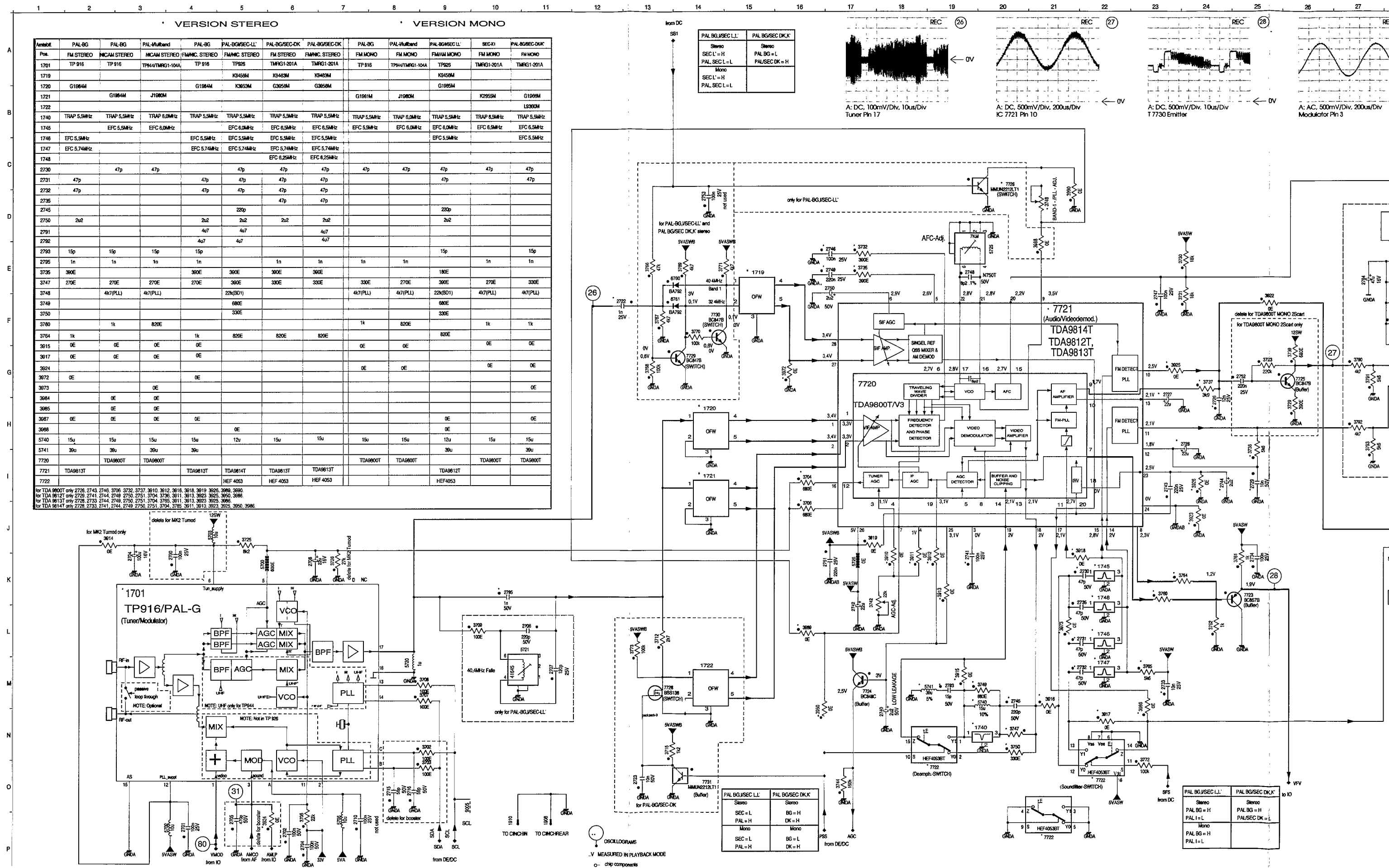
Signal	Description	Application											
+5AS	+5V analog after fuse 1700												QNIC
+5ASS	+5V digital, after coil 5706												QNIC
+5D	+5V digital			DE									QNIC
-28V	-28V display supply	PS			DC				IO				
-7V	-7V I/O-switches supply								IO				
12SW	+12V analog (< 6W switched)	PS						AL			FV		QNIC
12VA	+12V analog	PS						IO		FV	AF		
14VM1	+14V for threading- and headmotor	PS		DE									
2FSC	2x Colour subcarrier					VS						OS	
33V	+33V for tuner tuning voltage	PS								FV			
5VA	+5V analog	PS						IO		FV	AF	OS	
5VASW	+5V analog (< 6W switched)	PS	HA	DE		VS			SE	FV		OS	QNIC
5VASW2	+5V analog after coil 5802											OS	
5VASWB	+5V analog after coil 5726									FV			
5VD	+5V digital	PS		DE	DC					FV			
5VD1	+5V digital, after coil 5200				DC								
5VD2	+5V digital, after coil 5400			DE									
8SC1	Scart 1 pin 8 output			DE					IO				
8SC2	Scart 2 pin 8 input			DE					IO				
9/14VM2	Capstan motor supply, switched	PS		DE									
AEH1/2	Audio erase head							AL					
AF1	Audio from frontend, left							AL	IO		FV	AF	
AF2	Audio from frontend, right										FV	AF	
AFC	Automatic frequency control				DC						FV		
AFE	Audio from frontend										FV		QNIC
AGC	Automatic gain control			DE							FV		
AH1/2/C	Audio heads		HA										
AIN1	Audio input scart 1							AL	IO				
AIN1L	Audio input scart 1, left								IO			AF	
AIN1R	Audio input scart 1, right								IO			AF	
AIN2	Audio input scart 2							AL	IO				
AIN2L	Audio input scart 2, left								IO			AF	
AIN2R	Audio input scart 2, right								IO			AF	
AINFL	Audio left from Front connector								IO			AF	
AINFR	Audio right from front connector								IO			AF	
AMCO	Audio to the modulator										FV	AF	
AML P	Audio mono playback							AL	IO		FV	AF	
AML R	Audio mono record							AL	IO			AF	
AN1/2	Analog voltage from keyboard matrix				DC								
ANIL	NICAM Audio, left										FV		QNIC
ANIR	NICAM Audio, right										FV		QNIC
AOUT1L	Audio output from scart 1, left								IO			AF	
AOUT1R	Audio output from scart 1, right								IO			AF	
AOUT2L	Audio output from scart 2, left								IO			AF	
AOUT2R	Audio output from scart 2, right								IO			AF	
APH	Audio playback head							AL					
ARH	Audio record head							AL					
BLANKING	Blanking pulse RGB loopthrough								IO				
BLUE	Blue signal between scart 1/2								IO				
CAP	Capstan control voltage			DE									
CKDET	Colour system information			DE		VS							
CLKD1	Serial bus clock			DE	DC								
CREV	Capstan reverse			DE									
CROT	Colour rotation on/off			DE		VS							

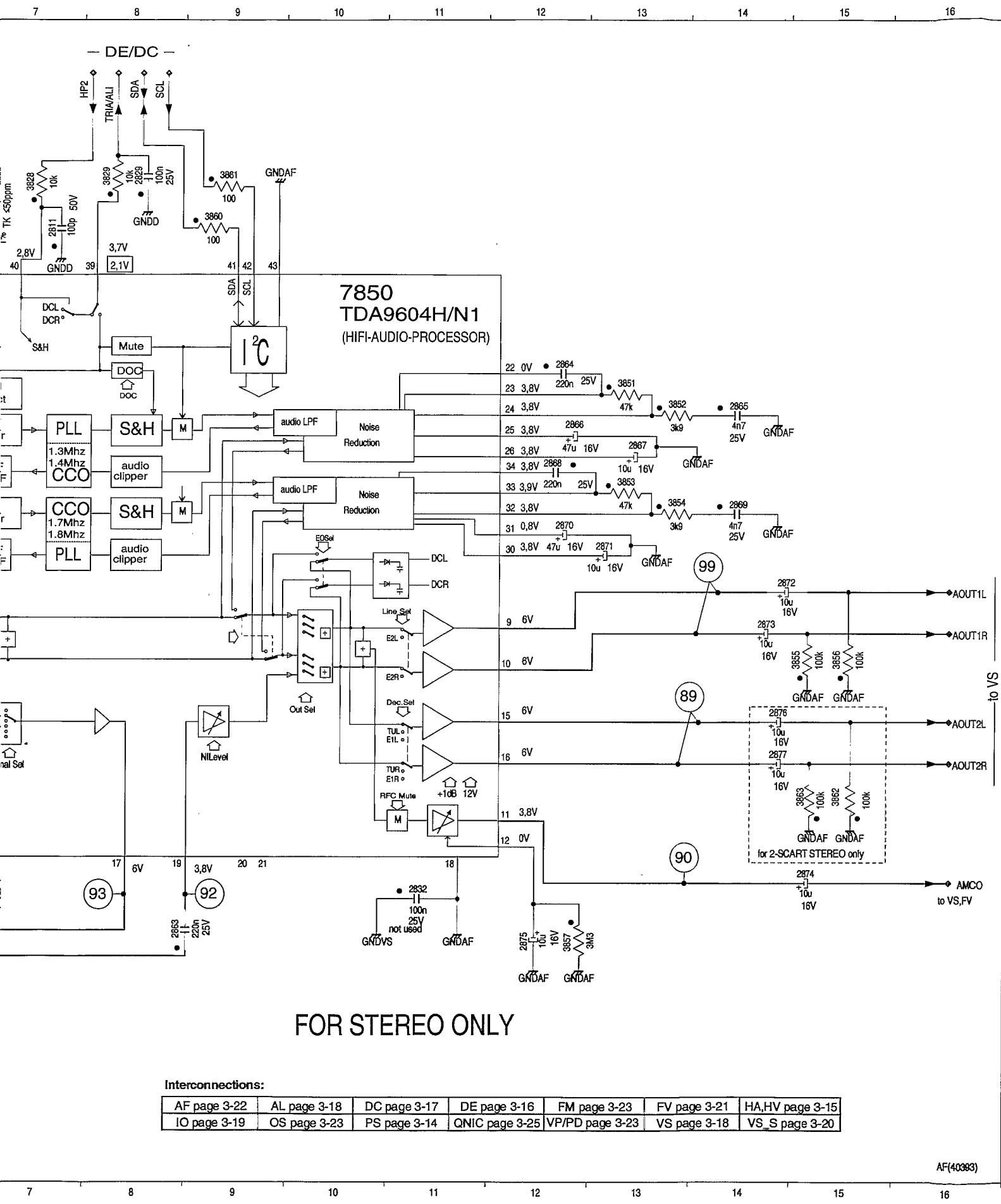
Signal	Description	Application									
CSCP	Colour phase switching for LP feature mode				DE		VS				
CSI	Colour system information				DE				SE		
CSP	Chrominance secam playback						VS		SE		
CSR	Chrominance secam record		HA						SE		
CSW	8V/14V switching for capstan motor	PS		DE							
CSYNC/1/2	Composite sync pulse		HA	DE		VS			SE		OS
CTL1/2	Control track signal			DE			AL				
DATD1/2	Serial bus data			DE	DC						
DEC	Audio switching voltage							IO			
ENVC	Envelope comparator signal		HA	DE							
FFP	Feature frame pulse			DE		VS					
FG	Capstan tachometer pulse			DE							
FGD	Capstan tachometer pulse digital			DE							
FMAP	FM audio playback		HA							AF	
FMAR	FM audio record		HA							AF	
FMPV	FM video playback		HA			VS		SE			
FMRV	FM video record		HA			VS					
FOME	Follow Me (video signals equal)			DE							OS
FTA	Threading tachometer			DE							
FTAD	Threading tachometer digital			DE							
GND A	Ground analog							IO	FV		QNIC
GND A1/A2	Ground analog QNIC										QNIC
GND AF	Ground analog AF									AF	
GND IO	Ground analog IO							IO			
GND AL	Ground analog AL						AL				
GND D	Ground digital			DE				IO		AF	QNIC
GND EO	Ground erase oscillator						AL				
GND M	Ground capstan motor			DE							
GND VS	Ground signal electronics									AF	
GND VSIO	Ground analog VS, IO							IO			
GREEN	Green signal between scart 1/2							IO			
HEHI	Heater for display tube high	PS			DC						
HELO	Heater for display tube low	PS			DC						
HEST	Heater voltage control signal				DC						
HP2	Head pulse audio		HA	DE						AF	
I/R	Deck switch / Record protection			DE							
I LED	LED-tower supply			DE							
INIT	Deck switch			DE							
IPOR	Inverse power on reset			DE	DC						
IRAF	Inverse record FM-audio		HA	DE							
IREV	Dubbing oscillator on/off			DE		VS	AL				
ISTBY	Inverse stand by	PS			DC						
ISWS	Video-FM mute			DE		VS					
IWIND	Control pulse amplification low			DE							
LH1/2/C	Long play heads		HA								
MEH1/2	Main erase head						AL				
MON	Monitor loop through scart 1/2							IO			
MOT0-3	Head motor Control lines			DE							
MTA	Audio mute			DE			AL				
NC	Not connected			DE							
OCLK	OSD-bus clock				DC						OS
OCS	OSD chip select				DC						OS
ODAT	OSD-bus data				DC						OS
OFF	Frame pulse			DE							OS

Signal	Description	Application											
PBV	Playback			DE					SE				
PG/FG	Head wheel position/-speed			DE									
POS	Position pulse headwheel			DE									
PSS	PAL or secam-L				DC				FV				
RECP	Record protection			DE									
RED	Red signal between scart 1/2							IO					
REEL	Head wheel control			DE									
SB1	Secam band 1				DC				FV				
SCL	IIC bus clock							IO	FV	AF	OS	QNIC	
SCL2	Serial bus clock			DE	VS								
SDA	IIC bus data							IO	FV	AF	OS	QNIC	
SDA2	Serial bus data			DE	VS								
SFS	Sound filter switch				DC				FV				
SH1/2/C	Standard play heads		HA										
SSIF	Second sound interfrequency								FV			QNIC	
SWIN	Head switching pulse		HA	DE									
SYNC	Control track pulse			DE									
TAE	Tape end detection			DE									
TAS	Tape start detection			DE									
THIO	Threading motor in/out			DE									
TMO	Threading motor on/off			DE									
TMO1/2	Threading motor connection			DE									
TRIA/ALI	Tracking information audio / Audio level indication			DE						AF			
TRIV	Tracking information video		HA	DE									
VBS	Video input				VS		IO				OS		
VFR	Video from front connector						IO						
VFV	Video from frontend				VS		IO		FV		OS		
VIN1	Video input scart 1						IO						
VIN2	Video input scart 2						IO						
VISS	Control sync pulse inversion			DE									
VMOD	Video to the modulator						IO		FV				
VOUT	Video from OSD part						IO				OS		
VREC	Video record from I/O				VS			SE			OS		
VREF	Reference voltage							SE					
VSB	Video from signal electronics				VS						OS		
W/R	Control track write/read			DE									
WTL	Wind tachometer left			DE									
WTLD	Wind tachometer left digital			DE									
WTR	Wind tachometer right			DE									
WTRD	Wind tachometer right digital			DE									

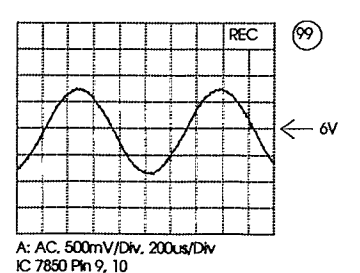
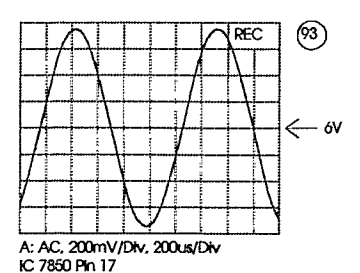
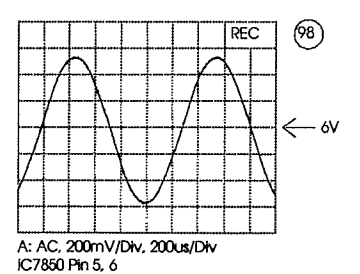
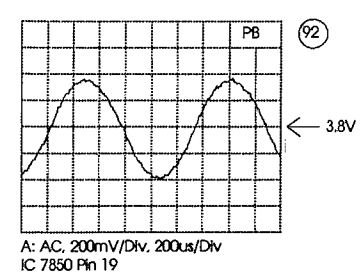
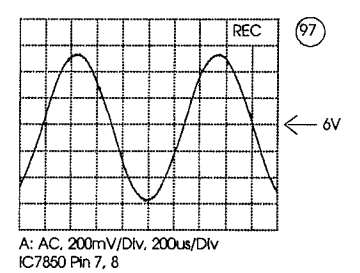
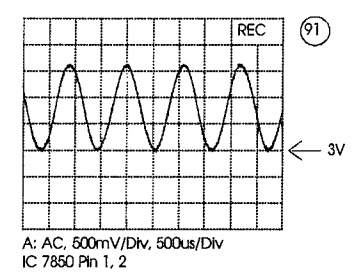
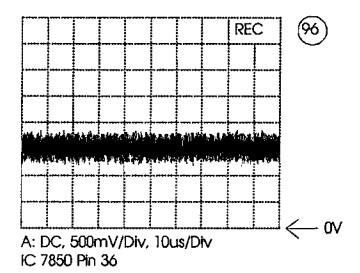
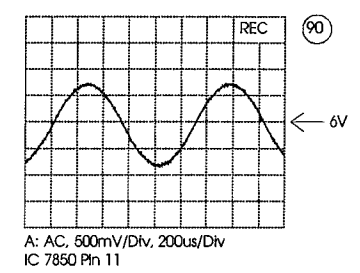
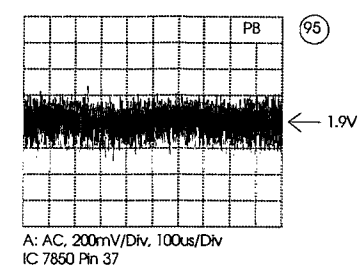
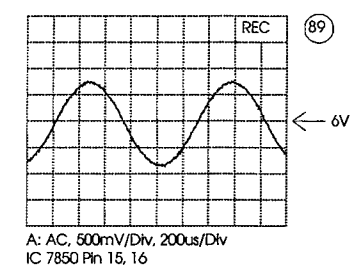
PS Power Supply page 3-33
 HA Head Amplifier page 3-15
 DE Deck Electronics page 3-16
 DC Display Control page 3-17
 VS Video Signal Processing page 3-18
 AL Audio Linear page 3-18
 IO In/Out page 3-19
 SE Secam Processing page 3-20
 FV Frontend page 3-21
 AF Audio Processing page 3-22
 OS On Screen Display page 3-23
 QNIC ... Nicam Board page 3-25

Frontend (FV)

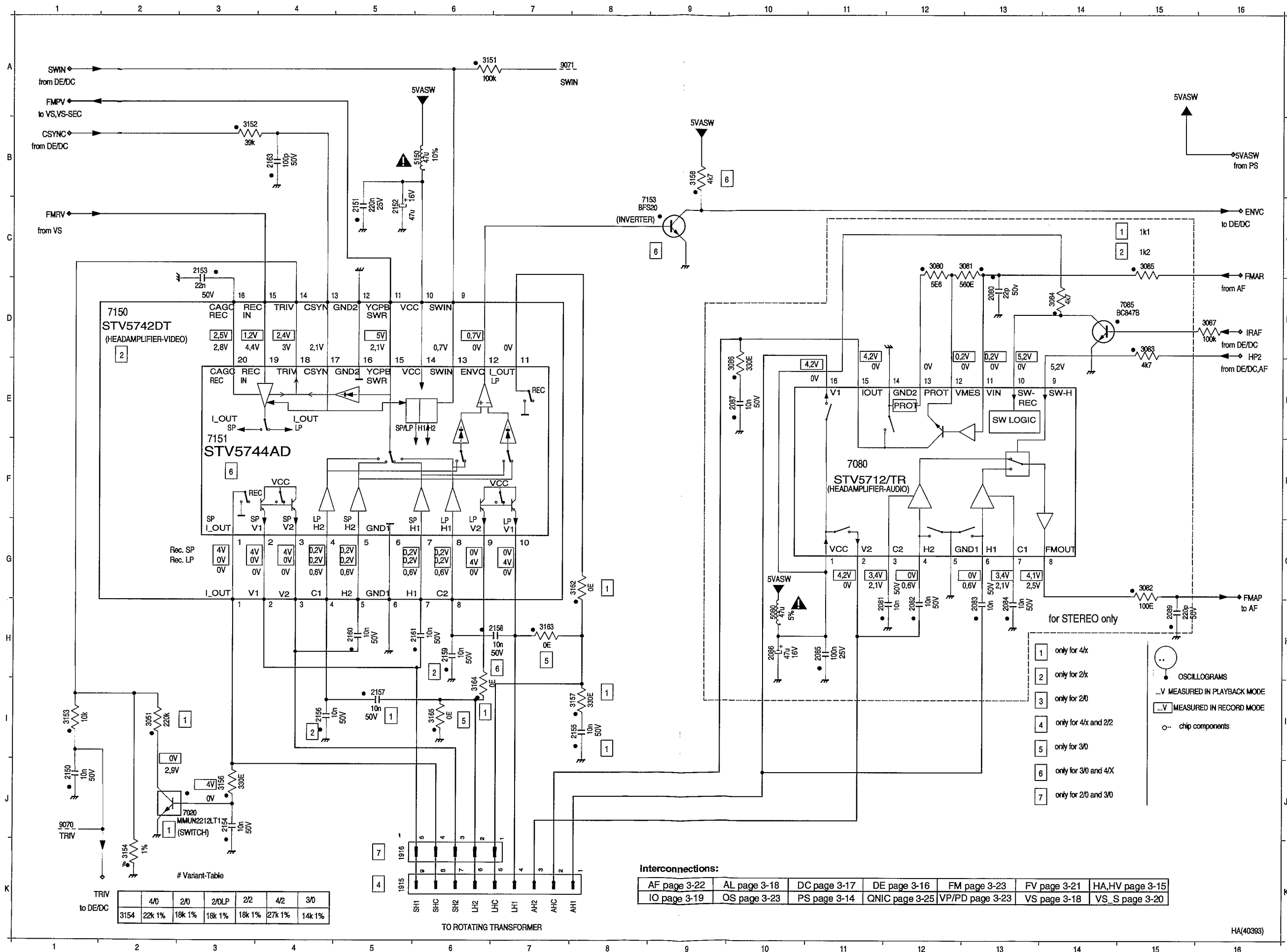




- 2811 B 7
- 2829 B 8
- 2832 I11
- 2850 B 5
- 2851 B 5
- 2852 B 6
- 2853 B 6
- 2854 B 6
- 2855 D 3
- 2856 E 3
- 2857 F 2
- 2858 F 3
- 2859 F 3
- 2860 G 2
- 2861 G 3
- 2862 G 2
- 2863 I 8
- 2864 D12
- 2865 D14
- 2866 D12
- 2867 D13
- 2868 E12
- 2869 E14
- 2870 E12
- 2871 F13
- 2872 F14
- 2873 F14
- 2874 I15
- 2875 I12
- 2876 G14
- 2877 H14
- 2878 F 4
- 2879 F 2
- 3828 B 7
- 3829 B 8
- 3850 B 6
- 3851 D13
- 3852 D13
- 3853 E13
- 3854 E13
- 3855 G15
- 3856 G15
- 3857 I12
- 3860 B 9
- 3861 B 9
- 3862 H15
- 3863 H15
- 7850 C10



Head Amplifier (HA)



- 1915 K5
- 1916 K5
- 2080 D13
- 2081 H11
- 2082 H12
- 2083 H13
- 2084 H13
- 2085 H11
- 2086 H10
- 2087 E10
- 2089 H15
- 2150 J1
- 2151 C5
- 2152 C5
- 2153 C3
- 2154 J3
- 2155 I8
- 2156 I4
- 2157 I5
- 2158 H7
- 2159 H6
- 2160 H5
- 2161 H6
- 2163 B4
- 3051 I2
- 3080 C12
- 3081 C13
- 3082 G15
- 3083 D15
- 3084 D14
- 3085 C15
- 3086 E10
- 3087 D16
- 3151 A6
- 3152 B3
- 3153 I1
- 3154 K2
- 3156 J3
- 3157 I8
- 3158 B9
- 3162 G8
- 3163 H7
- 3164 I6
- 3165 I6
- 5080 H10
- 5150 B6
- 7020 J3
- 7085 D15
- 7150 D2
- 7151 F3
- 7153 C8
- 9070 J1
- 9071 A7

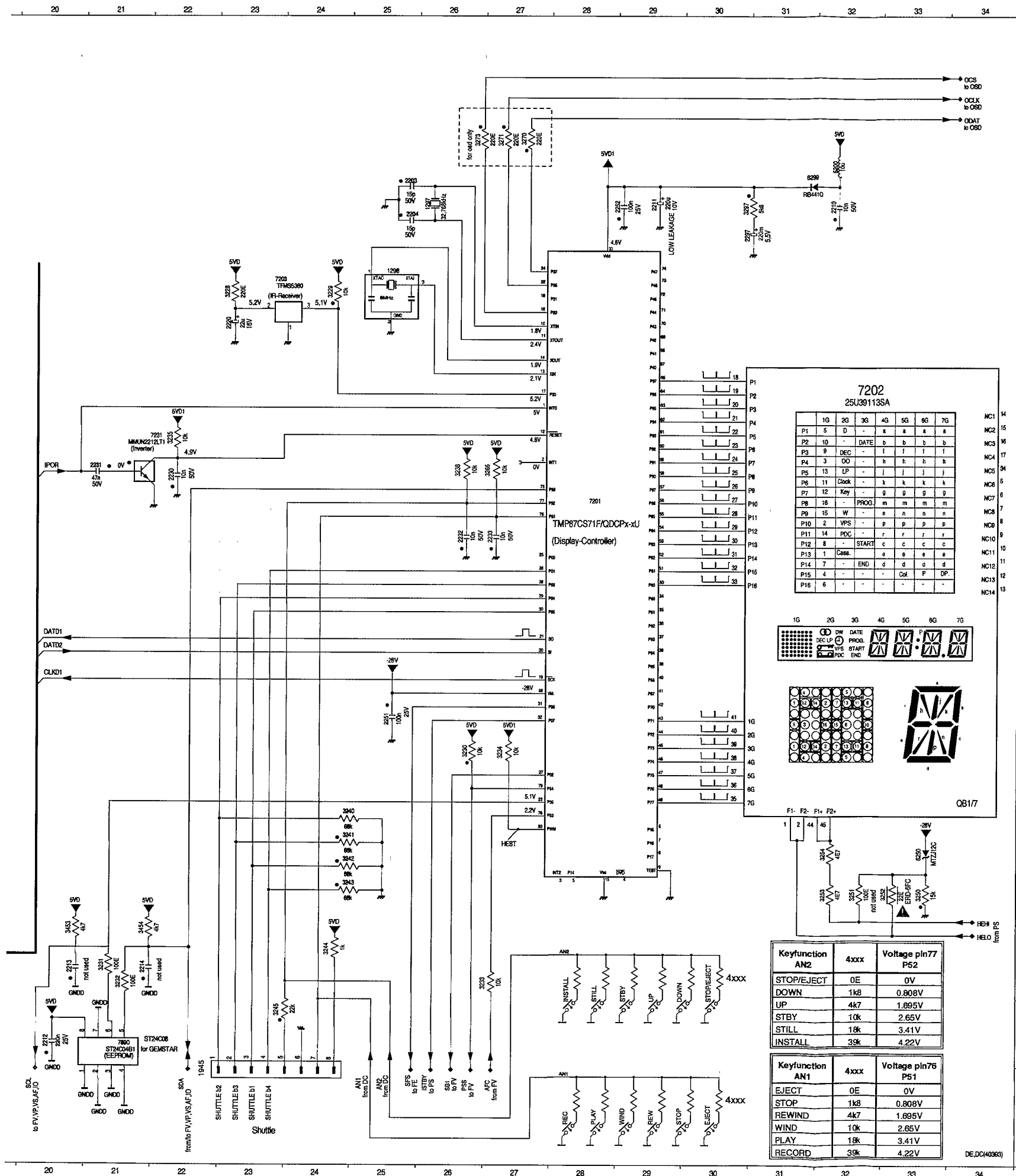
Variant-Table

TRIV to DE/DC	4/0	2/0	2/0LP	2/2	4/2	3/0
	3154	22k 1%	18k 1%	18k 1%	18k 1%	27k 1%
						14k 1%

Interconnections:

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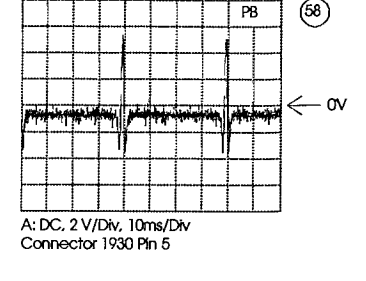
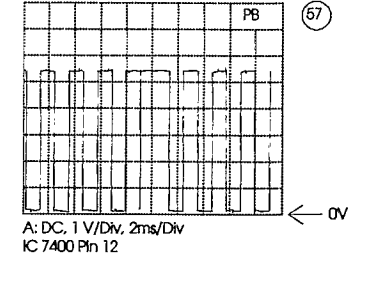
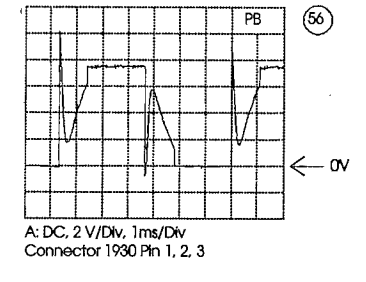
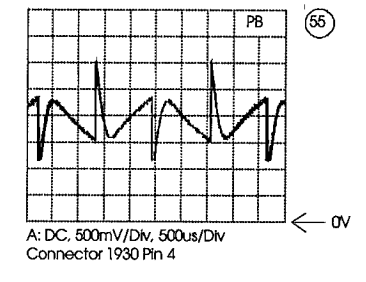
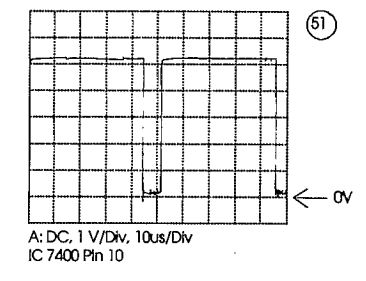
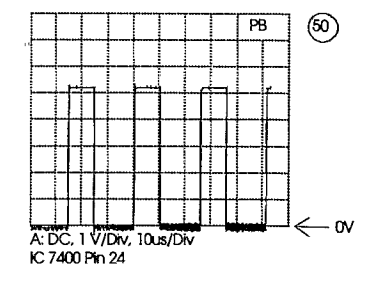
Display Control (DC)



