

HITACHI

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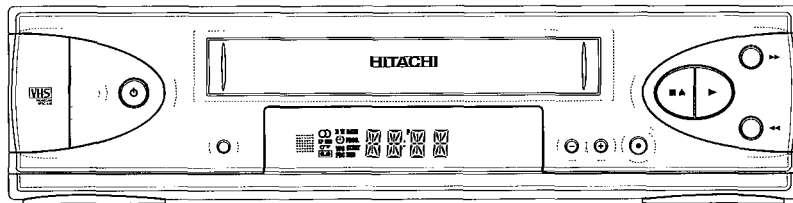
No.0005E

VT-600 Series



V18570

SERVICE MANUAL Wartungsanleitung Documentation Technique



VT-F641ENA
VT-F641EUKN
VT-F641EVPS
VT-F652ELN
VT-M602EL
VT-M605EVPS
VT-M610EPV
VT-M610EUK
VT-M631EUK
VT-M631EVPS
VT-M632EL

VHS

This video deck is a VHS type video recorder. For proper operation, only the VHS type cassette must be used.

VHS

Dieser Video-Recorder entspricht dem VHS-Format. Für richtigen Betrieb müssen daher VHS-Magnetband-Cassetten verwendet werden.

VHS

Cet appareil est un magnétoscope format VHS. Pour un fonctionnement optimal n'utiliser que des cassettes VHS.

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

Änderungen der Technischen Daten und Teile im Sinne ständiger Verbesserung vorbehalten.

A des fins d'amélioration, les spécifications et les pièces sont sujets à modifications.

VIDEO CASSETTE RECORDER

Video-Cassettenrecorder

Magnétoscope à cassette

PCS 93501 GB

June 1997

HITACHI HOME ELECTRONICS EUROPE

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Features

	System		Tuning System				Mechanism				Video				Audio				Programming		Special features		Connectors		Cinch connectors						
	Modulator	Splitter for France	Autosearch	Autoinstall	Cable tuner	Tuner only mode	Videotext	Audioheads mono	Audioheads FM	Winding Time 260s (E180)	Rewind Time 170s (E180)	Tape counter linear	NTSC Playback	VISS (search)	Quick view	Video longplay (8h)	Studio picture control	NICAM	Stereo HiFi	Audio long play (8h)	Daily/weekly	Showview / Video+	VPS / PDC / VPS + PDC	Record prep. mode Start 2	Child lock	Time/Date download	Backup time of clock (min.)	Startconnectors	Video in front	Audio in front (left & right)	Audio out rear (left & right)
VT-F641ENA	✓		✓		✓	✓	4	✓	2	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	SV	VPDC	✓	✓	✓	30	2			✓
VT-F641EUKN	✓			✓		✓	4	✓	2	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	V+	PDC	✓	✓	✓	30	2			✓
VT-F641EVPS	✓		✓		✓	✓	4	✓	2	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	SV	VPS	✓	✓	✓	30	2			✓
VT-F652ELN		✓	✓		✓	✓	4	✓	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	SV	VPDC	✓	✓	✓	30	2	✓	✓	✓
VT-M602EL		✓	✓		✓	✓	2	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	SV	VPDC	✓	✓	✓	30	2			
VT-M605EVPS	✓		✓		✓		2	✓		✓	✓	✓		✓			✓	✓			✓	SV	VPS	✓	✓		30	2			
VT-M610EPV	✓		✓		✓		2	✓		✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	SV	VPDC	✓	✓	✓	30	2			
VT-M610EUK	✓			✓			2	✓		✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	V+	PDC	✓	✓	✓	30	2			
VT-M631EUK	✓			✓			4	✓		✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	V+	PDC	✓	✓	✓	30	2			
VT-M631EVPS	✓		✓		✓		4	✓		✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	SV	VPS	✓	✓		30	2			
VT-M632EL		✓	✓		✓		4	✓		✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	SV	VPDC	✓	✓	✓	30	2			

Survey of sets and PCB's

		QMB - MOTHERBOARD															TAPE DECK																										
		-QMB layout												Deck Control-µP Pos. 7400			Display Control-µP Pos. 7201			-CINCH Board rear		-CINCH Board front		-QNIC NICAM 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		
Page 3 -		12	14	15	16	17	18	18	19	20	21	22	23	16	17						12/18	26	25	Chapter 4																			
		PAL I	PAL BG	SECAM BG	SECAM L/L'									QTD	QDCE1-xP	QDCE2-xU	QDCH1-xP	QDCH2-xU	QDCH5-xU	CINCH rear	QBOC1	QNIC	WDQ-P2/0	WDQ-P2/0LP	WDQ-P4/0	WDQ-S4/0	WDQ-P4/2	WDQ-S4/2															
VT-F641ENA														✓						✓		✓																					
VT-F641EUKN		✓	✓											✓			✓			✓		✓					✓																
VT-F641EVPS			✓											✓				✓		✓							✓																
VT-F652ELN		✓	✓	✓	✓									✓				✓		✓	✓	✓						✓															
VT-M602EL		✓	✓	✓	✓									✓		✓				✓		✓																					
VT-M605EVPS			✓											✓		✓							✓																				
VT-M610EPV			✓											✓		✓																											
VT-M610EUK		✓												✓	✓									✓																			
VT-M631EUK		✓												✓	✓										✓																		
VT-M631EVPS			✓											✓		✓									✓																		
VT-M632EL		✓	✓	✓	✓									✓		✓										✓																	


GB Safety instructions

- Safety regulations demand that the set be restored to its original condition and that components identical with the original types be used.
Safety components are marked by the symbol 
- All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD). Careless handling during repair may reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist strap with resistance. Keep components and tools on the same potential.
- A set to be repaired should always be connected to the mains via a suitable isolating transformer.
- Never replace any modules or any other parts while the set is switched on.
- Use plastic instead of metal alignment tools. This in order to preclude short-circuit or to prevent a specific circuit from being rendered unstable.

Remarks

- The direct voltages and oscillograms ought to be measured relative to the set mass.
EXCEPTION
At the power supply, the DC voltages and the oscillograms at the primary side are measured to LIVE GND.
- The direct voltages and oscillograms mentioned in the diagrams ought to be measured with a colour bar signal and the picture carrier at 503.25 MHz (C25).
- The oscillograms and direct voltages have been measured in RECORD or PLAY mode
- The semiconductors, which are mentioned in the circuit diagram and in the parts lists, are fully exchangeable per position with the semiconductors in the set, irrespective of the type designation of these semiconductors.


D Sicherheitshinweise

- Die Sicherheitsvorschriften erfordern es, daß sich das Gerät nach der Reparatur in seinem originalen Zustand befindet und daß die zur Reparatur benutzten Ersatzteile mit den Originalersatzteilen identisch sind.
Sicherheits-Bauteile sind mit der Markierung  versehen
- Alle IC's und Halbleiter sind empfindlich gegen elektrostatische Entladungen (ESD). Unvorschriftsmässige Behandlung von Halbleitern im Reparaturfall kann zur Zerstörung dieser Bauteile oder zu einer drastischen Reduzierung der Lebensdauer führen. Sorgen Sie dafür, daß Sie sich im Reparaturfall über ein Armband mit Widerstand auf dem gleichen Potential, wie die Masse des Gerätes befinden. Alle Bauteile, Werkzeuge und Hilfsmittel sind auf das gleiche Potential zu legen.
- Ein zu reparierendes Gerät ist immer über einen Trenntransformator an die Netzspannung anzuschließen.
- Bei eingeschaltetem Gerät dürfen keine Module oder sonstige Einzelteile ausgetauscht werden
- Zum Abgleich sind ausschließlich Kunststoffwerkzeuge zu benutzen (keine Metallwerkzeuge verwenden). Dadurch wird vermieden, daß ein Kurzschluß entstehen kann oder eine Schaltung instabil wird.

Anmerkungen

- Die Gleichspannung und Oszillogramme sind gegen Gerätemasse zu messen.
AUSNAHME
Beim Netzteil sind die Gleichspannungen und Oszillogramme auf der Primärseite gegen Live GND gemessen.
- Die Gleichspannungen und Oszillogramme angeführt in den Schaltbildern sollen unter folgenden Bedingungen gemessen werden: Farbbalkensignal, Bildträger auf 503.25 MHz (C25)
- Die Oszillogramme und Gleichspannungen sind in RECORD oder PLAY gemessen. Die in den Stücklisten aufgeführten Bauteile sind positionsweise voll auswechselbar gegen die Bauteile in dem Gerät, ungeachtet der etwaigen Typenbezeichnungen.


F Avertissements

- Les normes de sécurité exigent qu'après réparation l'appareil soit remis dans son état d'origine et que soient utilisées les pièces de rechange identiques à celles spécifiées.
Les composants de sécurité sont marqués 
- Tout les IC et beaucoup d'autres semi-conducteurs sont sensibles aux décharges statiques (ESD). Leur longévité pourrait être considérablement écourtée par le fait qu'aucune précaution n'est prise à leur manipulation. Lors de réparations s'assurer de bien être relié au même potentiel que la masse de l'appareil et enfiler le bracelet muni d'une résistance de sécurité. Veiller à ce que les composants ainsi que les outils que l'on utilise soient également à ce potentiel.
- Toujours alimenter un appareil à réparer à travers un transfo d'isolement.
- Ne jamais remplacer les modules ni d'autres composants quand l'appareil est sous tension.
- Pour l'ajustage, utiliser des outils en plastique au lieu d'instruments métalliques. Ceci afin d'éviter les court-circuits et exclure l'instabilité dans certains circuits.

Observations

- La mesure des tensions continues et des oscillogrammes doit se faire par rapport à la terre de l'appareil.
EXCEPTION
Sur l'unité d'alimentation la tension continue et l'oscillogramme sont mesurés sur le côté primaire en Live GND.
- La mesure des tensions continues et des oscillogrammes figurant sur le schéma doit se faire dans un signal de barre couleur porteuse image sur 503.25 MHz (C25).
- Les oscillogrammes et tension sont mesurées en mode RECORD ou PLAY.
- Les semi-conducteurs indiqués dans le schéma de principe et à la liste des composants, sont interchangeables par repère sur ce chassis avec les semi-conducteurs de l'appareil quelle que soit la désignation de type donnée sur ces semi-conducteurs.


NL Veiligheidsinstructies

- Veiligheidsbepalingen vereisen, dat het apparaat in zijn oorspronkelijke toestand wordt teruggebracht en dat onderdelen, indientiek aan de oorspronkelijke, worden toegepast
De veiligheidsonderdelen zijn aangeduid met het symbool 
- Alle IC's en vele andere halfgeleiders zijn gevoelig voor elektrostatische ontladingen (ESD). Onzorgvuldig behandelen tijdens reparatie kan de levensduur drastisch doen verminderen. Zorg ervoor, dat U tijdens reparatie via een polsband met weerstand verbonden bent met hetzelfde potentiaal als de massa van het apparaat. Houd componenten en hulpmiddelen ook op hetzelfde potentiaal.
- Sluit een apparaat dat gerepareerd wordt altijd via een scheidingstransformator aan op de netspanning.
- Verwissel nooit modules of andere onderdelen terwijl het apparaat is ingeschakeld
- Gebruik voor het afregelen plastic i.p.v. metalen gereedschap. Dit om mogelijke kortsluiting te voorkomen of een bepaalde schakeling instabiel te maken

Opmerkingen

- De gelijkspanningen en oscillogrammen dienen gemeten te worden ten opzichte van de apparaat aarde.
- De gelijkspanningen en oscillogrammen vermeld in de schema's dienen gemeten te worden met een kleurbalkensignaal beeldtraaggolf op 503.25 MHz (C25).
- De oscillogrammen en gelijkspanningen zijn in RECORD of PLAY mode gemeten.
- De halfgeleiders, die in het princieschema en in de stuklijsten, zijn vermeld, zijn per positie volledig uitwisselbaar met de halfgeleiders in het apparaat, ongeacht de typeaanduiding op deze halfgeleiders.

I Avvertimenti

- Le prescrizioni di sicurezza richiedono che l'apparecchio sia ricondotto alle condizioni originali e che siano usati ricambi originali.
Componenti di sicurezza sono marcati con 
- Tutti gli IC e semiconduttori sono sensibili a scariche elettrostatiche (ESD). Noncuranze durante la riparazione di semiconduttori possono danneggiarli o condurre ad una riduzione drastica della durata. Durante la riparazione assicurarsi di essere collegati allo stesso potenziale attraverso un bracciale di protezione contro scariche elettrostatiche. Inoltre tenere anche tutti i componenti e gli attrezzi a questo potenziale.
- Apparecchi da riparare bisogna collegarli sempre via un trasformatore isolante (separatore) alla tensione normale.
- Non scambiare moduli o altri componenti quando l'apparecchio è in funzione.
- Per l'accordo usare soltanto attrezzi di plastica (non usare attrezzi metallici). Così si evitano cortocircuiti e collegamenti instabili.

Osservazioni

- Misurare le tensioni continue e gli oscillogrammi riferendosi alla massa dell'apparecchio.
ECCEZIONE
Le tensioni continue e gli oscillogrammi dall'alimentatore sono misurati sulla parte primaria contro GND-Live.
- Le tensioni continue e gli oscillogrammi indicati negli schemi di collegamento devono essere misurati secondo le condizioni seguenti: segnale barre colore, portante dell'immagine su: 503.25 MHz (C25).
- Gli oscillogrammi e le tensioni continue sono misurati in RECORD o PLAYBACK.
- I componenti indicati nelle liste sono intercambiabili con quelli nell'apparecchio nonostante l'eventuale denominazione di modelli.

GB WARNING FOR LITHIUM BATTERIES!

Lithium batteries, if incorrectly used (excessive heat, wrong connection of terminals, short circuit represent a danger of explosion!
Lithium batteries must be replaced only by original spare parts

D WARNHINWEIS ZU LITHIUM-BATTERIEN!

Bei falscher Handhabung (Überhitzung, Falschpolung oder Kurzschluss) der Lithium-Batterien besteht Explosionsgefahr!
Lithium-Batterien dürfen nur gegen Originalersatzteile getauscht werden.


F ATTENTION!

Pile au lithium.
Danger d'explosion si traitée incorrectement. Ne peut être remplacée que par un spécialiste (comme décrit dans les instructions de réparation).

NL OPGELET MET LITHIUM-BATTERIJEN!

Bij foutieve behandeling (oververhitting, foutieve poling of kortsluiting) van lithium-batterijen bestaat er explosiegevaar! Lithium-batterijen mogen slechts door originele onderdelen vervangen worden.

E Avisos

- Las instrucciones de seguridad exigen que después de la reparación el aparato se encuentre en el estado original y que las piezas de repuesto, utilizadas para la reparación, sean idénticas a las originales.
Los componentes de seguridad están marcados con 
- Todos los IC y semiconductores son sensibles a descargas electrostáticas (ESD). Un tratamiento no conforme a las instrucciones de semiconductores en caso de reparación, podría llevar a la destrucción de estos componentes, o a una reducción drástica de la duración. Tenga cuidado de que, en caso de reparación, estar al mismo potencial que la masa del aparato, por una pulsera con resistencia. Ponga todos los componentes, herramientas y recursos al mismo potencial.
- Para reparar un aparato hay que conectarlo siempre a la alimentación a través de un transformador de aislamiento.
- Cuando un aparato está en marcha no pueden ser cambiados módulos u otras piezas de repuesto.
- Para los ajustes hay que utilizar exclusivamente herramientas de plástico (nunca herramientas metálicas). Así se evitan cortocircuitos y circuitos inestables.

Notas

- Hay que medir las tensiones continuas y los oscilogramas contra la masa del aparato.
UITZONDERING.
Bij het netgedeelte zijn de gelijkspanningen in oscillogrammen aan de primaire kant tegen Live GND gemeten.
- Las tensiones continuas y los oscilogramas mencionados en los esquemas tienen que ser medidos de manera siguiente.
señal barra de color portadora de imagen en 503.25MHz (C25)
- Los oscilogramas y las tensiones continuas son medidas en „RECORD“ y „PLAYBACK“
- Los componentes mencionados en las listas se los puede cambiar por los componentes en el aparato, a pesar de eventuales designaciones de tipos.

I ATTENZIONE CON LE PILE AL LITIO!

In caso di utilizzo errato (surriscaldamento, errata posizione dei poli o cortocircuito) delle pile al litio consiste pericolo di esplosione!
Le pile al litio si possono sostituire solo con pezzi di ricambio originali.

E AVISO!

Batería de litio.
Por una inadecuada intervención puede explotar.
Solo debe ser cambiada por una persona con conocimientos técnicos (como en la guía de reparación se describe).

DK ADVARSEL!

Lithium batteri. Eksplosionsfare.
Udskiftning må kun foretages af en sagkyndig, og som beskrevet i servicemanualen.

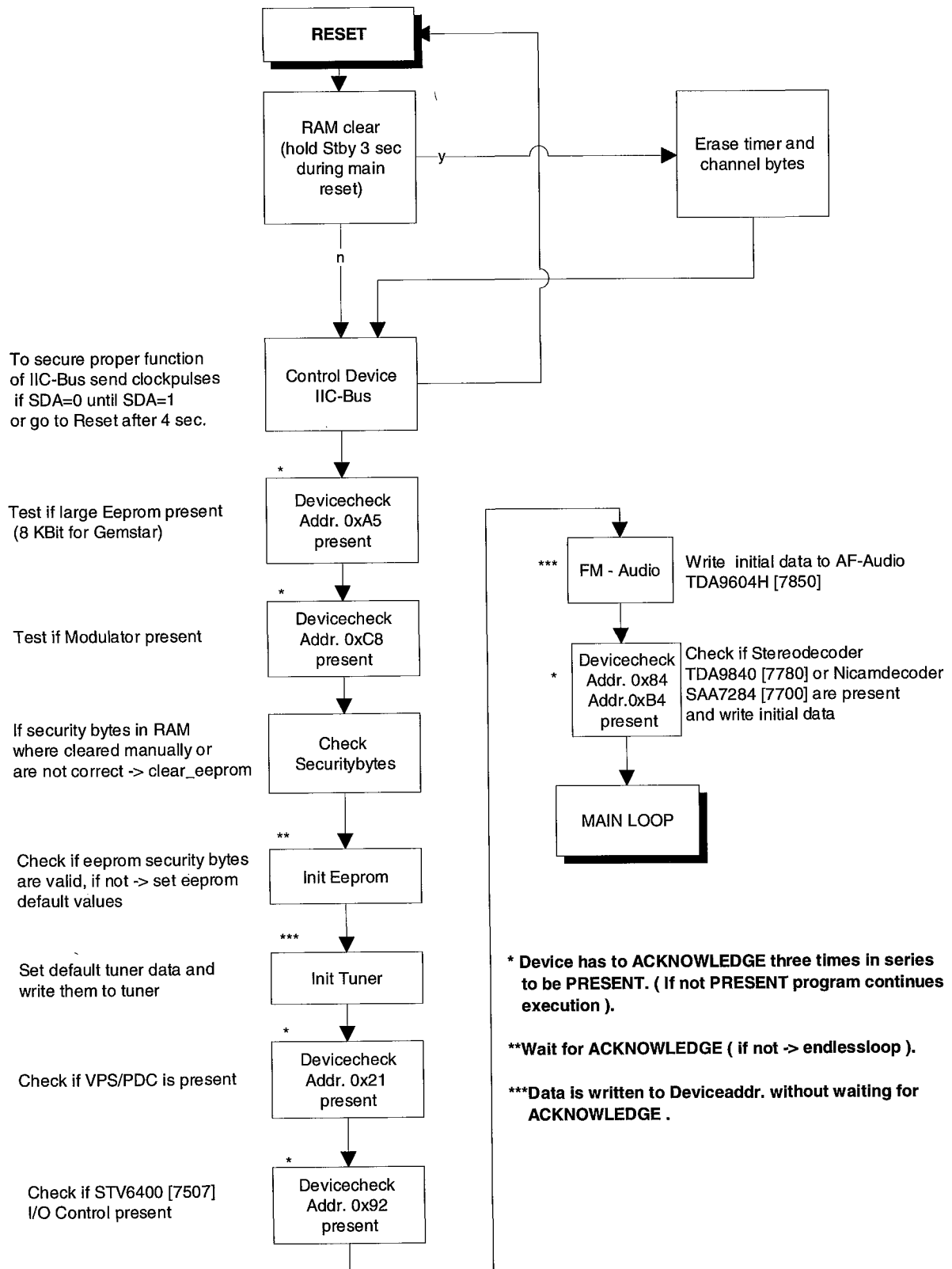
S VARNING!

Eksplösionsfara vid felaktigt batteribyte!
Använd samma batterityp eller ekvivalent typ som rekommenderas av apparattillverkaren

SF VAROITUS!

Paristo voi räjähtää, jos se on virheellisesti asennettu!
Vaihdakaan paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin.

Start - up Phase of the display control - μ P



(GB)

TECHNICAL DATA

Mains voltage	Netzspannung	Tension secteur	220 - 240 V, +/- 10%
Mains frequency	Netzfrequenz	Fréquence	45 - 65 Hz
Power consumption:	Leistungsaufnahme:	Puissance absorbée	mono 12.5 W during operation
			HiFi 16 W during operation
without Low Power Standby ...	Standby mode veille normal	mono 9.5 W
			HiFi 11 W
with Low Power Standby ...	Standby mit geringem Verbrauch mode veille faible consommation ..	< 6 W standby
Ambient temperature	Raumtemperatur	Température ambiante	+10°C to +35°C
Relative humidity	Relative Luftfeuchtigkeit	Humidité relative	20 - 80 %
Dimensions	Abmessungen	Encombrement	380 x 260 x 94 mm
Weight	Gewicht	Poids	3,7 kg
Fast forward/rewind time (turbo) ...	Vor-/Rückspulzeit (turbo)	Temps (re-)bobinage (turbo)	typ. 100s (E180 cass.)
Position of use	Betriebslage	Position d'emploi	horizontally, max 15°
Video resolution	Video-Auflösung	Puissance absorbée	≥240 lines
Audio	Audio	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

Netspanning	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
			HiFi 16 W during operation
zonder Low Power Standby ..	sin standby de bajo consumo ..	in attesa non a basso consumo ..	mono 9.5 W during standby
			HiFi 11 W during standby
met Low Power Standby ..	con standby de bajo consumo ..	in attesa a basso consumo	< 6 W standby
Omgevingstemperatuur	Temperatura ambiente	Temperatura ambiente	+10°C to +35°C
Relatieve vochtigheid	Humedad relativa	Umidità relativa	20 - 80 %
Afmetingen	Dimensiones	Dimensioni	380 x 260 x 94 mm
Gewicht	Peso	Peso	3,7 kg
Vooruit/terugspoeltijd (turbo)	tiempo de (re-)bobinado (turbo)	Tempo di (ri-)avvolgimento (turbo)	typ 100s (E180 cass.)
Gebruikspositie	Posición de uso	Posizione di funzionamento	horizontally, max 15°
Oplossend vermogen	Resolución video	Risoluzione video	≥240 lines
Audio	Audio	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 Ohm
Pin 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 Ohm
Pin 20	CVBS I (video in)	1 V _{pp} +/-3dB	R _{in} 75 Ohm

*) passive loop through to Euroconnector AV1

(F)

CARACTERISTIQUES

Mains voltage	220 - 240 V, +/- 10%
Mains frequency	45 - 65 Hz
Power consumption:	mono 12.5 W during operation
	HiFi 16 W during operation
without Low Power Standby ...	mono 9.5 W
	HiFi 11 W
with Low Power Standby ...	< 6 W standby
Ambient temperature	+10°C to +35°C
Relative humidity	20 - 80 %
Dimensions	380 x 260 x 94 mm
Weight	3,7 kg
Fast forward/rewind time (turbo) ...	typ. 100s (E180 cass.)
Position of use	horizontally, max 15°
Video resolution	≥240 lines
Audio	Audio SP: Linear Audio
	80Hz - 10kHz (≤8dB)
	Audio LP: Linear Audio
	80Hz - 5kHz (≤8dB)
	Stereo FM Audio
	20Hz - 20kHz (≤3dB)

(I)

DATI TECNICI

Tensione di alimentazione	220 - 240 V
Frequenza di rete	45 - 65 Hz
Potenza assorbita:	mono 12.5 W during operation
	HiFi 16 W during operation
in attesa non a basso consumo ..	mono 9.5 W during standby
	HiFi 11 W during standby
in attesa a basso consumo	< 6 W standby
Temperatura ambiente	+10°C to +35°C
Umidità relativa	20 - 80 %
Dimensioni	380 x 260 x 94 mm
Peso	3,7 kg
Tempo di (ri-)avvolgimento (turbo)	typ 100s (E180 cass.)
Posizione di funzionamento	horizontally, max 15°
Risoluzione video	≥240 lines
Audio SP. Linear Audio	80Hz - 10kHz (≤8dB)
Audio LP. Linear Audio	80Hz - 5kHz (≤8dB)
Stereo FM Audio	20Hz - 20kHz (≤3dB)

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

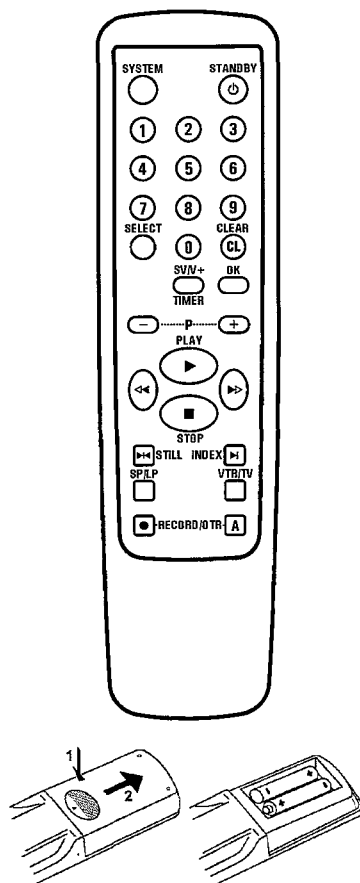
Input voltage max	< 100 dBuV
min.	> 60 dBuV

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OPERATING INSTRUCTIONS IN BRIEF

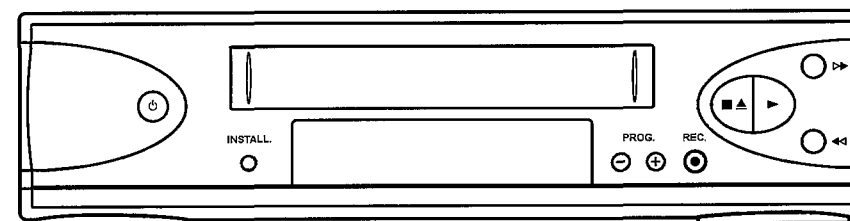
The remote control



- SYSTEM** Special function
- STANDBY** Standby
- 0-9** Digit buttons 0-9
- SELECT** Function selector
- CLEAR (CL)** Reset, clear
- SV/V+/TIMER** 'VIDEOPlus' or 'TIMER' programming
- 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
- STILL** Still picture
- INDEX** Index search
- SP/LP** (SP/LP) selection
- VTR/TV** TV monitor function
- RECORD/OTR** Record
- A** Activate record button (RECORD/OTR and A button simultaneously).

Front of the video recorder

- Standby**
- INSTALL** Installation button
- PROG. -** Down/Minus, programme number
- PROG. +** Up/Plus, programme number
- REC.** Record
- Stop/Cassette eject**
- ▶** Playback
- ▶▶** Forward wind/ Forward scanning
- ◀◀** Rewind/Reverse scanning



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.

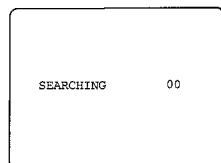
Emergency interrupt

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/flof/fastext/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 8 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** button. '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.

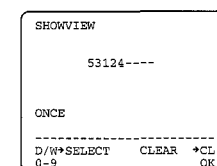
Usually the start time is the same as the PDC or VPS time. If, however, in the TV guide, in addition to a TV programme's start time, a different PDC or VPS time is given, e.g. '20.15 (PDC or VPS 20.14)', you have to enter '20.14' as the start time **exactly to the minute**.

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 **I** 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 **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** and the **SELECT** button again simultaneously, for a few seconds until **CL** appears in the video recorder display.

Note: If a button is pressed with activated child lock, **CL** 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 3 until 'DEC' appears in the display.

* This video recorder can receive HI-FI sound transmissions in 'NICAM'. At step 3, 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.

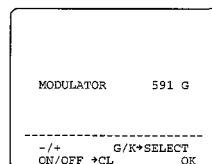
Note: If you want to delete an **unwanted** TV channel, press the **CLEAR (CL)** button at step 3.

* **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

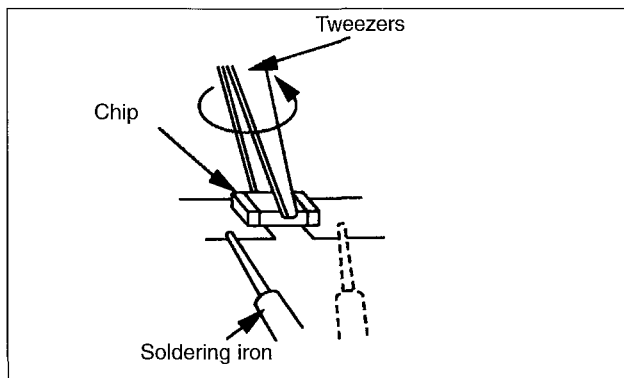


Fig. 2-1

3. Installation of leadless components

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

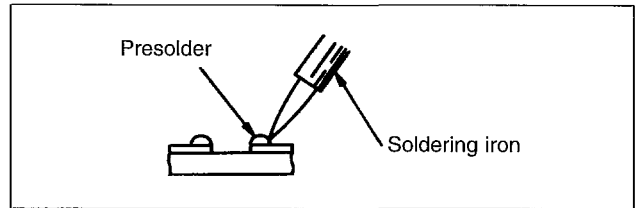


Fig 2-2

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

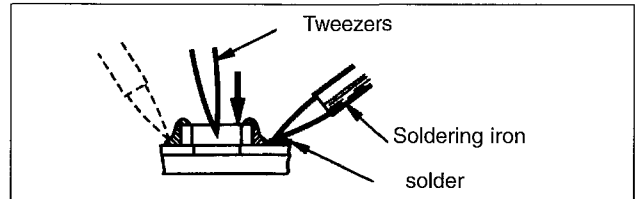


Fig 2-3

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*

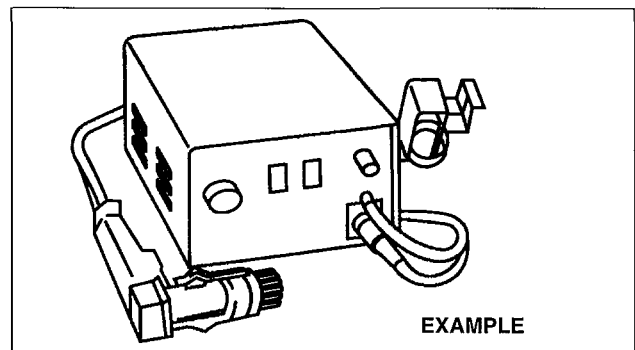


Fig. 2-4

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

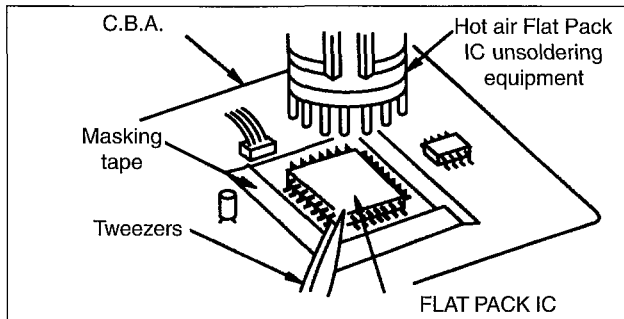


Fig 2-5

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

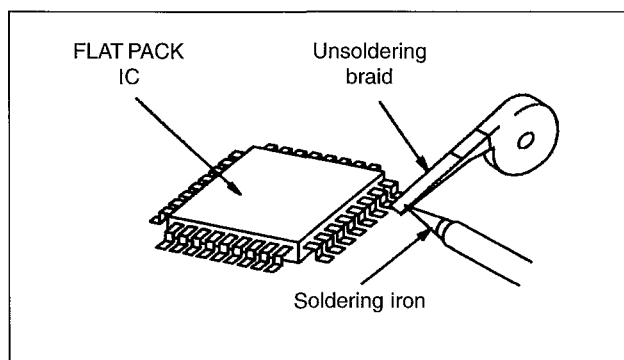


Fig. 2-6

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.

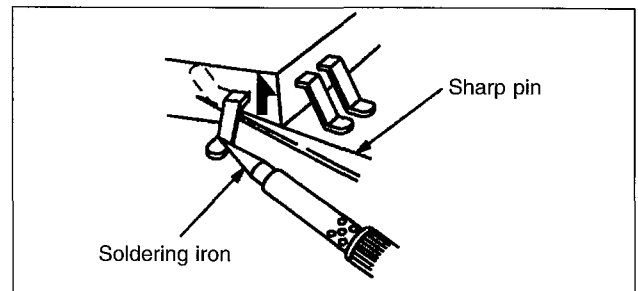


Fig 2-7

• 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

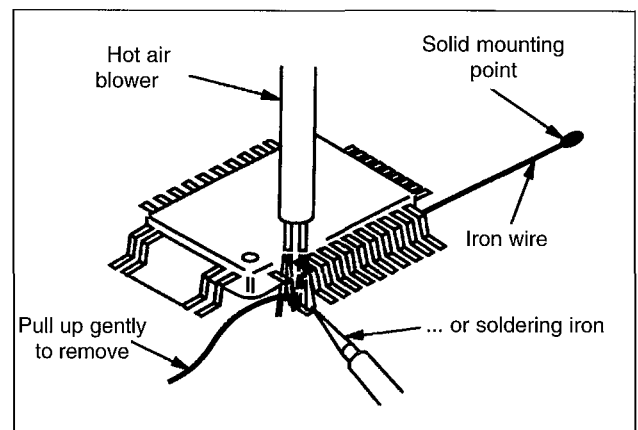


Fig 2-8

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).

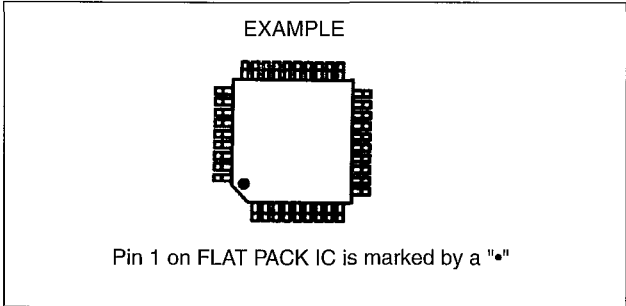


Fig 2-9

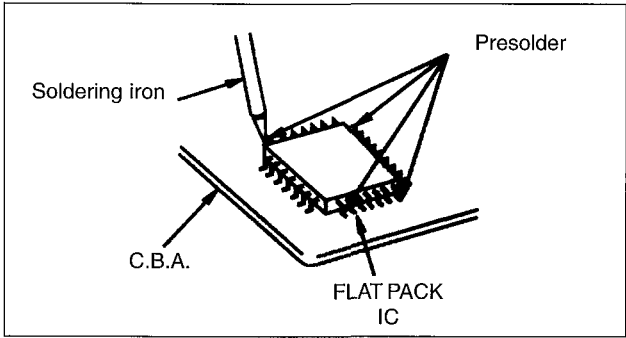


Fig. 2-10

- 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:

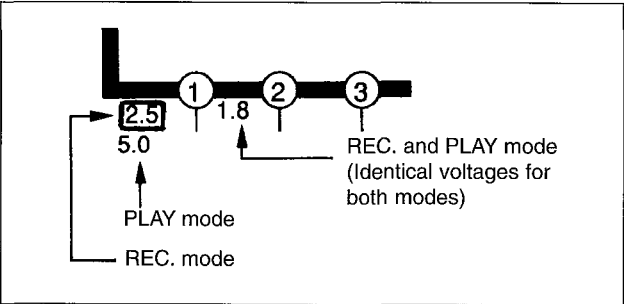


Fig 2-11

How to read wave forms

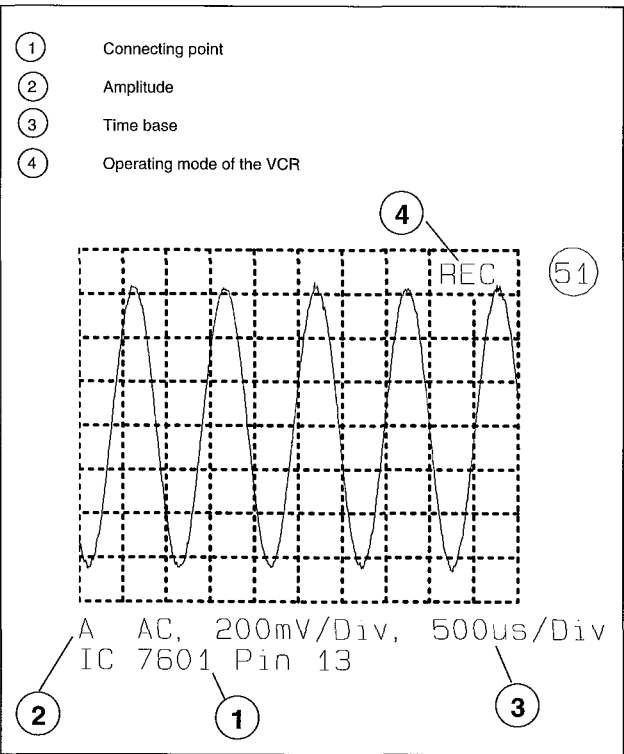


Fig 2-12

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:

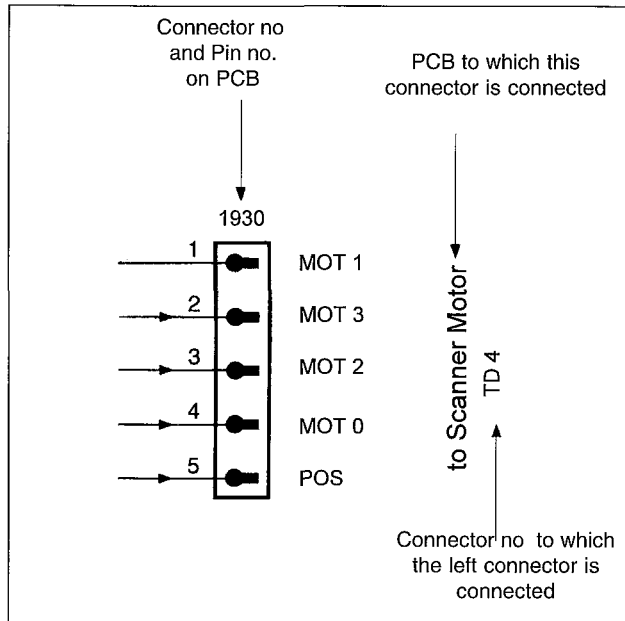


Fig. 2-13

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).