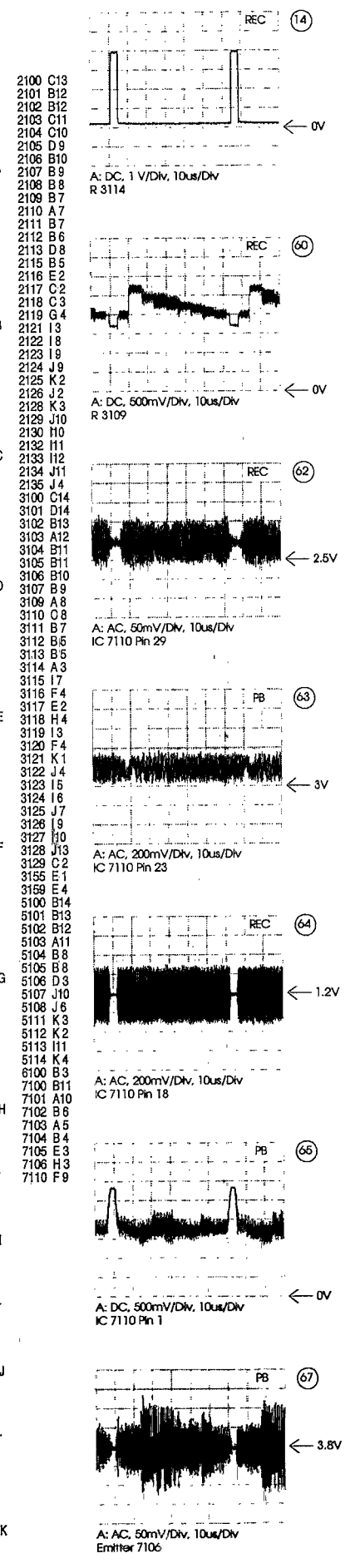
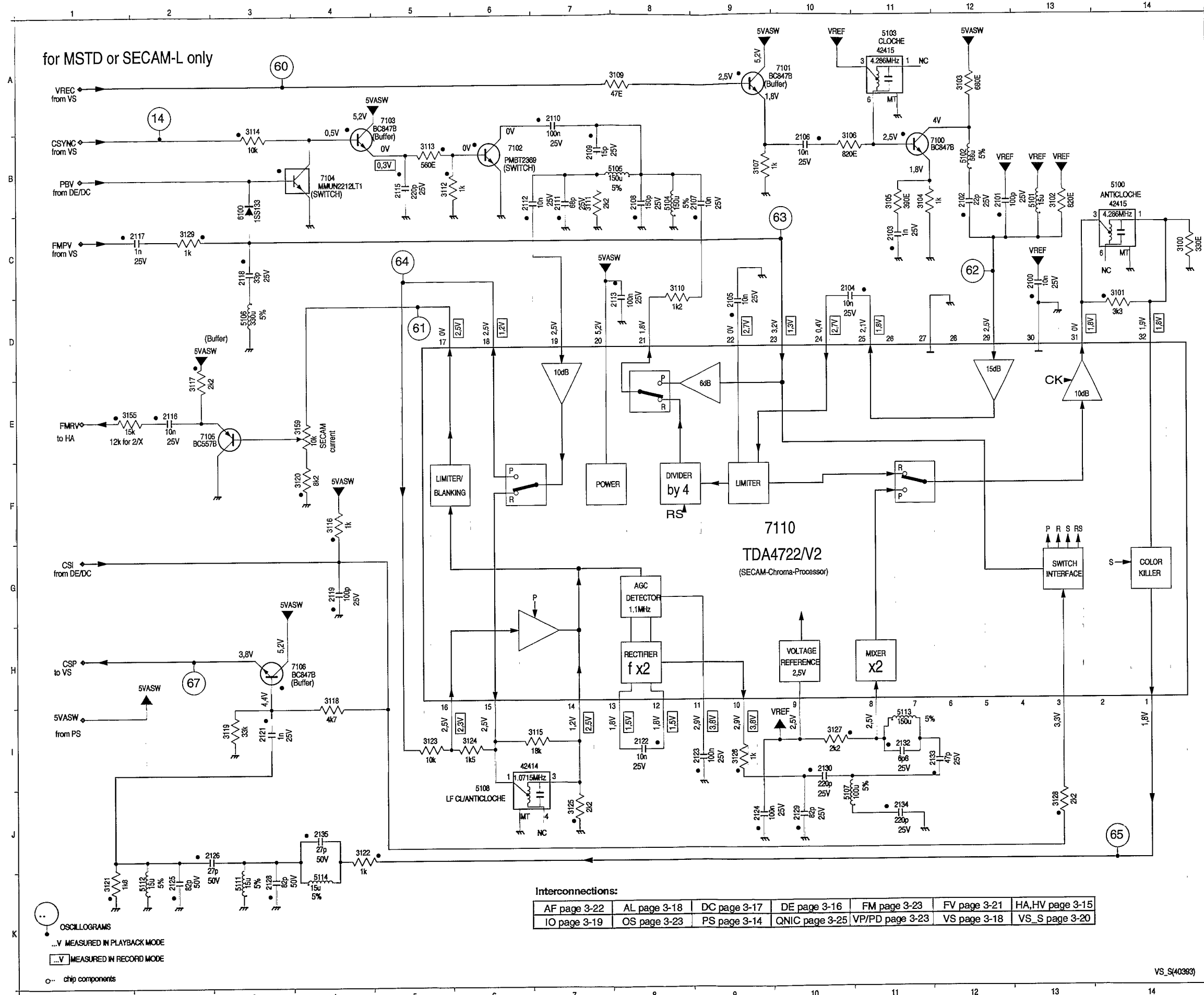
- 1297 C26
- 1298 C25
- 1400 L15
- 1480 H9
- 1461 H8
- 1930 A2
- 1944 A8
- 1945 C22
- 1946 P5
- 2203 B25
- 2204 C25
- 2210 C32
- 2211 C29
- 2212 C30
- 2213 N20
- 2214 N21
- 2220 E23
- 2230 C22
- 2231 C21
- 2232 H56
- 2233 H27
- 2251 J25
- 2252 C29
- 2257 C30
- 2300 A3
- 2301 A3
- 2302 B3
- 2308 D4
- 2310 E3
- 2311 E4
- 2313 D1
- 2314 C7
- 2315 D7
- 2318 D7
- 2317 E7
- 2318 D2
- 2319 G7
- 2320 C4
- 2400 B18
- 2401 B15
- 2402 G14
- 2403 M15
- 2404 M15
- 2416 M11
- 2417 L7
- 2440 B10
- 2441 C10
- 2442 E10
- 2455 H2
- 2459 B19
- 2480 P4
- 2481 G5
- 2482 P5
- 2483 I7
- 2484 J5
- 2485 J6
- 2486 J7
- 2487 J7
- 2488 M6
- 2470 L5
- 2471 O8
- 2472 L7
- 2473 L7
- 2474 L8
- 3228 D23
- 3229 D24
- 3230 K26
- 3231 N21
- 3232 N21
- 3233 N27
- 3234 K27
- 3235 F22
- 3238 G29
- 3240 L24
- 3241 L24
- 3242 L24
- 3243 M24
- 3244 N24
- 3245 C23
- 3250 M33
- 3251 M32
- 3252 M33
- 3253 M32
- 3254 L32
- 3255 B27
- 3270 B27
- 3271 B27
- 3278 B26
- 3287 C30
- 3300 A3
- 3301 A3
- 3302 B3
- 3303 B3
- 3304 D4
- 3306 D3
- 3312 F5
- 3313 F5
- 3316 D18
- 3400 B14
- 3401 B13
- 3402 C14
- 3403 F17
- 3404 F14
- 3405 B18
- 3406 F14
- 3407 E14
- 3408 G18
- 3410 J14
- 3411 C18
- 3412 F18
- 3413 I12
- 3414 A17
- 3415 A17
- 3416 C14
- 3417 B14
- 3418 E18
- 3419 D17
- 3420 L14
- 3421 H18
- 3423 B17
- 3424 O6
- 3430 H17
- 3431 H17
- 3432 L18
- 3433 D17
- 3434 H18
- 3435 I18
- 3436 I18
- 3437 H17
- 3438 I18
- 3440 B10
- 3441 D10
- 3442 E10
- 3443 B11
- 3444 C11
- 3445 D11
- 3447 E12
- 3448 C11
- 3446 C12
- 3450 B13
- 3451 K17
- 3452 L18
- 3453 M20
- 3454 M21
- 3455 F18
- 3456 G2
- 3457 F3
- 3458 G2
- 3459 B17
- 3460 G5
- 3461 H6
- 3462 F8
- 3463 G9
- 3464 C18
- 3465 D19
- 3466 B17
- 3470 L5
- 3471 L5
- 3472 O8
- 3473 O7
- 3474 J6
- 3475 J5
- 3476 J5
- 3477 H9
- 3478 H8
- 3479 H8
- 3480 H9
- 3481 N6
- 3482 O5
- 3483 O7
- 3484 M6
- 3488 I6
- 3489 J5
- 3490 I7
- 3491 J7
- 3492 M7
- 3493 M6
- 3494 M9
- 3495 M10
- 3496 B18
- 3497 M9
- 3498 K11
- 3499 L12
- 3570 H4
- 3571 H18
- 5200 B32
- 5300 D2
- 5400 B16
- 5402 I14
- 6250 L33
- 6299 B31
- 6480 C17
- 7201 C29
- 7202 F32
- 7203 D23
- 7231 F22
- 7300 E5
- 7301 H12
- 7400 F15
- 7440 C10
- 7440 D10
- 7455 G4
- 7456 G3
- 7457 G2
- 7458 C19
- 7460 L9
- 7461 H5
- 7462 F8
- 7463 B17
- 7464 L5
- 7465 P7
- 7466 K5
- 7467 F8
- 7468 G5
- 7469 H5
- 7800 C21

Interconnections:

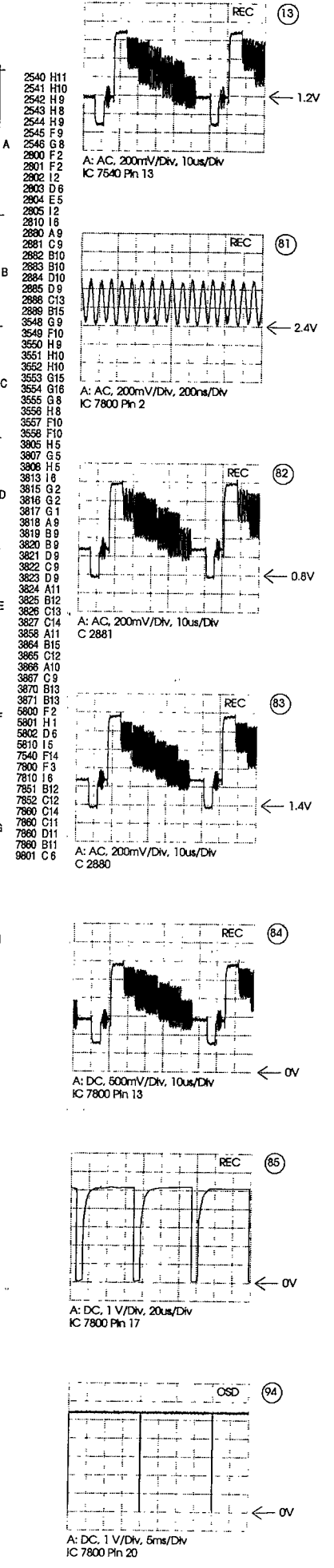
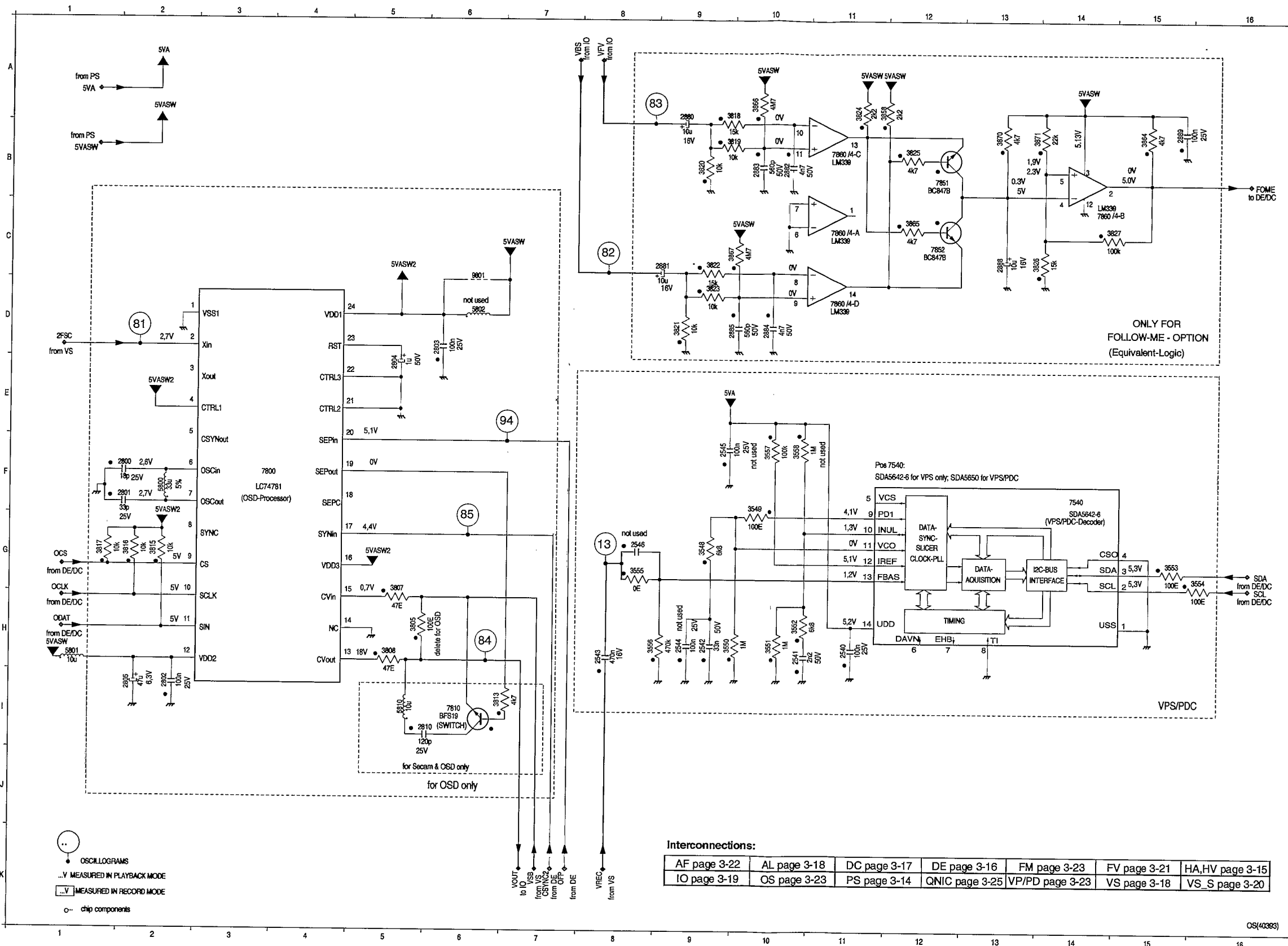
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VS_S	page 3-20



Video Signal Processing Secam (VS_S)



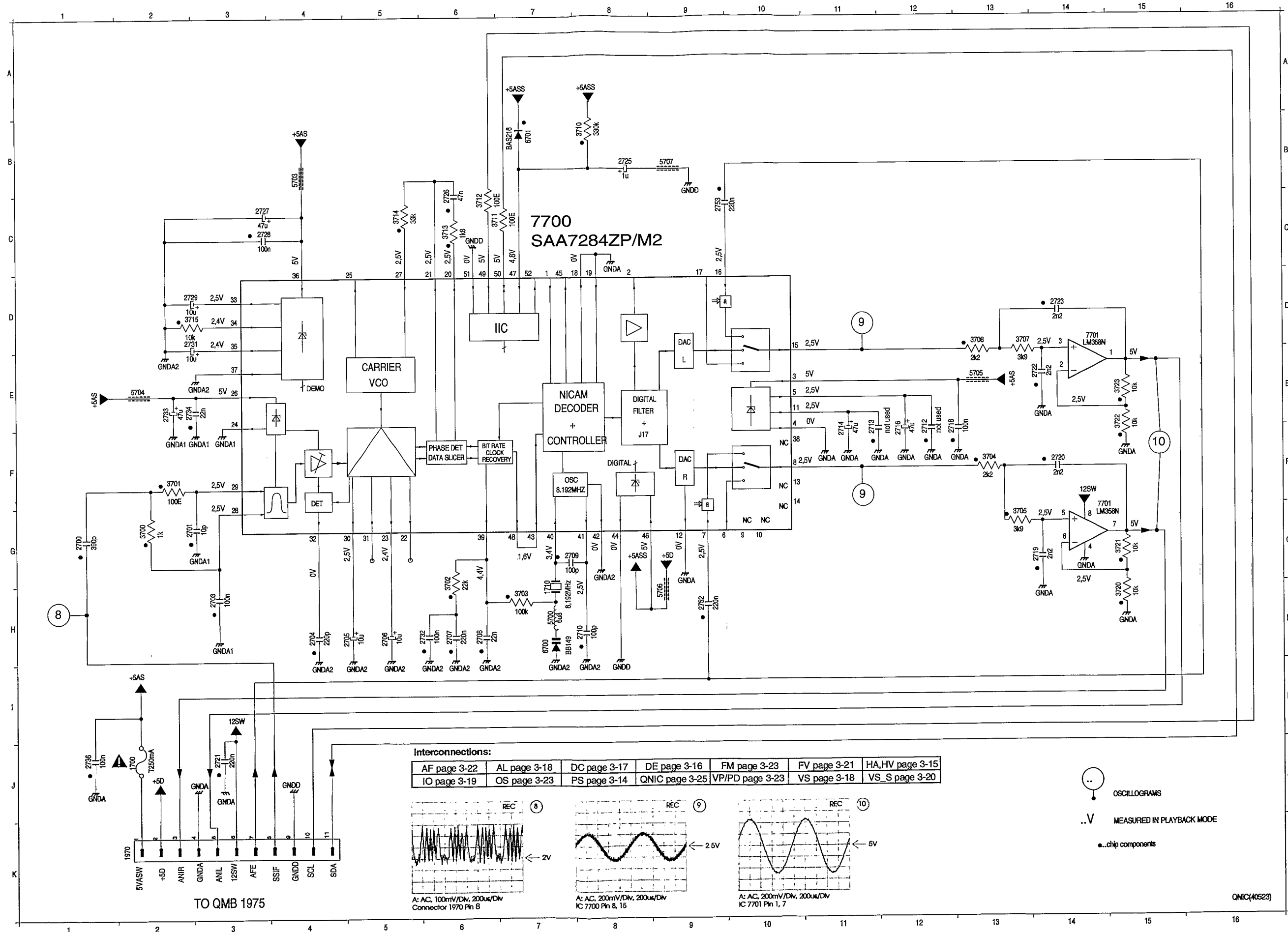
On Screen Display (OS), Follow Me (FM), Video Programming System / Programm Delivery Control (VP/PD)



Interconnections:

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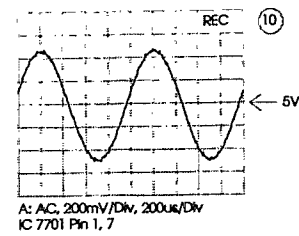
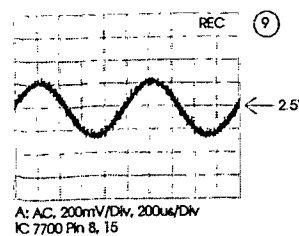
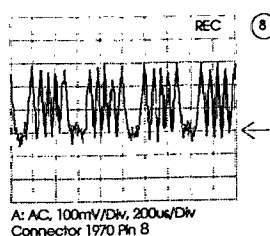
Nicam Board (QNIC)



- 1700 J2
- 1710 H7
- 1970 K2
- 2700 G1
- 2701 G2
- 2703 H3
- 2704 H4
- 2705 H5
- 2706 H5
- 2707 H6
- 2708 H6
- 2709 G7
- 2710 H8
- 2712 F12
- 2713 F11
- 2714 F11
- 2716 F12
- 2718 F12
- 2719 G14
- 2720 F14
- 2721 J3
- 2722 E14
- 2723 D14
- 2725 B8
- 2726 C6
- 2727 C3
- 2728 C3
- 2729 D2
- 2731 D2
- 2732 H6
- 2733 E2
- 2734 E2
- 2736 J1
- 2738 J9
- 2739 C9
- 2700 G2
- 3701 F2
- 3702 G6
- 3703 H7
- 3704 F13
- 3705 G13
- 3707 D13
- 3708 D13
- 3710 B8
- 3711 C7
- 3712 C6
- 3713 C6
- 3714 C5
- 3715 D3
- 3720 H15
- 3721 G15
- 3722 E15
- 3723 E15
- 5700 H7
- 5703 B4
- 5704 E2
- 5705 E13
- 5706 H9
- 5707 B9
- 6700 H7
- 6701 B7
- 7700 C7
- 7701 D14
- 7701 G14

Interconnections:

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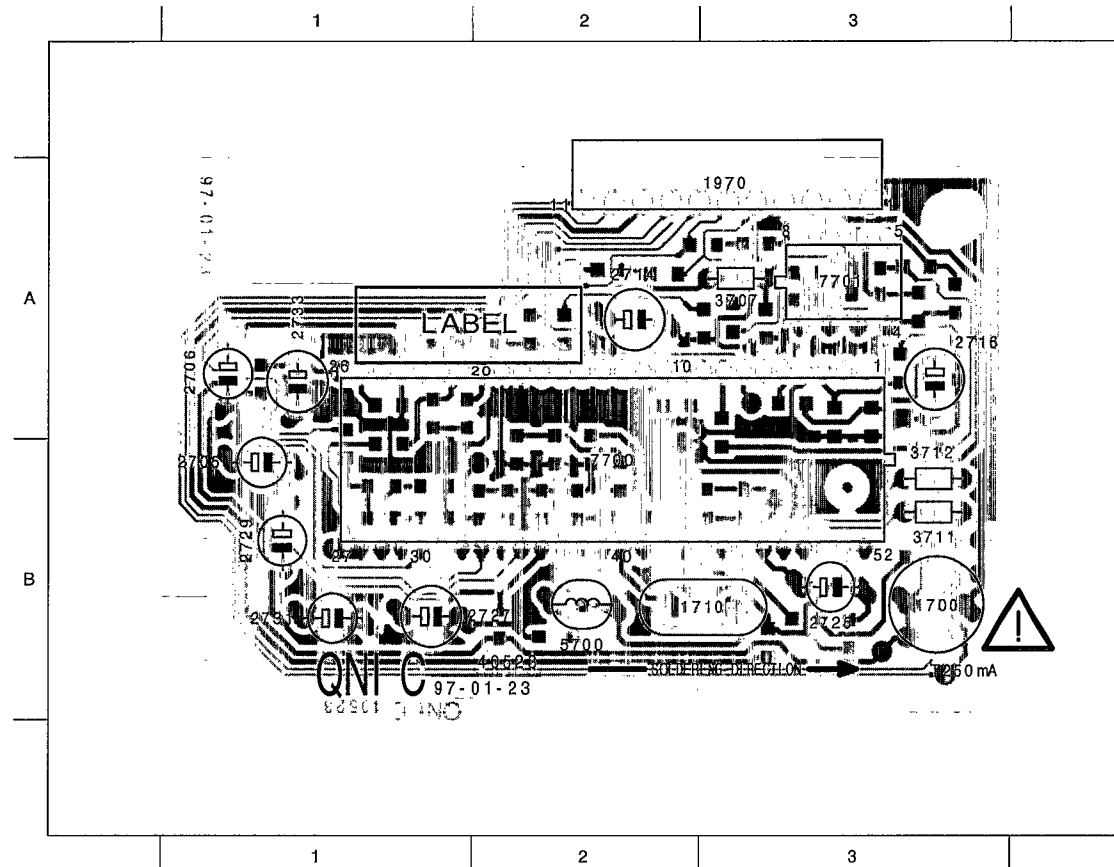


⊙ OSCILLOGRAMS
 ..V MEASURED IN PLAYBACK MODE
 e...chip components

TO QMB 1975

QNIC(40523)

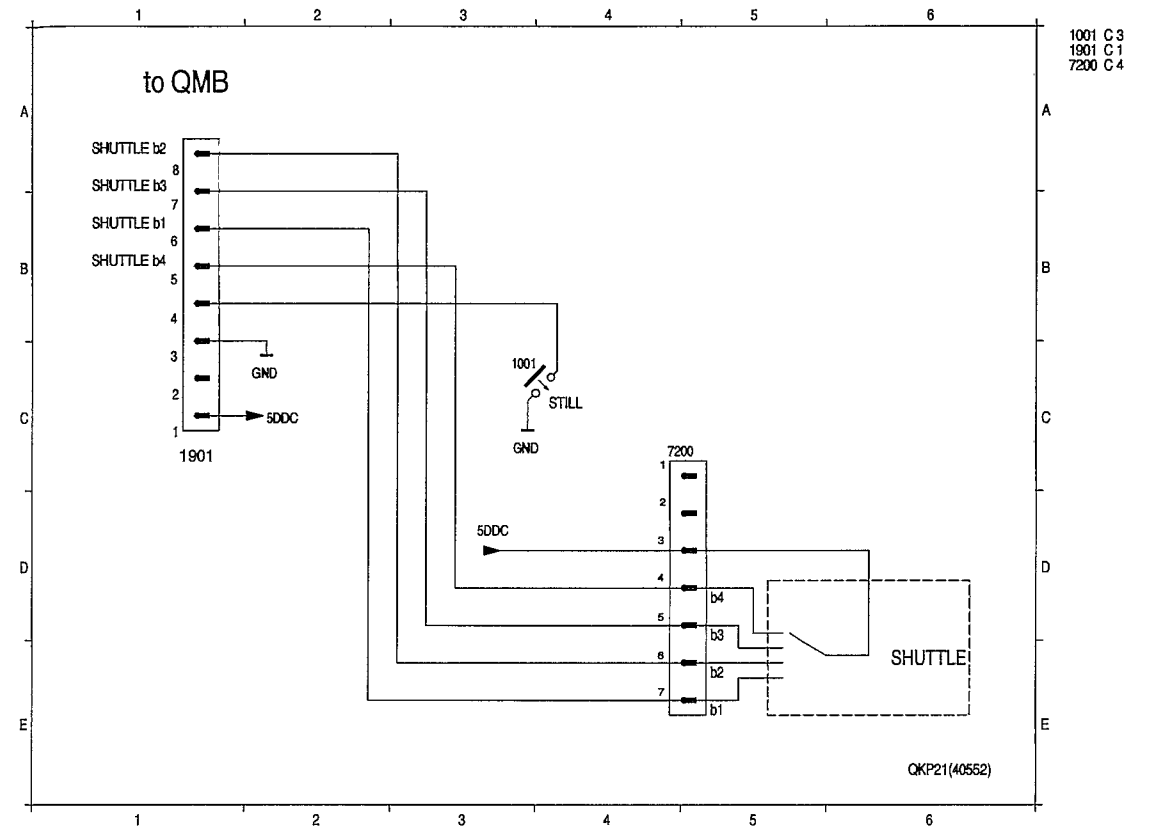
Nicam Board (QNIC)



- 1700 B 3
- 1710 B 3
- 1970 A 3
- 2705 B 1
- 2706 A 1
- 2714 A 2
- 2716 A 3
- 2725 B 3
- 2727 B 1
- A 2729 B 1
- 2731 B 1
- 2733 A 1
- 3707 A 3
- 3711 B 3
- 3712 B 3
- 5700 B 2
- 7700 B 2
- 7701 A 3

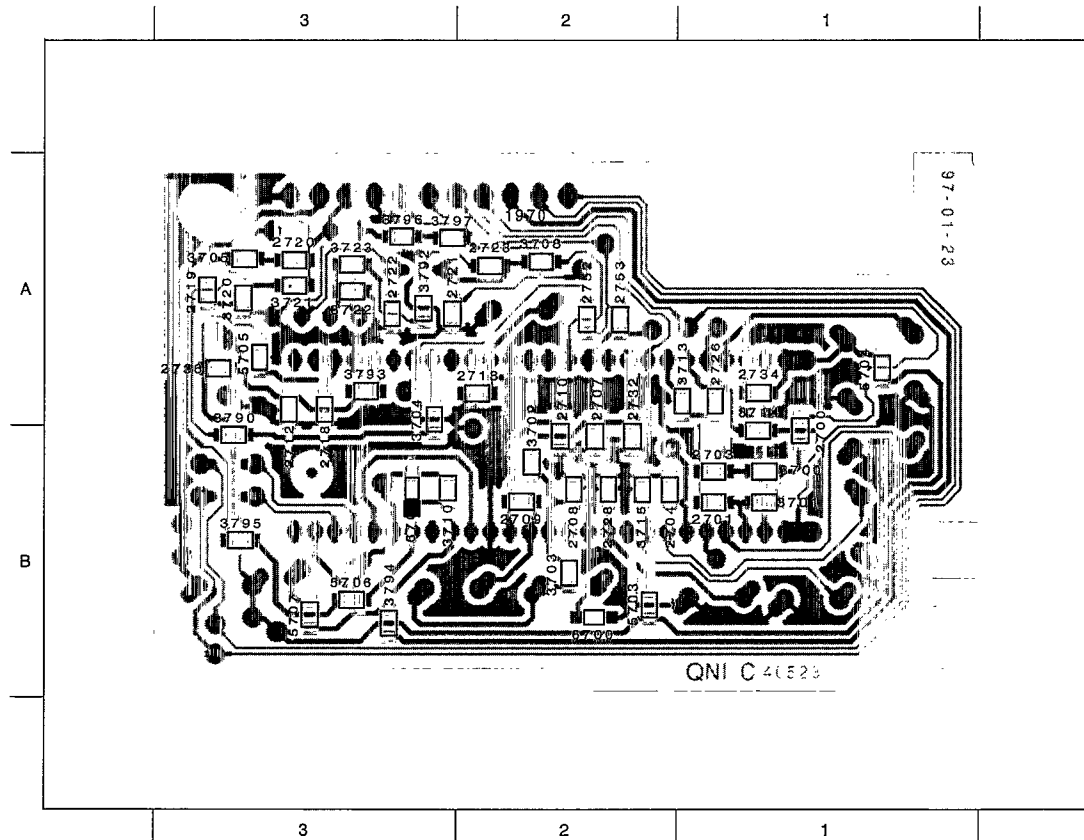
B

Shuttle Board (QKP21)

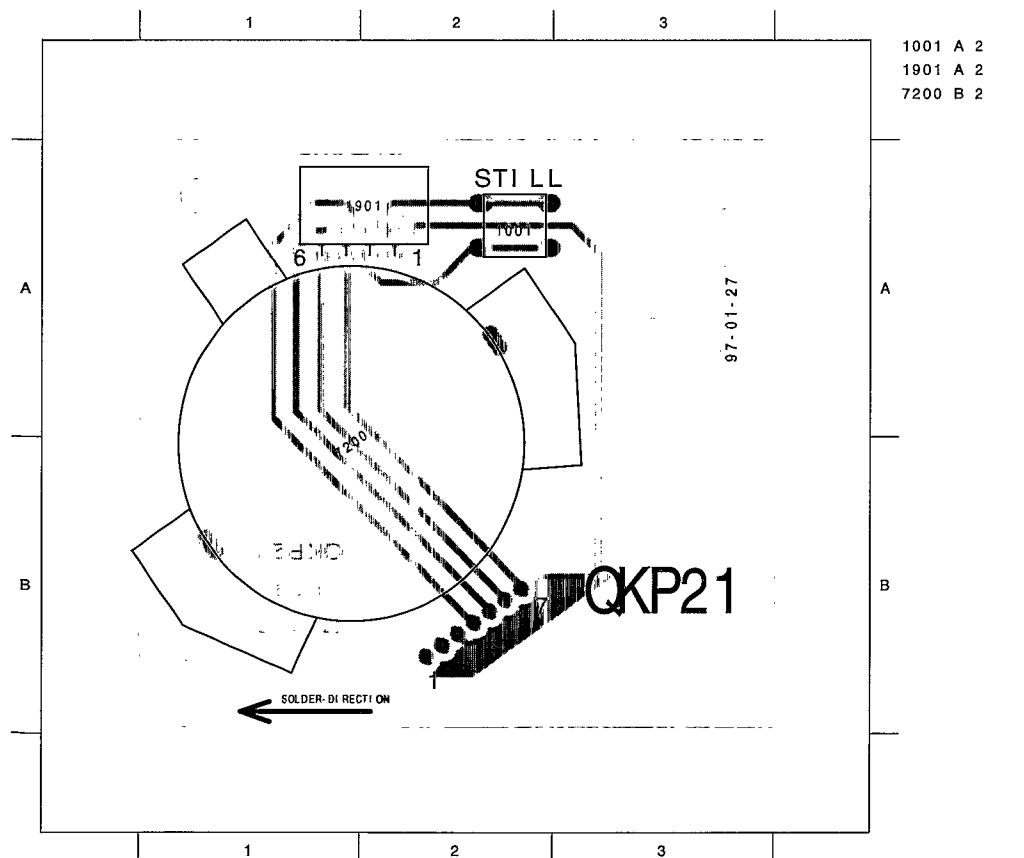


- 1001 C 3
- 1901 C 1
- 7200 C 4

QKP21(40552)

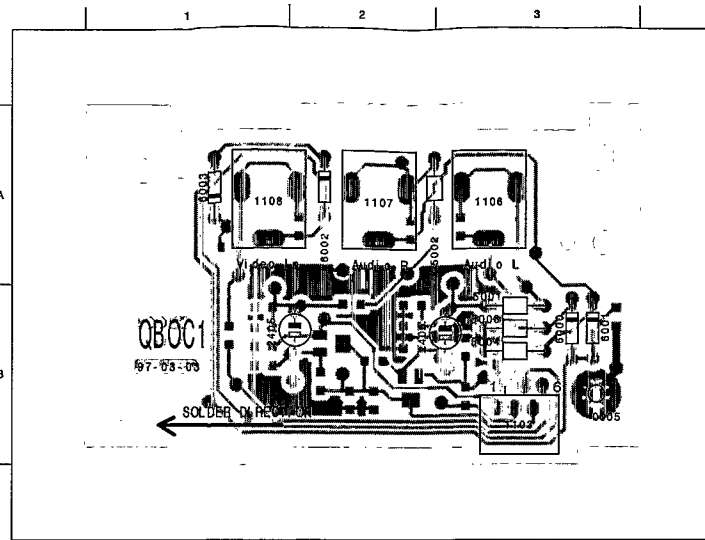
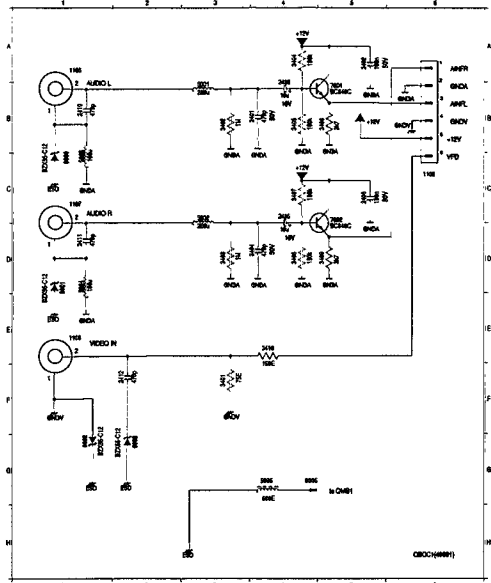