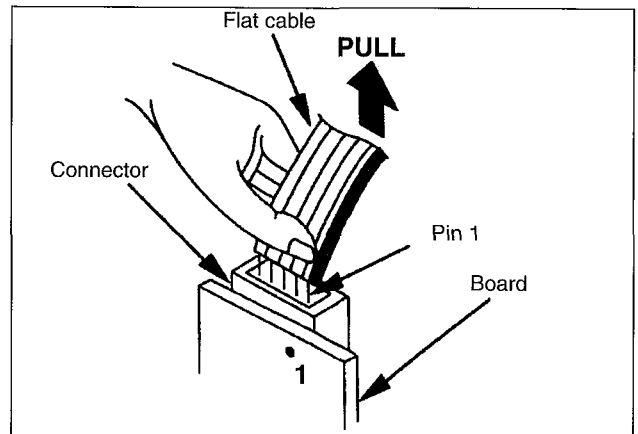


Fig 2-14

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

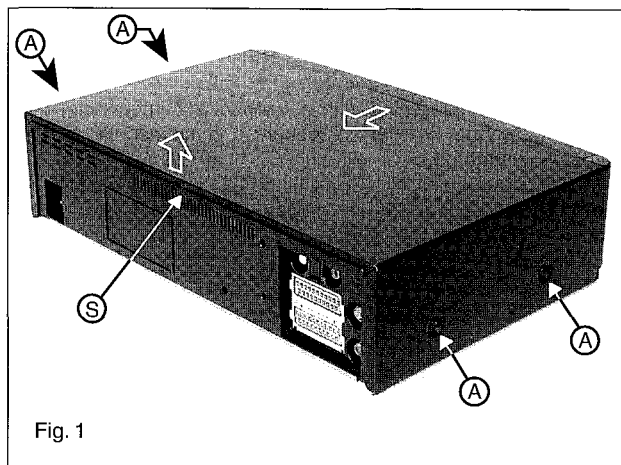


Fig. 1

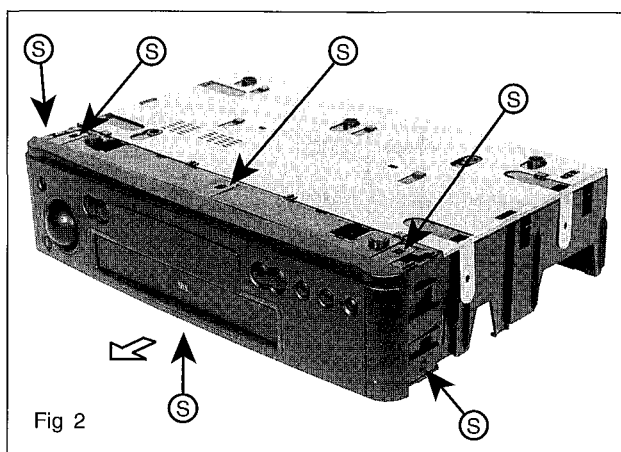
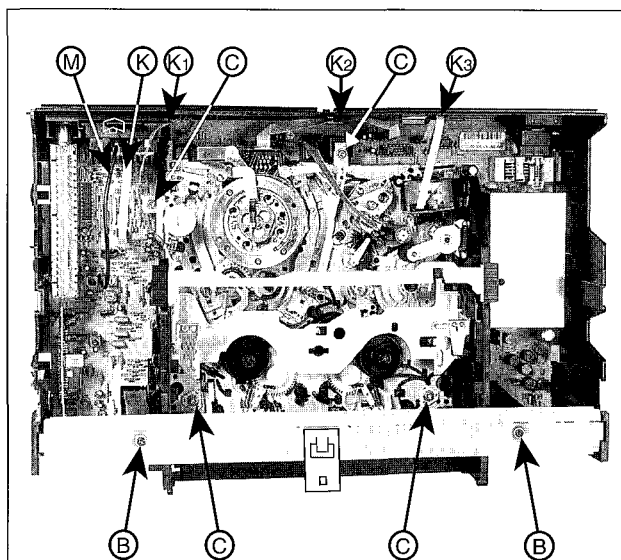


Fig. 2



Lift protection

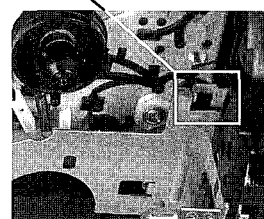
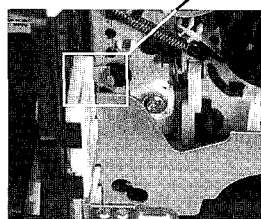


Fig. 3

* .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!

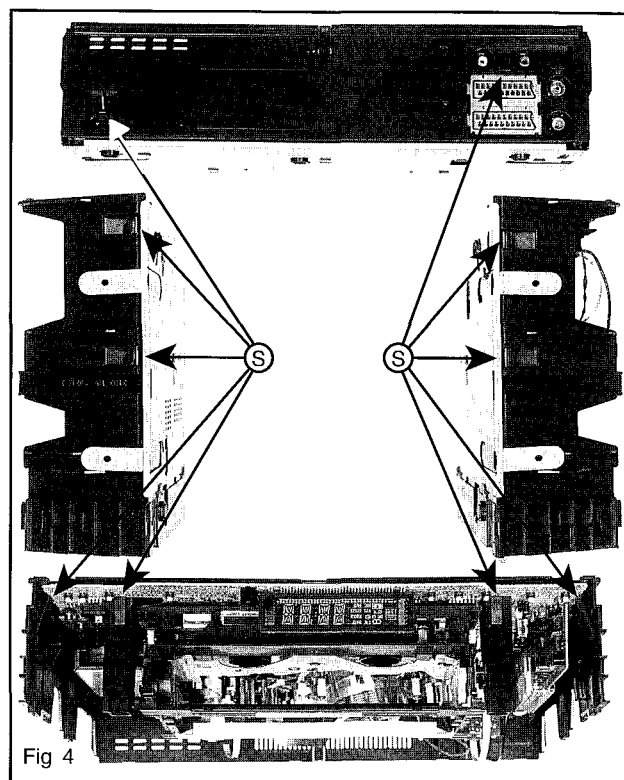


Fig 4

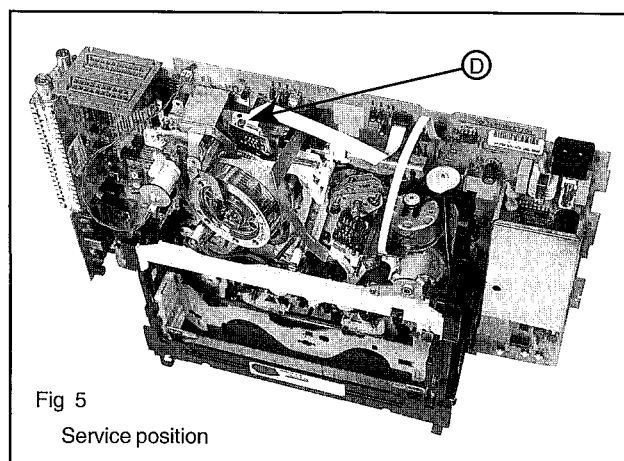


Fig 5

Service position

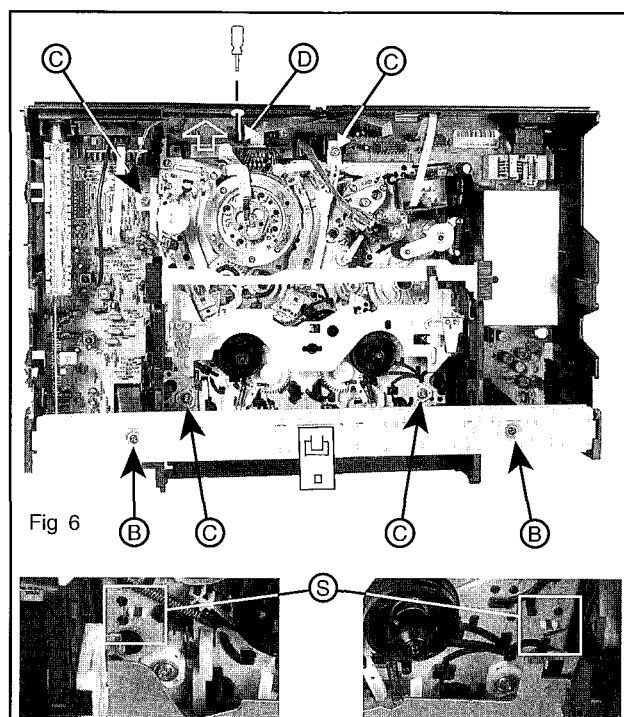


Fig 6

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**).

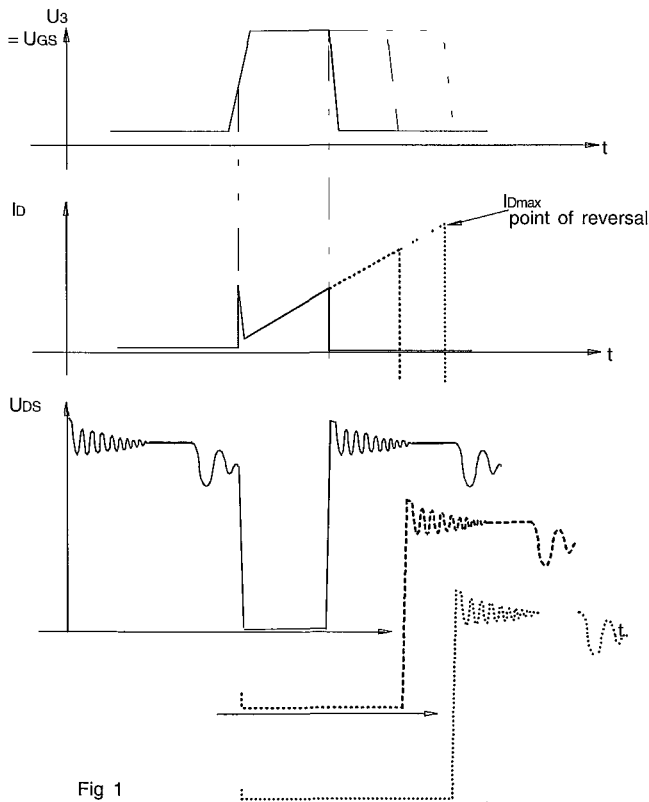


Fig 1

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).

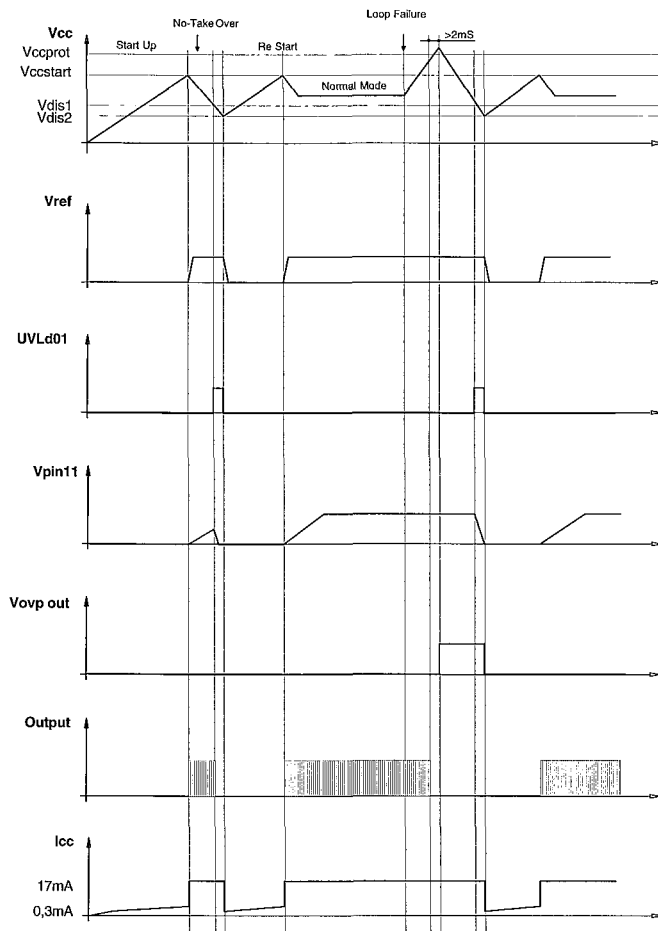


Fig 2

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_a (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.

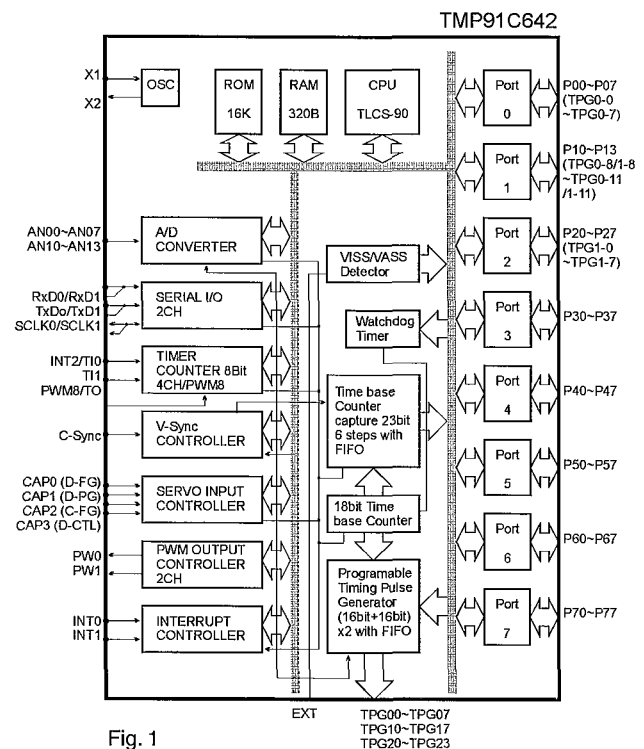


Fig. 1

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

$$V_{on} / V_{off} = 1 + R_{3488} / 100.$$

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. 1 mVp (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 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. 21.5 kHz. 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

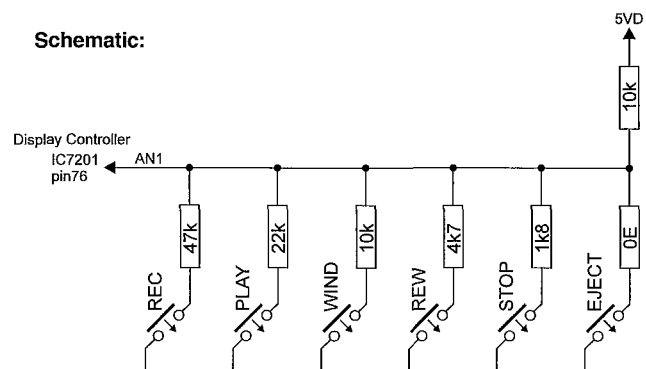
3.1 Shuttle:

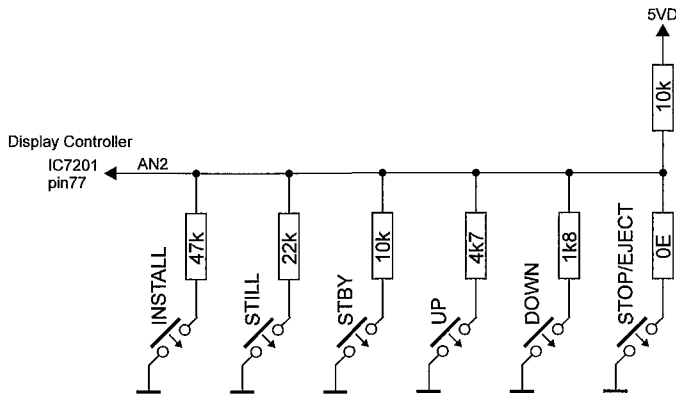
The shuttle EVQ WLG 001, which is electrically connected to the Print QMB1 via connector 1945 represents a binary coded rotary switch with a rotation angle of +/- 70 degrees and 16 switching positions. A spring returns it to its centre position once released. From this position, it can be moved in both 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 +3.5V_{bcc}.

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 ($2F_{sc} = 8.86 \text{ MHz}$) 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 MHz.

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 subprint 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.

6. NICAM decoder SAA 7284ZP - QNIC

The IC SAA7284 is a NICAM decoder which does not require any adjustment. It is realised on the QNIC subprint

The NICAM signal is filtered out by internal filters and is converted into the basic band. The signal is then demodulated and decoded. The digitised audio signal is converted into an analogue signal via a D/A converter.

In addition to the NICAM decoding, an audio switch is available (inputs pin 7,16) via which the internally or externally demodulated audio signal can be selected.

This switch is used to switch over to the FM audio or AM sound at SECAM L/L in case of incorrect NICAM decoding or a NICAM carrier not being available

Two low passes with an amplification of approx. 6dB are connected to the output which remove the carrier rests from the audio signal

7. Video signal processing VS (VS-, IO-, AL - part)

7.1 Switching functions of the signal electronics IC LA71525:

The signal electronics IC LA71525 [7007] is activated at pins 63 and 64 of the deck uP via the I2C bus

REC/PB

via IIC bus

during RECORD pin 19 (REC HIGH OUT) goes to 5V

PAL/SECAM/MESECAM/NTSC

via IIC Bus

during NTSC playback, pin 43 goes to 5V

SP/LP/SLP

via IIC bus

VIDEO INPUT SELECTION SWITCH

the video at pins 28 (Scart) or 32 (frontend) can be selected and switched via the IIC bus

VIDEO ENTRY

at pin 33 (FFP), the artificial picture pulse for the playback features and the test picture for the device installation are entered.:

Loop-through	< 0,8V
Test picture	= 1.2 .. 3.3V
art picture pulse	> 3.7V

COLOUR VECTOR

the colour vector is influenced with the aid of pin 67 (CSCP).

normal	< 0,8V
LP features colour	=

7.2 Recording :

7.2.1 Luminance

The input signal (pin 28 = Scart, pin 32 = frontend) is switched in the IC [7007] and is available at pin 34 as VREC with 1Vss. It is passed to pin 35 via an electrolytic capacitor. In the IC [7007], the video signal passes through an amplification control (time constant determined by C [2005]). After the AGC, the signal is passed to a clamping stage where it is attenuated by 6 dB and from which it is passed to a chroma separation 3.5 MHz low pass filter and to the vertical emphasis (out: pin 42, in: pin 40). This emphasis consists of a 1H-CCD delay line in IC [7003] (in: pin 5, out: pin 7) and an emitter follower [7005]. Next, the signal passes from pin 25 to pin 26 via another emitter follower [7002]. The filter at the base of the emitter follower does not function in the REC mode due to the low resistance of the emitter follower. The Y signal then passes through the detail enhancer, the non-linear emphasis, the linear emphasis (time constant via pin 23,24) and the white/dark clipping stage.

The signal generated thus then directly activates the FM modulator. Before the FM signal leaves the IC at pin 18, it passes through a further low pass filter. Then it is passed to the addition point (FMRV) with the chroma signal, via an external emitter follower [7006].

7.2.2 Chrominance PAL

The arriving video signal (pin 35) is separated from the chroma signal by a band pass filter (BPF1) and is then passed to an ACC stage. The ACC amplification stage controls the chroma amplitude for the subsequent stages (time constant via capacitor at pin 13). The chroma signal is then passed on by the main converter. The main converter mixes the 5.06MHz sub-carrier of the sub-converter with the 4.43 MHz chroma signal to the 627kHz chroma FM signal.

The sub-carrier is a mixed product consisting of 4.43MHz (the REC APC compares the quartz and burst frequency; time constant at pin 54) and $(40 + \frac{1}{8}) f_h = 627\text{kHz}$ (generated by 321fh -VCO, time constant pin 49/51 and the phase rotation according to the VHS standard, control pin 66). Via a band pass filter and the colour killer stage, the converted chroma signal is passed to pin 14 of the IC from where it is directly added to the Y-FM signal via an adjustment regulator [3007]. The colour killer can either identify the incoming signal itself (PAL yes/no, PAL- Chroma signal out, SECAM L Chroma signal killed) or can be set to PAL or SECAM L via the I2C bus. Apart from being a reference frequency, the quartz oscillation (pin 56) serves for the chroma processing and also for the clock frequency generation of the CCD stage [7003, pin 10].

7.2.3 MESECAM

The signal path is nearly identical to that of the PAL system.

Differences to the PAL system:

- No phase rotation
- The filter characteristic of the chroma band passes becomes wider
- Free running quartz frequency
- The deck microprocessor [7400] generates the MESECAM control signal via the IIC bus

7.2.4 SECAM L

The FBAS signal (VREC) of the IC [7007] passes via the emitter follower [7101] to the cloche filter, which cancels the transmitter RF-preemphasis. In the Secam L- IC pin 29 [7110], the signal passes through a 15dB amplifier and a frequency divider. The latter generates the 1.1 MHz signal required for recording by frequency division ($\frac{1}{4}$) of the chroma signal. The signal is then passed to pin 21 containing the subsequent band pass filter. The band pass filter attenuates the harmonics generated during the frequency division. At the same time, the chroma signal is blanked at this stage for the duration of the line synchronous pulse. The signal then passes through a 10dB amplifier and is switched to pin 15 on an anticloche filter. This filter generates the FM preemphasis provided as standard for a Secam chroma signal. This is then added to the luminance FM signal at the addition point (FMRV) as a CSR signal.