- 2700 B 1
- 2701 B 1
- 2703 B 1
- 2704 B 2
- 2707 B 2
- 2708 B 2
- 2709 B 2
- 2710 B 2
- 2712 A 3
- A 2713 A 2
- 2718 A 3
- 2719 A 3
- 2720 A 3
- 2721 A 3
- 2722 A 3
- 2723 A 2
- 2728 A 1
- 2728 B 2
- 2732 B 2
- B 2734 A 1
- 2736 A 3
- 2752 A 2
- 2753 A 2
- 3700 B 1
- 3701 B 1
- 3702 B 2
- 3703 B 2
- 3704 A 3
- 3705 A 3
- 3708 A 2
- 3710 B 3
- 3713 A 1
- 3714 B 1
- 3715 B 2
- 3720 A 3
- 3721 A 3
- 3722 A 3
- 3723 A 3
- 3790 B 3
- 3792 A 3
- 3793 A 3
- 3794 B 3
- 3795 B 3
- 3796 A 3
- 3797 A 3
- 5703 B 2
- 5704 A 1
- 5705 A 3
- 5706 B 3
- 5707 B 3
- 6700 B 2
- 6701 B 3

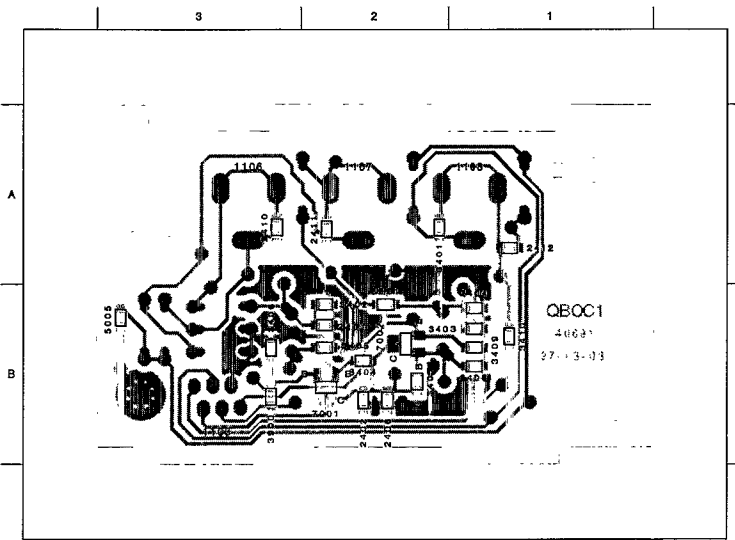


- 1001 A 2
- 1901 A 2
- 7200 B 2

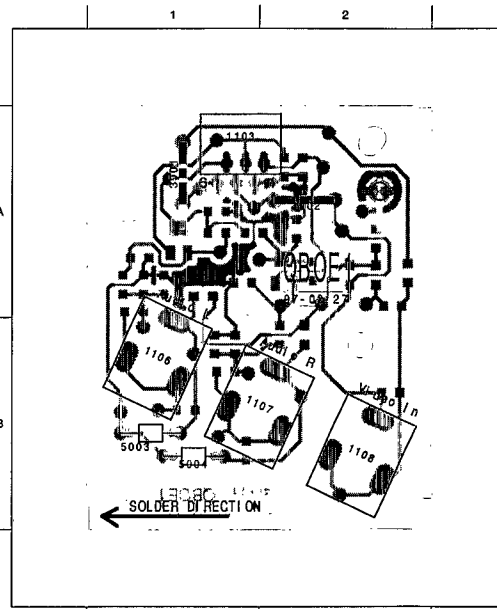
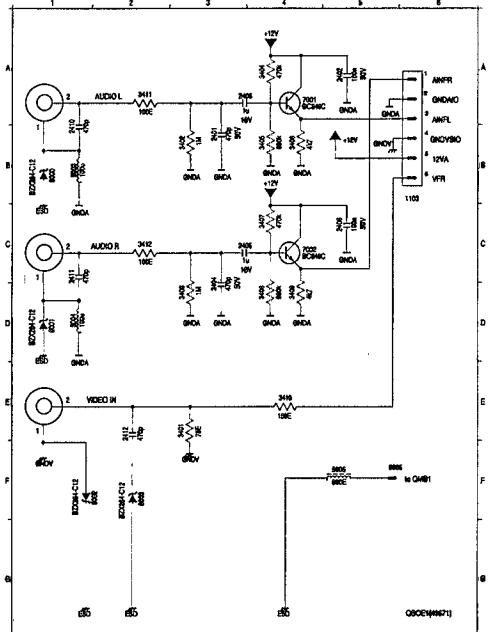
Socket Boards (QBOC1,QBOE1,QBOG1)



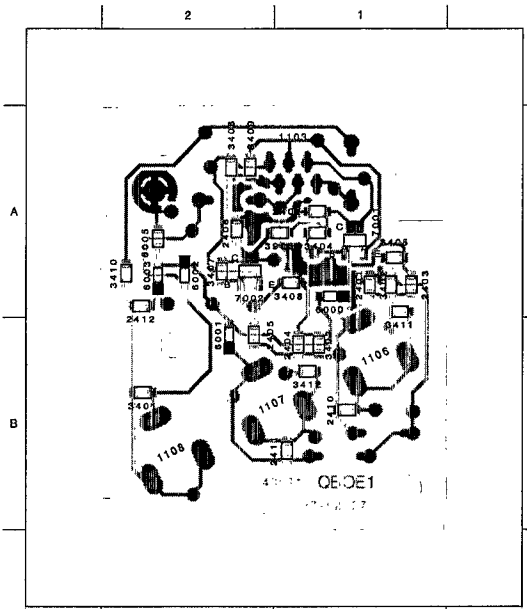
- 0005 B 3
- 1103 B 3
- 1106 A 3
- 1107 A 2
- 1108 A 2
- 2403 B 3
- 2405 B 2
- 5001 B 3
- 5002 A 2
- A 5003 B 3
- 5004 B 3
- 6000 B 3
- 6001 B 3
- 6002 A 2
- 6003 A 1



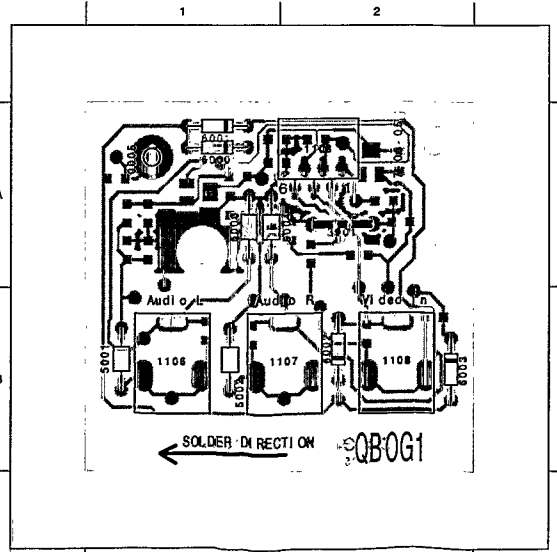
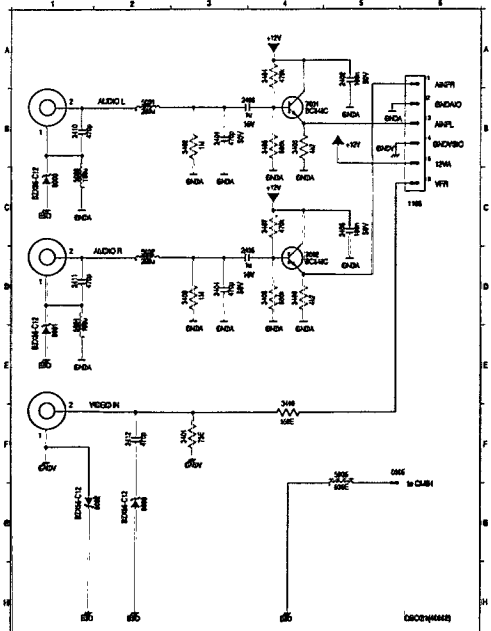
- 2401 B 2
- 2402 B 2
- 2404 B 1
- 2406 B 2
- 2410 A 3
- 2411 A 2
- 2412 A 1
- 3401 A 2
- 3402 B 2
- 3407 B 2
- 3408 B 1
- 3409 B 1
- 3410 B 1
- 3900 B 3
- 3901 B 2
- B 5005 B 3
- 7001 B 2
- 7002 B 2



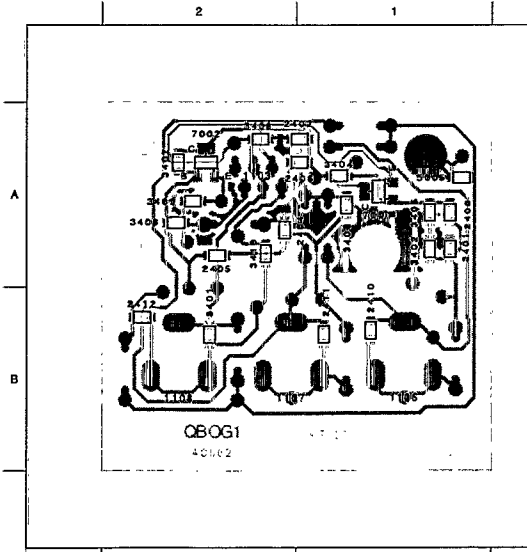
- 0005 A 2
- 1103 A 1
- 1106 B 1
- 1107 B 1
- 1108 B 2
- 3901 A 1
- 3902 A 2
- 5003 B 1
- 5004 B 1



- 2401 A 1
- 2402 A 1
- 2403 A 1
- 2404 B 1
- 2406 B 2
- 2408 A 2
- 2410 B 1
- 2411 B 1
- 2412 A 2
- 3401 B 2
- A 3402 A 1
- 3403 B 1
- 3404 A 1
- 3405 A 1
- 3406 A 2
- 3407 A 2
- 3408 A 1
- 3409 A 2
- 3410 A 2
- 3411 A 1
- 3412 B 1
- B 3903 A 1
- 5005 A 2
- 6000 A 1
- 6001 B 2
- 6002 A 2
- 6003 A 2
- 7001 A 1
- 7002 A 2



- 0005 A 1
- 1103 A 2
- 1106 B 1
- 1107 B 1
- 1108 B 2
- 3901 A 2
- 5001 B 1
- 5002 B 1
- 5003 A 1
- A 5004 A 1
- 6000 A 1
- 6001 A 1
- 6002 B 2
- 6003 B 2



- 2401 A 1
- 2402 A 1
- 2403 A 1
- 2404 A 2
- 2405 A 2
- 2406 A 1
- 2410 B 1
- 2411 B 1
- 2412 B 2
- A 3401 B 2
- 3402 A 1
- 3403 A 1
- 3404 A 1
- 3405 A 1
- 3406 A 2
- 3407 A 2
- 3408 A 2
- 3409 A 2
- 3410 A 2
- B 5005 A 1
- 7001 A 1
- 7002 A 2

4. DRIVE ASSEMBLY

This tape deck has three motors; one providing precision drive for the scanner unit; the second providing direct drive for the capstan and belt drive for the reel tables; the third motor drives the lift and tape threading/dethreading operations.

Special features are:

Quick start
Short winding time
Automatic cleaning of video heads by cleaning roller

To obtain a high repair standard we have developed a range of service kit's. These kit's covers the spare parts which are engaged together.

The tape deck's sensors are located on the motherboard underneath the tape deck, and included in its circuitry, lay out and parts list.

4.1 Deck parts replacement

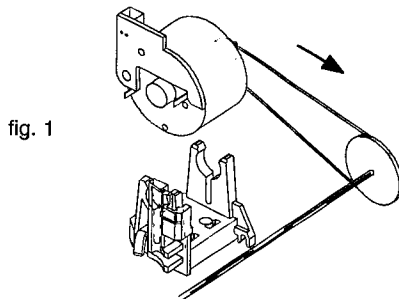
The procedure for the removal and refitting of the following parts is described; only the lift, the scanner, the capstan motor and the A/C head are fixed by screws.

All the other deck assembly parts are held only by snap hooks.

For the replacement of parts on the underside of the tape deck, remove the tape deck from the motherboard.

Manual extraction of cassette:

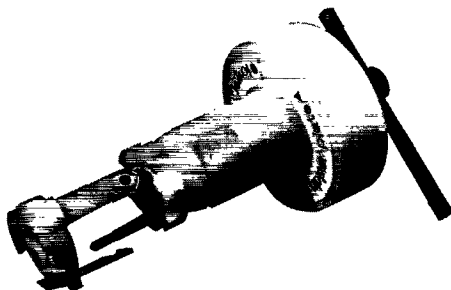
If, after the Eject button has been pressed, the drive does not unthread and eject the cassette, the dethreading/eject operation can also be carried out manually by turning the wheel at the rear of the threading motor.



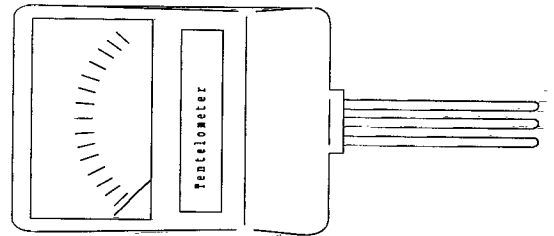
IMPORTANT:

After each repair has been carried out in the drive assembly, the first operation after repairing must be to bring the cassette compartment into „eject“ position by hand.

Auxiliary tools for deck adjustment:



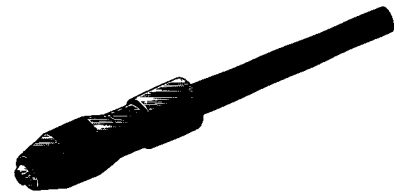
Tool for removing the head disc 4822 395 90977



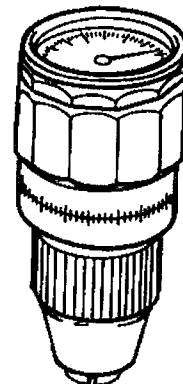
Tentelometer 4822 395 90584



Tool for tapetension adjustment 4822 395 50188

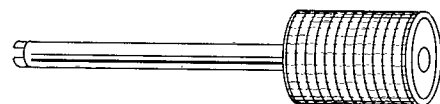


Handle 4822 256 90493



Torquemeter:

600 gf-cm 4822 395 90232
90 gf-cm 4822395 80196



Post adjustment screwdriver 4822 395 50275

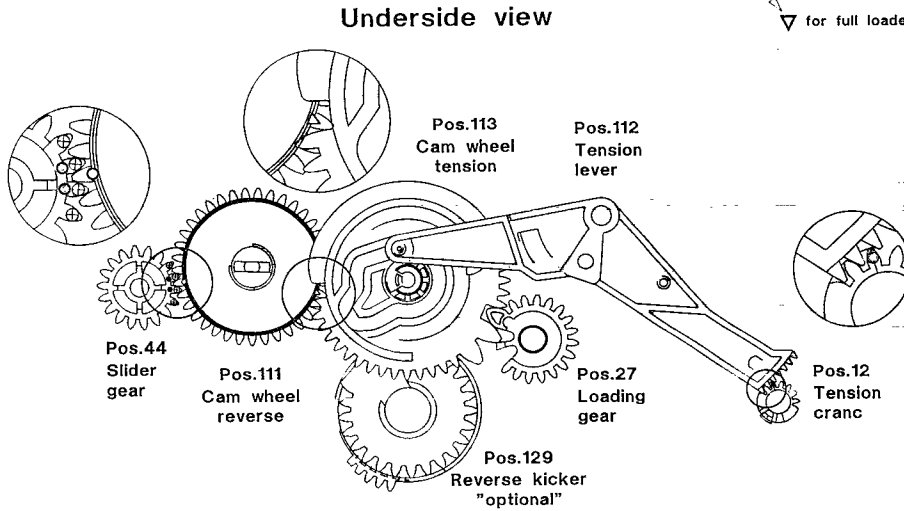
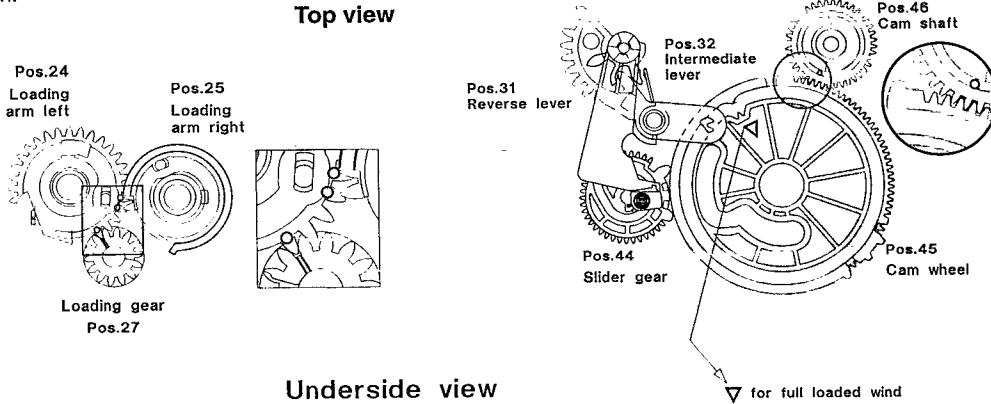
Testcassette 4822 397 30103

Nylon gloves 5322 395 94022

4.1.1 Deck lay out diagram

Deck in position „threaded out“.

The following diagrams indicate the relative position of the gearwheels and levers when the deck is in the threaded out (cassette-compartment down) position.



4.1.2 The Lift

Refitting the lift compartment:

Ensure the lift compartment is down and gear A is rotated one click stop anticlockwise from the down position.

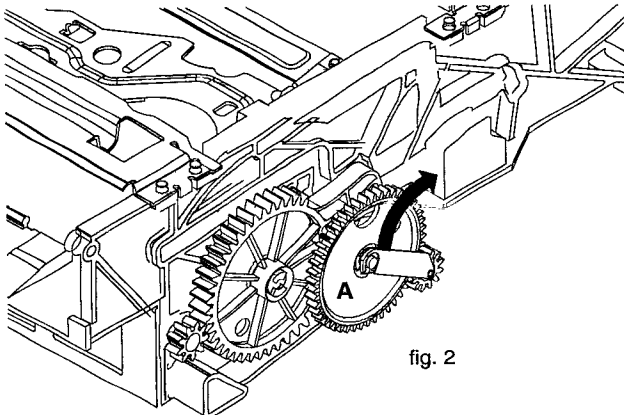
The removal and refitting of the lift can be carried out in all deck positions with the exception of „eject“ (ensure that gears 103/105 are free).

To remove the lift:

Free the holding bracket (Fig. 2) by rotating it up and back from the upper end.

Unscrew the 4 screws on the underside of the deck.

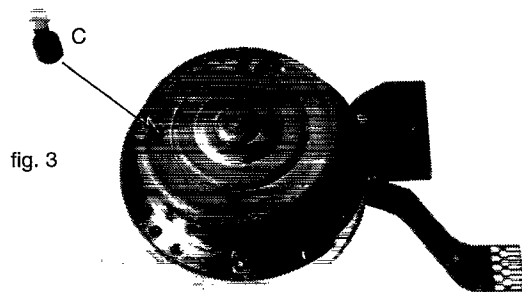
Carefully remove the lift vertically, noting the position of the record protect operating lever.



4.1.3 Head disc replacement

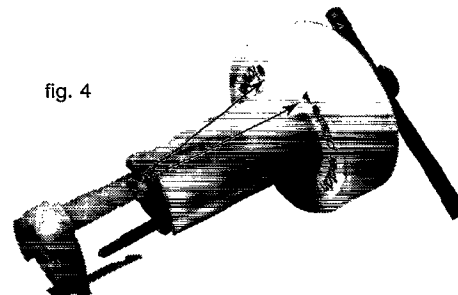
Removal :

Nylon gloves should be worn when handling the head disc. Turn the headdisc until the long hole of the rotor appears in the bigger hole of the scannermotor. Insert the reference pin C (included with each service head disc) through the bigger hole of the lid of the scanner motor until the pin snaps in the long hole of the rotor. (Fig. 3)



Important:

Choose Installation/Removal of the upper/lower clamping element by turning and attaching the reference element to the tool. (Fig. 4)



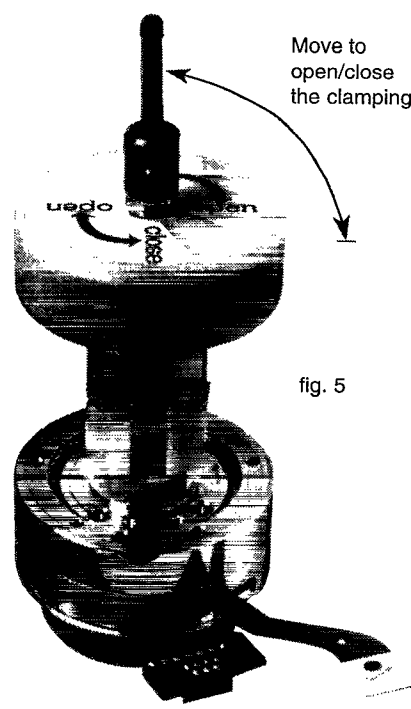


fig. 5

Position the tool on the upper clamping element, loosen the clamping element by turning the lever 90 degrees and remove it from the head disc. (Fig. 5)

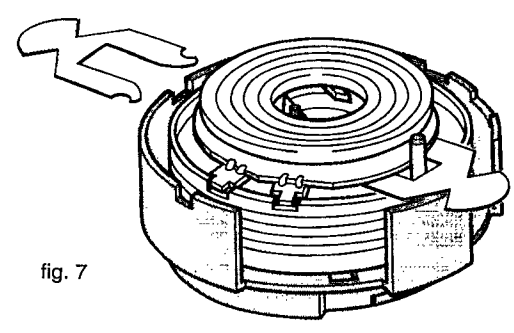


fig. 7

Position the tool (reference: lower clamping element) on the new headdisc (with protective cover) and loosen the lower clamping element. Position the head disc so that pin D of the protective cover engages in the hole of the stator (the arrow on the protective cover must point towards the scanner print). (Fig. 8)

Prepare the tool for the lower clamping element. Position the tool on the head disc and make sure that all 3 pins are snapped in the the lower clamping element. Loosen the clamping element by turning the lever 90 degrees and remove the head disc plus the tool from the scanner spindle. (Fig.6)

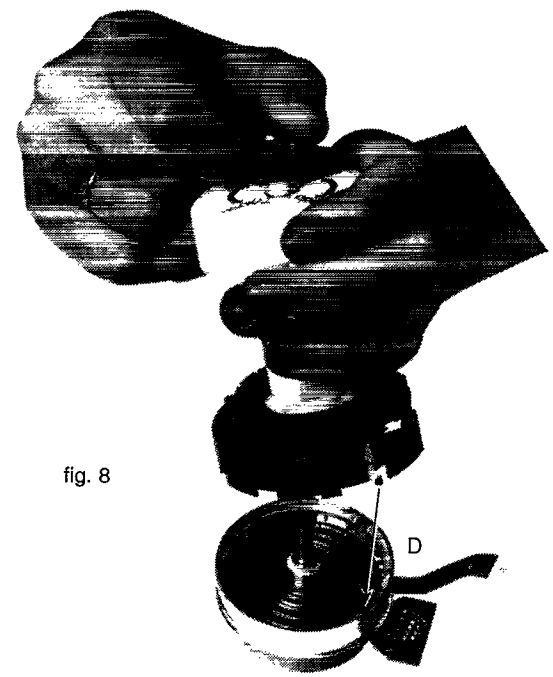


fig. 8

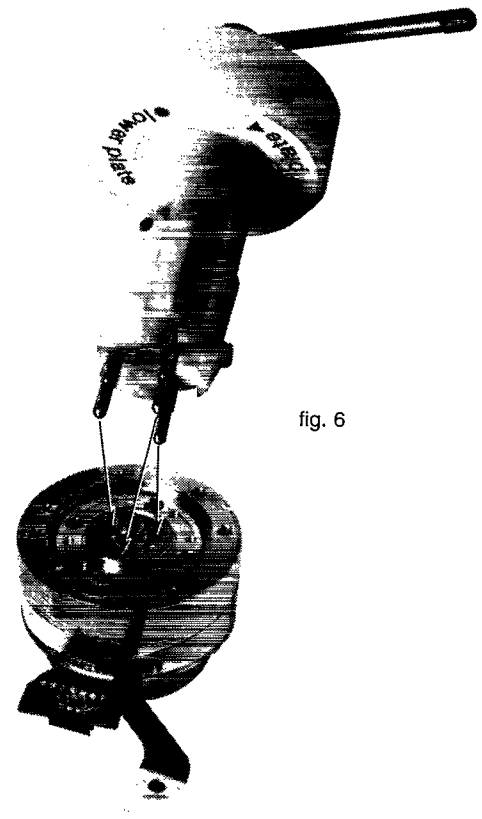


fig. 6

Reach the exact position through pressing the tool down with a force of 1 N. and fix the lower clamping element by turning the lever towards „close“. Remove the tool. Change the tool to „upper clamping element“ and position the clamping element exactly. (Fig. 9)

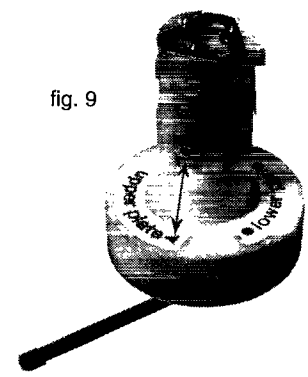


fig. 9

Tighten the clamping element through turning the lever towards „open“. Position the tool planely on the head disc and fix the clamping element. (Fig.5 „close“) Remove the protecting cap from the head disc, withdraw the two Mylar foils and remove the reference pin C.

Installation:

Before carrying out the installation of the new head disc make sure that the scanner motor spindle is clean and undamaged. (The spindle has to be free of grease and must not be touched with bare hands) Insert the 2 Mylar foils (included with each head disc) in the head disc. (Fig.7)

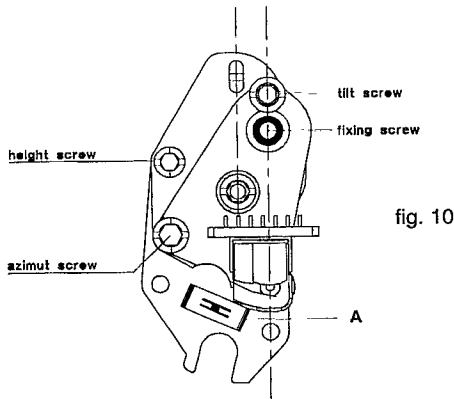
After replacing the head disc, carry out the following adjustments and checks :

- Head switching pulse (gap position, chapter 3)
- Write current adjustments (chapter 3)
- Check tape path alignment (see paragraph 4.2.1.)

4.1.4 A/C Head (Combi head) (Pos. 36)

Remove the fixing spring (A) (fig. 10)
 Remove the fixing screw and replace the A/C head.
 Use a new fixing spring (included with new A/Chead) for reassembly.

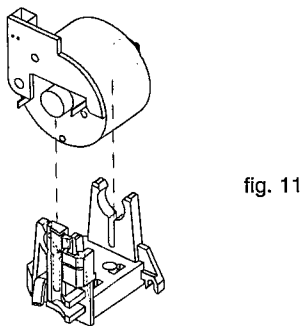
After the A/C head has been replaced, all adjustments described in paragraph 4.2.1.2 and paragraph 4.2.2 have to be carried out.



4.1.5 Threading motor (Pos. 38)

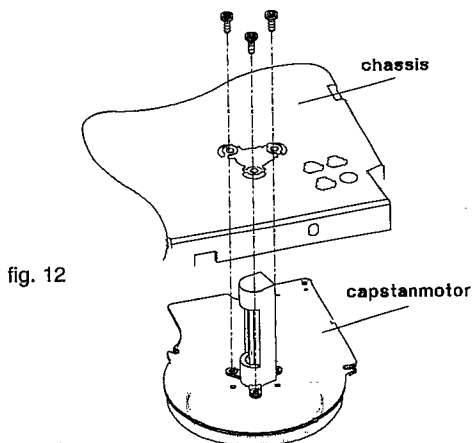
Remove the belt and disconnect the connector plug.
 Remove the threading motor from the motor supports (Fig. 11).

During reassembly ensure that the threading motor is correctly located in the front and rear supports.



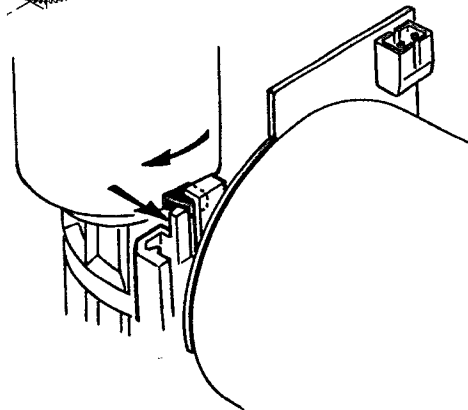
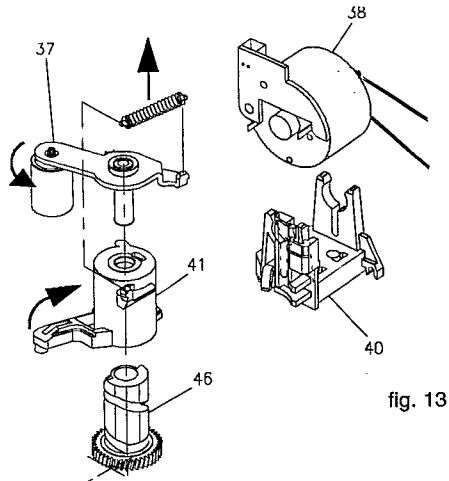
4.1.6 Capstan motor (Pos. 127)

Remove the tape deck.
 Remove the belt (pos.126) on the underside;
 Remove the three capstan motor fixing screws (Fig. 12) and withdraw the capstan motor downward from the drive assy.
 The reassembly is carried out in reverse order. Make sure that the capstan is free of grease.



4.1.7 Pressure roller (Pos. 37)

Remove the tape deck
 Unhook and remove the pressure roller tension spring.
 Release the pressure roller guide (pos. 41) from the guide in the threading motor holder by pressing the top of the motor guide rearwards and rotating the pressure roller guide assembly clockwise by approximately a quarter of a turn (Fig. 13) The pressure roller and guide can now be lifted clear.

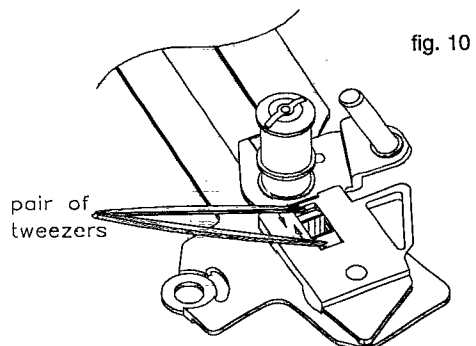


Ensure that no grease from the pressure roller guide gets to the capstan or pressure roller.
 The reassembly is carried out in reverse order.

4.1.8 Roller unit right (Pos. 26)

Remove the tape deck.
 Compress the two snap hooks by means of a pair of tweezers and remove the roller assy from the roller unit right (Fig. 14).
 Unhinge the loading arm right from the holding plate and push the latter towards the front of the deck to remove from the guide (right).

NOTE: During reassembly ensure the link from 25 is engaged in the hole of the holder plate 26.
 After replacing the roller unit (right), the tape path has to be checked, and adjusted if necessary (paragraph 4.2.1).



4.1.9 Roller unit left (Pos.23)

Set the drive assy to „Eject“ position.
 Unhook the tension arm spring (pos. 11), to avoid the tension arm spring being pre-loaded.
 At the bottom side of the drive assy remove the tension lever (pos.112).
 Compress the two snap hooks by means of a pair of tweezers (Fig. 9) and remove the roller assy (A) from the plate (B).
 Unhinge the loading arm (left) from the holding plate and remove the latter downward from the drive assy through the recess in the chassis (Fig. 15).
 The reassembly is carried out in reverse order.

NOTE : During reassembly

1. Place the carriage holding plate in the assembly with the half-round cutout nearest the rear of the deck.
2. When the loading arm is refitted ensure the pin on the underside of 23 is through the link of 24B.

After replacing the roller unit (left) the tape path has to be checked (paragraph 4.2.1.), and adjusted if necessary.

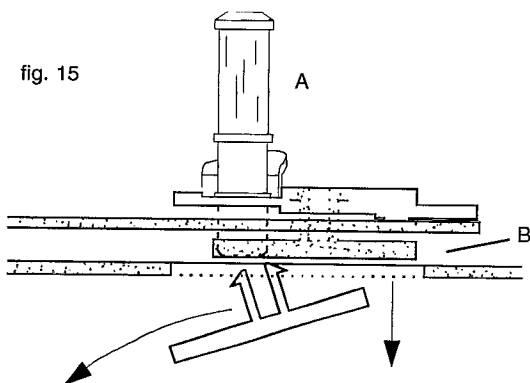


fig. 15

4.2 Adjustments

Adjustments must not be made in the service position.

4.2.1 Tape path

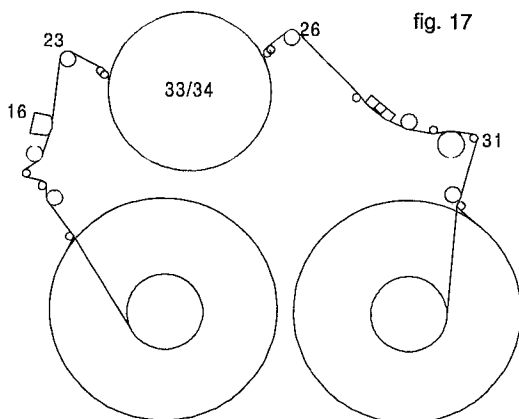


fig. 17

4.2.1.1 Roller left unit/roller unit right

Preparation:

Connect one input of a dual trace oscilloscope to observe the tape sync pulse CTL (pos.7460 IC SAA1310 pin16). The other input (DC coupled) to observe the tracking information TRIV.
 Trigger the oscilloscope externally on the head pulse HP1 ("SWIN").
 Playback the black and white section of the alignment test tape.
 Set the deck in the condition where the video heads are running along the upper edge of the tracks only by:

1. Call the service test program (chapter 2.1)
2. Activate manual tracking (service test program step 03) and watch the tape sync pulse move to the left in relation to the TRIV signal.
3. Note the extreme left hand position reached by the sync pulse, repeat as necessary.
4. Stop the movement of the pulse when the TRIV signal reduces to 1/2 to 2/3 maximum amplitude by pressing the normal play button. A noisy picture (disturbances) is visible on the TV set and the CTL pulse should be to the left of the display.
 The recorder will hold this position until the service test program step 03 is left.
 This condition works only if X-distance is adjusted.

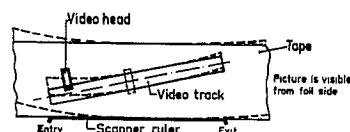
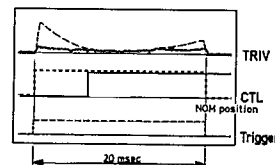


fig. 18



Adjustment:

Adjust the left and right roller units to make the tracking signal TRIV straight and flat as possible (Fig. 18).

4.2.1.2 A/C Combi head

Tilt angle adjustment

Set the drive to feature mode (e.g. +7)

Adjustment :

By means of the tilt angle adjusting screw move the tape until the lower edge just touches the tape guide A1 (see Fig. 19) the tape must not be distorted at the lower edge (by pressing onto guide).

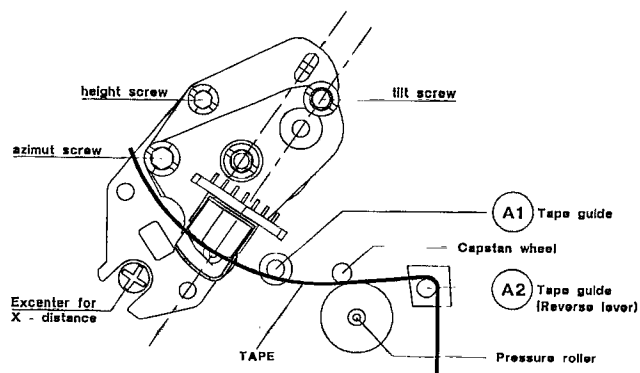


fig.19

Adjustment of the azimuth angle and the head height

Connect an oscilloscope to the linear Audio output.
 Play the section of the test cassette with the audio signal 400 Hz.
 Adjust for maximum output voltage by means of the height adjustment screw
 Play the section of the test cassette with the audio signal 8 kHz.
 Adjust to maximum output voltage by means of the azimuth adjustment screw (Fig. 19).
 If necessary, repeat this procedure
 Check the tilt angle adjustment

If the tape path was completely out of adjustment or if several components in the tape path have been replaced, it is possible, that the adjustments described in paragraph 4.2.1.1 and paragraph 4.2.1.2 have to be repeated several times.

4.2.2 Adjustment of the horizontal distance (x-distance)

Before this adjustment is carried out, insert the test cassette (start from Eject position). Call the service test program (tracking value will take up its nominal position) and press the „play“ button.
 Playback the black/white part of the test cassette.)
 Display the TRIV signal on an oscilloscope (DC-coupled) and adjust for maximum voltage by means of the excentric screw (Fig.19).

4.2.3 Brake band and tape tension

Due to further development it is no longer necessary to make these adjustments after replacement of the brake band.
 If the brake band or tape tension are completely misadjusted, set them to a center position; set the drive to „play“ and adjust the brake band until the edge of the elbow of the tape tension arm is aligned with the left inner edge of the left guide (fig. 20).

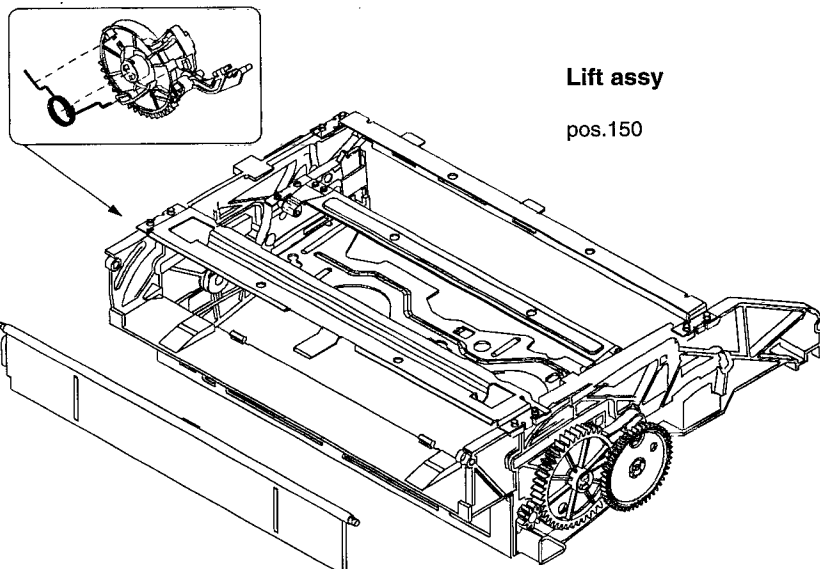
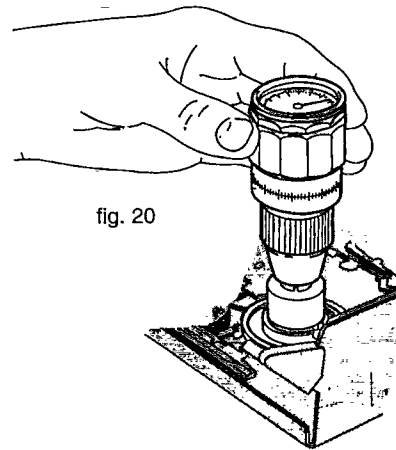
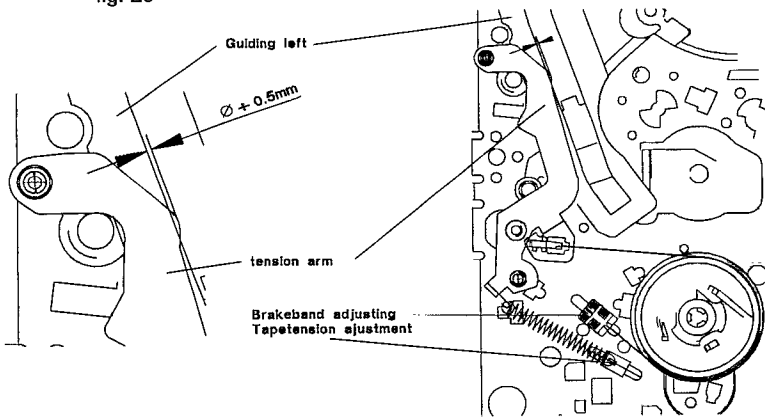
4.2.4 Friction clutch control check

Set the drive to „Play“ position.
 Place the torquemeter on the right reel.
 Turn the capstan motor to move the right reel clockwise.
 Keep turning, until the indication at the torquemeter no longer changes (Fig. 21)
 The torque has to be 10,5 mNm +/-25% (105gFcm +/-25%)

4.2.5 Reverse brake control

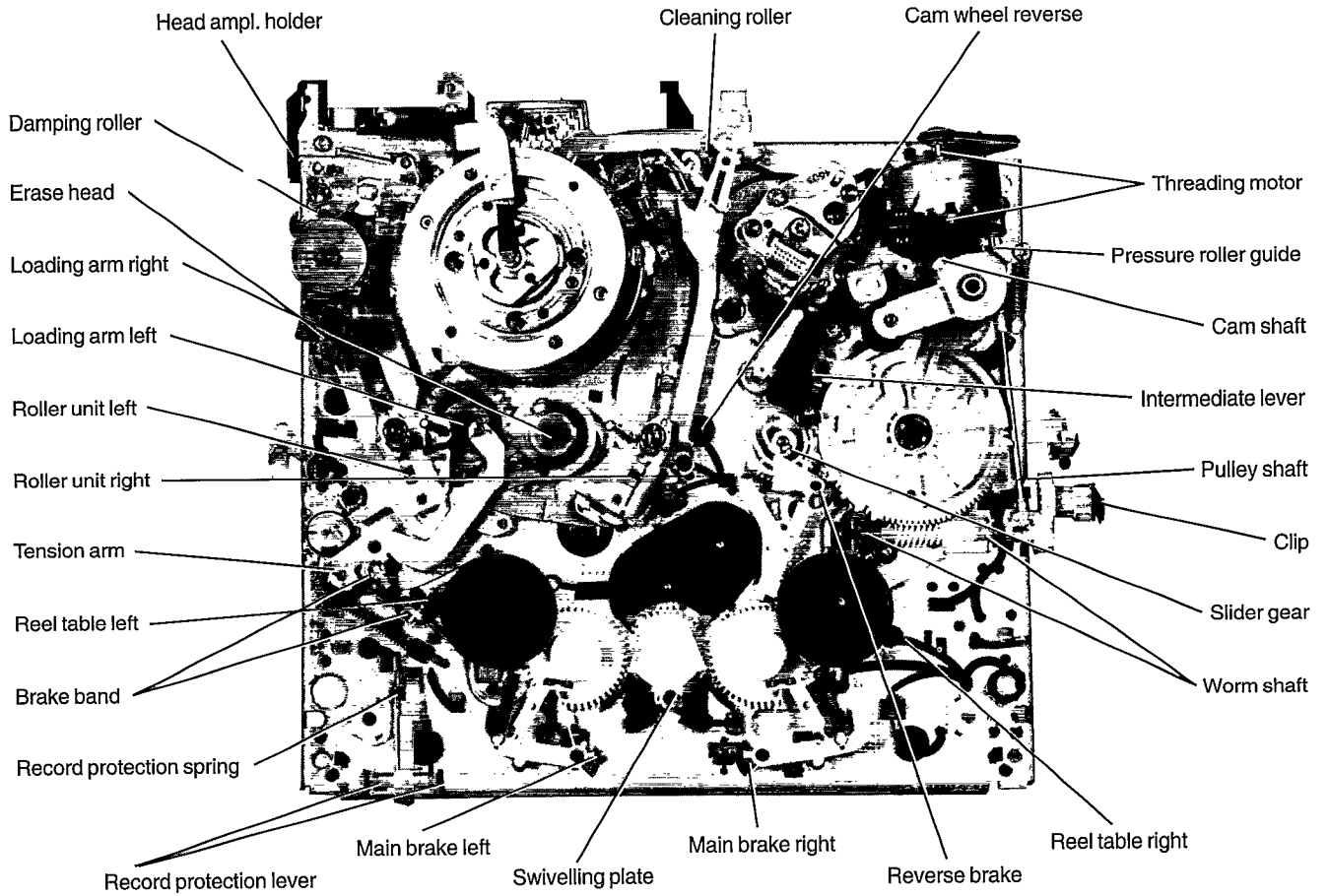
Set the drive to „Reverse“ position.
 Place a torquemeter on the right reel and turn the latter counterclockwise, until the reel just starts to flip.
 The value indicated at the torquemeter has to be 7mNm +/-3mNm (70 gFcm +/-30gFcm) (Fig. 21).

fig. 20

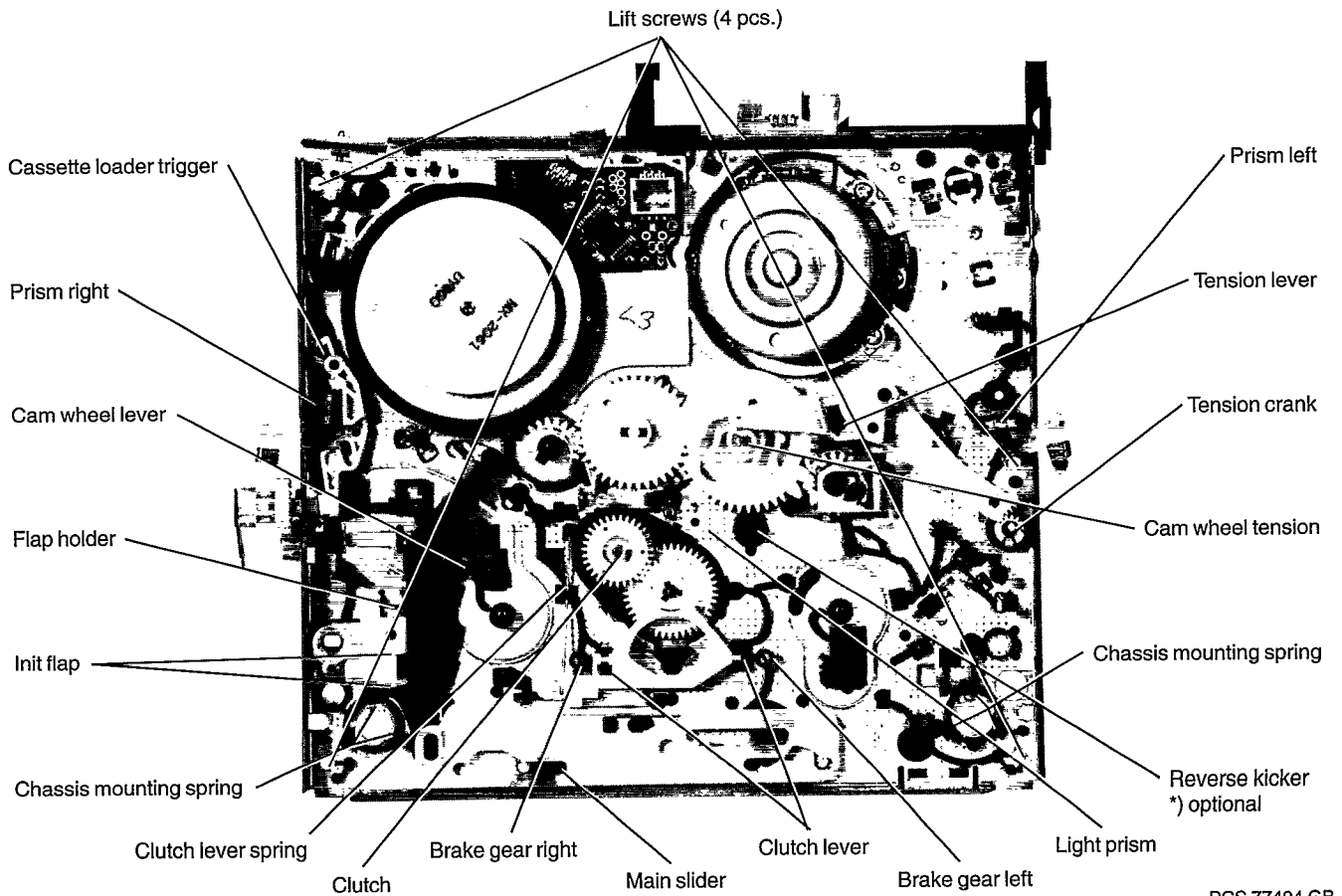


In order to make the replacement of the deck parts easier, the snap hooks are marked with an arrow.

TOP VIEW

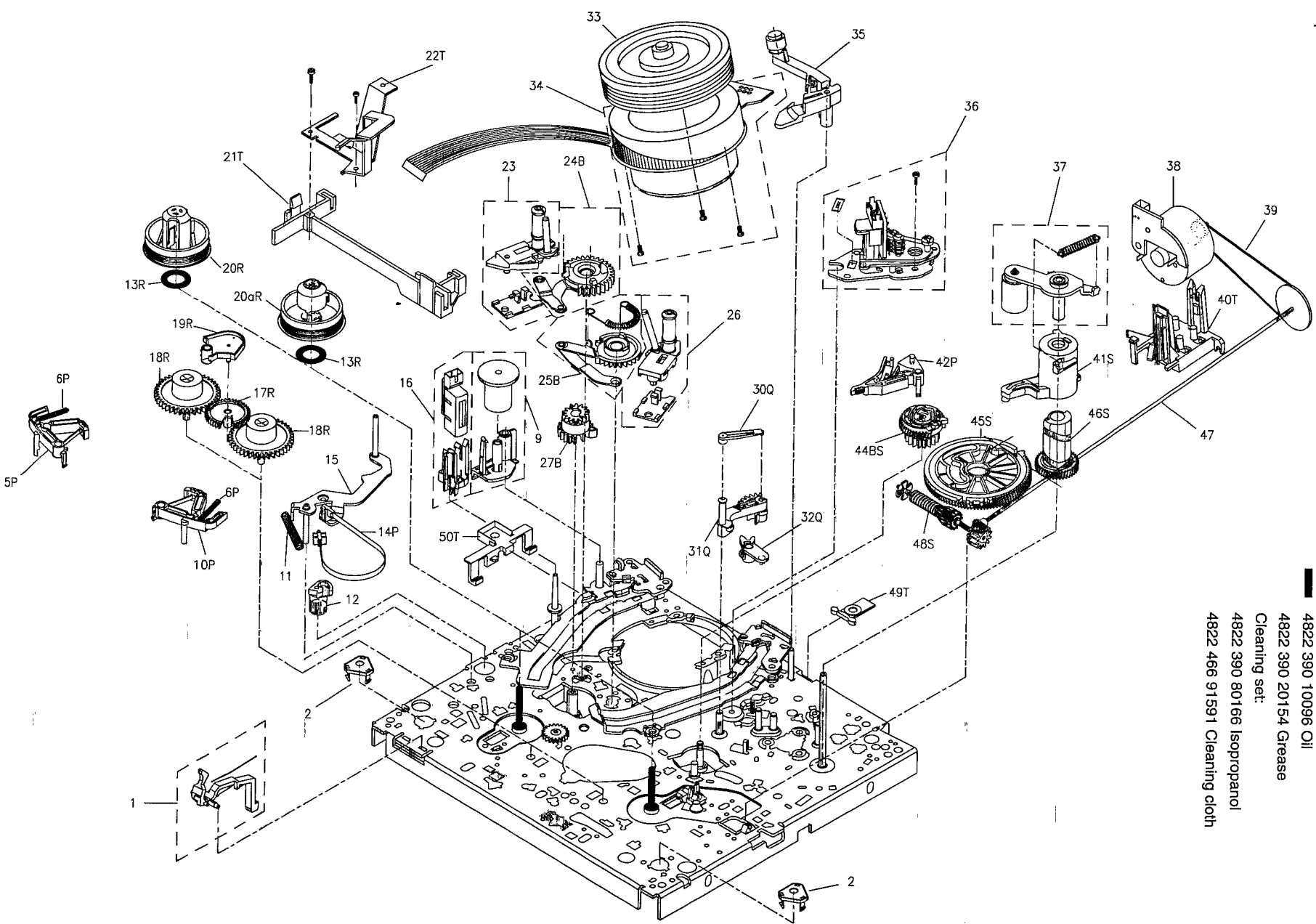


UNDERSIDE VIEW



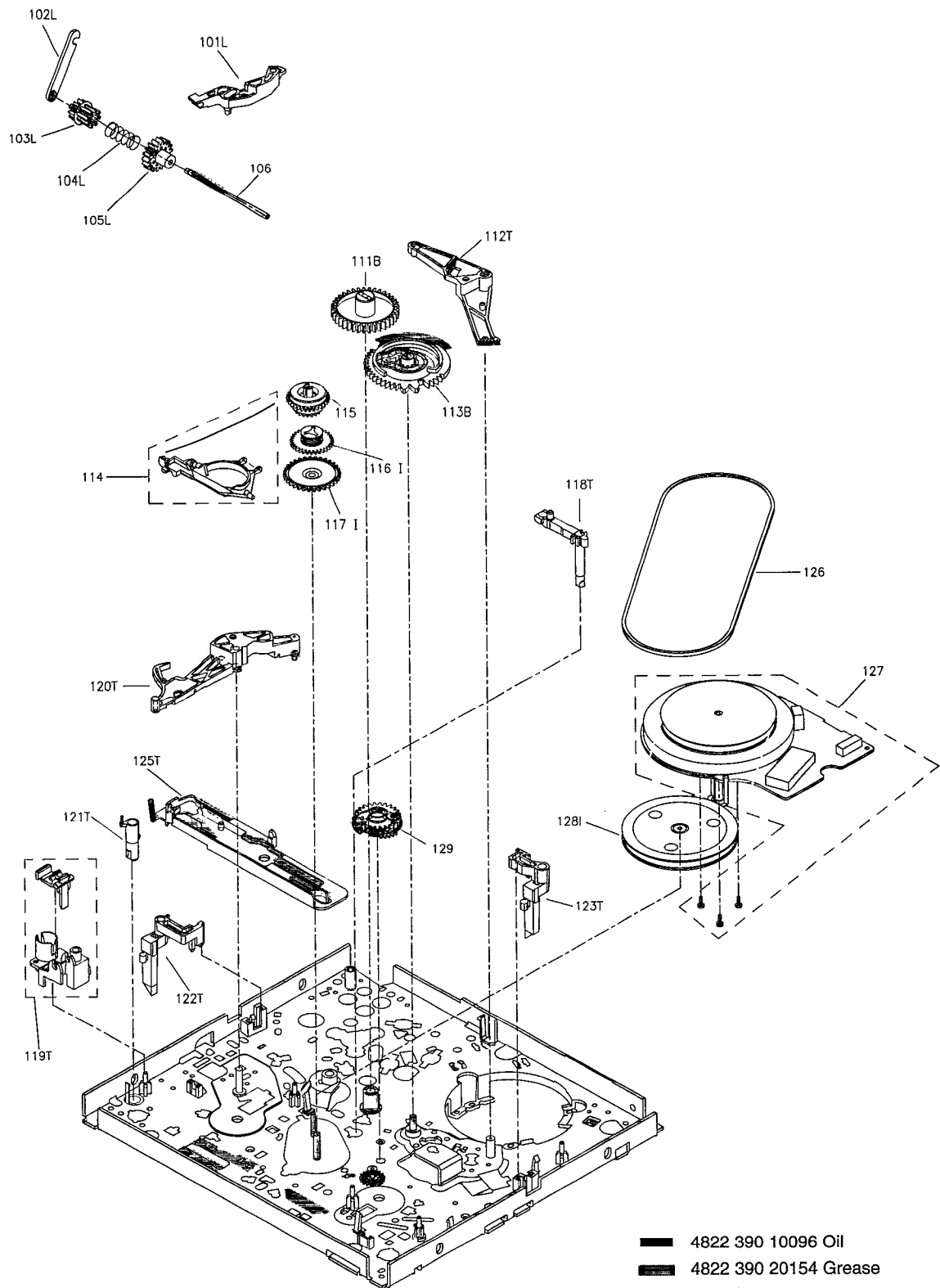
4.3 Exploded view

Top view



- 4822 390 10096 Oil
- 4822 390 20154 Grease
- Cleaning set:
- 4822 390 80166 Isopropanol
- 4822 466 91591 Cleaning cloth

Underside viw



- 4822 390 10096 Oil
- 4822 390 20154 Grease
- Cleaning set:
- 4822 390 80166 Isopropanol
- 4822 466 91591 Cleaning cloth

MECHANICAL PARTS LIST

Pos.	Description	K I T S							Code number 4822
		B	I	L	P	Q	R	S	
1	Rec. protection lever (with spring)								402 10202
2	Chassis mounting spring (2x)								492 71022
5	Main brake left				P				
6	Main brake spring (2x)				P				
9	Damping roller *)								528 70782
10	Main brake right				P				
11	Tension arm spring								492 33317
12	Tension crank								403 70551
13	Slip ring						R		
14	Tension band				P				
15	Tension arm								403 70547
16	Erase head								249 10522
17	Swivelling gear						R		
18	Brake gear (2x)						R		
19	Swivelling plate						R		
20	Reel table (S)						R		
20a	Reel table (T)						R		
21	Headamplifier holder							T	
22	Bracket							T	
23	Roller unit left								528 70771
24	Loading arm left	B							
25	Loading arm right	B							
26	Roller unit right								528 70772
27	Loading gear	B							
30	Reverse clip					Q			
31	Reverse lever					Q			
32	Intermediate lever					Q			
33	Head disc 2/0								691 10583
33	Head disc 2/0-LP								691 10585
33	Head disc 4/0								691 21011
33	Head disc 4/0 Secam								691 21012
33	Head disc 4/2								691 10548
33	Head disc 4/2 Secam								691 10551
34	Scanner motor 2/0 (with screws)								361 10963
34	Scanner motor 4/0 (with screws)								361 10819
34	Scanner motor 4/2 (with screws)								361 10901
35	Cleaning roller								528 70773
36	A/C Head (with clip and screws)								249 10468
37	Pressure roller (with spring)								528 70774
38	Threading motor								361 10809
39	Threading belt								358 20421
40	Motor holder							T	
41	Pressure roller guide						S		
42	Reverse brake			P					
44	Slider gear	B					S		
45	Cam wheel						S		
46	Cam shaft						S		
47	Pulley shaft								528 81462
48	Worm shaft						S		
49	Chassis mounting clip							T	
50	WD-holder							T	

Pos.	Description	K I T S							Code number 4822
		B	I	L	P	Q	R	S	
101	Cassette loader trigger			L					
102	Clip			L					
103	Cassette loader gear1			L					
104	Cassette loader spring			L					
105	Cassette loader gear2			L					
106	Spindle								535 93277
111	Cam wheel reverse	B							
112	Tension lever							T	
113	Cam wheel tension	B							
114	Clutch lever (with spring)								403 70549
115	Clutch								528 20736
116	Changing gear		I						
117	Double gear		I						
118	Light prism							T	
119	Init flap and holder							T	
120	Cam wheel lever							T	
121	S-VHS lever							T	
122	Prism rihgt							T	
123	Prism left							T	
125	Main slider							T	
126	Driving belt								358 31166
127	Capstan motor (with screws)								361 10805
129	Reverse kicker with transmission gears *)								522 20451
128	Gear pulley		I						
150	Lift								443 64112
	KIT B								310 31955
	KIT I								310 31963
	KIT L								310 32116
	KIT P								310 32191
	KIT Q								310 10658
	KIT R								310 10659
	KIT S								310 10661
	KIT T								310 10662

*) optional

Um eine hohen Reparaturstandard zu gewährleisten sind mit Ausnahme von Kit T immer alle im Kit enthaltenen Teile zu tauschen.

In order to guarantee a high repairstandard all spare parts included in a kit have to be replaced with the exception of kit T.

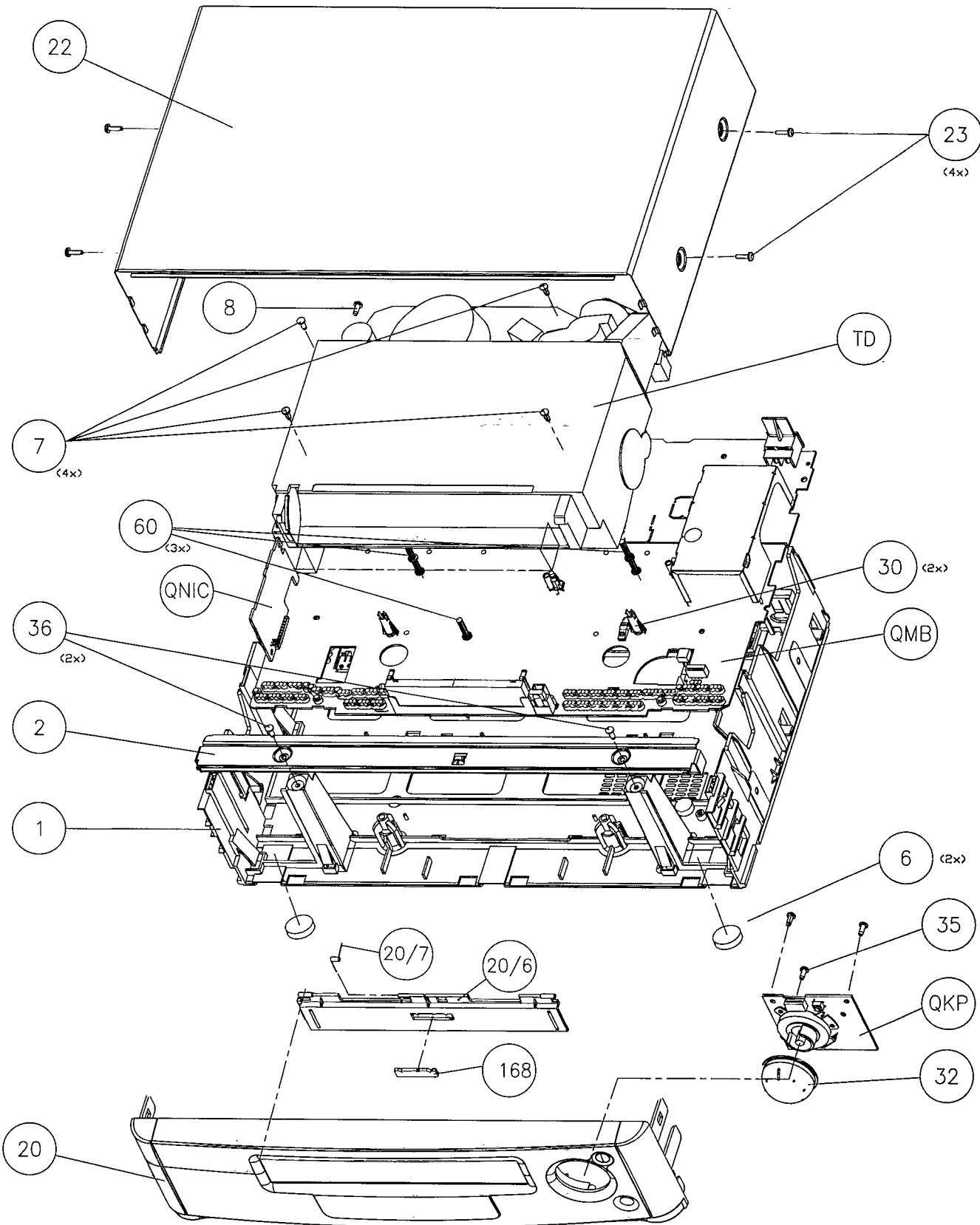
Per una riparazione garantita occorre sostituire tutti i pezzi contenuti nei kit, fatta eccezione per il kit T.

Para obtener un estándar de reparaciones elevado, es necesario cambiar todas las partes contenidas en el kit, la única excepción es para el kit T.

A fin d'obtenir un standard de réparations élevé, toutes les pièces de rechange incluses dans un kit sont à remplacer, exception faite du kit T.

Om een hoge reparatiekwaliteit te waarborgen moeten, met uitzondering van kit T, altijd alle zich in een kit bevindende onderdelen worden vervangen.