7.3 Playback :

7.3.1 Luminance

The FM playback signal is passed from the head amplifier [7150] as a FMPV to the signal electronics [7007], pin 15. In the IC [7007], the level of the envelope curve is regulated before being filtered in the FM processing. At pin 17, the signal leaves the IC, passes via a phase shifter and a transistor stage for adapting the filter characteristic and then re-enters the IC [7007] at pin 20. The FM signal limited with a double limiter is demodulated and filtered with a low pass filter. The demodulated Y signal still contains the preemphasis from the recording. This now removes the linear deemphasis at the base of the emitter follower [7002].

The filter circuit is effective, as pin 25 becomes an open-collector output during the playback mode, whose load impedance is determined by the deemphasis circuit. A peaking stage lifts the frequencies by approx. 2 MHz (time constant pin 22).

The Y signal is then clamped, filtered with a low pass and passed through the vertical noise canceller or dropout compensator. For this purpose, the Y signal leaves the IC [7007] (out: pin 42, in: pin 40) and is delayed by 1H in IC [7003]. The CCD-1H-delay line functions for the Y signal as a comb filter (vertical noise suppression) and as a line store for the dropout compensation.

Subsequent switching stages: non-linear deemphasis, horizontal noise canceller and the picture control circuit for sharpness. Then the chroma signal is added to the luminance signal and is output as the FBAS signal (pin 38).

7.3.2 Chroma PAL

At pin 15, the FMPV signal is passed from the head amplifier to the signal electronics IC [7007]. With the aid of an internal low pass, the 627kHz chroma signal is filtered from the FMPV signal. The ACC amplifier amplifies and regulates the chroma amplitude. In the main converter, the chroma signal is mixed with 5.06 MHz to the original 4.43 MHz. The 5.06 MHz are generated during playback by the free-running quartz oscillator and the $(40+1/8)$ fH = 627 kHz frequency derived from the 321fH-VCO. After the main converter, most of the adjacent crosstalk is removed from the chroma signal by 2H comb filters [7003]. The chroma signal is then filtered by a band pass, checked by the colour killer, looped-through via pin 46 and 45 and added to the Y signal.

7.3.3 Chroma MESECAM DK

The signal path is nearly identical to that of the PAL system.

Differences to the PAL system:

- The 321 fH VCO is synchronised by the sync
- No phase rotation
- The comb filter is not active
- Internal band pass filters have a wider band width
- The deck microprocessor [7400] generates the control signal for SECAM B/G via IIC-Bus

7.3.4 Chroma SECAM L

During playback, the FM-Signal is passed from the band (FMPV) to pin 23 [7110], amplified by 6dB, passed through the same band pass as during recording and is then amplified once again by 10dB. From pin 16, the NF preemphasis of the recording is cancelled. The anticlock circuit from the recording now acts as a clock circuit. The signal is modulated in the subsequent stages (AGC) and its frequency is doubled. The band pass at pin 10 removes unwanted harmonics from the signal before its frequency is doubled again. In order for the signal to become a standard Secam chroma signal, it is provided again with a RF preemphasis (anticlock). The chrominance signal then passes through a colour killer stage, a band pass filter and an emitter follower [7106], before reaching pin 46 of the signal electronics IC [7007] as a CSP signal via a coupling capacitor.

7.3.5 NTSC

During playback of NTSC signals, the original NTSC chroma is converted to a PAL chroma signal (control signals, see above). This requires an internal IC conversion in the chroma part, as well as a conversion in the CCD-IC [7003] to an 1H comb filter for crosstalk reduction. Line and picture frequencies do, however, remain unchanged according to the NTSC standard.

7.3.6 PAL M,N

as chroma PAL (7.3.2)

8. Audio linear AL (VS-, IO-, AL - Part)

The signal inputs for recording or loop-through (EE) are pins 71, 73 and 75 of LA71525 [7000]. During record and EE, the selected signal passes through the linear amplifier and then to the mute stage before leaving the IC at pin 77. This is the output leading to the IN/OUT part or the AF part in stereo units. The attenuation chain at pin 77 sets the level required for the ALC (Automatic Level Control) detector, whose time constant is determined at pin 72, and the level for the recording amplifier. L5601, R3657 and C2657 form the preemphasis for the recording amplifier.

The output of the recording amplifier is pin 1. Resistor [3604] then adds the recording current to the bias current, from which the current passes via the head to pin 5, where the switch is closed. During playback, the switch is closed at pin 7. The playback signal is amplified in the equaliser stage (time constant between pin 8 and pin 9) and the Pb level [3160] is set with the potentiometer. The potentiometer [3160] compensates for amplifier and head tolerances. The resistor [3605] and the capacitor [2600] determine the head resonance during playback.

In longplay, mode the frequency characteristic is adapted with RC networks [C2656, R3655] for record and [C2601] for playback.

The known circuit, running at approx. 70 kHz, is used as the erase oscillator for the erasing heads and bias current. To avoid interference peaks, the oscillator should be switched on slowly (switching stage T7603, time constant C2617, R3623 and current limiter R3625).

The bias current is set with the potentiometer [3618].

9. IN/OUT (VS-,IO-, AL - Part)

9.1 General:

The signal (VSB / VOUT) from the output of the signal electronics IC [7007] pin 38 or OSD [7800] pin 13 is offered to the TUMOD [1701] pin 1 as VMCO via the emitter follower [7501 / 7500].

After the Video- Input selector of the signal electronics IC [7007], the VREC signal is available at pin 34. The signal is passed to pin 35 (Y and PAL chroma signal processing), to SECAM VS part (SECAM chroma) and to the VPS/PDC part (data recording).

9.2 Video: 1-Scart devices

The selection of the video signal is exclusively made by the signal electronics IC. The frontend signal VFV (IN3/Pin 32) and VBS (IN1/pin 28) are directly applied. The VBS signal in the I/O part is directly connected to VIN1 via [3509/3510].

IN2 pin 30 of the signal electronics IC is used as 'Mute position' (active during playback).

9.3 Video: 2-Scart devices

The STV6400 [7507] receives the following signals at the inputs VFV, VIN1, VIN2, VFR, VOUT (via emitter follower 7501). In the STV6400, the input for the signal electronics signal VOUT (2 Vpp) contains a divider (1/2). The outputs pin15 and pin16 contain a 6dB-amplifier and feed the signal to the respective Scart connector. OUT1 Pin2 has no amplifier, this output leads to the signal electronics VS (VBS) at the Video- Input selector (IN1/pin 28). In 2 Scart sets, the video input selector of the signal electronics IC is always set to IN1. The front controller switches the individual input signals to the respective outputs via the IIC bus.

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 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 ($f_c > 30\text{kHz}$) 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:

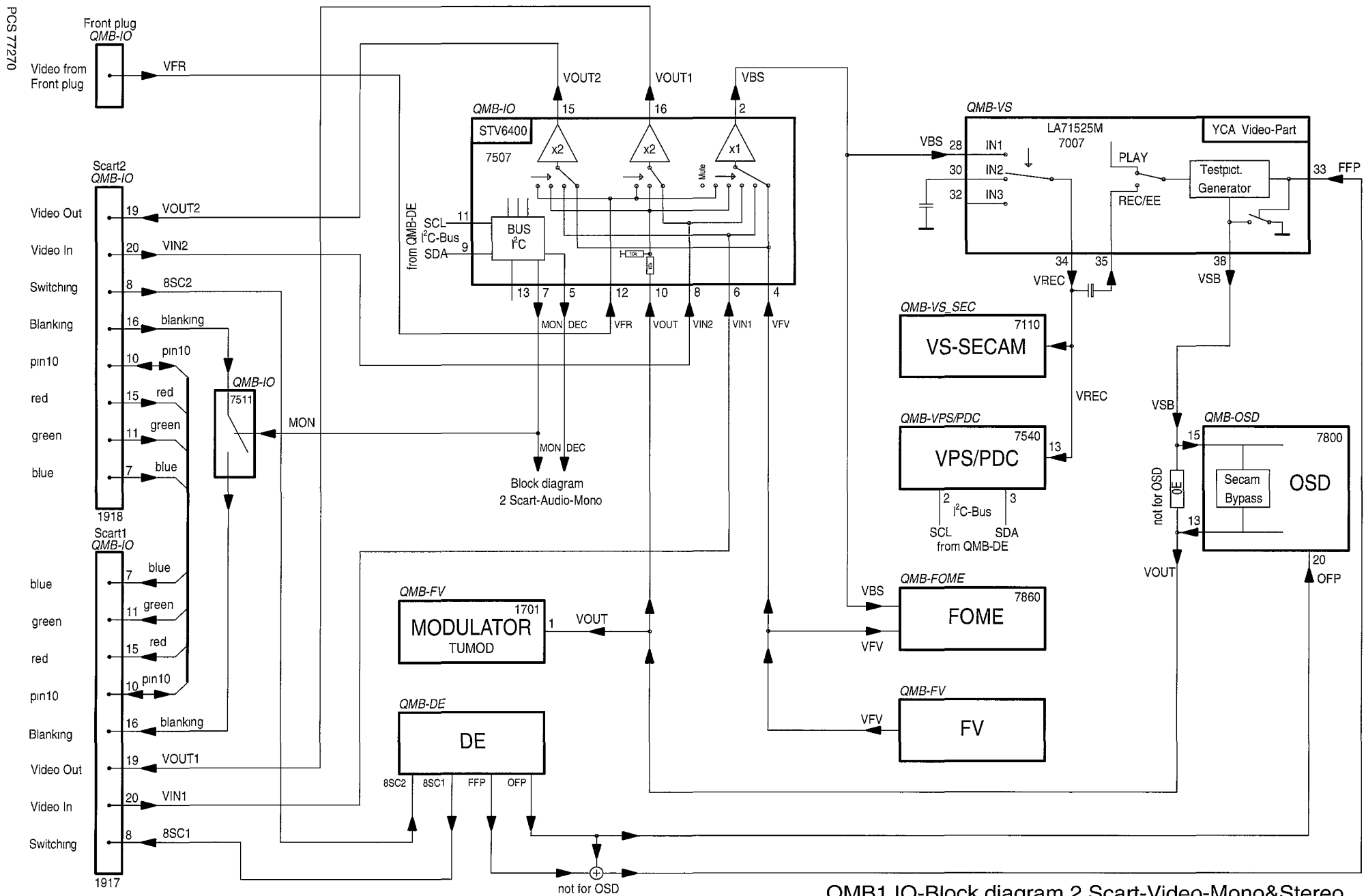
The signal from the head amplifier is passed to the HF-AGC via pin 37 where the tape and heads tolerances are compensated. The FM signals are passed to the PLL demodulators via both band pass filters and the limiter. Using a Sample & Hold stage, head switching noise is cancelled (triggered by HP2 signal). 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.

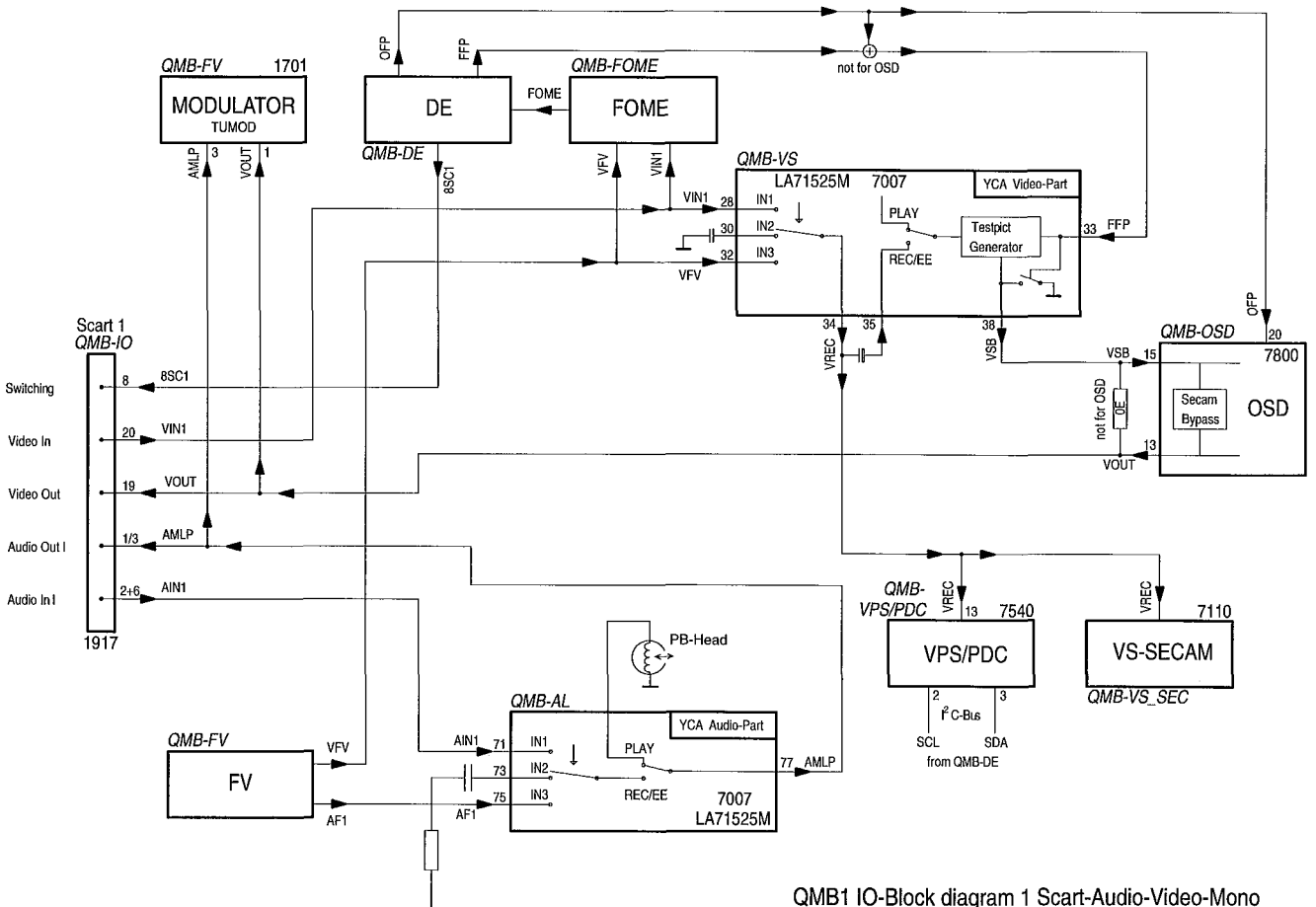
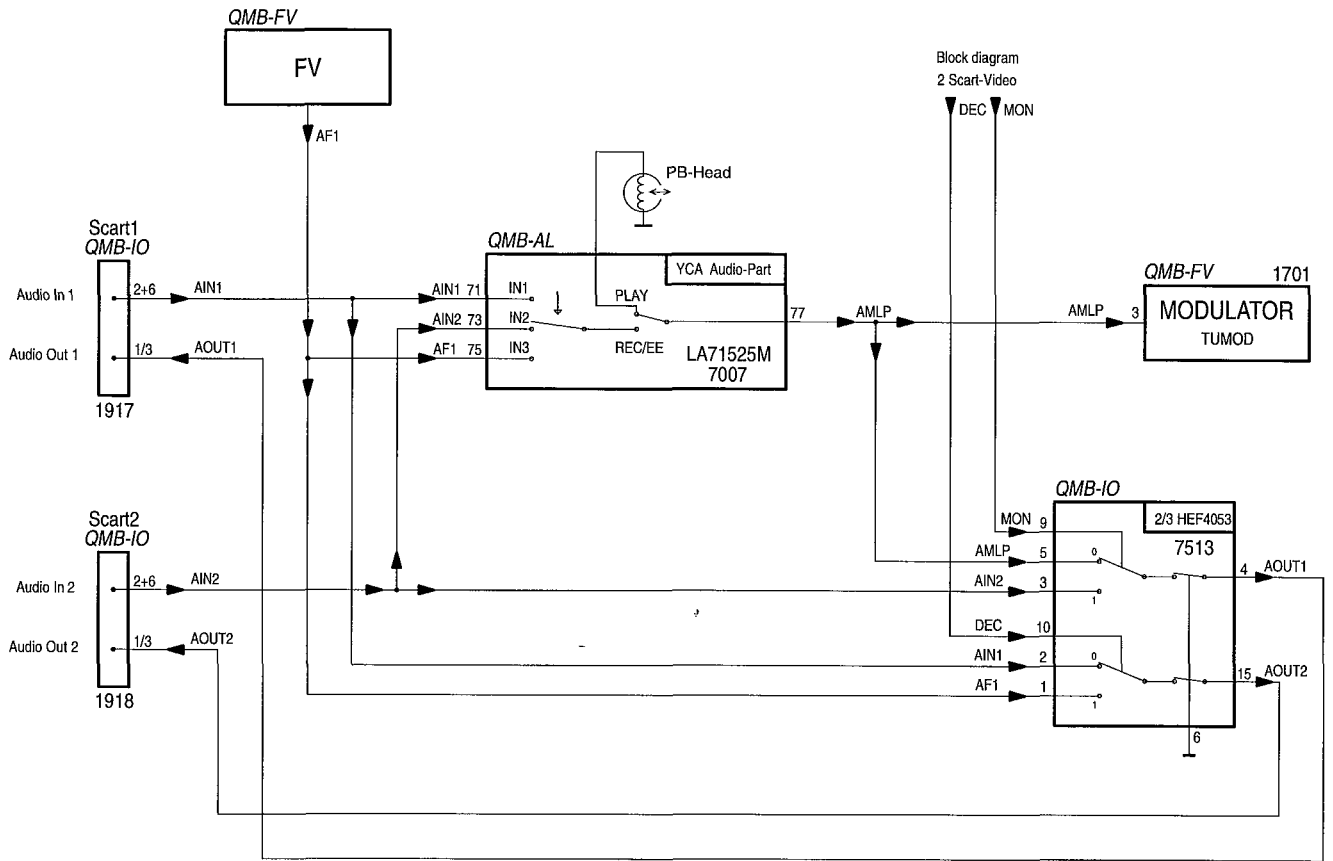
10.4 Linear audio interface

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).