PARTS LISTS
Exploded View set



Motherboard QMB PAL, SECAM, MONO, STEREO

CONNECTORS

1001△	4822 267 10577	MAINS PLUG
1002	4822 267 10498	CONN. 3p
1710	4822 265 30989	CONN. 3p
1750	4822 267 10458	CONN. 3p
1908	4822 267 10584	CONN. 1p
1909	4822 267 10583	CONN. 1p
1911	4822 265 10938	CINCH 2p white
1912	4822 265 10939	CINCH 2p red
1915	4822 267 10364	CONN. 9p
1916	4822 267 41199	CONN. 5p
1917	4822 264 10345	SCART CONN. ORANGE
1918	4822 264 10346	SCART CONN. BLUE
1930	4822 267 41062	CONN. 6p
1944	4822 265 30989	CONN. 3p
1945	4822 267 51261	CONN. 8p
1946	4822 267 10366	CONN. 8p
1961	4822 267 31512	CONN. 7p
1962	5322 268 90415	CONN. 2p

MISCELLANEOUS

0005	4822 256 10355	DISPLAY HOLDER
0007	4822 256 10195	HOLDER
0008	4822 256 10196	HOLDER
0020	4822 256 10197	HOLDER
0021	4822 256 10197	HOLDER
0022	4822 256 10197	HOLDER
1000	4822 242 81067	Crystal 4.433 619 MHz
1101	4822 276 13732	SWITCH TACT PUSH
1102	4822 276 13732	SWITCH TACT PUSH
1103	4822 276 13732	SWITCH TACT PUSH
1105	4822 276 13732	SWITCH TACT PUSH
1108	4822 276 13732	SWITCH TACT PUSH
1109	4822 276 13732	SWITCH TACT PUSH
1110	4822 276 13732	SWITCH TACT PUSH
1113	4822 276 13732	SWITCH TACT PUSH
1124	4822 276 13732	SWITCH TACT PUSH
1132	4822 276 13732	SWITCH TACT PUSH
1134	4822 276 13732	SWITCH TACT PUSH
1135	4822 276 13732	SWITCH TACT PUSH
1136	4822 276 13732	SWITCH TACT PUSH
1140	4822 276 13732	SWITCH TACT PUSH
1141	4822 276 13732	SWITCH TACT PUSH
1142	4822 276 13732	SWITCH TACT PUSH
1143	4822 276 13732	SWITCH TACT PUSH
1144	4822 276 13732	SWITCH TACT PUSH
1145	4822 276 13732	SWITCH TACT PUSH
1146	4822 276 13732	SWITCH TACT PUSH
1147	4822 276 13732	SWITCH TACT PUSH
1148	4822 276 13732	SWITCH TACT PUSH
1154	4822 276 13732	SWITCH TACT PUSH
1155	4822 276 13732	SWITCH TACT PUSH
1163	4822 276 13732	SWITCH TACT PUSH
1178	4822 276 13732	SWITCH TACT PUSH
1181	4822 276 13732	SWITCH TACT PUSH
1182	4822 276 13732	SWITCH TACT PUSH
1183	4822 276 13732	SWITCH TACT PUSH
1185	4822 276 13732	SWITCH TACT PUSH
1186	4822 276 13732	SWITCH TACT PUSH
1190	4822 276 13732	SWITCH TACT PUSH
1192	4822 276 13732	SWITCH TACT PUSH
1193	4822 276 13732	SWITCH TACT PUSH
1203	4822 276 13732	SWITCH TACT PUSH
1208	4822 276 13732	SWITCH TACT PUSH
1214	4822 276 13732	SWITCH TACT PUSH
1219	4822 276 13732	SWITCH TACT PUSH
1222	4822 276 13732	SWITCH TACT PUSH
1223	4822 276 13732	SWITCH TACT PUSH
1224	4822 276 13732	SWITCH TACT PUSH
1227	4822 276 13732	SWITCH TACT PUSH
1228	4822 276 13732	SWITCH TACT PUSH
1229	4822 276 13732	SWITCH TACT PUSH

1230	4822 276 13732	SWITCH TACT PUSH
1231	4822 276 13732	SWITCH TACT PUSH
1232	4822 276 13732	SWITCH TACT PUSH
1233	4822 276 13732	SWITCH TACT PUSH
1234	4822 276 13732	SWITCH TACT PUSH
1235	4822 276 13732	SWITCH TACT PUSH
1236	4822 276 13732	SWITCH TACT PUSH
1242	4822 276 13732	SWITCH TACT PUSH
1297	5322 242 73682	Crystal 32,768 KHZ
1298	4822 242 82114	Crystal 8,00 MHZ
1350△	4822 252 11234	Fuse 100 mA
1351△	4822 071 55001	Fuse 500 mA
1352△	4822 071 55001	Fuse 500 mA
1353△	4822 070 31252	Fuse 1.25 A
1355△	4822 252 11235	Fuse 1.0 A
1356△	4822 252 11235	Fuse 1.0 A
1400	4822 242 82059	Crystal 10 MHZ
1460	4822 277 11521	Switch
1461	4822 277 11521	Switch
1701	4822 210 10701	TMRB1-101A, TP944 PAL-I/UK
1701	4822 210 10709	TMRG1-104A PAL I /07
1701	4822 210 10702	TMRG1-101A,TP916(L)PAL-G (Passive Loop Through)
1701	4822 210 10698	TMRG2-102A, TP926 SECAM (Booster SECAM)
1701	4822 210 10723	TMRG1-201A PAL G/K
1719	4822 242 10688	OFWK9456M SEC-LL'
1719	4822 242 10306	OFWK9463M SEC-DK
1720	4822 242 81964	G1984 FM stereo PAL-G
1720	4822 242 81737	G1965 mono SEC
1720	4822 242 10307	OFWG3956M SEC-DK
1720	4822 242 81436	OFWK3953M stereo SEC
1721	4822 242 81388	OFWG1961M mono PAL-G
1721	4822 242 81261	OFWG1966M mono SEC-DK
1721	4822 242 10575	OFWJ1980M PAL-I
1722	4822 242 10318	OFWL9360M mono SEC-DK
1740	4822 242 72586	TPS 5,5MB-TF20 PAL-G
1740	4822 242 81572	TPS 6,0MB-TF21 PAL-I
1745	4822 242 70279	SFE 6,0MB SEC-L, PAL-I
1745	4822 242 10428	EFCT5R5YS5A PAL-G
1745	4822 242 10429	EFCT6R5YS5A SEC-DK
1746	4822 242 10428	EFCT5R5YS5A
1747	4822 242 10563	EFCT5R74YS5A stereo FM
1748	4822 242 10754	EFCT6R25YS5A stereo DK
1781	4822 242 82059	Crystal 10 MHZ

CAPACITORS

2001	4822 126 10002	100nF20%Y5V	25V
2002	4822 122 33177	10nF 20% X7R	50V
2003	4822 126 10002	100nF20%Y5V	25V
2004	4822 122 33177	10nF 20% X7R	50V
2005	4822 124 23055	22µF20%	16V
2006	4822 126 13222	390pF 2% np0	63V
2007	5322 122 32966	39pF 5%np0	50V
2008	5322 122 32658	22pF 5%	50V
2009	4822 126 10002	100nF20%Y5V	25V
2010	4822 124 80987	220µF20%	6,3V
2011	4822 122 33177	10nF 20% X7R	50V
2012	4822 124 11569	4,7µF 20%	25V
2013	4822 126 10002	100nF20%Y5V	25V
2014	4822 124 80975	0,47µF20%	50V
2015	4822 126 10002	100nF20%Y5V	25V
2016	4822 126 10002	100nF20%Y5V	25V
2017	4822 124 22826	10µF	16V
2018	5322 122 32658	22pF 5%	50V
2019	4822 124 22826	10µF	16V
2020	4822 124 22826	10µF	16V
2021	4822 124 22826	10µF	16V
2022	4822 126 10002	100nF20%Y5V	25V
2023	4822 122 33177	10nF 20% X7R	50V
2024	4822 126 10002	100nF20%Y5V	25V
2025	4822 124 11568	47µF 20%	16V

Motherboard QMB PAL, SECAM, MONO, STEREO

2026	4822 122 33575	220pF 5%	50V	2153	5322 122 32654	22nF 10% X7R	63V
2027	4822 122 33177	10nF 20% X7R	50V	2154	4822 122 33177	10nF 20% X7R	50V
2028	4822 122 33177	10nF 20% X7R	50V	2155	4822 122 33177	10nF 20% X7R	50V
2029	4822 122 33177	10nF 20% X7R	50V	2156	4822 122 33177	10nF 20% X7R	50V
2030	4822 122 33177	10nF 20% X7R	50V	2157	4822 122 33177	10nF 20% X7R	50V
2031	4822 126 10002	100nF20%Y5V	25V	2158	4822 122 33177	10nF 20% X7R	50V
2032	4822 124 11568	47µF 20%	16V	2159	4822 122 33177	10nF 20% X7R	50V
2033	4822 126 10002	100nF20%Y5V	25V	2160	4822 122 33177	10nF 20% X7R	50V
2034	4822 122 33177	10nF 20% X7R	50V	2161	4822 122 33177	10nF 20% X7R	50V
2035	4822 122 33177	10nF 20% X7R	50V	2163	5322 122 32531	100pF 5%	50V
2036	4822 122 33515	82pF 5%	63V	2203	5322 122 32481	15pF 5%	50V
2037	4822 126 14124	220pF 2%		2204	5322 122 32481	15pF 5%	50V
2038	5322 122 32659	33pF 5%	50V	2210	4822 122 33177	10nF 20% X7R	50V
2038	5322 122 32658	22pF 5%	50V for 2 heads	2211	4822 124 81112	220µF20%	10V
2039	4822 124 23053	1µF20%	63V	2212	4822 126 13061	220nF20% Y5V	25V
2040	5322 122 32654	22nF10%X7R	63V	2220	4822 124 23055	22µF20%	16V
2041	4822 124 23053	1µF20%	63V	2230	4822 122 33177	10nF 20% X7R	50V
2042	4822 122 33797	47nF20%Y5V	50V	2231	4822 122 33797	47nF20%Y5V	50V
2043	4822 124 41969	1µF20%	50V	2232	4822 122 33177	10nF 20% X7R	50V
2044	4822 124 23053	1µF20%	63V	2233	4822 122 33177	10nF 20% X7R	50V
2045	4822 122 33797	47nF20%Y5V	50V	2251	4822 126 10002	100nF20%Y5V	25V
2046	5322 122 34123	1nF10%X7R	50V	2252	4822 126 10002	100nF20%Y5V	25V
2047	4822 122 33177	10nF 20% X7R	50V	2297	4822 124 11968	220mF +80-20%	5,5V
2049	4822 124 11568	47µF 20%	16V	2300	4822 124 80407	1µF20%	50V
2054	4822 124 41969	1µF20%	50V	2301	4822 124 80407	1µF20%	50V
2055	4822 122 33177	10nF 20% X7R	50V	2302	4822 124 80407	1µF20%	50V
2059	4822 124 23053	1µF20%	63V	2308	5322 122 32531	100pF 5%	50V
2064	5322 122 31946	27pF 5%	63V	2310	4822 126 10002	100nF20%Y5V	25V
2066	4822 122 33177	10nF 20% X7R	50V	2311	4822 122 33177	10nF 20% X7R	50V
2080	5322 122 32658	22pF 5%	50V	2313	4822 122 33575	220pF 5%	50V
2081	4822 122 33177	10nF 20% X7R	50V	2314	4822 126 10002	100nF20%Y5V	25V
2082	4822 122 33177	10nF 20% X7R	50V	2315	4822 122 33177	10nF 20% X7R	50V
2083	4822 122 33177	10nF 20% X7R	50V	2316	4822 122 33797	47nF20%Y5V	50V
2084	4822 122 33177	10nF 20% X7R	50V	2317	5322 122 32654	22nF10%X7R	63V
2085	4822 126 10002	100nF20%Y5V	25V	2318	4822 124 22263	220µF20%	25V
2086	4822 124 11568	47µF 20%	16V	2319	5322 122 32654	22nF10%X7R	63V
2087	4822 122 33177	10nF 20% X7R	50V	2320	5322 122 32654	22nF10%X7R	63V
2089	4822 122 33575	220pF 5%	50V	2350	4822 126 14125	470pF 2%	
2100	4822 122 33177	10nF 20% X7R	50V	2353	4822 126 13196	100nF10% X7R	25V
2101	5322 122 32531	100pF 5%	50V	2354	4822 126 10002	100nF20%Y5V	25V
2102	5322 122 32658	22pF 5%	50V	2355	5322 122 34123	1nF10%X7R	50V
2103	5322 122 34123	1nF10%X7R	50V	2356	4822 124 23053	1µF20%	63V
2104	4822 122 33177	10nF 20% X7R	50V	2357	△4822 126 13841	1nF 20%	250V
2105	4822 122 33177	10nF 20% X7R	50V	2358	4822 126 10002	100nF20%Y5V	25V
2106	4822 122 33177	10nF 20% X7R	50V	2359	4822 126 13061	220nF20% Y5V	25V
2107	4822 122 33177	10nF 20% X7R	50V	2360	△4822 121 10667	68nF 20%	275V
2108	5322 122 33538	150pF 2%	63V	2361	4822 124 22864	47µF	50V
2109	5322 122 32481	15pF 5%	50V	2362	△4822 124 11969	22µF 20%	400V
2110	4822 126 10002	100nF20%Y5V	25V	2363	4822 124 22864	47µF	50V
2111	4822 126 13694	68pF 1%	63V	2364	4822 124 11899	220µF 20%	25V
2112	4822 122 33177	10nF 20% X7R	50V	2365	4822 124 11971	470µF 20%	16V
2113	4822 126 10002	100nF20%Y5V	25V	2366	4822 126 14126	47pF 5%	2KV
2115	4822 122 33575	220pF 5%	50V	2367	4822 124 11899	220µF 20%	25V
2116	4822 122 33177	10nF 20% X7R	50V	2368	4822 122 31175	1nF 10%	500V
2117	5322 122 34123	1nF10%X7R	50V	2369	4822 126 10002	100nF20%Y5V	25V
2118	5322 122 32659	33pF 5%	50V	2370	4822 124 23052	100µF20%	16V
2119	5322 122 32531	100pF 5%	50V	2371	4822 124 11971	470µF 20%	16V
2121	5322 122 34123	1nF10%X7R	50V	2372	4822 126 13061	220nF20% Y5V	25V
2122	4822 122 33177	10nF 20% X7R	50V	2373	4822 124 11486	220µF 20%	16V
2123	4822 126 10002	100nF20%Y5V	25V	2374	4822 124 11971	470µF 20%	16V
2124	4822 126 10002	100nF20%Y5V	25V	2375	4822 121 42004	10nF 10%	400V
2125	4822 122 33515	82pF 5%	63V	2376	4822 124 22833	10µF	50V
2126	5322 122 31946	27pF 5%	63V	2378	4822 121 42004	10nF 10%	400V
2128	4822 122 33515	82pF 5%	63V	2379	5322 126 10223	4,7nF10%X7R	63V
2129	4822 122 33515	82pF 5%	63V	2385	4822 124 11486	220µF 20%	16V
2130	4822 122 33575	220pF 5%	50V	2386	5322 122 32268	470pF 10%	50V
2132	5322 122 32269	6,8pF 5%	50V	2400	4822 122 33177	10nF 20% X7R	50V
2133	5322 122 32452	47pF 5%	63V	2401	4822 124 23055	22µF20%	16V
2134	4822 122 33575	220pF 5%	50V	2403	5322 122 32658	22pF 5%	50V
2135	5322 122 31946	27pF 5%	63V	2404	5322 122 32658	22pF 5%	50V
2137	4822 116 10056	VDR 0805 1MA/ 8VMAX		2416	4822 126 10002	100nF20%Y5V	25V
2138	4822 116 10056	VDR 0805 1MA/ 8VMAX		2417	4822 124 81295	47µF20%	6,3V
2150	4822 122 33177	10nF 20% X7R	50V	2440	4822 124 81029	100µF20%	25V
2151	4822 126 13061	220nF20% Y5V	25V	2441	4822 126 10002	100nF20%Y5V	25V
2152	4822 124 11568	47µF 20%	16V	2442	4822 122 33177	10nF 20% X7R	50V

Motherboard QMB PAL, SECAM, MONO, STEREO

2455	4822	122 33175	2,2nF 20% X7R	50V	2704	4822	124 23052	100µF20%	16V	
2459	4822	124 22263	220µF20%	25V	2705	5322	122 32268	470pF 10%	50V	
2461	5322	126 10223	4,7nF10%X7R	63V	2706	4822	122 33575	220pF 5%	50V	
2463	4822	124 23027	47µF	6.3V	2707	5322	122 33861	120pF10%	50V	
2464	5322	126 10223	4,7nF10%X7R	63V	2708	4822	124 23055	22µF20%	16V	
2465	4822	122 33175	2,2nF 20% X7R	50V	2715	5322	122 32661	56pF 5%	50V	
2466	4822	124 23027	47µF	6.3V	2716	5322	122 32661	56pF 5%	50V	
2467	4822	122 33342	33nF10%X7R	63V	2722	5322	122 34123	1nF10%X7R	50V	
2468	4822	126 10002	100nF20%Y5V	25V	2723	4822	122 33177	10nF 20% X7R	50V	
2470	4822	122 33177	10nF 20% X7R	50V	2726	4822	126 12104	12nF 5%X7R	63V	
2471	4822	122 33177	10nF 20% X7R	50V	2727	4822	124 23055	22µF20%	16V	
2472	5322	122 32531	100pF 5%	50V	2728	4822	124 23055	22µF20%	16V	
2473	5322	122 32531	100pF 5%	50V	2729	4822	122 33177	10nF 20% X7R	50V	
2474	5322	122 32531	100pF 5%	50V	2730	5322	122 32452	47pF 5%	63V	
2501	4822	126 10002	100nF20%Y5V	25V	2731	5322	122 32452	47pF 5%	63V	
2502	4822	124 22826	10µF	16V	2732	5322	122 32452	47pF 5%	63V	
2503	4822	124 22826	10µF	16V	2733	4822	122 33177	10nF 20% X7R	50V	
2504	4822	116 10056	VDR 0805 1MA/ 8VMAX	for stereo	2734	4822	126 10002	100nF20%Y5V	25V	
2504	5322	122 32268	470pF 10%	50V	for mono	2735	5322	122 32452	47pF 5%	63V
2505	5322	122 32268	470pF 10%	50V	for mono	2740	4822	124 41576	2,2µF 20%	50V
2505	4822	116 10056	VDR 0805 1MA/ 8VMAX	for stereo	2741	4822	126 10002	100nF20%Y5V	25V	
2506	4822	116 10056	VDR 0805 1MA/ 8VMAX	for stereo	2742	4822	124 23055	22µF20%	16V	
2506	5322	122 32268	470pF 10%	50V	for mono	2743	4822	126 13061	220nF20% Y5V	25V
2507	4822	116 10056	VDR 0805 1MA/ 8VMAX		2744	4822	124 40786	2,2µF20%	63V	
2508	4822	126 10002	100nF20%Y5V	25V	2745	4822	122 33575	220pF 5%	50V	
2509	5322	122 32268	470pF 10%	50V	for mono	2746	4822	126 10002	100nF20%Y5V	25V
2509	4822	116 10056	VDR 0805 1MA/ 8VMAX	for stereo	2747	4822	126 10002	100nF20%Y5V	25V	
2510	5322	122 32268	470pF 10%	50V	for mono	2748	4822	126 12945	8,2pF 2%	
2510	4822	116 10056	VDR 0805 1MA/ 8VMAX	for stereo	2749	4822	126 13061	220nF20% Y5V	25V	
2511	4822	116 10056	VDR 0805 1MA/ 8VMAX	for stereo	2750	4822	124 40786	2,2µF20%	63V	
2511	5322	122 32268	470pF 10%	50V	for mono	2752	4822	126 13061	220nF20% Y5V	25V
2512	4822	116 10056	VDR 0805 1MA/ 8VMAX		2780	4822	124 22826	10µF	16V	
2514	4822	124 23027	47µF	6.3V	2781	4822	122 33177	10nF 20% X7R	50V	
2515	4822	126 10002	100nF20%Y5V	25V	2782	4822	126 10002	100nF20%Y5V	25V	
2516	4822	124 11568	47µF 20%	16V	2783	5322	126 10184	680p 5%	50V	
2517	4822	126 10002	100nF20%Y5V	25V	2784	4822	124 11568	47µF 20%	16V	
2519	4822	126 10002	100nF20%Y5V	25V	2785	5322	122 32531	100pF 5%	50V	
2520	4822	126 10002	100nF20%Y5V	25V	2786	4822	124 11569	4,7µF 20%	25V	
2521	4822	126 10002	100nF20%Y5V	25V	2787	4822	124 11569	4,7µF 20%	25V	
2523	4822	126 10002	100nF20%Y5V	25V	2788	5322	122 32654	22nF10% X7R	63V	
2524	4822	126 10002	100nF20%Y5V	25V	2789	4822	122 33177	10nF 20% X7R	50V	
2525	4822	126 10002	100nF20%Y5V	25V	2790	4822	122 33177	10nF 20% X7R	50V	
2526	4822	126 10002	100nF20%Y5V	25V	2791	4822	124 11569	4,7µF 20%	25V	
2527	4822	126 10002	100nF20%Y5V	25V	2792	4822	124 11569	4,7µF 20%	25V	
2530	4822	126 13061	220nF20% Y5V	25V	2793	5322	122 32481	15pF 5%	50V	
2540	4822	126 10002	100nF20%Y5V	25V	2794	4822	126 10002	100nF20%Y5V	25V	
2541	4822	122 33175	2,2nF 20% X7R	50V	2795	5322	122 34123	1nF10%X7R	50V	
2542	4822	122 33342	33nF10%X7R	63V	2796	4822	124 11569	4,7µF 20%	25V	
2543	4822	126 13482	470nF80/20%	16V	2800	4822	126 13689	18pF 1%	63V	
2545	4822	126 10002	100nF20%Y5V	25V	2801	5322	122 32659	33pF 5%	50V	
2600	5322	126 10184	680p 5%	50V	2802	4822	126 14118	100nF -20+80%	50V	
2601	4822	122 33175	2,2nF 20% X7R	50V	2802	4822	126 10002	100nF20%Y5V	25V	
2602	4822	124 22826	10µF	16V	2803	4822	126 10002	100nF20%Y5V	25V	
2603	4822	122 33177	10nF 20% X7R	50V	2804	4822	124 23053	1µF20%	63V	
2604	4822	124 22739	100µF	50V	for mono	2805	4822	124 23027	47µF	6.3V
2604	4822	124 22826	10µF	16V	for stereo	2810	5322	122 33861	120pF10%	50V
2605	5322	122 34123	1nF10%X7R	50V	2811	5322	122 32531	100pF 5%	50V	
2606	4822	126 10002	100nF20%Y5V	25V	2831	5322	122 32481	15pF 5%	50V	
2608	4822	122 33177	10nF 20% X7R	50V	2850	4822	124 23052	100µF20%	16V	
2617	4822	124 11568	47µF 20%	16V	2851	5322	122 32654	22nF10% X7R	63V	
2618	5322	122 31863	330pF 5%	50V	2852	4822	124 23052	100µF20%	16V	
2619	4822	124 11568	47µF 20%	16V	2853	5322	122 32654	22nF10% X7R	63V	
2620	4822	121 51655	47nF	50V	2854	4822	124 40786	2,2µF20%	63V	
2621	5322	122 34123	1nF10%X7R	50V	2855	5322	122 32654	22nF10% X7R	63V	
2622	4822	121 43873	27nF 5%	50V	2856	5322	122 32654	22nF10% X7R	63V	
2647	4822	126 10002	100nF20%Y5V	25V	2857	4822	126 13061	220nF20% Y5V	25V	
2648	4822	124 23055	22µF20%	16V	2858	4822	126 13061	220nF20% Y5V	25V	
2650	4822	126 10002	100nF20%Y5V	25V	2859	4822	126 13061	220nF20% Y5V	25V	
2651	4822	124 11568	47µF 20%	16V	2860	4822	126 13061	220nF20% Y5V	25V	
2652	4822	124 22826	10µF	16V	2861	4822	126 13061	220nF20% Y5V	25V	
2656	4822	126 14127	39nF 10%	50V	2862	4822	126 13061	220nF20% Y5V	25V	
2657	4822	122 33128	15nF10%X7R	63V	2863	4822	126 13061	220nF20% Y5V	25V	
2700	4822	126 10002	100nF20%Y5V	25V	2864	4822	126 13061	220nF20% Y5V	25V	
2701	4822	126 10002	100nF20%Y5V	25V	2865	5322	126 10223	4,7nF10%X7R	63V	
2702	4822	126 10002	100nF20%Y5V	25V	2866	4822	124 11568	47µF 20%	16V	

Motherboard QMB PAL, SECAM, MONO, STEREO

2867	4822 124 22826	10µF	16V
2868	4822 126 13061	220nF20%Y5V	25V
2869	5322 126 10223	4,7nF10%X7R	63V
2870	4822 124 11568	47µF 20%	16V
2871	4822 124 22826	10µF	16V
2872	4822 124 22826	10µF	16V
2873	4822 124 22826	10µF	16V
2874	4822 124 22826	10µF	16V
2875	4822 124 22826	10µF	16V
2876	4822 124 22826	10µF	16V
2877	4822 124 22826	10µF	16V
2880	4822 124 22826	10µF	16V
2881	4822 124 22826	10µF	16V
2882	5322 126 10223	4,7nF10%X7R	63V
2883	5322 116 80853	560pF 5%	63V
2884	5322 126 10223	4,7nF10%X7R	63V
2885	5322 116 80853	560pF 5%	63V
2888	4822 124 22826	10µF	16V
2889	4822 126 10002	100nF20%Y5V	25V

RESISTORS

3000	4822 051 10102	1K00	2%	0,25W
3001	4822 051 10102	1K00	2%	0,25W
3002	4822 116 52228	680E	5%	0,5W
3003	4822 116 52228	680E	5%	0,5W
3004	4822 116 52228	680E	5%	0,5W
3005	4822 116 52303	8K2	5%	0,5W
3006	4822 116 52238	12K	5%	0,5W
3007	4822 100 12157	10K	30%	POT
3008	4822 116 83883	470E	5%	0,5W
3010	4822 051 10102	1K00	2%	0,25W
3011	4822 117 11449	2K2	1%	0,1W
3012	4822 117 11449	2K2	1%	0,1W
3013	4822 117 11721	1K3	2%	0,1W
3014	4822 116 83903	4K7	2%	0,1W
3015	4822 051 10102	1K00	2%	0,25W
3016	4822 051 20822	8K20	5%	0,1W
3017	4822 116 52249	1K8	5%	0,5W
3018	4822 116 83883	470E	5%	0,5W
3019	4822 051 20562	5K60	5%	0,1W
3020	4822 051 20224	220K0	5%	0,1W
3021	4822 050 11002	1K00	1%	0,4W
3022	4822 050 11002	1K00	1%	0,4W
3024	4822 051 20822	8K20	1%	0,1W
3024	4822 051 20682	6K80	5%	0,1W for 2/x
3027	4822 116 52264	27K	5%	0,5W
3028	4822 051 20562	5K60	5%	0,1W for 1 scart
3028	4822 051 20332	3K30	5%	0,1W for 2 scart
3029	4822 051 20225	2M20	5%	0,1W
3030	4822 116 52256	2K2	5%	0,5W
3031	4822 116 52256	2K2	5%	0,5W
3032	4822 117 11449	2K2	1%	0,1W
3033	4822 116 52251	18K	5%	0,5W
3034	4822 051 20153	15K00	5%	0,1W
3035	4822 117 11449	2K2	1%	0,1W
3036	4822 051 20471	470R0	5%	0,1W
3045	4822 116 83876	270E	5%	0,5W
3046	4822 050 11002	1K00	1%	0,4W
3048	4822 116 83884	47K	5%	0,5W
3050	4822 116 83872	220R	5%	0,5W
3050	4822 116 52175	100E	5%	0,5W
3051	4822 051 20224	220K0	5%	0,1W
3052	4822 116 52175	100E	5%	0,5W
3054	4822 117 11449	2K2	1%	0,1W
3055	4822 117 10361	680R	1%	0,1W
3080	4822 051 20568	5R60	5%	0,1W
3081	4822 051 20561	560R0	5%	0,1W
3082	4822 051 20101	100R0	5%	0,1W
3083	4822 051 20472	4K70	5%	0,1W
3084	4822 051 20472	4K70	5%	0,1W
3085	4822 051 20112	1K10	5%	0,1W
3086	4822 051 20331	330R0	5%	0,1W
3087	4822 116 52234	100K	5%	0,5W

3100	4822 116 52219	330E	5%	0,5W
3101	4822 051 20332	3K30	5%	0,1W
3102	4822 116 52231	820E	5%	0,5W
3103	4822 116 52228	680E	5%	0,5W
3104	4822 050 11002	1K00	1%	0,4W
3105	4822 116 52222	390E	5%	0,5W
3106	4822 116 52231	820E	5%	0,5W
3107	4822 050 11002	1K00	1%	0,4W
3109	4822 116 52195	47E	5%	0,5W
3110	4822 116 52207	1K2	5%	0,5W
3111	4822 116 52256	2K2	5%	0,5W
3112	4822 051 10102	1K00	2%	0,25W
3113	4822 051 20561	560R0	5%	0,1W
3114	4822 117 10833	10K	1%	0,1W
3115	4822 116 52251	18K	5%	0,5W
3116	4822 051 10102	1K00	2%	0,25W
3117	4822 116 52256	2K2	5%	0,5W
3118	4822 116 52283	4K7	5%	0,5W
3119	4822 116 52271	33K	5%	0,5W
3120	4822 116 52303	8K20	5%	0,5W
3121	4822 051 20182	1K80	5%	0,1W
3122	4822 051 10102	1K00	2%	0,25W
3123	4822 116 83864	10K	5%	0,5W
3124	4822 116 52243	1K5	5%	0,5W
3125	4822 117 11449	2K2	1%	0,1W
3126	4822 051 10102	1K00	2%	0,25W
3127	4822 117 11449	2K2	1%	0,1W
3128	4822 117 11449	2K2	1%	0,1W
3129	4822 051 10102	1K00	2%	0,25W
3134	4822 117 11503	220R	1%	0,1W
3135	4822 117 11503	220R	1%	0,1W
3151	4822 051 20104	100K00	5%	0,1W
3152	4822 051 20393	39K00	5%	0,1W
3153	4822 117 10833	10K	1%	0,1W
3154	4822 117 12605	27K	1%	0,1W for 4/2
3154	4822 117 10354	22K	1%	0,1W for 4/0
3154	4822 117 12141	14K	1%	0,1W for 3/0
3154	4822 117 12342	18K	1%	0,1W for 2/x
3155	4822 117 11383	12K	1%	0,1W for 2/x
3155	4822 051 20153	15K00	5%	0,1W for 4/x
3156	4822 051 20331	330R00	5%	0,1W
3157	4822 051 20331	330R00	5%	0,1W
3158	4822 051 20472	4K70	5%	0,1W
3159	4822 100 12157	10K	30%	POT
3160	4822 100 12157	10K	30%	POT
3162	4822 051 20008	0R00 JUMP (0805)		
3163	4822 051 20008	0R00 JUMP (0805)		
3164	4822 051 20008	0R00 JUMP (0805)		
3165	4822 051 20008	0R00 JUMP (0805)		
3228	4822 116 83872	220E	5%	0,5W
3229	4822 117 10833	10K	1%	0,1W
3230	4822 117 10833	10K	1%	0,1W
3231	4822 116 52175	100E	5%	0,5W
3232	4822 116 52175	100E	5%	0,5W
3233	4822 116 83864	10K	5%	0,5W
3234	4822 116 83864	10K	5%	0,5W
3235	4822 116 83864	10K	5%	0,5W
3238	4822 116 83864	10K	5%	0,5W
3240	4822 116 52297	68K	5%	0,5W
3241	4822 051 20683	68K00	5%	0,1W
3242	4822 051 20683	68K00	5%	0,1W
3243	4822 051 20683	68K00	5%	0,1W
3244	4822 050 11002	1K00	1%	0,4W
3245	4822 051 20183	18K00	5%	0,1W
3250	4822 051 20153	15K00	5%	0,1W
3252△	4822 117 11593	22E	5%	
3253	4822 050 24708	4R70	1%	0,6W
3254	4822 050 24708	4R70	1%	0,6W
3265	4822 116 83864	10K	5%	0,5W
3270	4822 117 11503	220R	1%	0,1W
3271	4822 117 11503	220R	1%	0,1W
3273	4822 117 11503	220R	1%	0,1W
3297	4822 051 20562	5K60	5%	0,1W
3300	4822 116 52175	100E	5%	0,5W
3301	4822 116 52175	100E	5%	0,5W

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3302	4822 116 52175	100E	5%	0,5W	3436	4822 050 11002	1K00	1%	0,4W
3303	4822 116 83883	470E	5%	0,5W	3437	4822 116 83961	6K8	5%	
3304	4822 050 11002	1K00	1%	0,4W	3438	4822 051 20472	4K70	5%	0,1W
3305	4822 116 52283	4K7	5%	0,5W	3440△	4822 052 10228	2R20	5%	0,33W
3312	4822 116 52249	1K8	5%	0,5W	3441	4822 116 80176	1E	5%	0,5W
3313	4822 116 83884	47K	5%	0,5W	3442	4822 116 52304	82K	5%	0,5W
3350	4822 117 10833	10K	1%	0,1W	3443	4822 116 52257	22K	5%	0,5W
3351	4822 051 20223	22K00	5%	0,1W	3444	4822 116 52276	3K9	5%	0,5W
3352	4822 051 20562	5K60	5%	0,1W	3445	4822 116 83864	10K	5%	0,5W
3353	4822 117 10833	10K	1%	0,1W	3446	4822 116 52257	22K	5%	0,5W
3354	4822 117 11449	2K2	1%	0,1W	3447	4822 116 52257	22K	5%	0,5W
3355	4822 051 20822	8K20	5%	0,1W	3448	4822 116 83864	10K	5%	0,5W
3356	4822 051 20223	22K00	5%	0,1W	3449	4822 117 10833	10K	1%	0,1W
3357	4822 051 20472	4K70	5%	0,1W	3450	4822 116 52256	2K2	5%	0,5W
3358	4822 117 11149	82K	1%	0,1W	3451	4822 116 83864	10K	5%	0,5W
3359	4822 051 20471	470R00	5%	0,1W	3452	4822 116 52263	2K7	5%	0,5W
3360	4822 051 20689	68R00	5%	0,1W	3453	4822 116 52283	4K7	5%	0,5W
3361△	4822 052 10479	47R00	5%	0,33W	3454	4822 116 52283	4K7	5%	0,5W
3362	4822 051 20472	4K70	5%	0,1W	3455	4822 116 52283	4K7	5%	0,5W
3363	4822 050 21208	1R20	1%	0,6W	3456	4822 117 10833	10K	1%	0,1W
3365	4822 116 83874	220K	5%	0,5W	3457	4822 050 11002	1K00	1%	0,4W
3369	4822 116 83882	39K	5%	0,5W	3458	4822 051 20223	22K00	5%	0,1W
3370	4822 116 83882	39K	5%	0,5W	3459	4822 116 83876	270E	5%	0,5W
3374	4822 051 20271	270R00	5%	0,1W	3460	4822 116 83884	47K	5%	0,5W
3375	4822 051 10102	1K00	2%	0,25W	3461	4822 051 20472	4K70	5%	0,1W
3376	4822 051 20008	0R00 JUMP (0805)			3462	4822 051 20563	56K00	5%	0,1W
3377	4822 051 20472	4K70	5%	0,1W	3463	4822 116 52283	4K7	5%	0,5W
3378	4822 051 20272	2K70	5%	0,1W	3464	4822 116 52256	2K2	5%	0,5W
3379	4822 101 11383	470E	30%	POT	3466	4822 116 83864	10K	5%	0,5W
3380	4822 051 10102	1K00	2%	0,25W	3469	4822 116 83876	270E	5%	0,5W
3381	4822 051 20104	100K00	5%	0,1W	3470	4822 116 52264	27K	5%	0,5W
3382	4822 117 10833	10K	1%	0,1W	3471	4822 116 52222	390E	5%	0,5W
3383	4822 116 83874	220K	5%	0,5W	3472	4822 116 52264	27K	5%	0,5W
3384△	4822 052 10101	100R00	5%	0,33W	3473	4822 116 52222	390E	5%	0,5W
3385	4822 116 52269	3K30	1%	0,4W	3474	4822 116 83864	10K	5%	0,5W
3386	4822 116 52219	330E	1%	0,4W	3475	4822 116 52289	5K6	5%	0,5W
3387	4822 050 11002	1K00	1%	0,4W	3476	4822 116 52222	390E	5%	0,5W
3388	4822 050 11002	1K00	1%	0,4W	3477	4822 116 52283	4K7	5%	0,5W
3389	4822 117 11449	2K2	1%	0,1W	3478	4822 051 20104	100K00	5%	0,1W
3390	4822 051 20224	220K00	5%	0,1W	3479	4822 116 52283	4K7	5%	0,5W
3391	4822 051 20224	220K00	5%	0,1W	3480	4822 116 83884	47K	5%	0,5W
3392	4822 053 21335	3M30	5%	0,5W	3481	4822 116 52256	2K2	5%	0,5W
3393	4822 053 21335	3M30	5%	0,5W	3482	4822 116 52257	22K	5%	0,5W
3394	4822 116 52256	2K2	5%	0,5W	3483	4822 116 83864	10K	5%	0,5W
3395	4822 116 52257	22K	5%	0,5W	3484	4822 116 52283	4K7	5%	0,5W
3396	4822 116 52257	22K	5%	0,5W	3488	4822 051 20471	470R00	5%	0,1W
3400	4822 116 83864	10K	5%	0,5W	3489	4822 116 52283	4K7	5%	0,5W
3401	4822 116 83864	10K	5%	0,5W	3490	4822 116 83872	220R	5%	0,5W
3402	4822 050 11002	1K00	1%	0,4W	3491	4822 116 83884	47K	5%	0,5W
3403	4822 116 52256	2K2	5%	0,5W	3492	4822 051 20473	47K00	5%	0,1W
3404	4822 116 83864	10K	5%	0,5W	3493	4822 051 20225	2M20	5%	0,1W
3405	4822 116 83876	270E	5%	0,5W	3494	4822 051 20104	100K00	5%	0,1W
3406	4822 116 83864	10K	5%	0,5W	3495	4822 051 20104	100K00	5%	0,1W
3407	4822 116 83864	10K	5%	0,5W	3496	4822 051 20472	4K70	5%	0,1W
3408	4822 116 52256	2K2	5%	0,5W	3497	4822 051 20472	4K70	5%	0,1W
3410	4822 051 20472	4K70	5%	0,1W	3498	4822 051 20472	4K70	5%	0,1W
3411	4822 116 83864	10K	5%	0,5W	3499	4822 116 52283	4K7	5%	0,5W
3412	4822 116 52249	1K8	5%	0,5W	3501	4822 051 10102	1K00	2%	0,25W
3413	4822 050 11002	1K00	1%	0,4W	3502	4822 051 10102	1K00	2%	0,25W
3414△	4822 052 10109	10R00	5%	0,33W	3503	4822 051 10102	1K00	2%	0,25W
3415△	4822 052 10109	10R00	5%	0,33W	3505	4822 051 20759	75R00	5%	0,1W
3416	4822 116 52257	22K	5%	0,5W	3509	4822 051 20008	0R00 JUMP (0805)		
3417	4822 116 52283	4K7	5%	0,5W	3510	4822 051 20008	0R00 JUMP (0805)		
3418	4822 050 11002	1K00	1%	0,4W	3512	4822 051 20682	6K80	5%	0,1W
3419	4822 051 20472	4K70	5%	0,1W	3513	4822 116 83872	220E	5%	0,5W
3420	4822 117 10833	10K	1%	0,1W	3514	4822 116 83961	6K80	5%	
3421	4822 116 83864	10K	5%	0,5W	3515	4822 051 20682	6K80	5%	0,1W
3423	4822 116 83876	270R	5%	0,5W	3516	4822 117 11503	220R	1%	0,1W
3424	4822 116 52256	2K2	5%	0,5W	3517	4822 116 52234	100K	5%	0,5W
3430	4822 116 52249	1K8	5%	0,5W	3518	4822 116 52234	100K	5%	0,5W
3431	4822 116 52276	3K9	5%	0,5W	3519	4822 051 20822	8K20	5%	0,1W
3432	4822 116 83864	10K	5%	0,5W	3520	4822 117 10353	150R	1%	0,1W
3433	4822 116 52256	2K2	5%	0,5W	3521	4822 116 83961	6K8	5%	
3434	4822 116 52257	22K	5%	0,5W	3522	4822 051 20821	820R00	5%	0,1W
3435	4822 116 83864	10K	5%	0,5W	3523	4822 051 20008	0R00 JUMP (0805)		

△ ... Safety component, use only this type

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Motherboard QMB PAL, SECAM, MONO, STEREO

3524	4822 051 20759	75R00	5%	0,1W	3712	4822 051 20272	2K70	5%	0,1W
3525	4822 051 20822	8K20	5%	0,1W	3715	4822 051 20122	1K20	5%	0,1W
3526	4822 117 11449	2K20	1%	0,1W	3723	4822 051 20224	220K00	5%	0,1W
3527	4822 051 20472	4K70	5%	0,1W	3725	4822 051 20822	8K20	5%	0,1W
3528	4822 116 83884	47K	5%	0,5W	3726	4822 051 20273	27K00	5%	0,1W
3529	4822 051 20759	75R00	5%	0,1W	3729	4822 051 20391	390R00	5%	0,1W
3530	4822 051 20472	4K70	5%	0,1W	3730	4822 051 20183	18K00	5%	0,1W
3531	4822 051 20101	100R00	5%	0,1W	3731	4822 051 20183	18K00	5%	0,1W
3532	4822 051 20101	100R00	5%	0,1W	3732	4822 051 20391	390R00	5%	0,1W
3533	4822 051 20759	75R00	5%	0,1W	3735	4822 117 11448	180R	1%	0,1W for mono SEC
3534	4822 051 20008	0R00 JUMP (0805)			3735	4822 051 20391	390R00	5%	0,1W
3535	4822 117 11503	220E	1%	0,1W	3736	4822 051 20562	5K60	5%	0,1W
3536	4822 117 11503	220E	1%	0,1W	3737	4822 051 20392	3K90	5%	0,1W
3537	4822 116 83872	220E	5%	0,5W	3739	4822 051 20681	680R00	5%	0,1W
3538	4822 116 83961	6K8	5%		3742	4822 100 12158	22K	30%	POT
3539	4822 116 83961	6K8	5%		3744	4822 051 20154	150K00	5%	0,1W
3540	4822 117 11503	220E	1%	0,1W	3747	4822 051 20391	390R00	5%	0,1W for SECAM
3542	4822 117 11503	220E	1%	0,1W	3747	4822 051 20331	330R00	5%	0,1W for SEC DK
3543	4822 051 20471	470R00	5%	0,1W	3747	4822 051 20271	270E	5%	0,1W for PAL
3544	4822 117 11503	220R	1%	0,1W	3748	4822 100 12156	4K7	30%	POT for PLL adj.
3545	4822 116 52256	2K2	5%	0,5W	3748	4822 100 12158	22K	30%	POT for Bd. 1 adj.
3546	4822 116 52256	2K2	5%	0,5W	3749	4822 051 20681	680R00	5%	0,1W
3547	4822 051 20479	47R00	5%	0,1W	3750	4822 051 20331	330R00	5%	0,1W
3548	4822 051 20682	6K80	5%	0,1W	3760	4822 051 10102	1K00	2%	0,25W
3549	4822 051 20101	100R00	5%	0,1W	3760	4822 051 20821	820R00	5%	0,1W for PAL I
3550	4822 051 20105	1M00	5%	0,1W	3761	4822 051 10102	1K00	2%	0,25W
3551	4822 051 20105	1M00	5%	0,1W	3762	4822 051 10102	1K00	2%	0,25W
3552	4822 051 20682	6K80	5%	0,1W	3764	4822 051 10102	1K00	2%	0,25W for PAL
3553	4822 051 20101	100R00	5%	0,1W	3764	4822 051 20821	820R00	5%	0,1W for SECAM
3554	4822 051 20101	100R00	5%	0,1W	3765	4822 051 20562	5K60	5%	0,1W
3555	4822 051 20008	0R00 JUMP (0805)			3766	4822 051 20473	47K00	5%	0,1W
3556	4822 051 20474	470K00	5%	0,1W	3767	4822 051 20472	4K70	5%	0,1W
3557	4822 051 20104	100K00	5%	0,1W	3768	4822 051 20104	100K00	5%	0,1W
3560	4822 051 20008	0R00 JUMP (0805)			3769	4822 051 20472	4K70	5%	0,1W
3561	4822 051 20472	4K70	5%	0,1W	3770	4822 051 20104	100K00	5%	0,1W
3562	4822 051 20473	47K00	5%	0,1W	3771	4822 051 20472	4K70	5%	0,1W
3563	4822 051 20822	8K20	5%	0,1W	3772	4822 051 20104	100K00	5%	0,1W
3570	4822 116 83864	10K	5%	0,5W	3773	4822 051 20104	100K00	5%	0,1W
3571	4822 117 11383	12K	1%	0,1W	3780	4822 051 20101	100R00	5%	0,1W
3600	4822 116 52257	22K	5%	0,5W	3781	4822 051 20101	100R00	5%	0,1W
3601	4822 117 10833	10K	1%	0,1W	3782	4822 051 20333	33K00	5%	0,1W
3602	4822 051 20472	4K70	5%	0,1W	3790	4822 051 20472	4K70	5%	0,1W
3603	4822 051 20101	100R00	5%	0,1W	3791	4822 051 20562	5K60	5%	0,1W
3604	4822 116 52257	22K	5%	0,5W	3792	4822 051 20472	4K70	5%	0,1W
3605	4822 117 11449	2K2	1%	0,1W	3793	4822 051 20562	5K60	5%	0,1W
3606	4822 116 52195	47E	5%	0,5W	3805	4822 051 20101	100R00	5%	0,1W
3607	4822 051 20394	390K00	5%	0,1W	3807	4822 051 20479	47R00	5%	0,1W
3608	4822 117 11383	12K	1%	0,1W	3808	4822 051 20479	47R00	5%	0,1W
3609	4822 051 20822	8K20	5%	0,1W	3813	4822 051 20472	4K70	5%	0,1W
3610	4822 117 11449	2K2	1%	0,1W	3815	4822 117 10833	10K	1%	0,1W
3611	4822 051 20101	100R00	5%	0,1W for mono	3816	4822 117 10833	10K	1%	0,1W
3611	4822 051 20681	680R00	5%	0,1W for stereo	3817	4822 117 10833	10K	1%	0,1W
3612	4822 117 11449	2K2	1%	0,1W	3818	4822 051 20153	15K00	5%	0,1W
3615	4822 051 20101	100R00	5%	0,1W	3819	4822 117 10833	10K	1%	0,1W
3618	4822 100 12159	100K	30%	POT	3820	4822 117 10833	10K	1%	0,1W
3619	4822 051 20158	1R50	5%	0,1W	3821	4822 117 10833	10K	1%	0,1W
3620	4822 051 20473	47K00	5%	0,1W	3822	4822 051 20153	15K00	5%	0,1W
3622	4822 051 20335	3M30	5%	0,1W	3823	4822 117 10833	10K	1%	0,1W
3623	4822 117 10833	10K	1%	0,1W	3824	4822 117 11449	2K2	1%	0,1W
3624	4822 051 20332	3K30	5%	0,1W	3825	4822 051 20472	4K70	5%	0,1W
3625	4822 051 20339	33R00	5%	0,1W	3826	4822 051 20153	15K00	5%	0,1W
3626	4822 051 20224	220K00	5%	0,1W	3827	4822 051 20104	100K00	5%	0,1W
3627	4822 051 20563	56K00	5%	0,1W	3828	4822 117 10833	10K	1%	0,1W
3638	4822 051 20109	10R00	5%	0,1W	3829	4822 051 20008	0R00 JUMP (0805)		
3655	4822 051 20681	680R00	5%	0,1W	3850	4822 117 12708	39K	1%	0,1W
3656	4822 116 83961	6K8	5%		3851	4822 051 20473	47K00	5%	0,1W
3657	4822 051 20391	390R00	5%	0,1W	3852	4822 051 20392	3K90	5%	0,1W
3702	4822 051 20101	100R00	5%	0,1W	3853	4822 051 20473	47K00	5%	0,1W
3703	4822 051 20101	100R00	5%	0,1W	3854	4822 051 20392	3K90	5%	0,1W
3704	4822 051 20681	680R00	5%	0,1W	3855	4822 051 20104	100K00	5%	0,1W
3705	4822 051 20223	22K00	5%	0,1W	3856	4822 051 20104	100K00	5%	0,1W
3706	4822 051 20681	680R00	5%	0,1W	3857	4822 051 20335	3M30	5%	0,1W
3707	4822 051 20101	100R00	5%	0,1W	3858	4822 117 11449	2K2	1%	0,1W
3708	4822 051 20101	100R00	5%	0,1W	3860	4822 051 20101	100R00	5%	0,1W
3709	4822 051 20101	100R00	5%	0,1W	3861	4822 051 20101	100R00	5%	0,1W

Motherboard QMB PAL, SECAM, MONO, STEREO

3862	4822 051 20104	100K00	5%	0,1W			
3863	4822 051 20104	100K00	5%	0,1W			
3864	4822 051 20472	4K70	5%	0,1W			
3865	4822 051 20472	4K70	5%	0,1W			
3866	4822 051 20475	4M70	5%	0,1W			
3867	4822 051 20475	4M70	5%	0,1W			
3870	4822 051 20472	4K70	5%	0,1W			
3871	4822 051 20223	22K00	5%	0,1W			
3901	4822 051 20008	0R00 JUMP (0805)					
3902	4822 051 20008	0R00 JUMP (0805)					
3903	4822 051 20008	0R00 JUMP (0805)					
3905	4822 051 20008	0R00 JUMP (0805)					
3906	4822 051 20008	0R00 JUMP (0805)					
3907	4822 051 20008	0R00 JUMP (0805)					
3908	4822 051 20008	0R00 JUMP (0805)					
3910	4822 051 20008	0R00 JUMP (0805)					
3911	4822 051 20008	0R00 JUMP (0805)					
3912	4822 051 20008	0R00 JUMP (0805)					
3913	4822 051 20008	0R00 JUMP (0805)					
3915	4822 051 20008	0R00 JUMP (0805)					
3916	4822 051 20008	0R00 JUMP (0805)					
3917	4822 051 20008	0R00 JUMP (0805)					
3918	4822 051 20008	0R00 JUMP (0805)					
3919	4822 051 20008	0R00 JUMP (0805)					
3922	4822 051 20008	0R00 JUMP (0805)					
3923	4822 051 20008	0R00 JUMP (0805)					
3924	4822 051 20008	0R00 JUMP (0805)					
3925	4822 051 20008	0R00 JUMP (0805)					
3926	4822 051 20008	0R00 JUMP (0805)					
3927	4822 051 20008	0R00 JUMP (0805)					
3928	4822 051 20008	0R00 JUMP (0805)					
3929	4822 051 20008	0R00 JUMP (0805)					
3930	4822 051 20008	0R00 JUMP (0805)					
3931	4822 051 20008	0R00 JUMP (0805)					
3941	4822 051 20008	0R00 JUMP (0805)					
3942	4822 051 20008	0R00 JUMP (0805)					
3943	4822 051 20008	0R00 JUMP (0805)					
3944	4822 051 20008	0R00 JUMP (0805)					
3945	4822 051 20008	0R00 JUMP (0805)					
3946	4822 051 20008	0R00 JUMP (0805)					
3947	4822 051 20008	0R00 JUMP (0805)					
3950	4822 051 20008	0R00 JUMP (0805)					
3951	4822 051 20008	0R00 JUMP (0805)					
3956	4822 051 20008	0R00 JUMP (0805)					
3960	4822 051 20008	0R00 JUMP (0805)					
3961	4822 051 20008	0R00 JUMP (0805)					
3962	4822 051 20008	0R00 JUMP (0805)					
3965	4822 051 20008	0R00 JUMP (0805)					
3966	4822 051 20008	0R00 JUMP (0805)					
3967	4822 051 20008	0R00 JUMP (0805)					
3970	4822 051 20008	0R00 JUMP (0805)					
3972	4822 051 20008	0R00 JUMP (0805)					
3973	4822 051 20008	0R00 JUMP (0805)					
3984	4822 051 20008	0R00 JUMP (0805)					
3985	4822 051 20008	0R00 JUMP (0805)					
3986	4822 051 20008	0R00 JUMP (0805)					
3988	4822 051 20008	0R00 JUMP (0805)					
3989	4822 051 20008	0R00 JUMP (0805)					
3990	4822 051 20008	0R00 JUMP (0805)					
3998	4822 051 20008	0R00 JUMP (0805)					
3999	4822 051 20008	0R00 JUMP (0805)					
4501	4822 117 12708	39K00	5%	0,1W			
4505	4822 117 10833	10K	1%	0,1W			
4512	4822 117 12708	39K00	5%	0,1W			
4517	4822 051 20182	1K80	5%	0,1W	for DOWN		
4517	4822 117 10833	10K	1%	0,1W	for STBY		
4517	4822 051 20472	4K70	5%	0,1W	for UP		
4518	4822 117 12708	39K00	5%	0,1W			
4523	4822 117 10833	10K	1%	0,1W			
4545	4822 117 10833	10K	1%	0,1W			
4563	4822 117 10833	10K	1%	0,1W			
4569	4822 051 20182	1K80	5%	0,1W			
4579	4822 051 20182	1K80	5%	0,1W			
4580	4822 117 12708	39K00	5%	0,1W			
4583	4822 117 10833	10K00	1%	0,1W	for STBY		
4583	4822 051 20472	4K70	5%	0,1W	for UP		
4583	4822 051 20182	1K80	5%	0,1W	for DOWN		
4591	4822 117 12708	39K00	5%	0,1W			
4592	4822 117 12708	39K00	5%	0,1W			
4595	4822 117 12708	39K00	5%	0,1W			
4596	4822 117 12708	39K00	5%	0,1W	for REC		
4596	4822 051 20008	0R00 JUMP (0805)			for EJECT		
4609	4822 051 20182	1K80	5%	0,1W			
4610	4822 117 12708	39K00	5%	0,1W			
4628	4822 117 12708	39K00	5%	0,1W			
4653	4822 051 20182	1K80	5%	0,1W			
4659	4822 051 20472	4K70	5%	0,1W			
4660	4822 051 20472	4K70	5%	0,1W	for REW		
4660	4822 051 20182	1K80	5%	0,1W	for STOP		
4665	4822 051 20472	4K70	5%	0,1W	for UP		
4665	4822 117 12708	39K00	5%	0,1W	for INST.		
4671	4822 051 20008	0R00 JUMP (0805)			for ST/EJ		
4671	4822 051 20182	1K80	5%	0,1W	for DOWN		
4672	4822 051 20183	18K00	5%	0,1W			
4677	4822 051 20182	1K80	5%	0,1W	for DOWN		
4677	4822 051 20008	0R00 JUMP (0805)			for ST/EJ		
4678	4822 117 10833	10K	1%	0,1W			
4683	4822 051 20008	0R00 JUMP (0805)					
4684	4822 051 20472	4K70	5%	0,1W	for REW		
4684	4822 117 12708	39K00	5%	0,1W	for REC		
4703	4822 117 12708	39K00	5%	0,1W			
4716	4822 051 20472	4K70	5%	0,1W			
4728	4822 051 20183	18K00	5%	0,1W			
4739	4822 051 20008	0R00 JUMP (0805)					
4742	4822 117 10833	10K	1%	0,1W			
4745	4822 051 20472	4K70	5%	0,1W	for UP		
4745	4822 051 20008	0R00 JUMP (0805)			for ST/EJ		
4746	4822 051 20472	4K70	5%	0,1W	for REW		
4746	4822 051 20183	18K00	5%	0,1W	for PLAY		
4752	4822 051 20472	4K70	5%	0,1W			
4757	4822 051 20008	0R00 JUMP (0805)					
4758	4822 051 20183	18K00	5%	0,1W			
4758	4822 117 10833	10K	1%	0,1W			
4763	4822 117 12708	39K00	5%	0,1W			
4764	4822 117 10833	10K	1%	0,1W	for WIND		
4764	4822 051 20183	18K00	5%	0,1W	for PLAY		
4764	4822 051 20472	4K70	5%	0,1W	for REW		
4772	4822 117 10833	10K	1%	0,1W	for WIND		
4772	4822 051 20472	4K70	5%	0,1W	for REW		
4787	4822 051 20008	0R00 JUMP (0805)					

COILS

5000	4822 157 11234	10μH	5%		
5001	4822 152 20677	10μH			
5002	4822 152 20677	10μH			
5004	4822 157 11142	47μH	5%		
5005	4822 157 11145	150μH	5%		
5020	4822 157 10972	15μH	5%		
5026	4822 157 11228	LAN02TB101J			
5036	4822 157 11149	56μH	5%		
5080△	4822 157 11226	47μH	5%		
5100	4822 157 63661	FIL LC VAR 4M286 5VS			
5101	4822 157 10972	15μH	5%		
5102	4822 157 11149	56μH	5%		
5103	4822 157 63661	FIL LC VAR 4M286 5VS			
5104	4822 157 11227	150μH	5%		
5105	4822 157 11227	150μH	5%		
5106	4822 157 11151	330μH	5%		
5107	4822 157 11228	LAN02TB101J			
5108	4822 157 63659	FIL LC VAR 1G072 5V2			
5111	4822 157 11229	15μH	5%		
5112	4822 157 10972	15μH	5%		
5113	4822 157 11145	150μH	5%		
5114	4822 157 10972	15μH	5%		
5115	4822 157 63717	6,8μH			
5130	4822 157 71206	BLM21A10PT			
5150△	4822 157 53906	47μH			
5200	4822 152 20677	10μH			

Motherboard QMB PAL, SECAM, MONO, STEREO

5300	△	4822 157 53005	
5350		4822 157 51462	10μH
5351		4822 157 71461	22μH 10%
5352	△	4822 157 10454	
5353	△	4822 146 10786	SRW32ES-E01
5354		4822 157 51462	10μH
5355	△	4822 157 53005	
5358		4822 157 60147	2,2μH
5361		4822 157 52286	22μH
5368		4822 157 60147	2,2μH
5400		4822 152 20677	10μH
5402		4822 152 20677	10μH
5601		4822 157 11249	10.000UF 5%
5602		4822 157 11151	330μH 5%
5603		4822 157 53531	
5604		4822 157 11251	3,3μH 10%
5605		4822 157 71206	BLM21A10PT
5700		4822 157 71206	BLM21A10PT
5702		4822 152 20677	10μH
5703		4822 152 20677	10μH
5705		4822 152 20677	10μH
5720		4822 157 11231	LAN02TB1R0J
5721		4822 157 70877	H292ONS-6785NK
5725		4822 157 70877	H292ONS-6785NK
5726		4822 051 20008	OR00 JUMP (0805)
5740		4822 157 11232	12μH 5% for SECAM LL'
5740		4822 157 11229	15μH 5% for PAL
5741		4822 157 11223	39μH 5%
5780		4822 157 70038	
5800		4822 157 11233	LAN02TB330J
5801		4822 152 20677	10μH
5810		4822 157 11234	10μH 5%
5831		4822 157 11235	LANO2TB220J

DIODES

6100		4822 130 32778	1SS133
6135		4822 130 34197	BZX79-B12
6250		4822 130 83514	MTZJ12C
6299		4822 130 10869	DIODE SIGN RB441
6350		4822 130 30842	BAV21
6351		4822 130 31983	BAT85
6352		4822 130 42488	BYD33D
6353		4822 130 42488	BYD33D
6354		4822 130 80858	1N5062
6355		4822 130 42488	BYD33D
6356		4822 130 42488	BYD33D
6357		4822 130 10871	DIODE RECT SBYV2
6358		5322 130 31938	BYV27-200
6359		4822 130 32715	SB340
6359		4822 130 83909	BYW98-200RL
6360		4822 130 83147	DF06M
6371		4822 130 42488	BYD33D
6372		4822 130 34142	BZX79-B33
6460		4822 130 10231	SET: 2x Sens + 1x Led
6500		4822 130 34197	BZX79-B12
6501		4822 130 34197	BZX79-B12
6502		4822 130 34197	BZX79-B12
6509		4822 130 83514	MTZJ12C
6510		4822 130 83514	MTZJ12C
6511		4822 130 10884	MTZJ18C
6516		4822 130 34278	BZX79-B6V8
6530		4822 130 10654	BAT254
6601		4822 130 30861	BZX79-B7V5
6760		4822 130 10414	BA792
6761		4822 130 10414	BA792

TRANSISTORS & IC's

7000		4822 130 42353	BSF19-F2
7001		4822 130 10872	MMUN2112LT1
7002		4822 130 60511	BC847B
7003		4822 209 15526	LC89980M

7004		4822 130 42353	BSF19-F2
7005		5322 130 60508	BC857B
7006		4822 130 60511	BC847B
7007		4822 209 15527	LA71525M
7008		5322 130 60508	BC857B
7009		4822 130 10872	MMUN2112LT1
7011		4822 130 60511	BC847B
7020		4822 130 63732	MMUN2212
7021		5322 130 60508	BC857B
7080		4822 209 90421	STV5712
7085		4822 130 60511	BC847B
7100		4822 130 60511	BC847B
7101		4822 130 60511	BC847B
7102		4822 209 73852	PMBT2369
7103		4822 130 60511	BC847B
7104		4822 130 63732	MMUN2212
7105		5322 130 60508	BC857B
7106		4822 130 60511	BC847B
7110		4822 209 90189	TDA4722/V2
7150		4822 209 13121	STV5742
7151		4822 209 15548	STV5744AD
7153		4822 130 63732	MMUN2212
7201		4822 209 15516	TMP87CS71F QDCE1-xP
7201		4822 209 15517	TMP87CS71F QDCE2-xU
7201		4822 209 15518	TMP87CS71F QDCE3-xU
7201		4822 209 15521	TMP87CS71F QDCH1-xP
7201		4822 209 15519	TMP87CS71F QDCH2-xU
7201		4822 209 15528	TMP87CS71F QDCH3-xU
7201		4822 209 15549	TMP87CS71F QDCH4-xU
7201		4822 209 15573	TMP87CS71F QDCH5-xU
7202		4822 135 00115	25U39113SA
7203		4822 212 30842	TFMS5360
7231		4822 130 63732	MMUN2212
7300		4822 209 13126	TDA5241
7301		4822 130 10872	MMUN2112LT1
7350	△	4822 130 63794	STP3NA60
7351	△	4822 209 32126	SOC1012T
7352		4822 209 81397	TL431CLpST
7353		4822 130 10214	STD17N06
7354		4822 209 90025	MC44603P
7356		4822 130 60511	BC847B
7357		4822 130 10214	STD17N06
7358		4822 130 40995	BD438
7359		4822 130 60511	BC847B
7400		4822 209 15529	TMP91C642AF QTDP2-xU
7420		4822 209 90313	L4812CV for stereo
7420		4822 209 81726	MC7812CT for mono
7440		4822 209 30146	L2722
7455		4822 130 10872	MMUN2112LT1
7456		4822 130 60511	BC847B
7457		4822 130 60511	BC847B
7458		4822 130 60511	BC847B
7460		4822 209 30836	SAA1310/N2
7461		4822 130 10231	SET: 2x Sens + 1x Led
7462		4822 130 10231	SET: 2x Sens + 1x Led
7463		4822 130 41344	BC337-40
7464		4822 130 10233	TCRT5000L
7465		4822 130 10233	TCRT5000L
7466		4822 130 10234	TCST1030L
7467		4822 130 60511	BC847B
7468		4822 130 60511	BC847B
7469		4822 130 60511	BC847B
7500		4822 130 60511	BC847B
7501		5322 130 60508	BC857B
7502		4822 130 60511	BC847B
7505		4822 130 63732	MMUN2212
7506		4822 130 10872	MMUN2112LT1
7507		4822 209 90016	STV6400
7510		5322 130 42136	BC848C
7511		4822 130 42615	BC817-40
7512		5322 130 42136	BC848C
7513		5322 209 14481	HEF4053BT
7513		5322 209 14481	HEF4053BT
7540		4822 209 15504	SDA5650 for VPS/PDC
7540		4822 209 32728	SDA5642 for VPS only

QNIC

MISCELLANEOUS

1700 Δ	4822 071 52501	Fuse	250mA
1710	4822 242 10433	Crystal	8,192 MHz
1970	4822 265 10943	CONN	11P

CAPACITORS

2700	4822 122 33172	390pF	5%	50V
2701	5322 122 32448	10pF	5%	50V
2703	4822 126 10002	100nF	20%	25V
2704	4822 122 33575	220pF	5%	50V
2705	4822 124 22826	10 μ F		16V
2706	4822 124 22826	10 μ F		16V
2707	4822 126 13061	220nF	20%	25V
2708	5322 122 32654	22nF	10%	63V
2709	5322 122 32531	100pF	5%	50V
2710	5322 122 32531	100pF	5%	50V
2714	4822 124 23027	47 μ F		6.3V
2716	4822 124 23027	47 μ F		6.3V
2718	4822 126 10002	100nF	20%	25V
2719	4822 122 33175	2,2nF	20%	50V
2720	4822 122 33175	2,2nF	20%	50V
2721	4822 126 13061	220nF	20%	25V
2722	4822 122 33175	2,2nF	20%	50V
2723	4822 122 33175	2,2nF	20%	50V
2725	4822 124 23053	1 μ F	20%	63V
2726	4822 122 33797	47nF	20%	50V
2727	4822 124 23027	47 μ F		6.3V
2728	4822 126 10002	100nF	20%	25V
2729	4822 124 22826	10 μ F		16V
2731	4822 124 22826	10 μ F		16V
2732	4822 126 10002	100nF	20%	25V
2733	4822 124 23027	47 μ F		6.3V
2734	5322 122 32654	22nF	10%	63V
2736	4822 126 10002	100nF	20%	25V
2752	4822 126 13061	220nF	20%	25V
2753	4822 126 13061	220nF	20%	25V