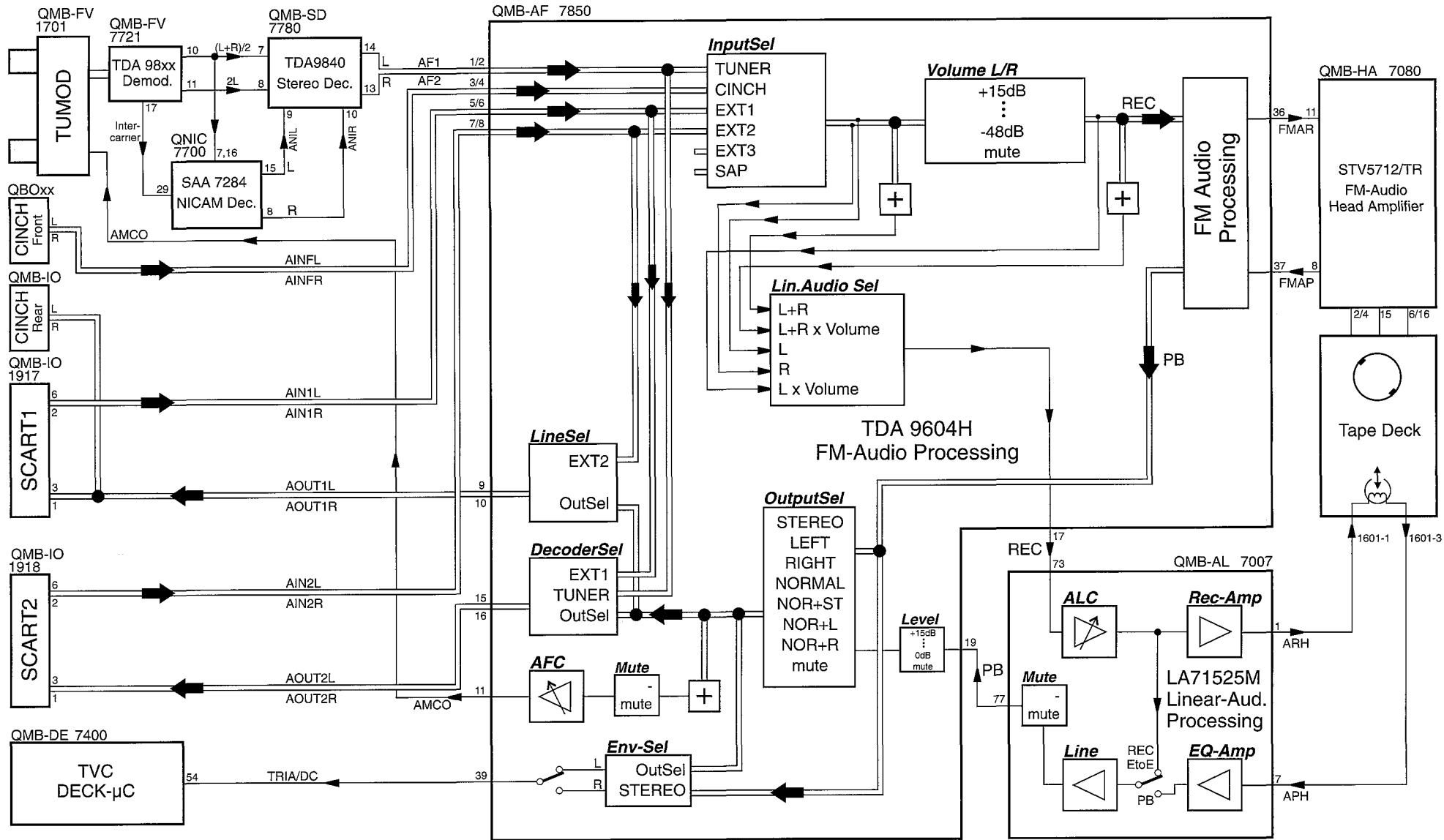
In stereo sets, the input selection switch of the signal electronics IC LA71525 [7007] is always set to IN2 (pin 73)

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.





Simple Blockdiagram FM Audio / Linear Audio processing



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

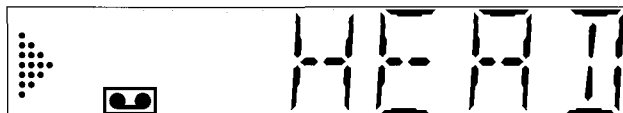
the following steps must be carried out:

- 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

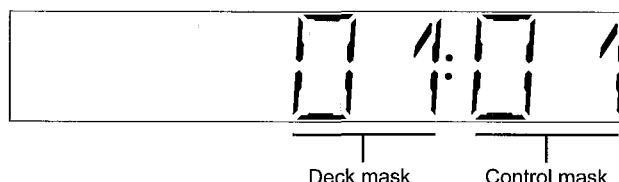
In the service test program, all drive functions apart from the channel search and channel change mode can be carried out. The program position set **before** entering the service test program is maintained.

2.2 Activating the service test program

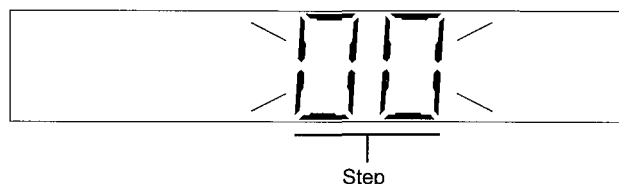
Press and hold down the STOP key on the remote control. Then press the PLAY key on the recorder and keep it depressed for at least 5 sec. The STOP key on the remote control may be released whilst the PLAY key on the recorder is pressed.

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:

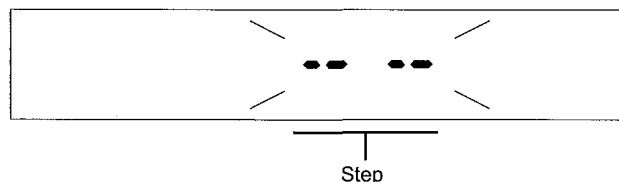


By pressing the SELECT key on the remote control, all step modes may be left and the currently selected step number appears and flashes



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 display shows -- and flashes



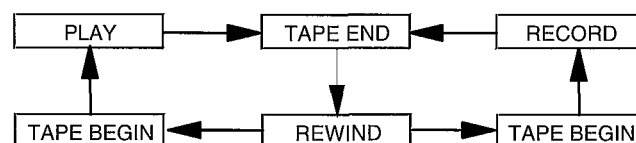
To leave the service program, press the STAND-BY key or disconnect recorder from mains

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)

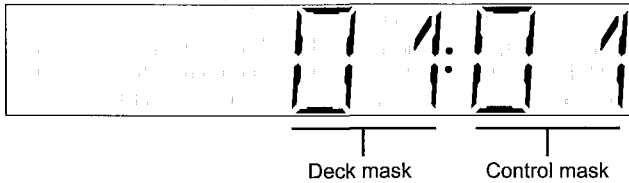
The endurance test is ended by pressing STOP or leaving the service test program



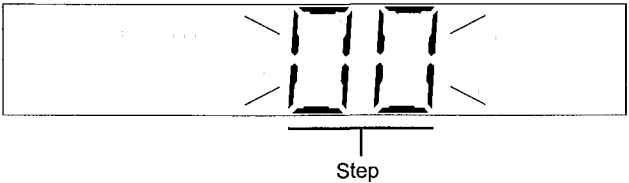
2.4 Description of steps with modes:

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)

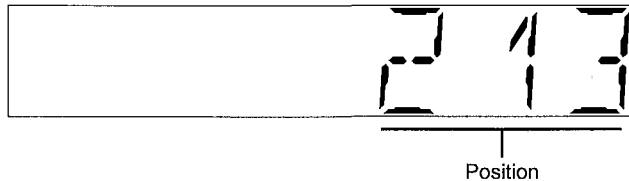
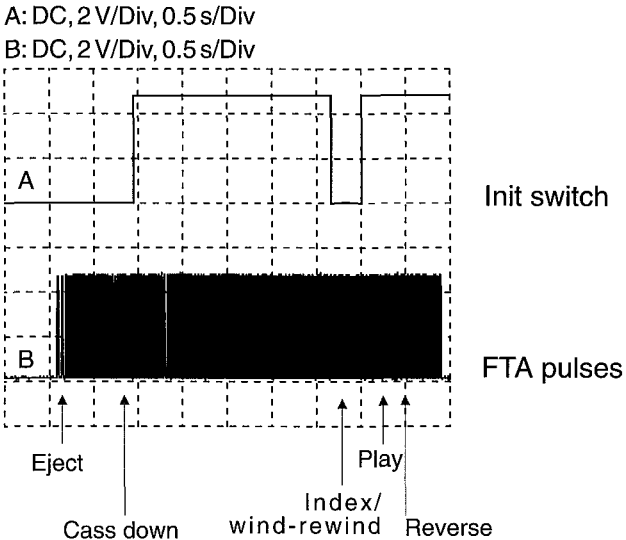


Table of drive positions:

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.



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 tachometer 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

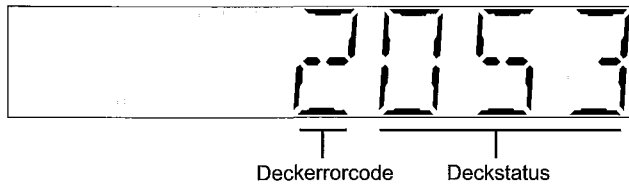
This is monitored with the FGD signal.

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)

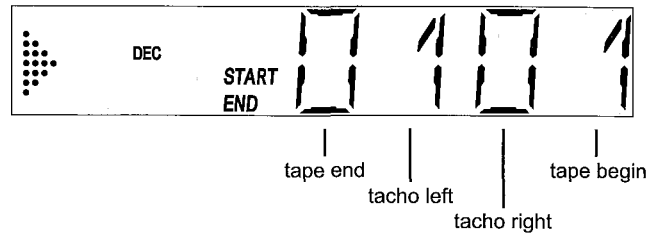
Functiontable:

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:

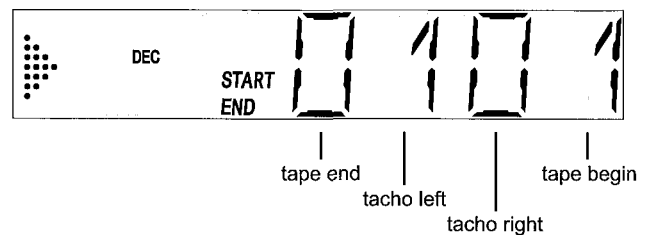
By pressing the SELECT key whilst step 04 is flashing, the operating hours counter shows how many hours the head disk has turned. The hours are displayed as a 4-digit decimal number.



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.



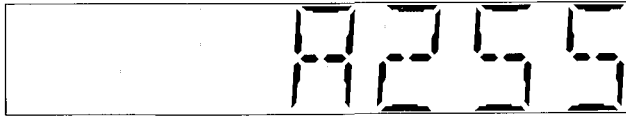
■ ● ◀ ▶ are used to show the deck status

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

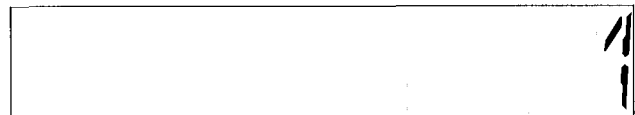
Purpose Adjustment of the reference level for the SPC.

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

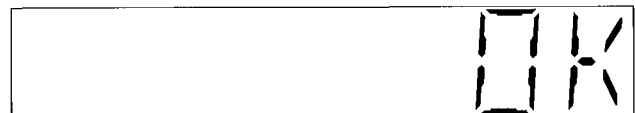
Before carrying out step 53, the correction value must be established in step 99.

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)

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

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

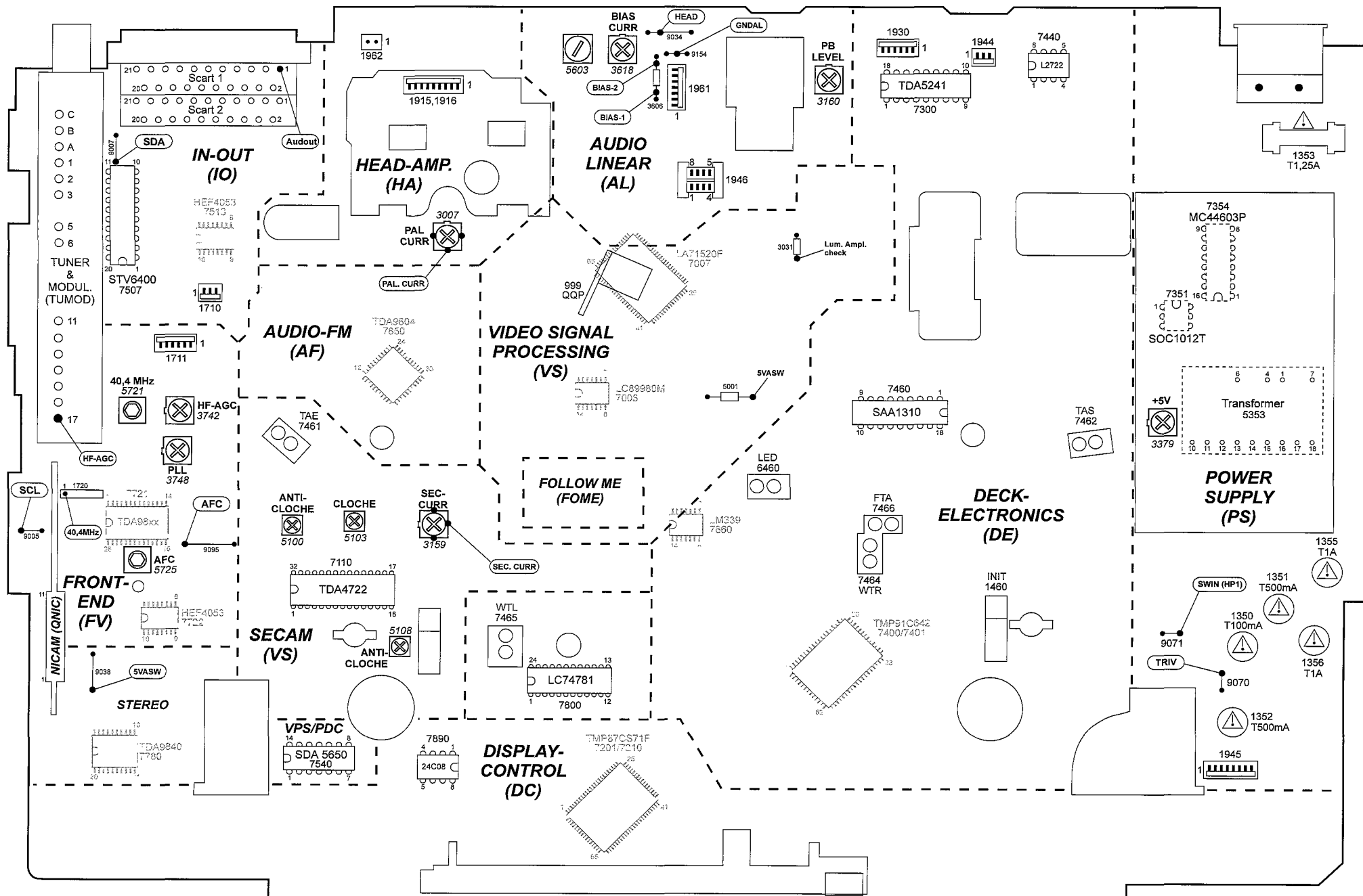
This Step can only be left by performing a **mains reset**, after which the service program must be entered again before Step 53 can be called up

Example:

$f_{\text{mess}} = 2047.97 \text{ Hz}$ $f_{\text{nom}} = 2048.00 \text{ Hz}$

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

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

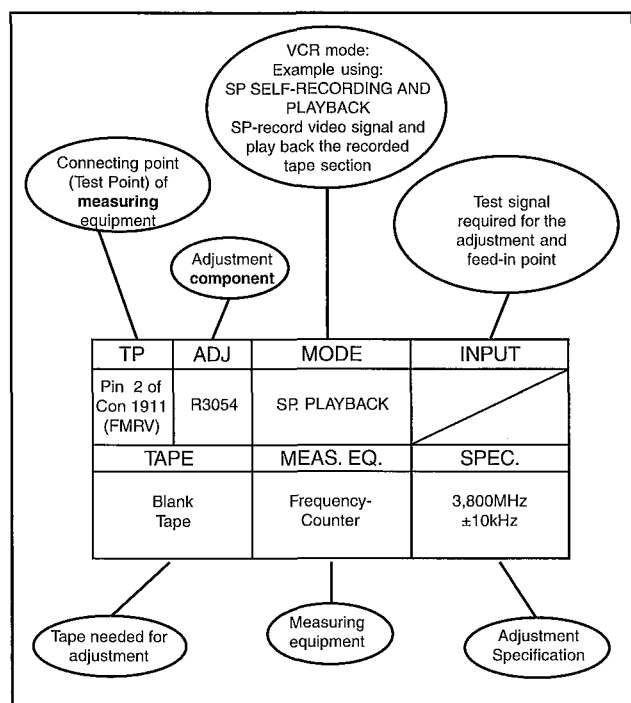


ADJUSTMENT INSTRUCTIONS

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

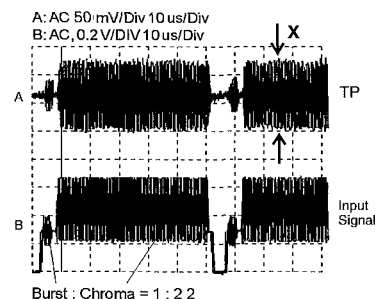
Control the luminance amplitude on TP R3031:

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

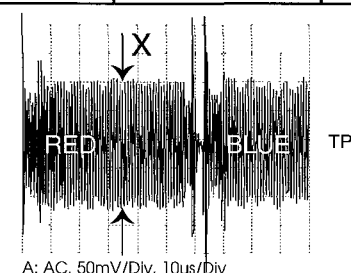
TP	ADJ.	MODE	INPUT
Pos. R3007 (slider)	R3007	Dummy mode Record Preset E1	(VIDEO IN E1) Red Picture PAL 75% Saturation
TAPE		MEAS. EQ.	SPEC.
Blank Tape		Oscilloscope Video Pattern Generator	X=160 ± 20 mV _{pp} , for 2 heads VCR X=130 ± 20 mV _{pp} , for 4 heads VCR



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 ± 10 kHz

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} ± 50 mV

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 Millivoltmeter	15mV _{RMS} ± 1 mV _{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 $\pm 0,2$ V

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 $\pm 0,2$ V

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 $\pm 0,2$ V

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(74dBμV) 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.

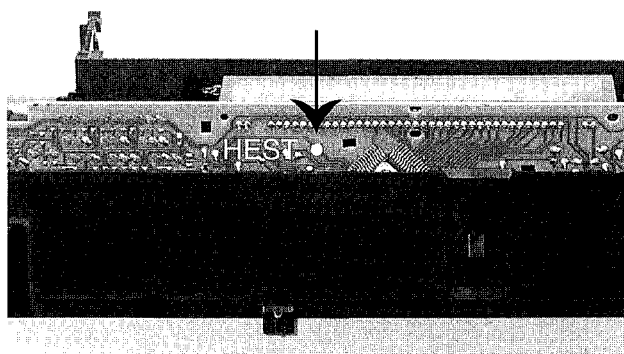
8. Display Control - QMB (DE, DC)

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.