RESISTORS

3700	4822 051 10102	1K00	2%	0,25W
3701	4822 051 20101	100R00	5%	0,1W
3702	4822 051 20223	22K00	5%	0,1W
3703	4822 051 20104	100K00	5%	0,1W
3704	4822 117 11449	2K2	1%	0,1W
3705	4822 051 20392	3K90	5%	0,1W
3707	4822 116 52276	3K9	5%	0,5W
3708	4822 117 11449	2K2	1%	0,1W
3710	4822 051 20334	330K00	5%	0,1W
3711	4822 116 52175	100E	5%	0,5W
3712	4822 116 52175	100E	5%	0,5W
3713	4822 051 20182	1K80	5%	0,1W
3714	4822 051 20333	33K00	5%	0,1W
3715	4822 117 10833	10K	1%	0,1W
3720	4822 117 10833	10K	1%	0,1W
3721	4822 117 10833	10K	1%	0,1W
3722	4822 117 10833	10K	1%	0,1W
3723	4822 117 10833	10K	1%	0,1W
3790	4822 051 20008	0R00	JUMP (0805)	
3792	4822 051 20008	0R00	JUMP (0805)	
3793	4822 051 20008	0R00	JUMP (0805)	
3794	4822 051 20008	0R00	JUMP (0805)	
3795	4822 051 20008	0R00	JUMP (0805)	
3796	4822 051 20008	0R00	JUMP (0805)	
3797	4822 051 20008	0R00	JUMP (0805)	

COILS

5700	4822 157 63717	6,8M μ H
5703	4822 157 71206	BLM21A10
5704	4822 157 71206	BLM21A10
5705	4822 157 71206	BLM21A10
5706	4822 157 71206	BLM21A10
5707	4822 157 71206	BLM21A10

DIODES

6700	4822 130 10652	BB149
6701	4822 130 83757	BAS216

TRANSISTORS & IC's

7700	4822 209 14809	SAA7284Z
7701	5322 209 61487	LM358N

CABLES & SUB MODULS

CABLES

8001	4822 320 11889	FFC TD1-1961
8002	4822 323 10374	CABLE TREE TD2-1962
8003	4822 320 11891	FFC TD1-1944
8004	4822 320 11892	FFC TD4-1930
8005	4822 320 11888	FFC 1901-1945
8007	4822 320 11891	FFC 1710-1750
8008	4822 323 10373	ESD-GND CONN.
	△ 4822 321 10886	MAINS CORD (+FUSE) for UK
	△ 4822 321 10249	MAINS CORD
	4822 320 50377	ANTENNA cable
	4822 321 63002	SCART cable

SUB MODULS

4822 214 12238	CINCH print rear
4822 214 12248	QKP21 Shuttle print



3
4



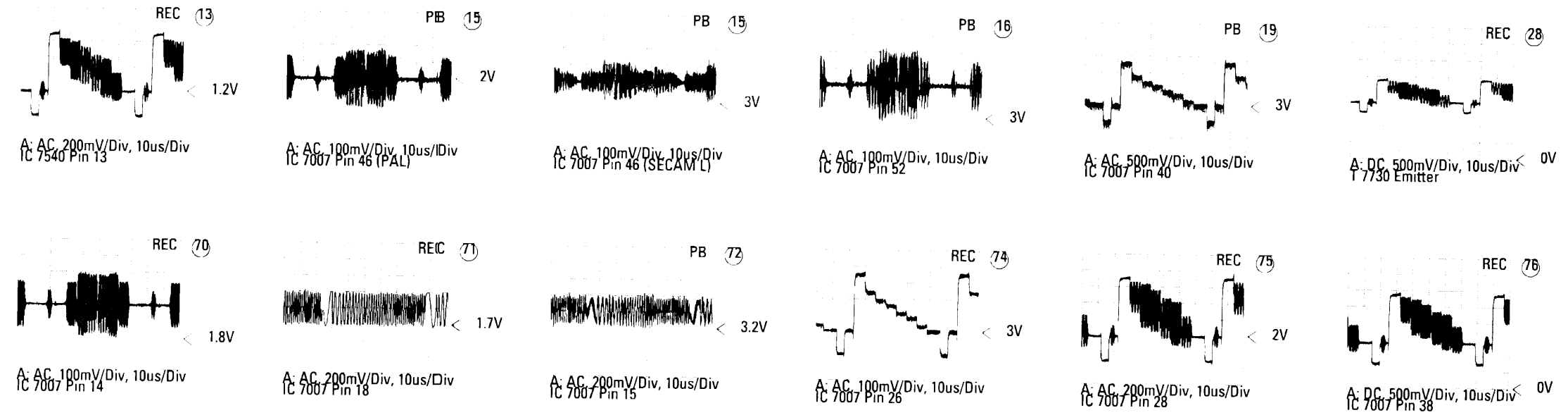
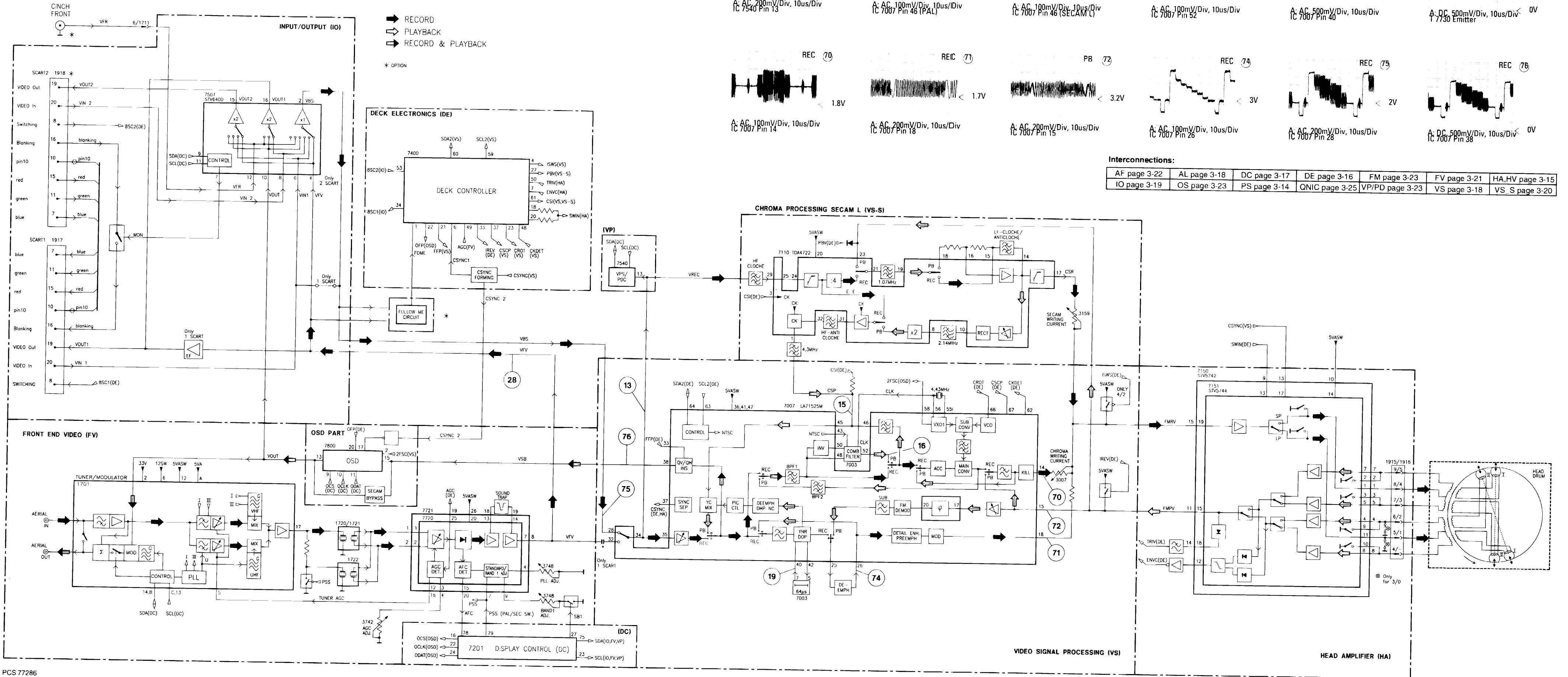
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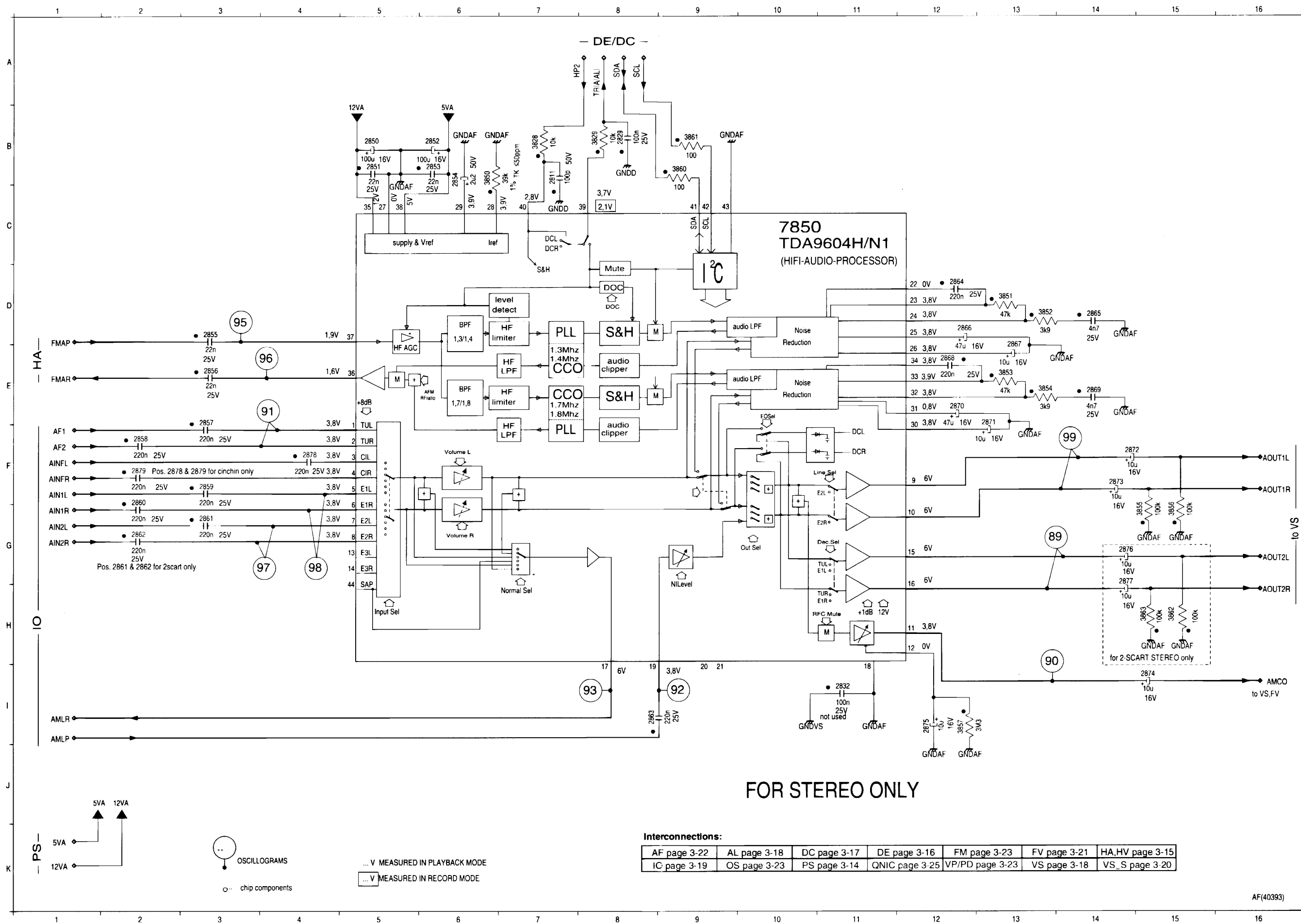
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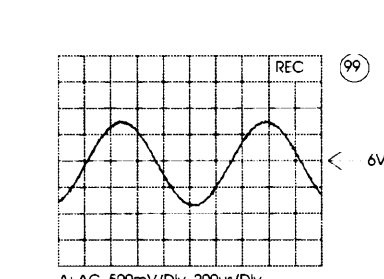
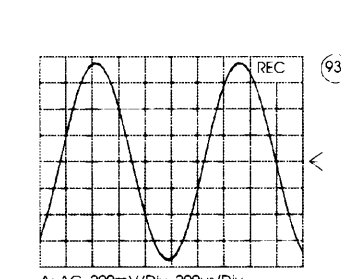
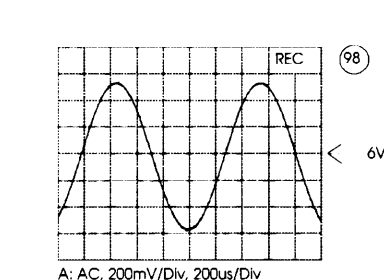
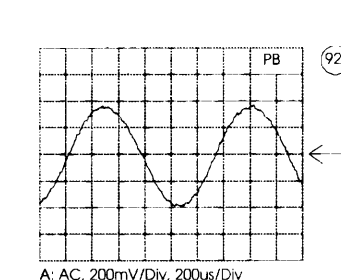
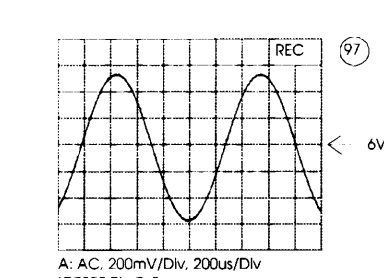
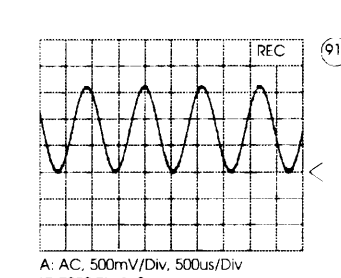
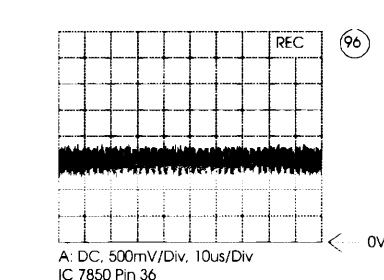
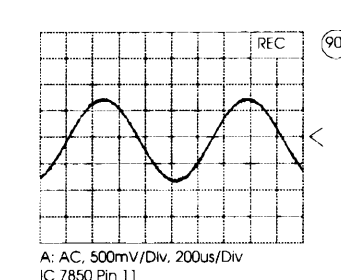
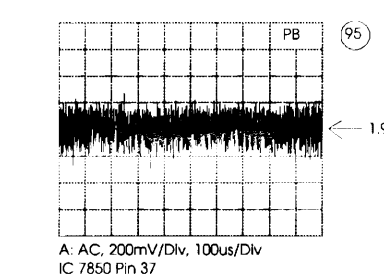
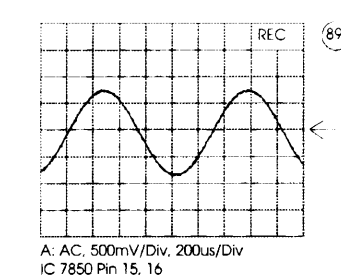
Block Diagram Video



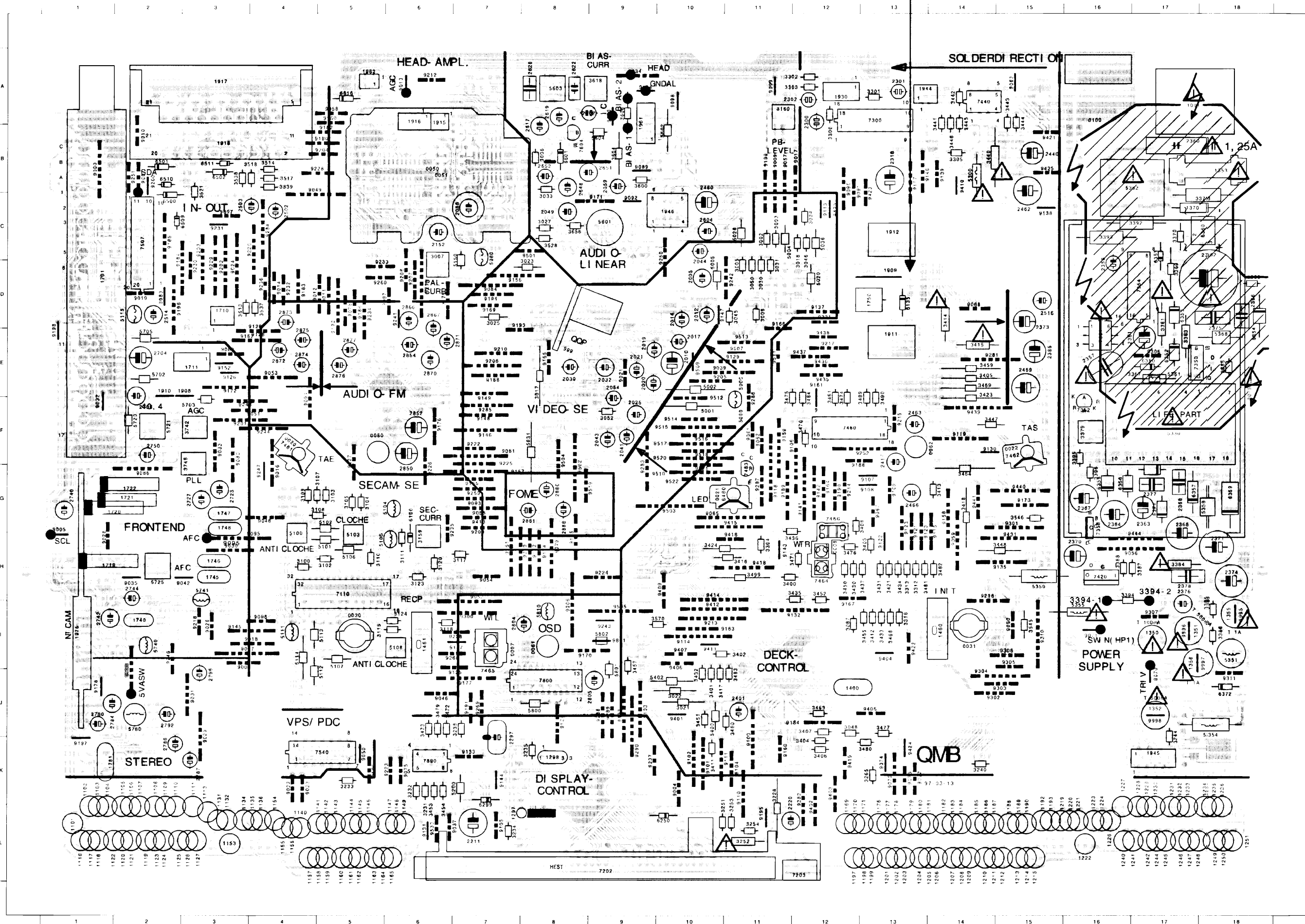
Audio FM Processing (AF)



- 2811 B 7
- 2829 B 8
- 2832 I 1
- 2850 B 5
- 2851 B 5
- 2852 B 6
- 2853 B 6
- 2854 B 6
- 2855 D 3
- 2856 E 3
- 2857 F 3
- 2858 F 2
- 2859 F 3
- 2860 G 2
- 2861 G 3
- 2862 G 2
- 2863 I 8
- 2864 D12
- 2865 D14
- 2866 D12
- 2867 D13
- 2868 E12
- 2869 E14
- 2870 E12
- 2871 F13
- 2872 F14
- 2873 F14
- 2874 I15
- 2875 I12
- 2876 G14
- 2877 H14
- 2878 F 4
- 2879 F 2
- 3828 B 7
- 3829 B 8
- 3850 B 6
- 3851 D13
- 3852 D13
- 3853 E13
- 3854 E13
- 3855 G15
- 3856 G15
- 3857 I12
- 3860 B 9
- 3861 B 9
- 3862 H15
- 3863 H15
- 7850 C10

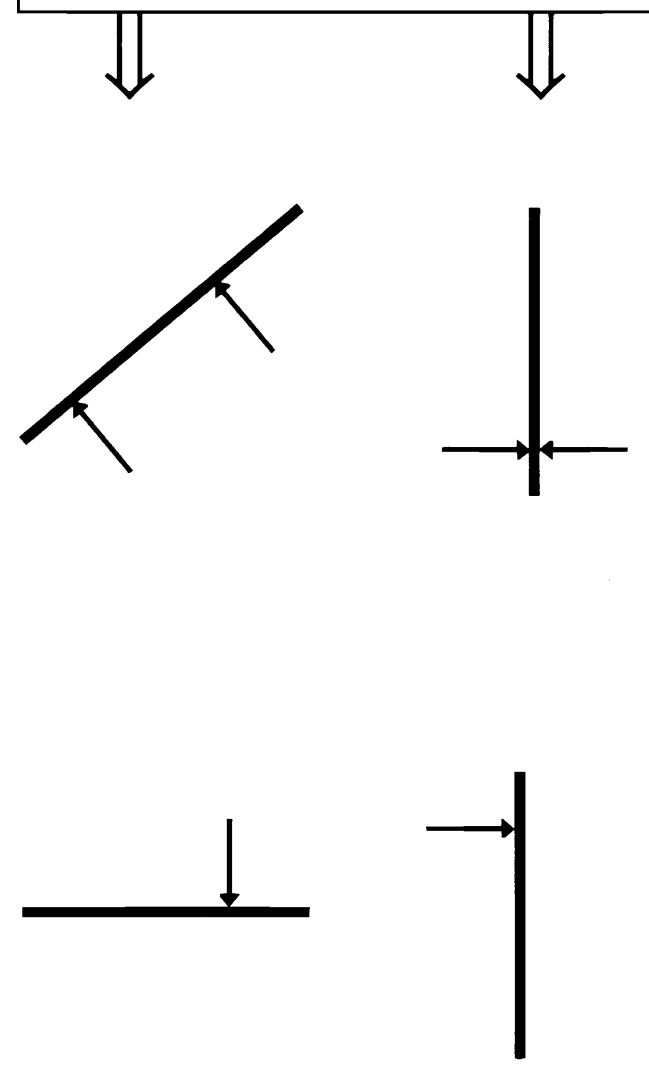


Layout for cinch print rear

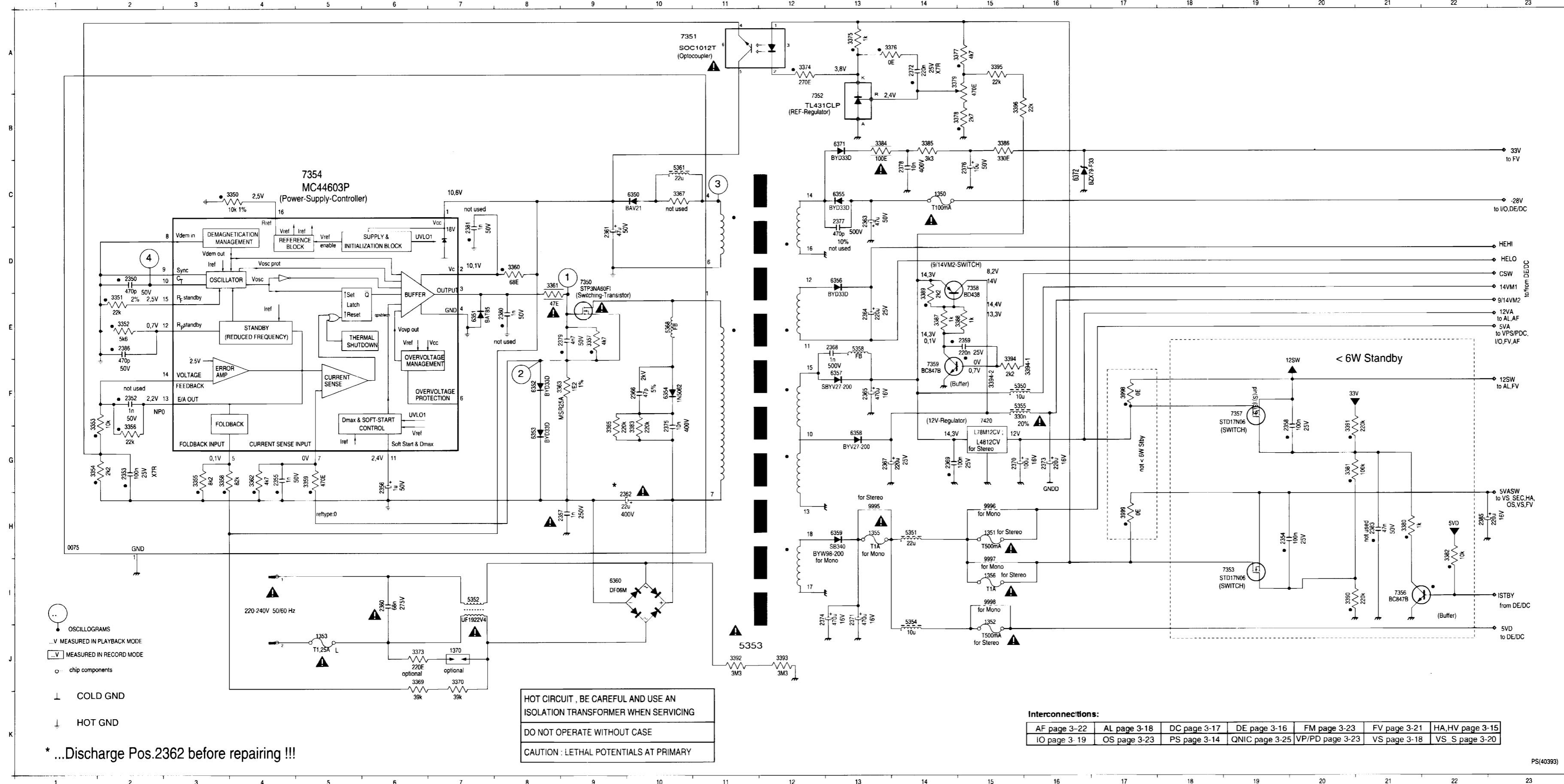


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0001 G 1	1272 L 16	2378 H 17	3301 A 13	3619 A 10	9009 I 4	9136 H 16	9260 G 8
0008 G 12	1273 L 16	2385 E 15	3302 A 12	3742 F 3	9010 H 2	9138 C 15	9268 I 6
16 F 17	1274 L 16	2401 J 11	3303 A 12	3748 F 3	9011 D 5	9139 B 14	9269 J 7
18 G 17	1276 L 16	2417 F 13	3304 H 11	5000 F 11	9012 D 5	9140 B 13	9281 E 14
0020 F 4	1277 L 16	2440 B 15	3305 H 14	5001 F 10	9013 A 6	9141 G 12	9282 L 12
0021 G 11	1278 L 17	2458 H 15	3312 H 13	5002 E 10	9014 D 4	9142 G 12	9283 F 9
0022 F 15	1279 L 17	2480 C 10	3313 H 13	5004 C 11	9015 E 4	9143 H 11	9284 C 4
0030 I 5	1230 L 17	2462 B 15	3316 I 13	5005 D 10	9017 C 12	9144 K 7	9285 F 7
0031 I 14	1231 L 17	2463 F 13	3361 D 17	5020 D 12	9018 I 4	9145 I 4	9286 F 11
0050 A 7	1232 L 17	2488 G 13	3363 E 17	5026 C 11	9019 D 2	9146 F 7	9287 G 11
0051 D 8	1233 L 17	2502 C 4	3365 E 18	5036 C 12	9021 E 9	9147 D 10	9288 J 9
0060 F 5	1234 L 18	2503 C 4	3367 E 17	5080 C 7	9022 K 4	9148 F 7	9289 J 9
0061 E 8	1235 L 18	2514 D 2	3369 D 17	5100 H 4	9023 K 4	9149 E 7	9290 J 9
0062 F 13	1236 L 18	2516 D 15	3370 C 17	5101 H 5	9024 D 3	9150 A 5	9300 I 7
0075 C 16	1240 L 16	2602 A 8	3373 C 18	5102 G 5	9026 J 3	9151 H 7	9301 G 15
0100 B 15	1241 L 17	2604 C 10	3379 F 18	5103 H 5	9027 I 3	9152 E 3	9302 J 14
099 E 8	1242 L 17	2617 B 8	3382 D 18	5104 G 6	9028 H 1	9154 A 9	9303 J 15
0011 A 17	1244 L 17	2619 A 8	3384 H 17	5105 H 6	9029 K 3	9155 E 8	9304 J 15
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1102 L 1	1246 L 17	2622 A 8	3386 I 18	5107 I 5	9032 F 1	9157 G 7	9306 E 17
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1106 L 2	1250 L 18	2704 E 2	3392 C 16	5113 I 4	9036 H 3	9161 F 12	9311 J 18
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1111 L 3	1351 I 17	2742 I 1	3401 J 10	5300 B 14	9046 J 6	9166 E 11	9405 J 13
1113 L 3	1352 J 17	2744 H 2	3402 I 10	5350 H 15	9048 G 4	9167 H 12	9408 I 10
1116 L 1	1353 B 18	2750 F 2	3403 H 13	5351 I 18	9049 C 4	9168 E 7	9407 I 10
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1120 L 2	1400 J 12	2787 K 3	3407 J 12	5358 G 16	9053 E 4	9172 E 3	9412 I 10
1121 L 2	1460 I 14	2792 J 2	3408 G 12	5361 E 17	9054 H 7	9173 G 15	9413 G 7
1122 L 2	1461 I 6	2796 J 3	3411 K 10	5368 E 18	9055 G 7	9174 H 8	9414 H 10
1123 L 2	1701 D 1	2804 I 8	3412 I 13	5400 J 10	9056 H 16	9175 H 8	9415 G 11
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1125 L 2	1711 C 2	2806 J 9	3414 C 12	5403 A 5	9058 A 5	9177 F 7	9418 H 11
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1127 L 3	1720 G 2	2854 E 6	3416 H 11	5603 A 8	9060 I 15	9179 D 6	9420 C 12
1131 L 3	1721 G 2	2866 D 6	3417 J 10	5604 B 9	9061 F 11	9180 B 5	9422 I 13
1132 L 3	1722 G 2	2867 D 6	3418 I 14	5702 E 2	9062 F 11	9182 B 5	9423 C 13
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1141 L 5	1748 G 3	2874 E 4	3431 M 13	5725 H 2	9070 J 17	9187 I 7	9436 F 12
1142 L 5	1750 D 13	2875 E 4	3432 I 10	5740 I 2	9071 I 16	9188 F 12	9437 E 12
1143 L 5	1751 H 3	2876 E 4	3433 H 11	5741 H 3	9072 J 13	9189 H 10	9438 E 12
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1155 L 4	1918 B 3	3006 B 8	3444 A 15	6250 L 10	9081 F 7	9198 E 1	9505 I 10
1156 L 4	1930 A 12	3007 D 8	3445 A 14	6299 K 8	9082 E 3	9199 B 11	9506 K 5
1157 L 4	1944 E 17	3008 D 14	3446 E 17	6300 D 14	9083 D 2	9200 B 2	9507 E 11
1158 L 5	1945 K 17	3017 E 8	3447 F 14	6351 C 17	9084 D 7	9201 F 3	9508 E 10
1159 L 5	1946 C 10	3018 C 12	3448 H 15	6352 E 17	9086 G 2	9202 D 3	9510 G 10
1160 L 5	1961 A 9	3021 J 10	3450 H 12	6353 D 17	9087 D 6	9203 D 3	9511 E 11
1161 L 5	1962 A 9	3022 J 10	3451 J 10	6354 D 18	9088 B 9	9204 B 5	9512 F 10
1162 L 5	1975 H 16	3023 B 11	3452 H 13	6356 G 16	9090 B 12	9205 E 6	9513 E 11
1163 L 5	2005 D 10	3025 D 7	3453 K 6	6357 G 17	9091 C 12	9206 E 7	9514 F 10
1164 L 5	2010 E 10	3027 C 8	3454 K 6	6358 G 16	9092 C 9	9207 D 6	9515 F 10
1165 L 6	2012 D 10	3030 D 11	3455 I 13	6359 G 18	9093 G 7	9208 D 6	9516 F 10
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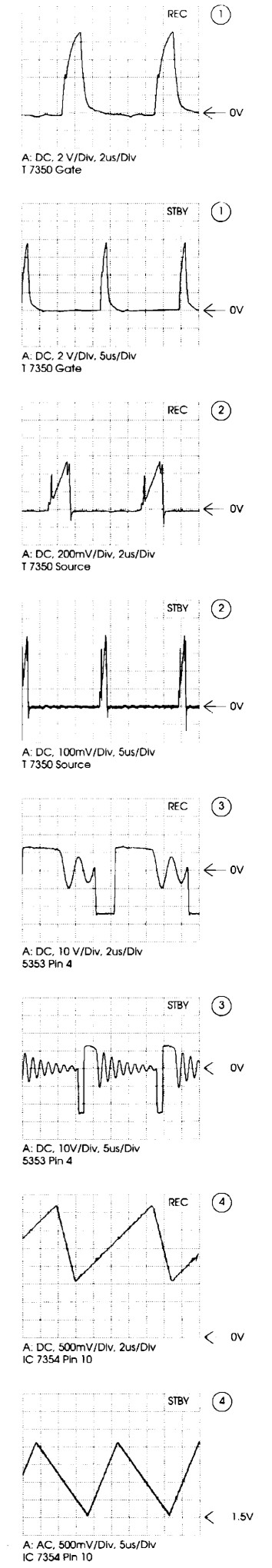
Make sure that the components in these areas are aligned correctly !!! (Danger of collision with deck)



Power Supply (PS)



- 0075 H 1
- 1350 C14
- 1351 H15
- 1352 J15
- 1353 J15
- 1355 H13
- 1356 I15
- 1370 J7
- 2350 D2
- 2352 F2
- 2353 G2
- 2354 H19
- 2355 G4
- 2356 G6
- 2357 H9
- 2358 H19
- 2359 F15
- 2360 I6
- 2361 D9
- 2362 H9
- 2363 C13
- 2364 E13
- 2365 F13
- 2366 F10
- 2367 G13
- 2368 E13
- 2369 G14
- 2370 G15
- 2371 H3
- 2372 A14
- 2373 G16
- 2374 I12
- 2375 G10
- 2376 C15
- 2377 C13
- 2378 C14
- 2379 E9
- 2380 G8
- 2381 D7
- 2383 H21
- 2385 H22
- 2386 E2
- 3350 C4
- 3351 E2
- 3352 E2
- 3353 G1
- 3354 G1
- 3355 G3
- 3356 G2
- 3357 E2
- 3358 G3
- 3359 G5
- 3360 D8
- 3361 E8
- 3362 G4
- 3363 G9
- 3365 G9
- 3367 C10
- 3369 I6
- 3370 J7
- 3373 J6
- 3374 A12
- 3375 A13
- 3376 A14
- 3377 A15
- 3378 B15
- 3379 A14
- 3380 H21
- 3381 H22
- 3382 G2
- 3383 G10
- 3384 B13
- 3385 B14
- 3386 B15
- 3387 E14
- 3388 E15
- 3389 E14
- 3390 I20
- 3391 G20
- 3392 J11
- 3393 J12
- 3394 F15
- 3395 A15
- 3396 B15
- 3398 F17
- 3399 H17
- 5350 I15
- 5351 H14
- 5352 I7
- 5353 J11
- 5356 C10
- 5358 E10
- 5359 C10
- 6351 E7
- 6352 F8
- 6353 G8
- 6354 F10
- 6355 C13
- 6356 D13
- 6357 F13
- 6358 C13
- 6359 H13
- 6360 I9
- 6371 B13
- 6372 C16
- 7350 D9
- 7351 A10
- 7352 B12
- 7353 I9
- 7354 C5
- 7356 I21
- 7357 F19



Supply Voltages and Bus Diagram

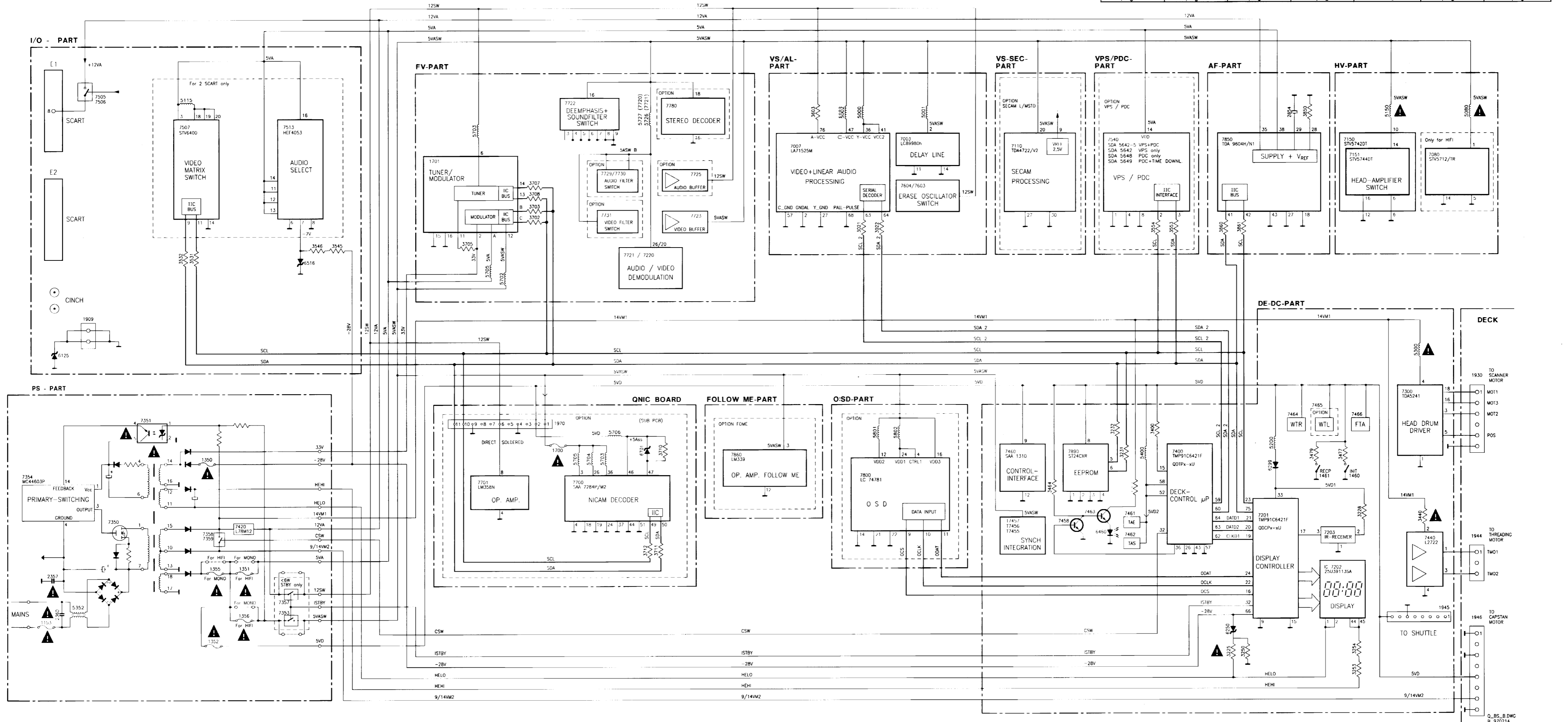
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Interconnections:

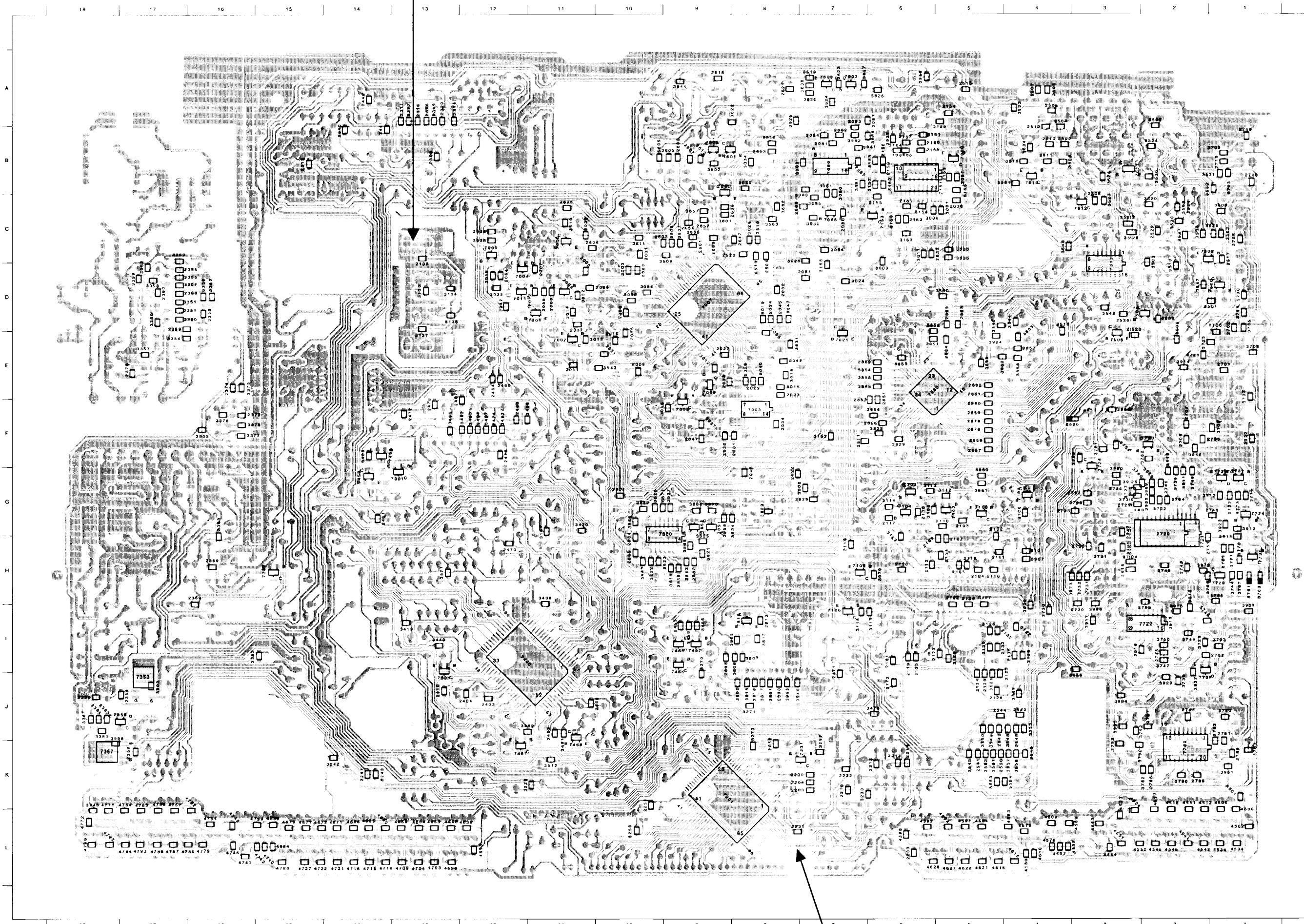
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Q_BS_B.DWG
R.970214

Mother Board QMB - solder side

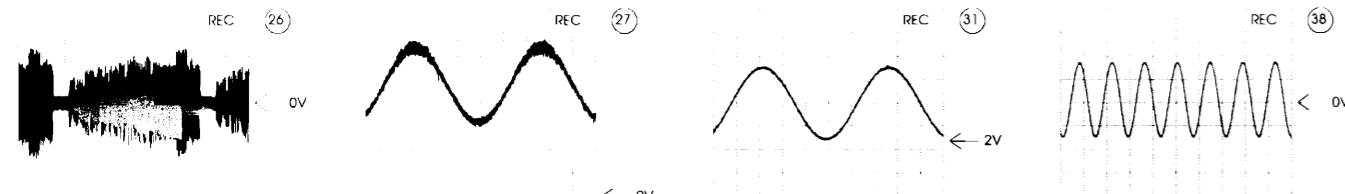
Layout for cinch print rear



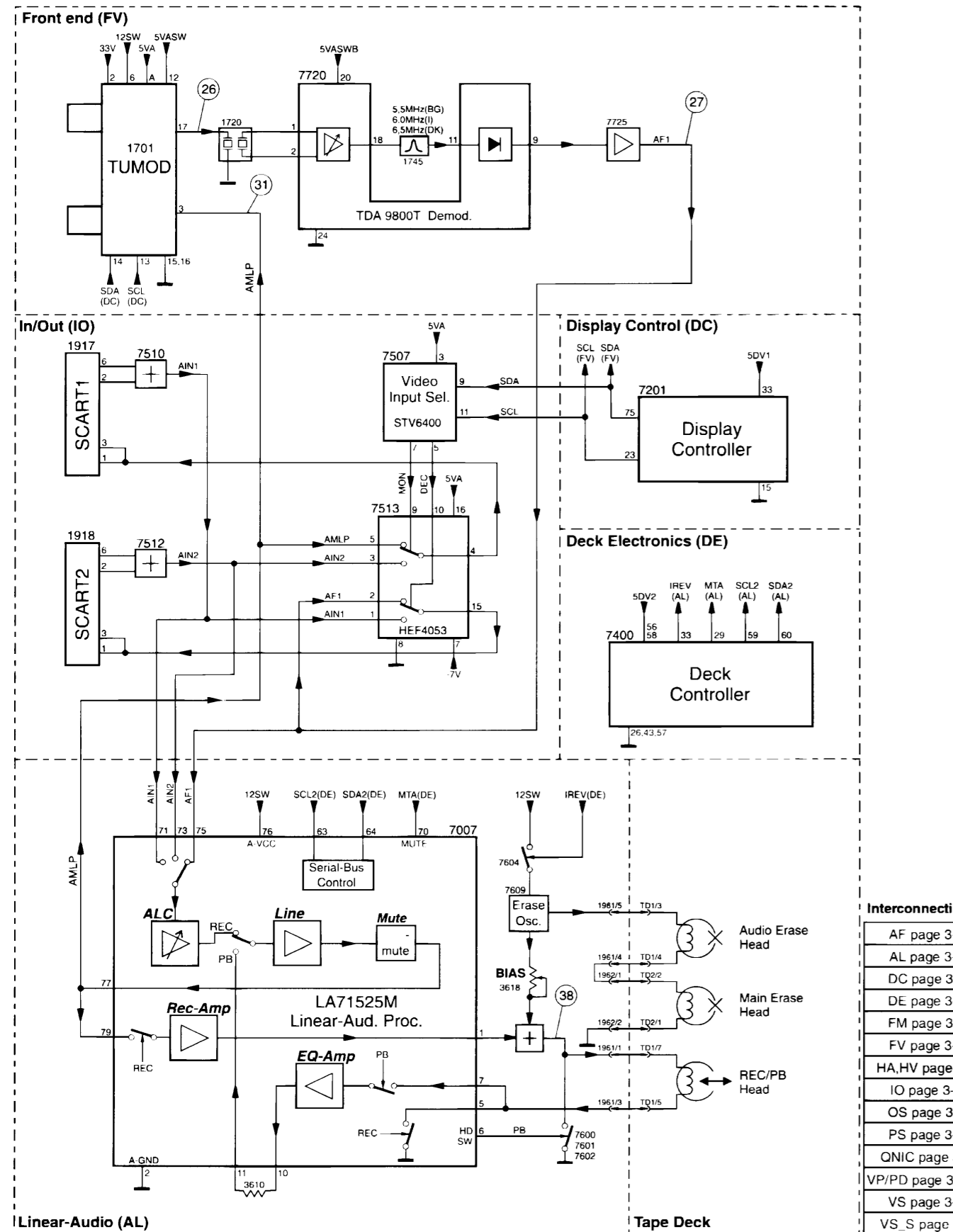
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2003 D 10	2350 C 17	2794 D 1	3359 D 17	3723 I 1	3961 K 1	7000 C 11
2004 D 11	2352 D 16	2795 F 2	3360 D 17	3725 E 1	3962 F 3	7001 D 11
2006 D 10	2353 D 17	2800 J 8	3362 D 17	3726 E 2	3965 J 8	7002 E 11
2007 D 11	2354 J 17	2801 J 8	3374 E 16	3729 I 2	3966 A 6	7003 F 8
2008 D 11	2355 D 17	2802 J 8	3375 E 16	3730 I 4	3967 J 4	7004 D 12
2009 E 10	2358 K 17	2803 I 9	3376 F 16	3731 H 3	3970 H 6	7005 F 8
2011 E 11	2359 I 16	2810 I 9	3377 F 16	3732 G 2	3972 H 2	7007 D 11
2013 D 11	2369 H 16	2811 F 7	3378 F 16	3735 G 2	3973 H 3	7007 D 9
2015 E 10	2372 F 16	2829 G 7	3380 J 18	3736 G 3	3984 J 3	7008 E 9
2016 E 10	2378 F 17	2831 E 8	3381 J 18	3737 G 3	3985 J 3	7009 C 12
2018 D 12	2380 D 17	2832 C 6	3382 I 15	3739 J 2	3986 I 1	7011 D 12
2022 G 8	2381 D 17	2851 F 6	3389 H 16	3744 H 1	3988 G 2	7020 R 5
2023 E 8	2383 J 18	2853 F 6	3390 J 18	3747 I 2	3989 G 2	7021 E 7
2024 D 8	2386 D 17	2855 F 6	3391 J 18	3749 I 2	3990 G 3	7080 B 7
2026 C 11	2400 J 11	2856 F 6	3410 J 13	3750 I 1	3998 K 18	7085 C 7
2027 E 9	2402 J 11	2857 F 5	3419 I 13	3760 G 2	3999 J 17	7100 G 5
2028 E 8	2403 J 12	2858 F 5	3420 G 11	3761 F 3	4501 K 1	7101 G 4
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2030 F 9	2416 F 12	2860 F 5	3449 I 13	3764 G 2	4505 L 1	7103 G 6
2031 F 8	2441 B 14	2861 E 5	3456 I 13	3765 G 3	4506 L 1	7104 G 6
2033 E 9	2442 A 14	2862 E 5	3458 I 9	3766 H 1	4511 L 2	7105 H 7
2034 F 8	2455 I 9	2863 D 5	3461 J 11	3767 H 1	4512 L 2	7108 I 7
2035 E 8	2481 G 14	2864 E 5	3462 J 11	3768 H 2	4517 L 2	7150 B 6
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2047 F 9	2473 F 13	2884 H 10	3497 F 12	3782 K 2	4545 L 2	7357 K 18
2051 D 7	2474 F 12	2885 H 10	3498 F 11	3790 K 3	4546 L 2	7359 H 15
2055 D 11	2501 C 8	2889 G 10	3500 C 1	3791 J 2	4551 L 3	7400 I 11
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2081 B 7	2507 A 4	3010 F 9	3505 B 2	3807 I 8	4589 L 4	7458 G 14
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2314 A 13	2783 J 2	3353 D 16	3706 H 3	3946 J 8	5605 B 10	
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2317 A 13	2789 K 2	3356 D 16	3709 F 1	3951 B 7	6530 F 3	

HEST

Block Diagram Audio Mono



A: DC, 100mV/Div, 10us/Div Tuner Pin 17
 A: DC, 500mV/Div, 200us/Div IC 7721 Pin 10
 A: AC, 500mV/Div, 200us/Div Modulator Pin 3
 A: DC, 1 V/Div, 10us/Div Connector 1931 Pin 1

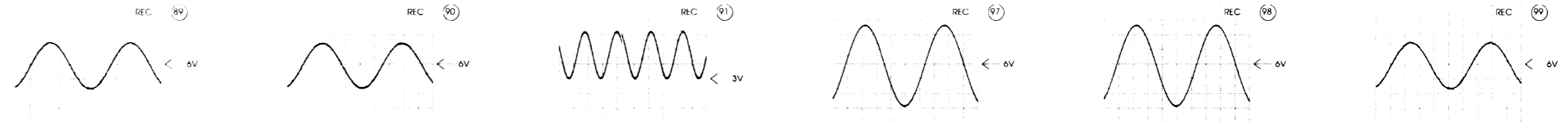


Linear-Audio (AL) Tape Deck

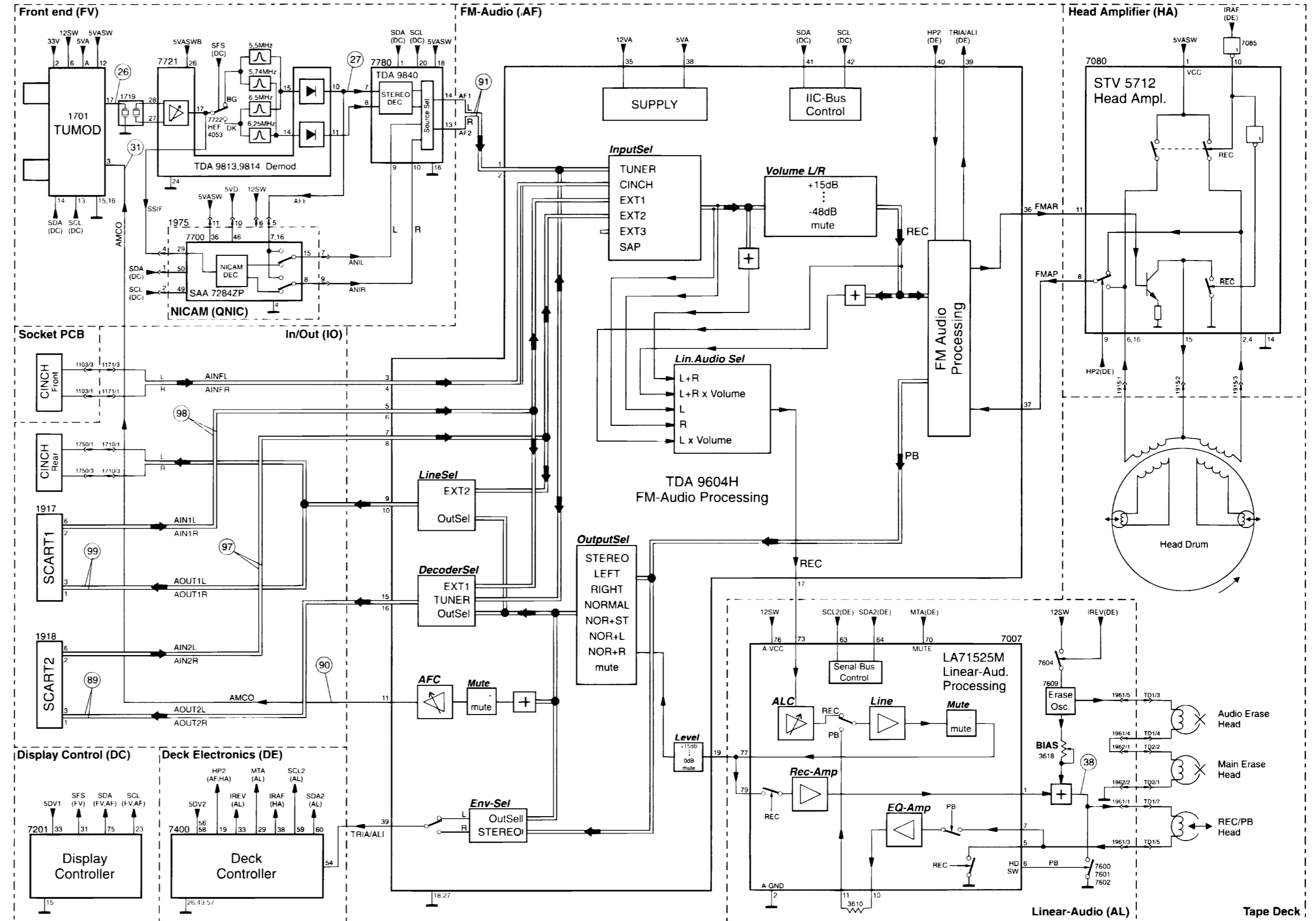
Interconnections:

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Block Diagram Audio Stereo



A: AC, 500mV/Div, 200us/Div IC 7850 Pin 15, 16
 A: AC, 500mV/Div, 200us/Div IC 7850 Pin 11
 A: AC, 500mV/Div, 500us/Div IC 7850 Pin 1, 2
 A: AC, 200mV/Div, 200us/Div IC 7850 Pin 7, 8
 A: AC, 200mV/Div, 200us/Div IC 7850 Pin 5, 6
 A: AC, 500mV/Div, 200us/Div IC 7850 Pin 9, 10

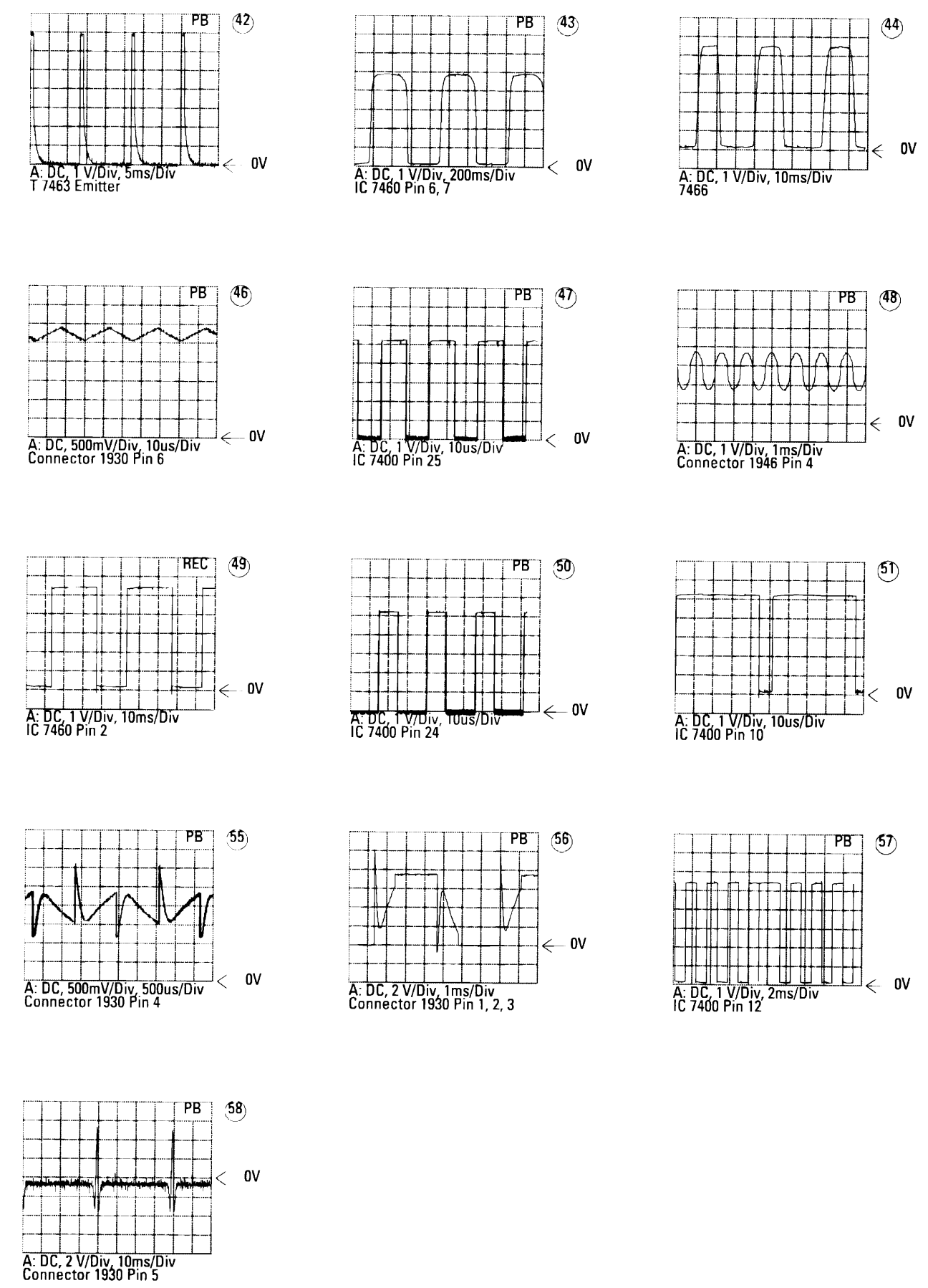
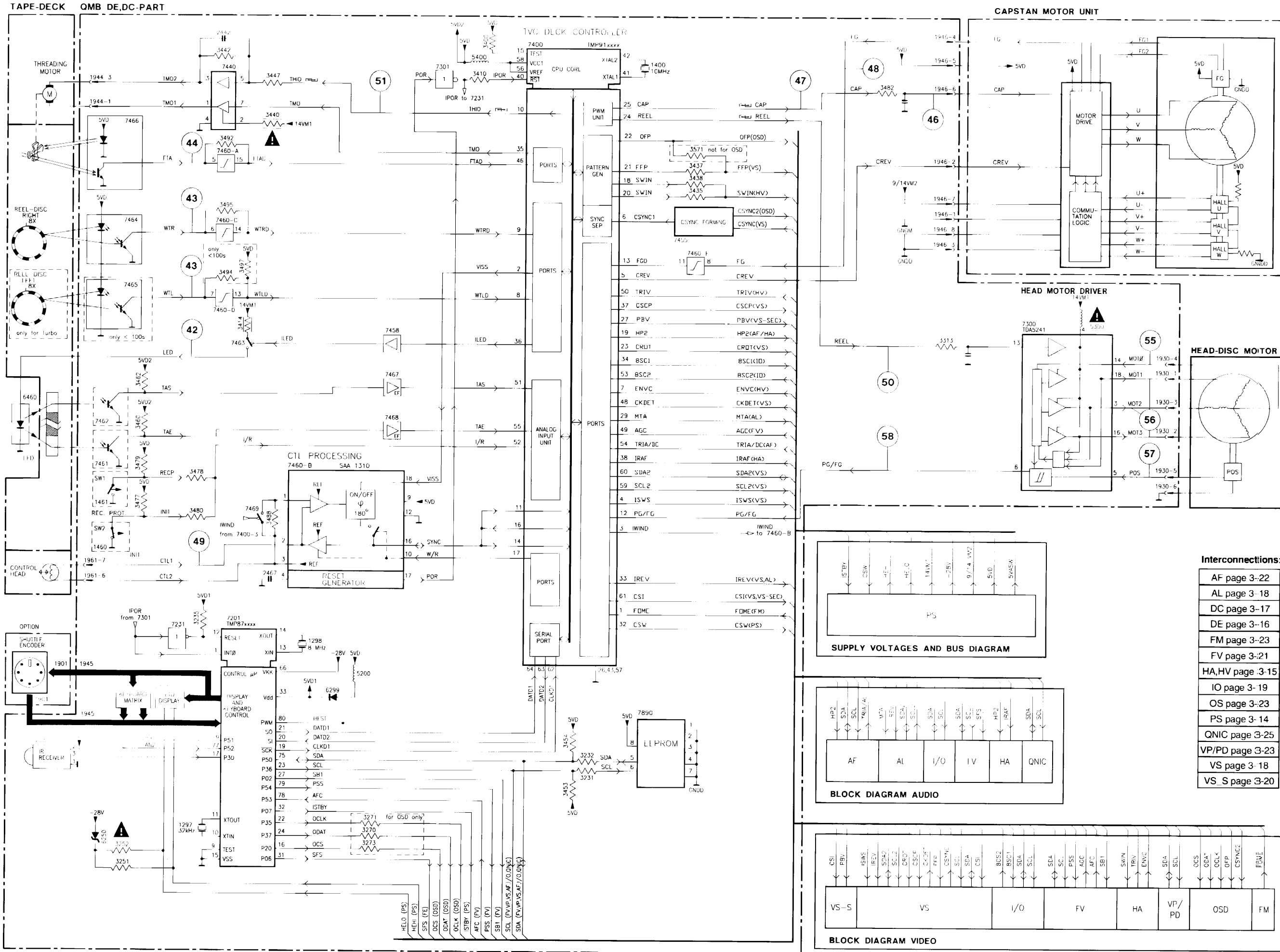


Linear-Audio (AL) Tape Deck

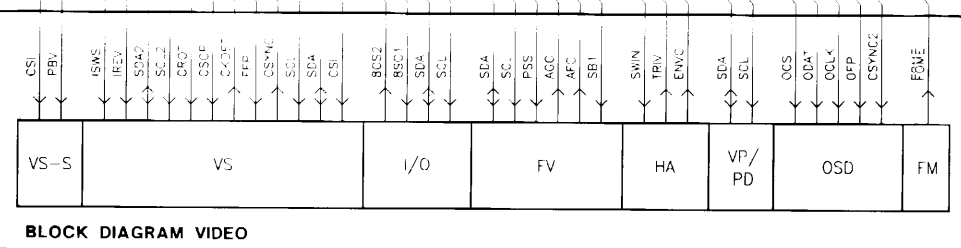
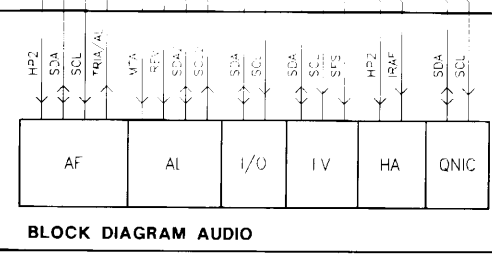
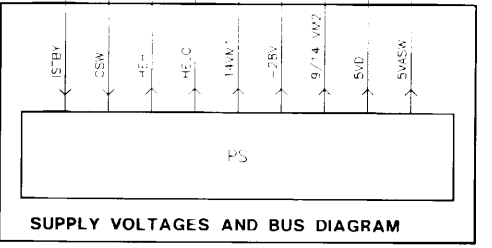
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Block Diagram Digital



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Wiring Diagram