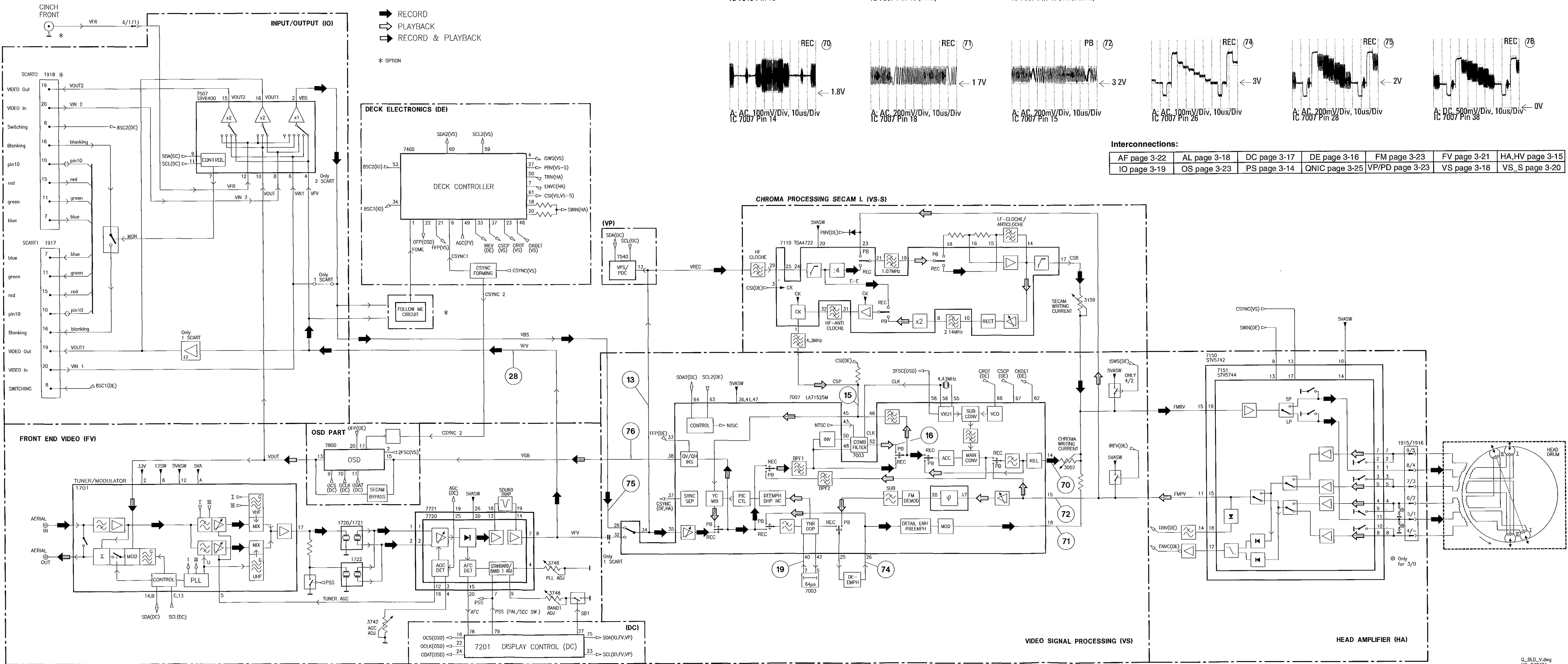
Application									
									QNIC
									QNIC
		DE							QNIC
S			DC			IO			
						IO			
S					AL			FV	QNIC
S						IO		FV	AF
S		DE							
				VS					OS
S								FV	
S						IO		FV	AF
S	HA	DE		VS			SE	FV	OS
									OS
								FV	
S		DE	DC					FV	
			DC						
		DE							
		DE				IO			
		DE				IO			
S		DE							
					AL				
					AL	IO		FV	AF
								FV	AF
			DC					FV	
								FV	
		DE						FV	
	HA								
					AL	IO			
						IO			AF
						IO			AF
					AL	IO			
						IO			AF
						IO			AF
						IO			AF
						IO			AF
								FV	AF
					AL	IO		FV	AF
					AL	IO			AF
			DC						
								FV	
								FV	
						IO			AF
						IO			AF
						IO			AF
						IO			AF
					AL				
					AL				
						IO			
						IO			
		DE							
		DE		VS					
		DE	DC						
		DE							
		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 AIO	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 scart1/2								IO				
HEHI	Heater for displaytube high	PS			DC								
HELO	Heater for displaytube low	PS			DC								
HEST	Heater voltage control signal				DC								
HP2	Head pulse audio		HA	DE							AF		
I/R	Deck switch / Record protection			DE									
ILED	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	
OPF	Frame pulse			DE								OS	

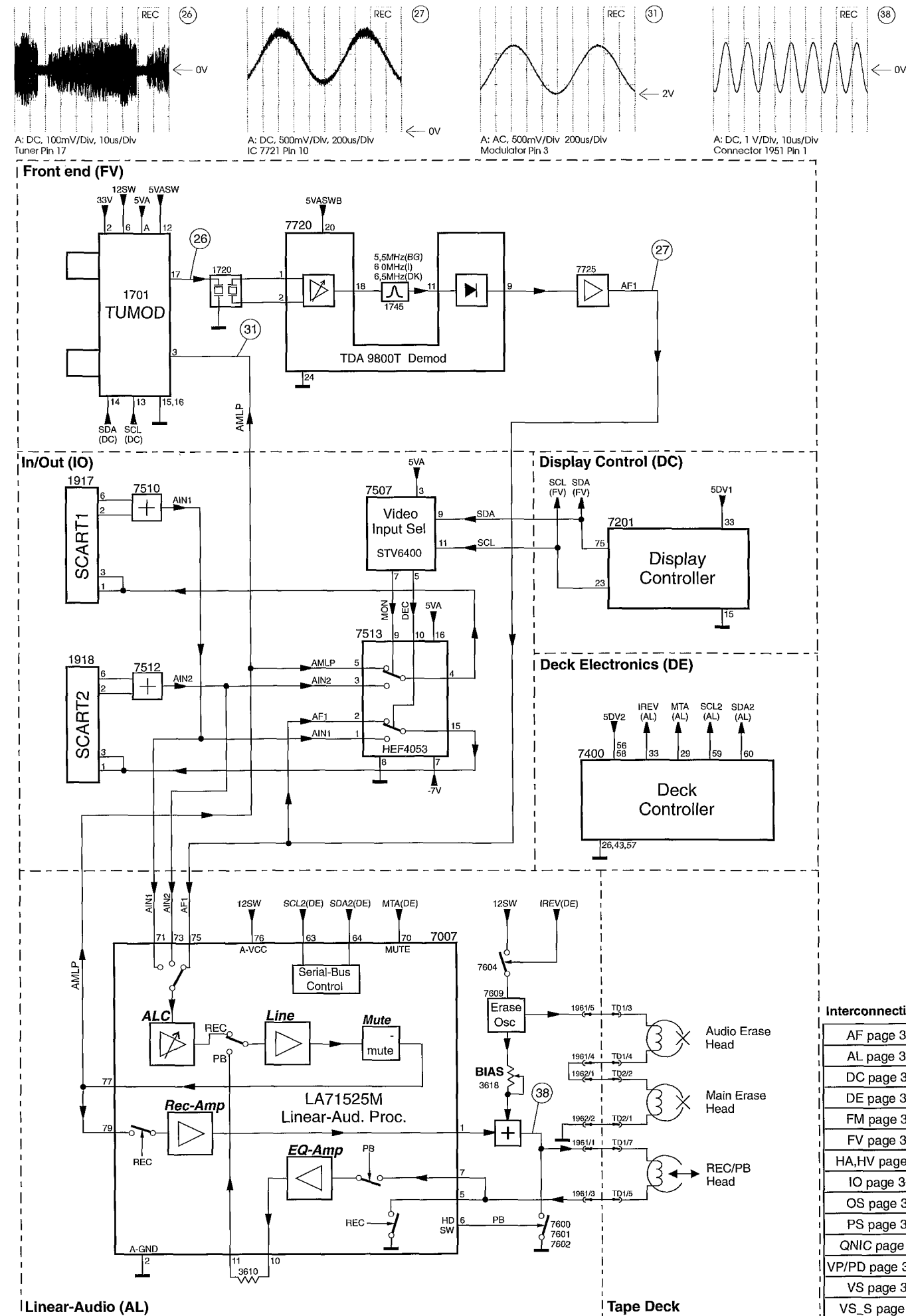
Signal	Description	Application											
PBV	Playback			DE					SE				
PG/FG	Head wheel position/-speed			DE									
POS	Position pulse headwheel			DE									
PSS	PAL or secam-L				DC					FV			
RECP	Record protection			DE									
RED	Red signal between scart 1/2							IO					
REEL	Head wheel control			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					
VS	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

Block Diagram Video

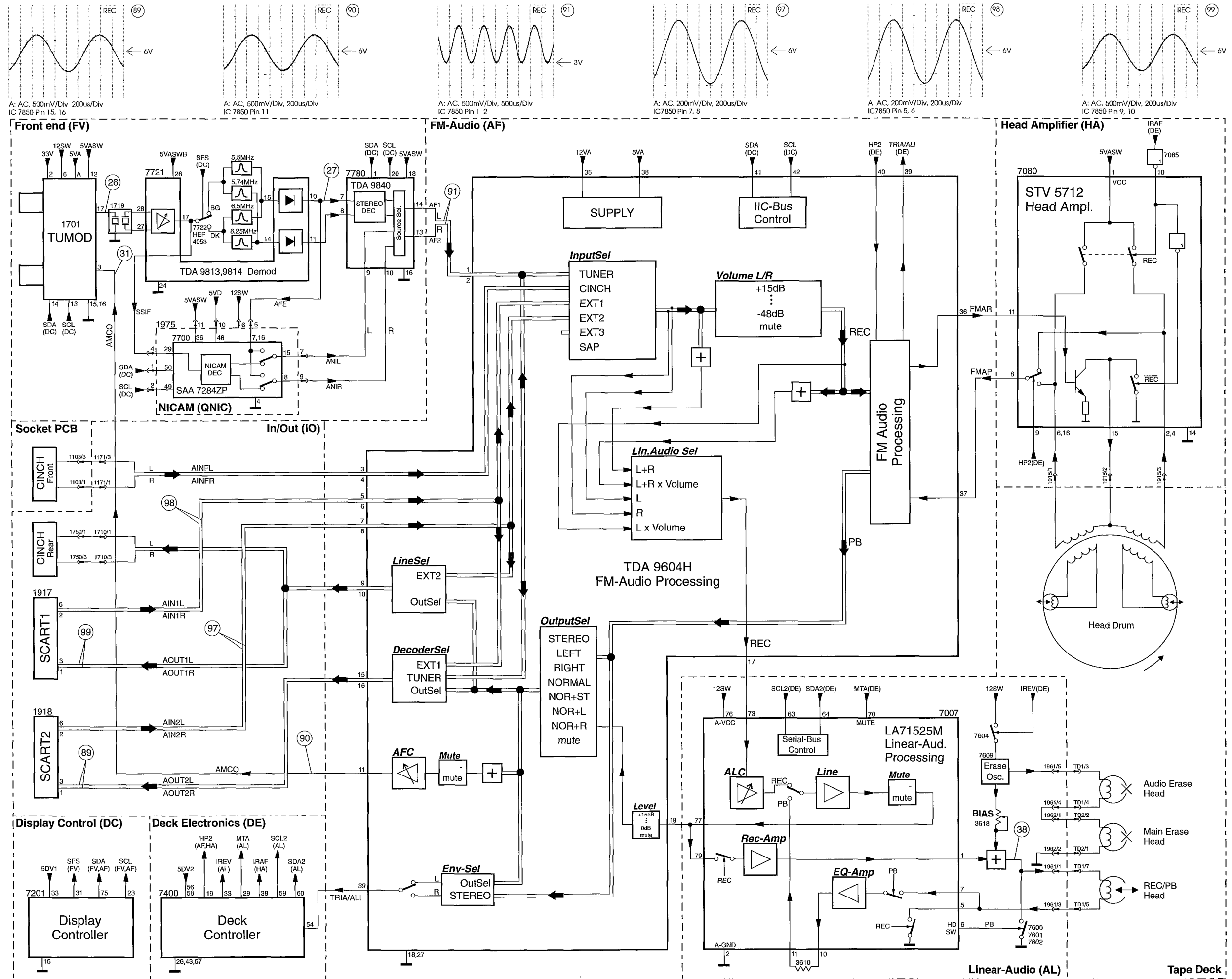


Block Diagram Audio Mono

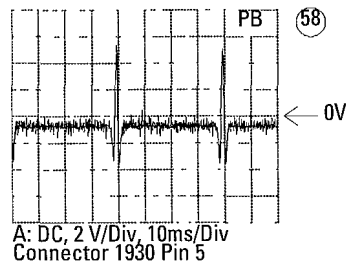
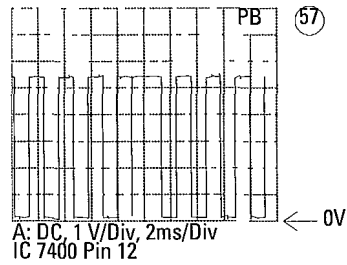
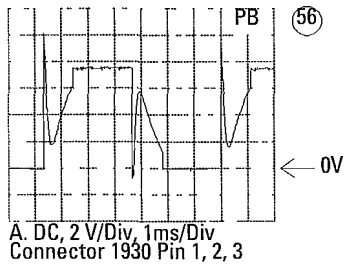
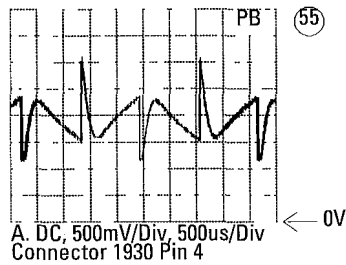
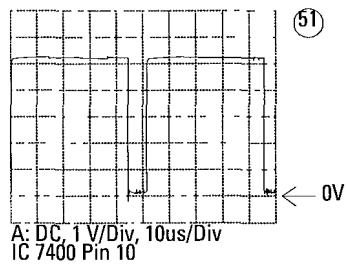
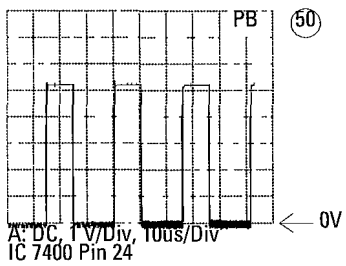
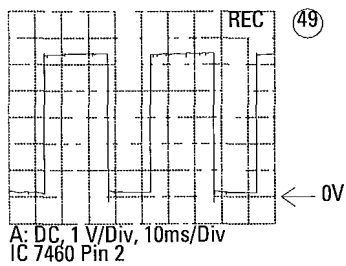
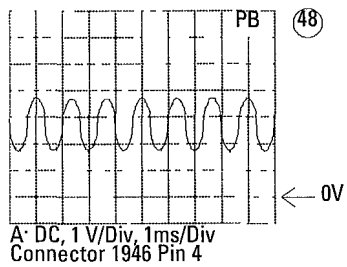
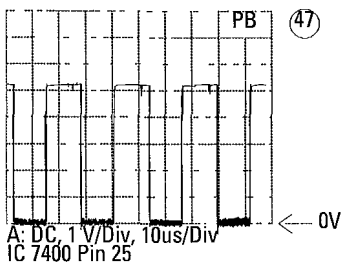
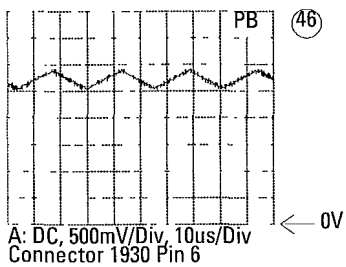
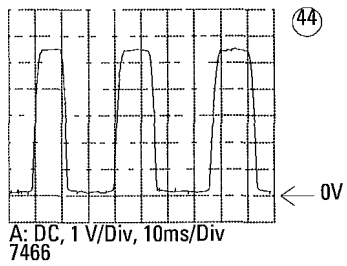
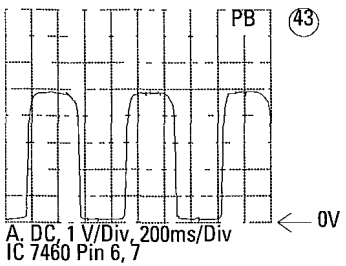
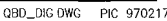


Interconnections:	
AF	page 3-22
AL	page 3-18
DC	page 3-17
DE	page 3-16
FM	page 3-23
FV	page 3-21
HA,HV	page 3-15
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PS	page 3-14
QNIC	page 3-25
VP/PD	page 3-23
VS	page 3-18
VS_S	page 3-20

Block Diagram Audio Stereo



Interconnections:	
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DC	page 3-17
DE	page 3-16
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FV	page 3-21
HA,HV	page 3-15
IO	page 3-19
OS	page 3-23
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VP/PD	page 3-23
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VS_S	page 3-20



Interconnections:
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FM page 3-23
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HA,HV page 3-15
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OS page 3-23
PS page 3-14
QNIC page 3-25
VP/PD page 3-23
VS page 3-18
VS_S page 3-20

Supply Voltages and Bus Diagram

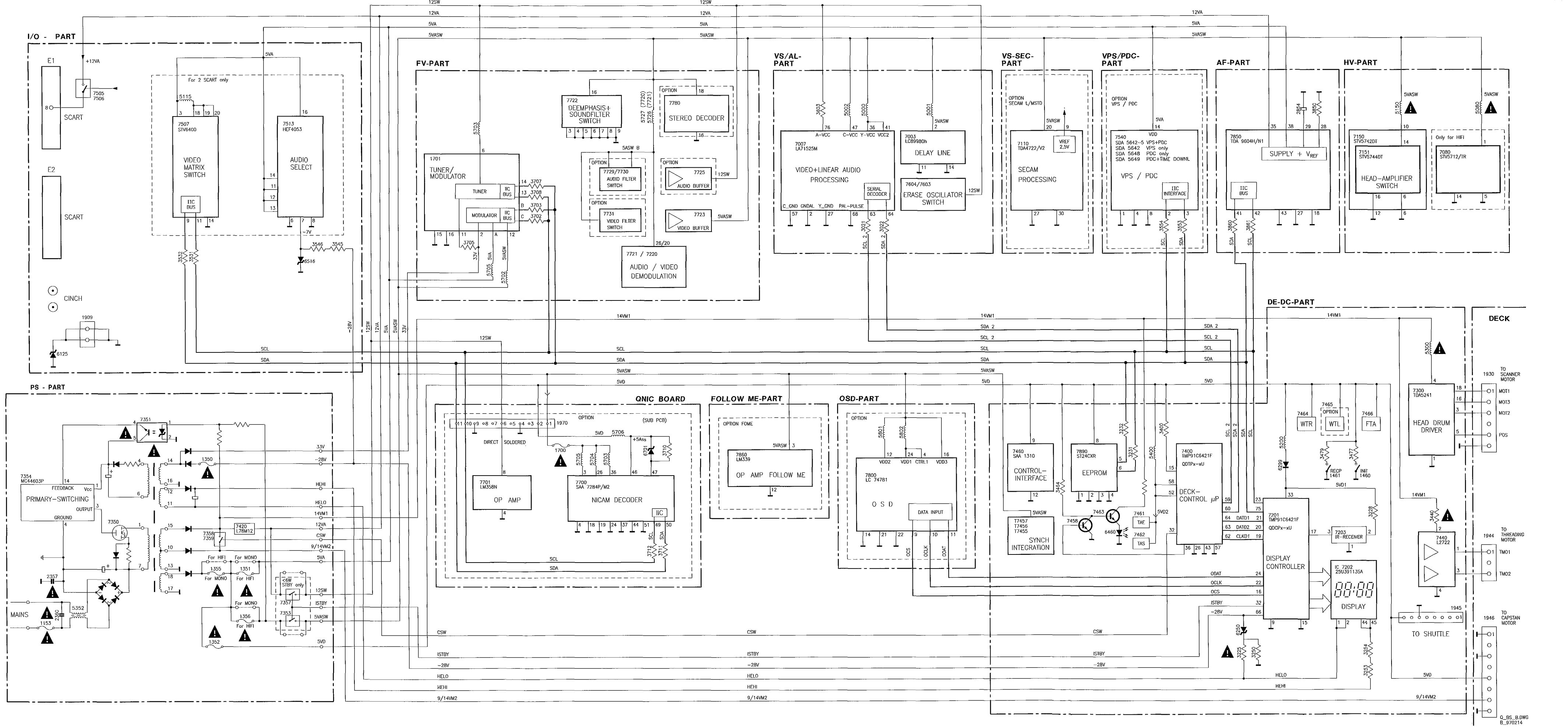
3-11

3-11

3-11

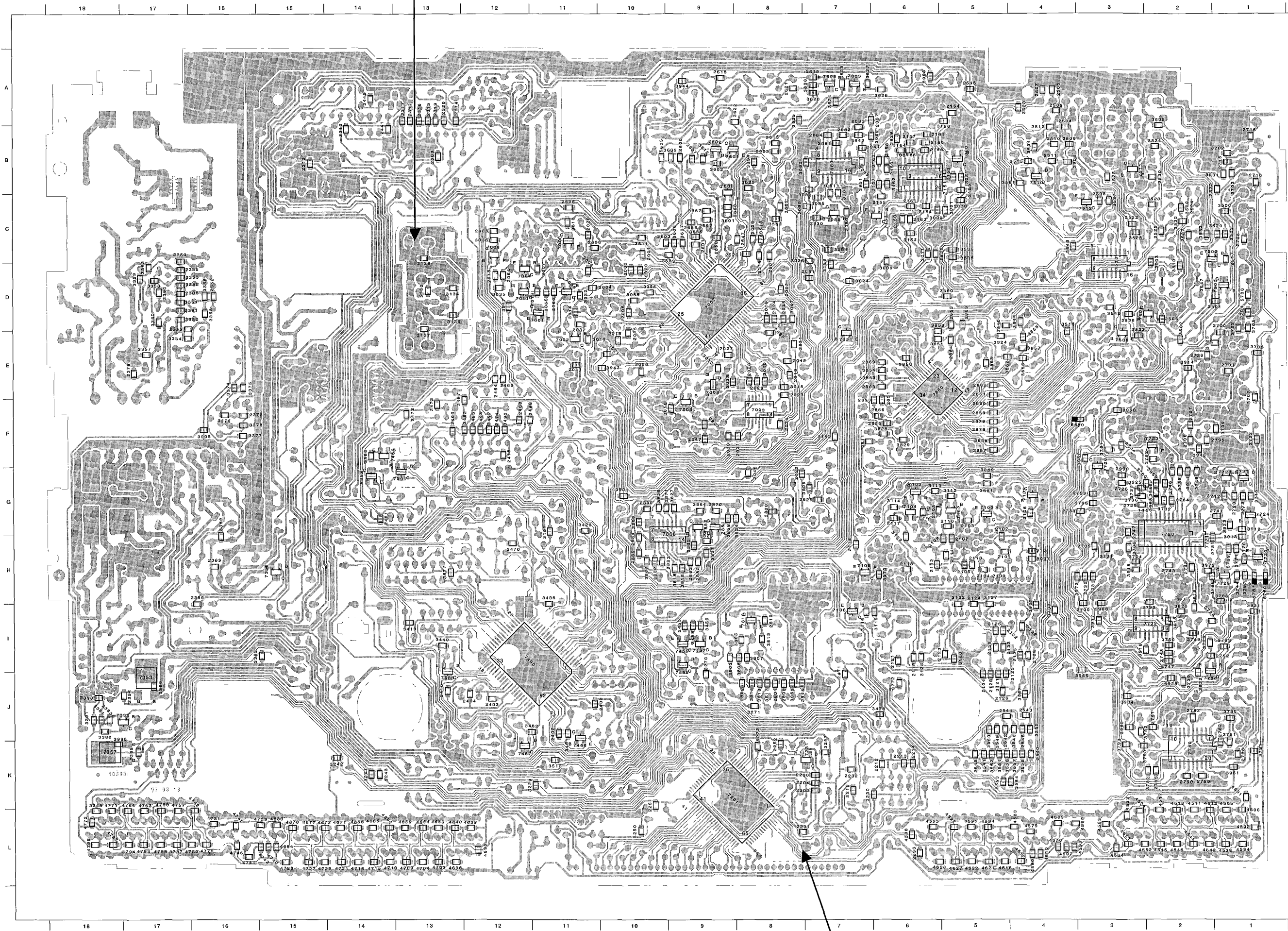
Interconnections:

AF page 3-22	AL page 3-18	DC page 3-17	DE page 3-16	FM page 3-23	FV page 3-21	HA,HV page 3-15
IO page 3-19	OS page 3-23	PS page 3-14	QNIC page 3-25	VP/PD page 3-23	VS page 3-18	VS_S page 3-20

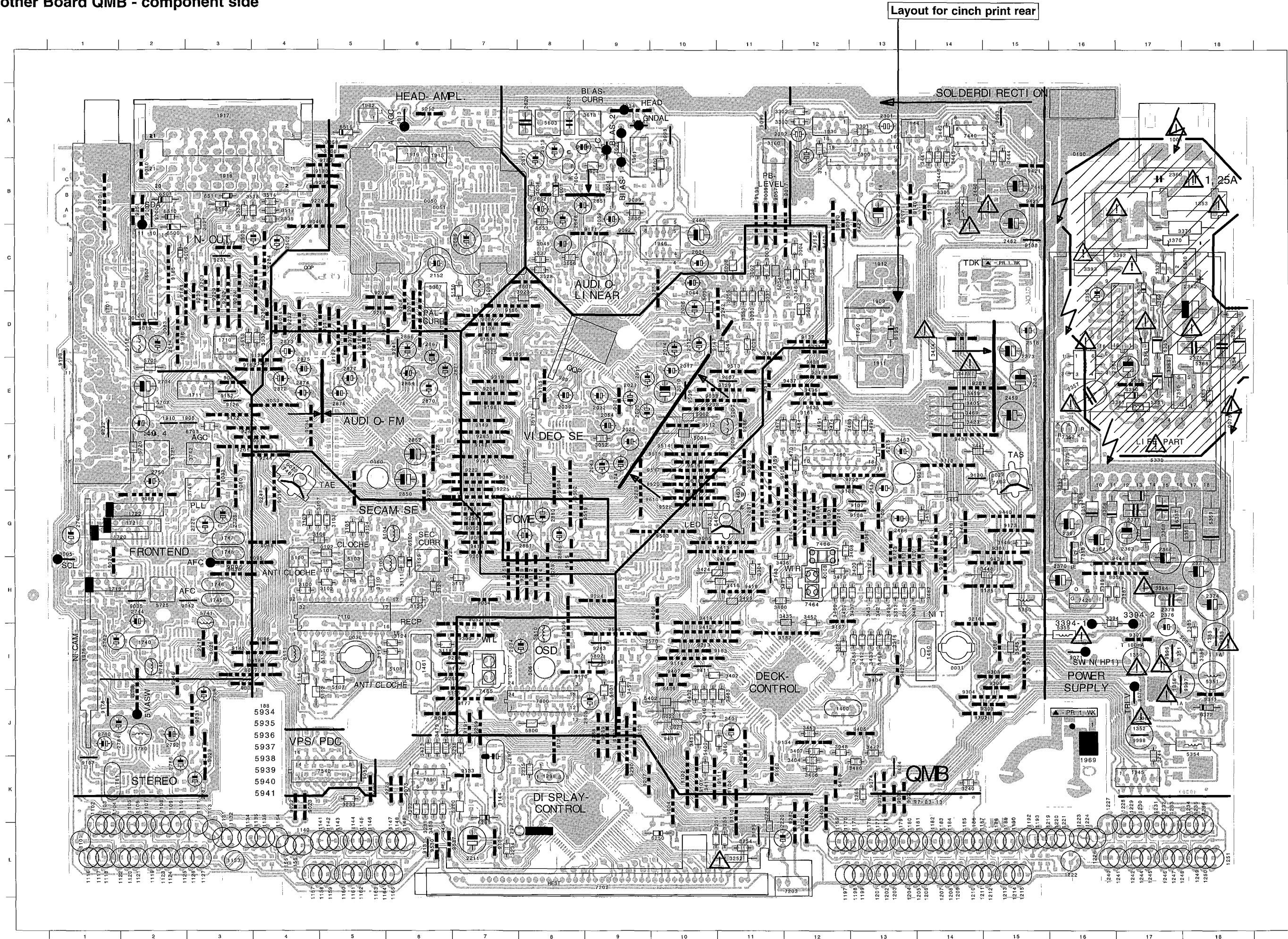


Mother Board QMB - solder side

Layout for cinch print rear

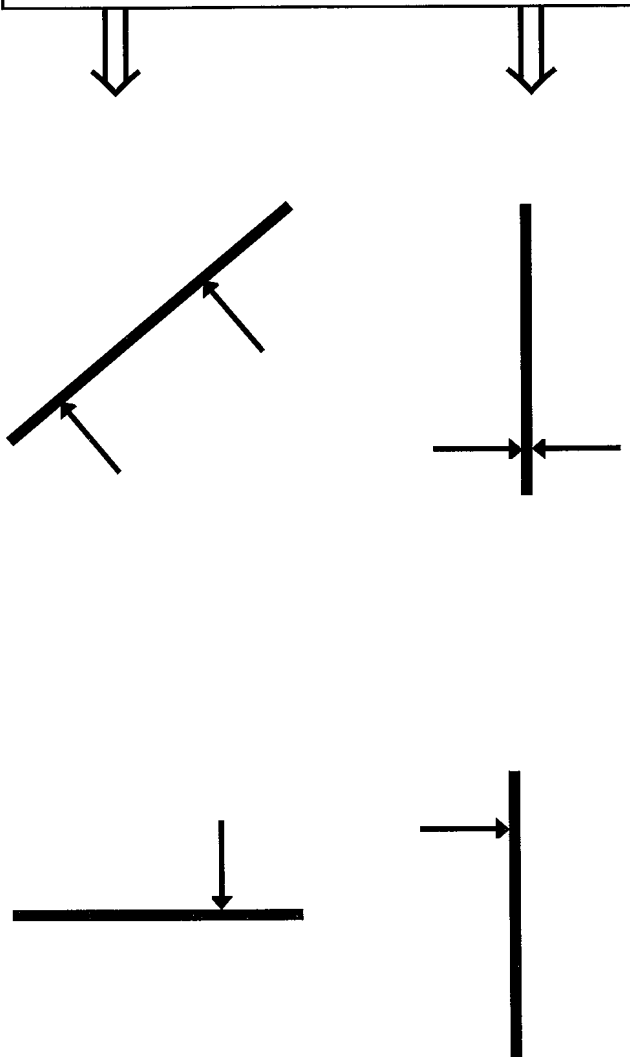


2001 C 10	2319 A 13	2790 K 2	3357 E 17	3712 G 1	3956 I 3	6760 H 1
2002 D 8	2320 A 13	2793 H 2	3358 D 17	3715 G 1	3960 F 3	6761 H 1
2003 D 10	2350 C 17	2794 D 1	3359 D 17	3723 I 1	3961 K 1	7000 C 11
2004 D 11	2352 D 16	2795 F 2	3360 D 17	3726 E 1	3962 F 3	7001 D 11
2006 D 10	2353 D 17	2800 J 8	3362 D 17	3726 E 2	3965 J 3	7002 F 11
2007 D 11	2354 J 7	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	2356 K 17	2803 I 9	3376 F 16	3731 H 3	3970 H 6	7005 F 9
2011 E 11	2359 I 16	2810 I 8	3377 F 16	3732 G 2	3972 H 2	7006 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	2379 E 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 3	7011 D 12
2022 G 8	2381 D 17	2851 F 6	3389 H 16	3744 H 1	3988 G 2	7020 B 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 2	7080 B 7
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2027 E 9	2402 J 11	2857 F 5	3419 I 13	3760 G 2	3999 J 17	7100 G 5
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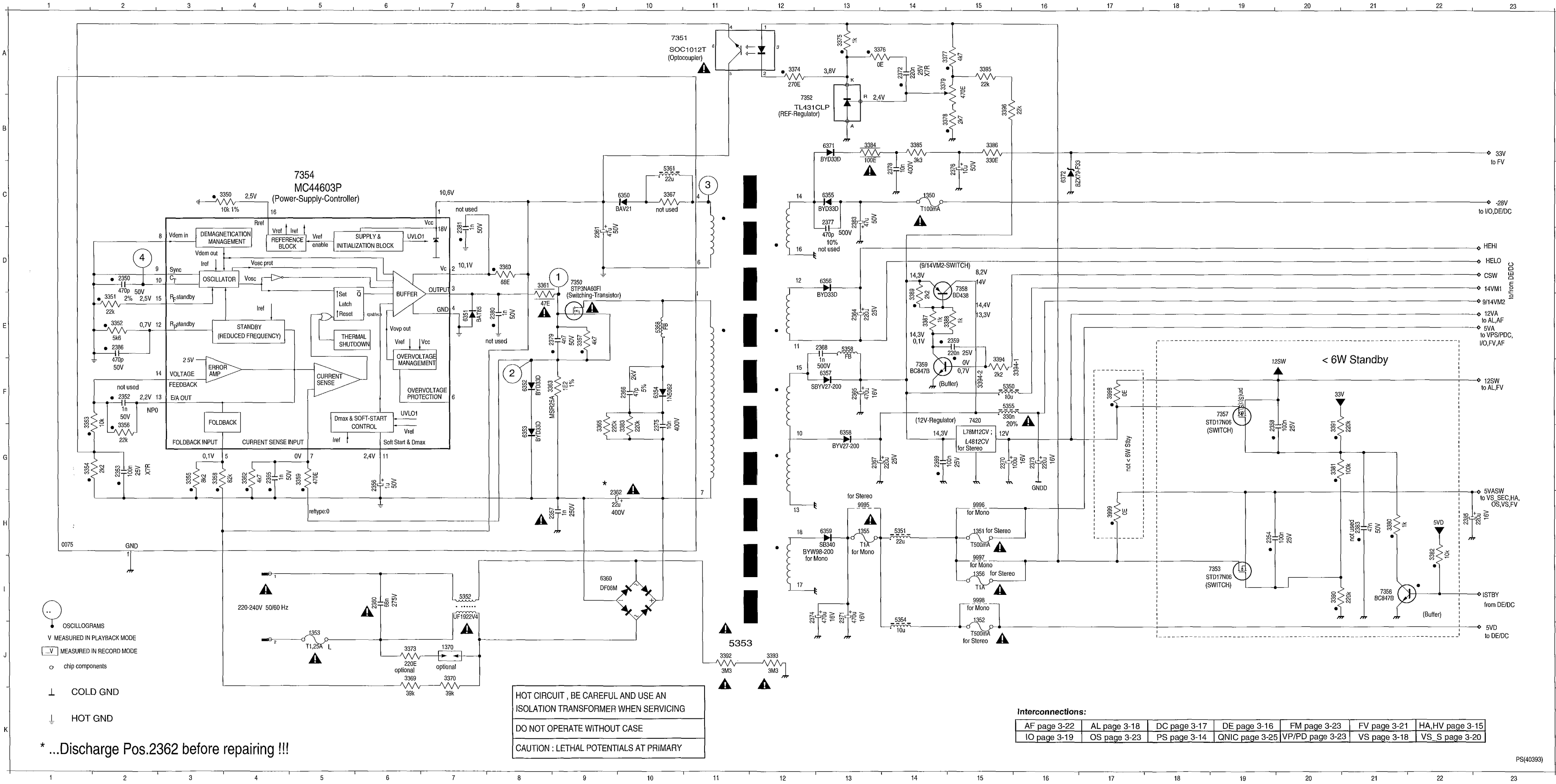


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Make sure that the components in these areas are aligned correctly !!! (Danger of collision with deck)

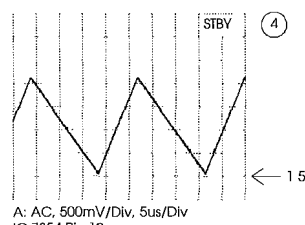
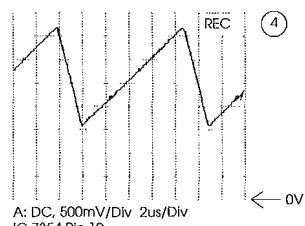
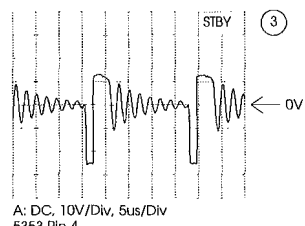
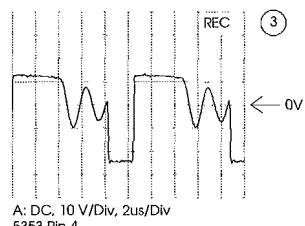
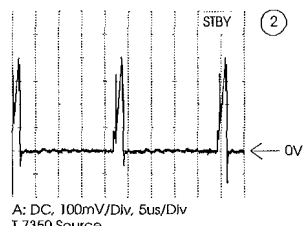
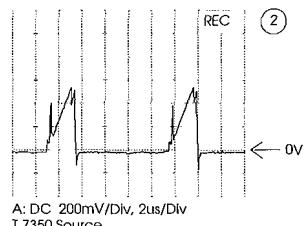
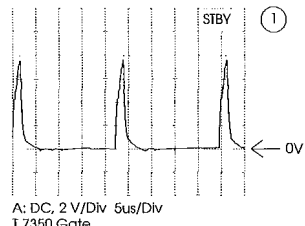
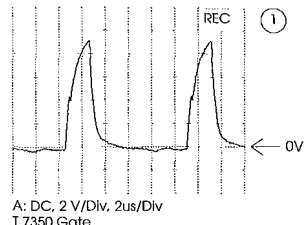


Power Supply (PS)



- 0075 H 1
- 1350 C14
- 1351 H15
- 1352 J15
- 1353 J 5
- 1355 H13
- 1356 H15
- 1370 J 7
- 2350 D 2
- 2352 F 2
- 2353 G 2
- 2354 H19
- 2355 G 4
- 2356 G 6
- 2357 H 9
- 2358 G19
- 2359 E15
- 2360 I 6
- 2361 D 9
- 2362 H 9
- 2363 C13
- 2364 E13
- 2365 F13
- 2366 F10
- 2367 G13
- 2368 E13
- 2369 G14
- 2370 G15
- 2371 H13
- 2372 A14
- 2373 G16
- 2374 H12
- 2375 G10
- 2376 C15
- 2377 C13
- 2378 C14
- 2379 E 9
- 2380 E 8
- 2381 D 7
- 2383 H21
- 2385 H22
- 2386 E 2
- 3350 C 4
- 3351 E 2
- 3352 E 2
- 3354 G 1
- 3355 G 3
- 3356 G 2
- 3357 F 9
- 3358 G 3
- 3359 G 5
- 3360 D 8
- 3361 D 8
- 3362 G 4
- 3363 F 9
- 3365 G 9
- 3367 C10
- 3369 J 6
- 3370 J 7
- 3373 J 6
- 3374 A12
- 3375 A13
- 3376 A15
- 3377 A15
- 3378 B15
- 3379 A14
- 3380 H21
- 3381 G20
- 3382 H22
- 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 F15
- 5351 H14
- 5352 I 7
- 5353 J11
- 5354 J14
- 5355 F15
- 5358 E13
- 5361 C10
- 6350 C10
- 6351 E 7
- 6352 F 8
- 6353 G 8
- 6354 F10
- 6355 C13
- 6356 D13
- 6357 F13
- 6359 G13
- 6359 H13
- 6360 I 9
- 6371 B13
- 6372 C16
- 7350 D 9
- 7351 A10
- 7352 B12
- 7353 I19
- 7354 C 5
- 7356 I21
- 7357 F19

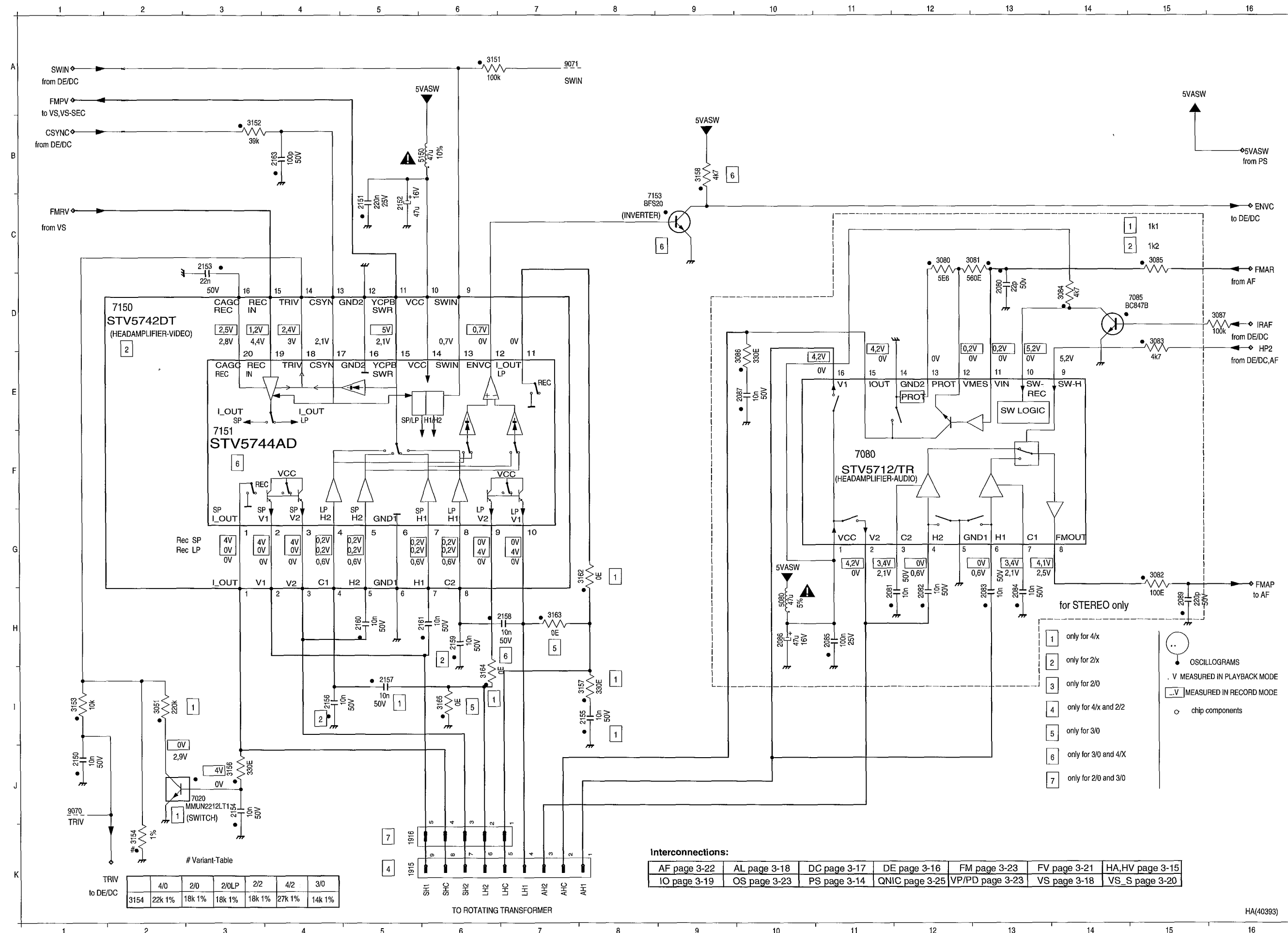
7358 D15
7359 F14
7420 F15
9995 H13
9996 H15
9997 I15
9998 I15



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Head Amplifier (HA)

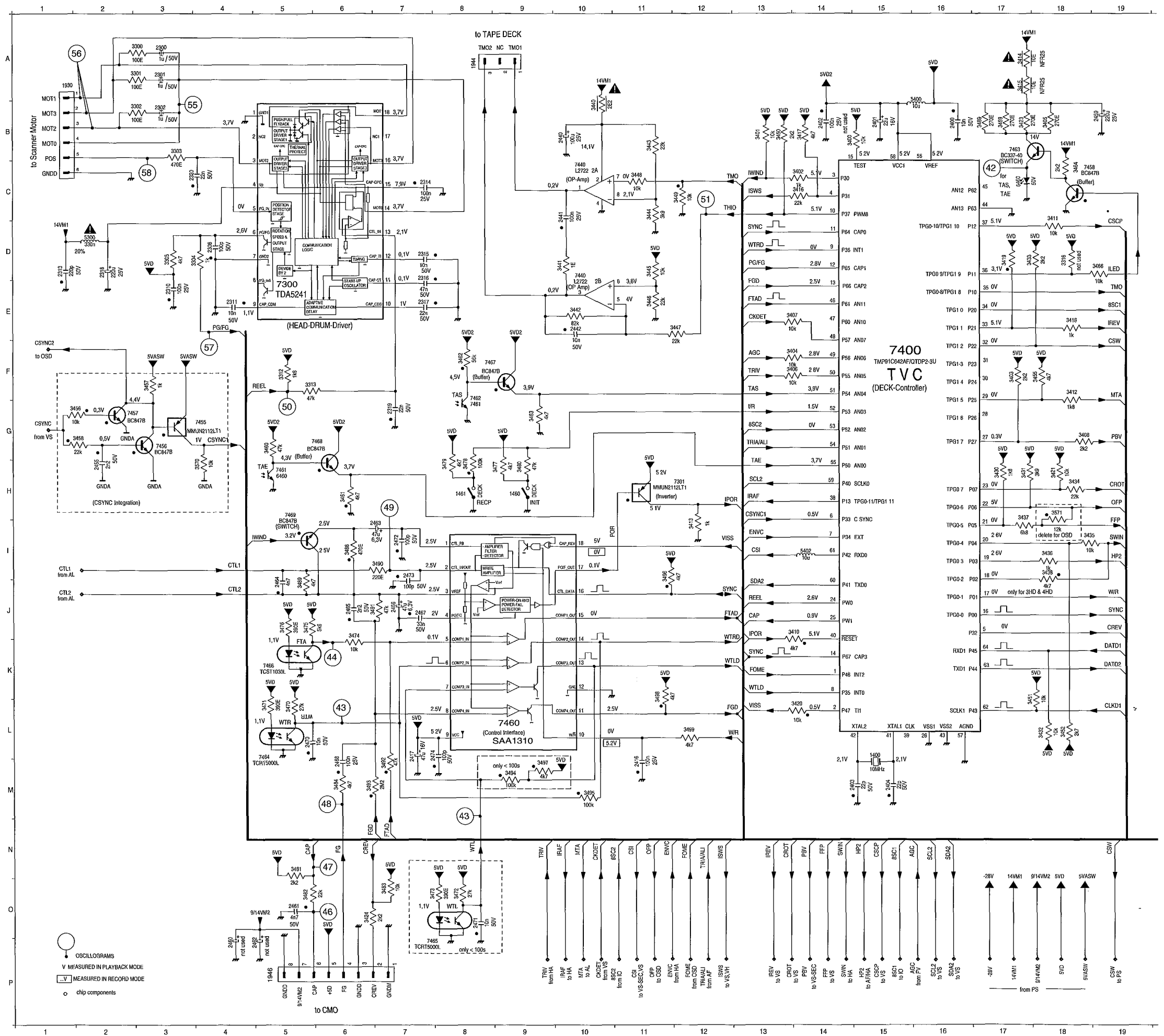
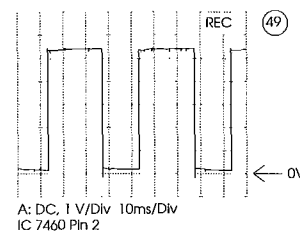
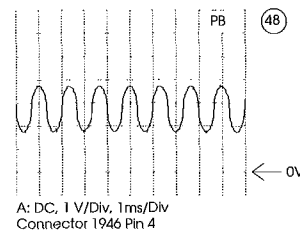
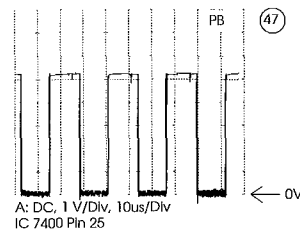
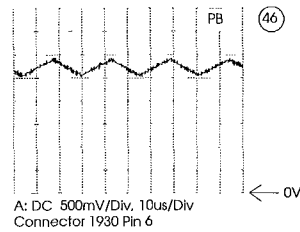
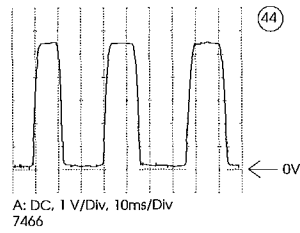
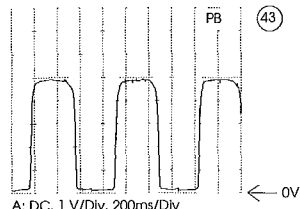
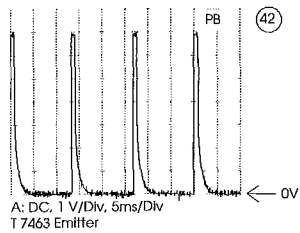


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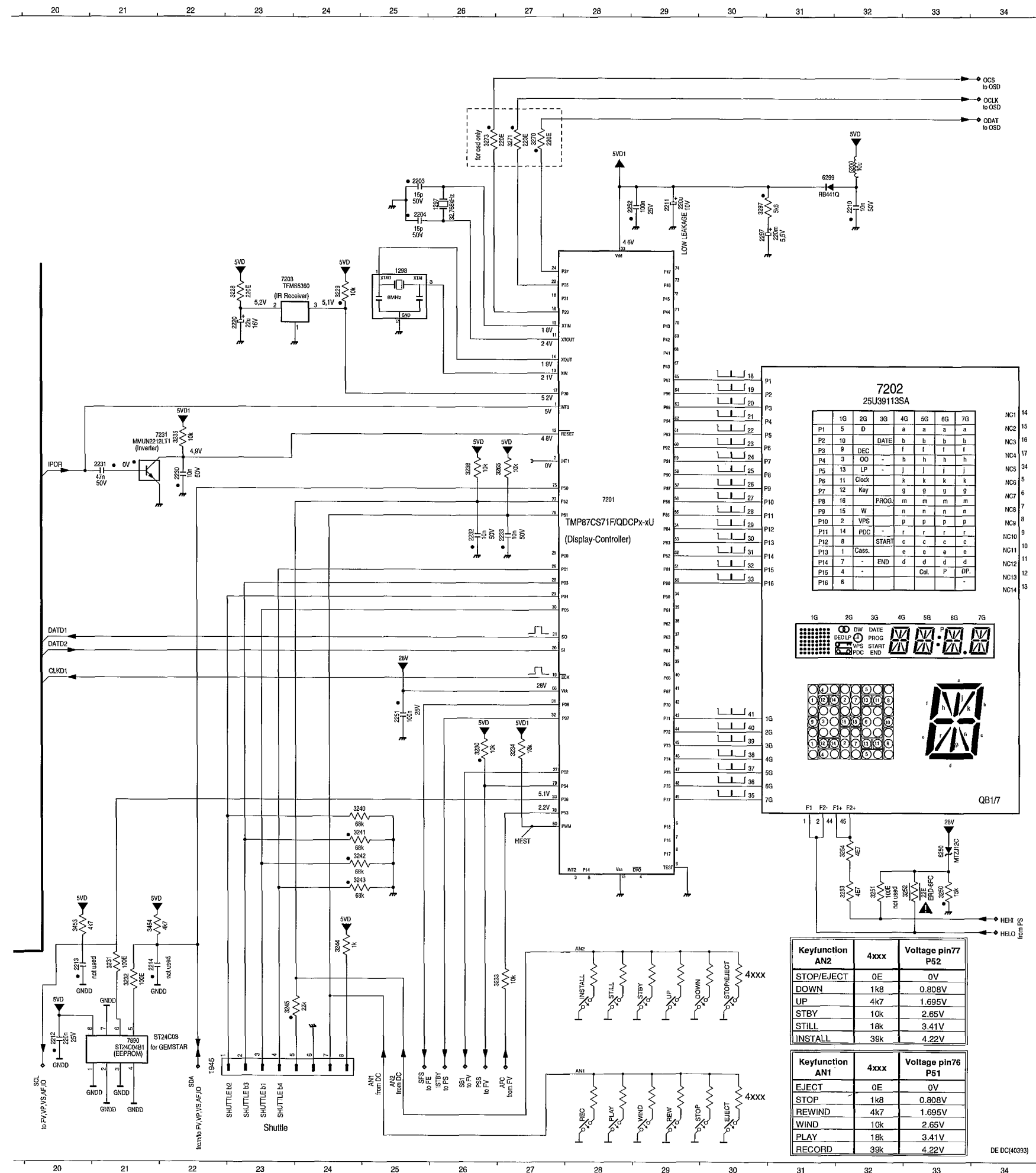
HA(40393)

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 L8
2156 L4
2157 L5
2158 H7
2159 H6
2160 H5
2161 H6
2163 B4
3051 I2
3080 C12
3081 C13
3082 I5
3083 D15
3084 D14
3085 I5
3086 E10
3087 D16
3151 A6
3152 B3
3153 I1
3154 K2
3156 J3
3157 L8
3158 B9
3162 L8
3163 H7
3164 I6
3165 L6
5080 H10
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7085 D15
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7153 C8
9070 J1
9071 A7

Deck Electronics (DE)



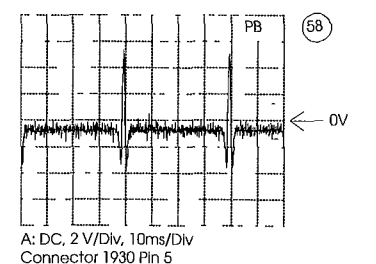
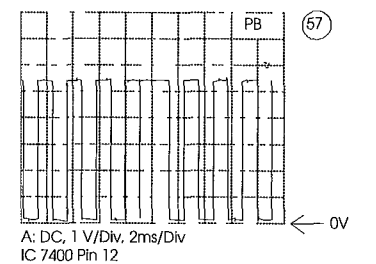
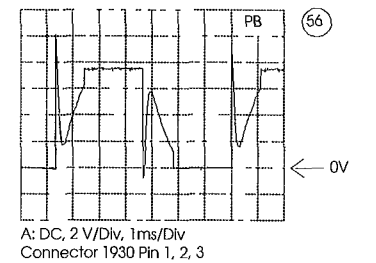
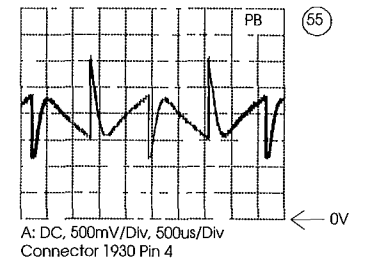
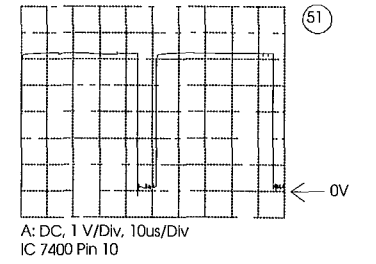
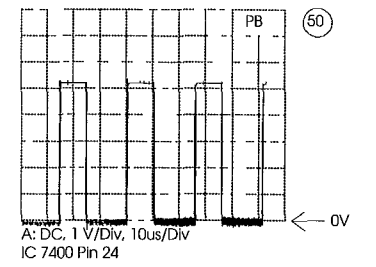
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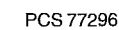


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1298 D25	3453 M20
1400 L15	3454 M21
1460 H9	3455 F18
1461 H8	3456 G2
1930 A2	3457 F3
1944 A8	3458 G2
1945 O22	3459 B17
1946 P5	3460 G5
2203 B25	3461 H6
2204 C25	3462 F8
2210 C32	3463 G9
2211 C29	3464 C18
2212 O20	3466 D19
2213 N20	3469 B17
2214 N21	3470 L5
2220 E23	3471 L5
2230 G22	3472 O8
2231 G21	3473 O7
2232 H26	3474 J6
2233 H27	3475 J5
2251 J25	3476 J5
2252 C29	3477 H9
2297 C30	3478 H8
2300 A3	3479 H8
2301 A3	3480 H9
2302 B3	3481 N5
2308 D4	3482 O6
2310 E3	3483 O7
2311 E4	3484 M6
2313 D1	3488 I6
2314 C7	3489 J5
2315 D7	3490 I7
2316 D7	3491 J7
2317 E7	3492 M7
2318 D2	3493 M6
2319 G7	3494 M9
2320 C4	3495 M10
2400 B16	3496 I11
2401 B15	3497 M9
2402 B14	3498 K11
2403 M15	3499 L12
2404 M15	3500 H4
2416 M11	3501 H18
2417 L7	5200 B32
2440 B10	5300 D2
2441 C10	5400 B16
2442 E10	5402 I14
2455 H2	6250 L33
2459 B19	6299 B31
2460 P4	6480 C17
2461 O5	7201 G28
2462 P5	7202 F32
2463 I7	7203 D23
2464 J5	7231 F22
2465 J6	7300 E5
2466 J7	7301 H12
2467 J7	7400 F15
2468 M6	7440 C10
2470 L5	7440 D10
2471 O8	7455 G4
2472 I7	7456 G3
2473 I7	7457 G2
2474 L8	7458 C19
3228 D23	7460 L9
3229 D24	7461 H5
3230 K26	7462 F8
3231 N21	7463 B17
3232 N21	7464 L5
3233 N27	7465 P7
3234 K27	7466 K5
3235 F22	7467 F8
3236 G26	7468 G5
3240 L24	7469 H5
3241 L24	7890 O21
3242 L24	
3243 M24	
3244 N24	
3245 O23	
3250 M33	
3251 M32	
3252 M33	
3253 M32	
3254 L32	
3265 G27	
3270 B27	
3271 B27	
3273 B26	
3297 C30	
3300 A3	
3301 A3	
3302 B3	
3303 B3	
3304 D4	
3305 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	
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3419 D17	
3420 L14	
3421 H18	
3423 B17	
3424 O6	
3430 H17	
3431 H17	
3432 L18	
3433 D17	
3434 H18	
3435 I18	
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3437 H17	
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3440 B10	
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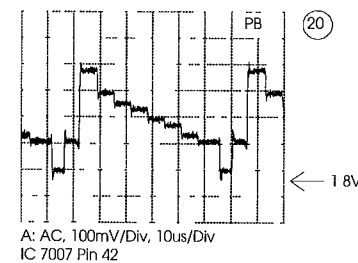
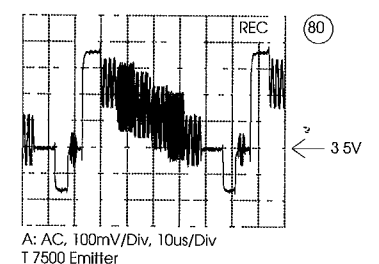
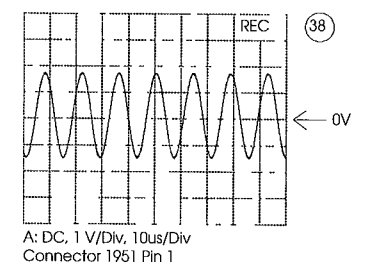
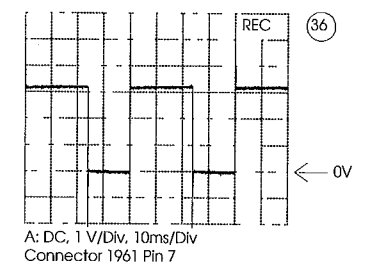
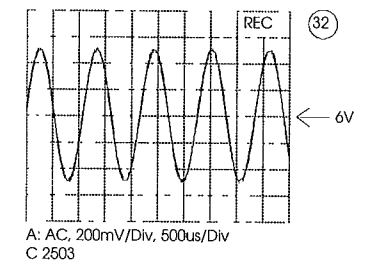
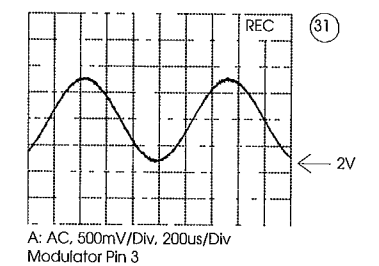
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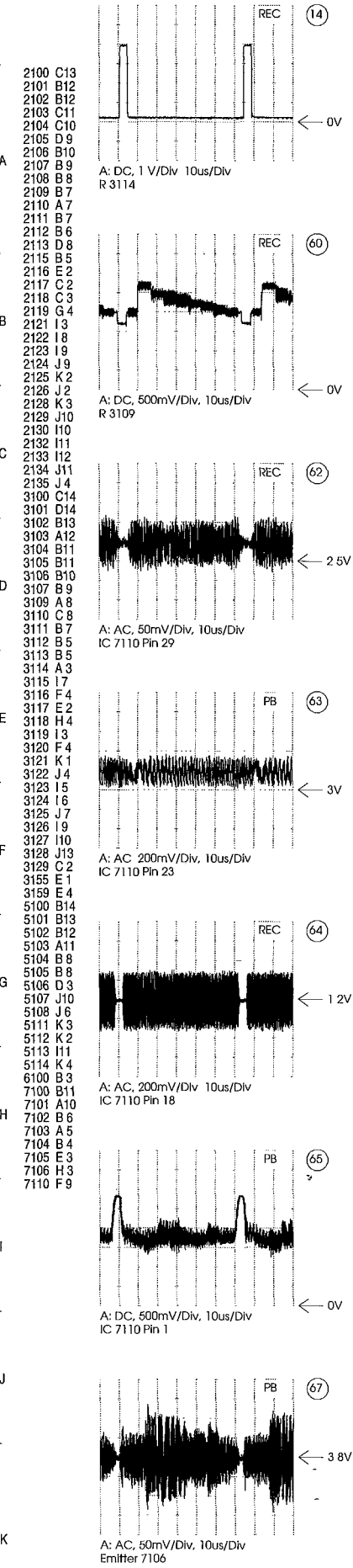
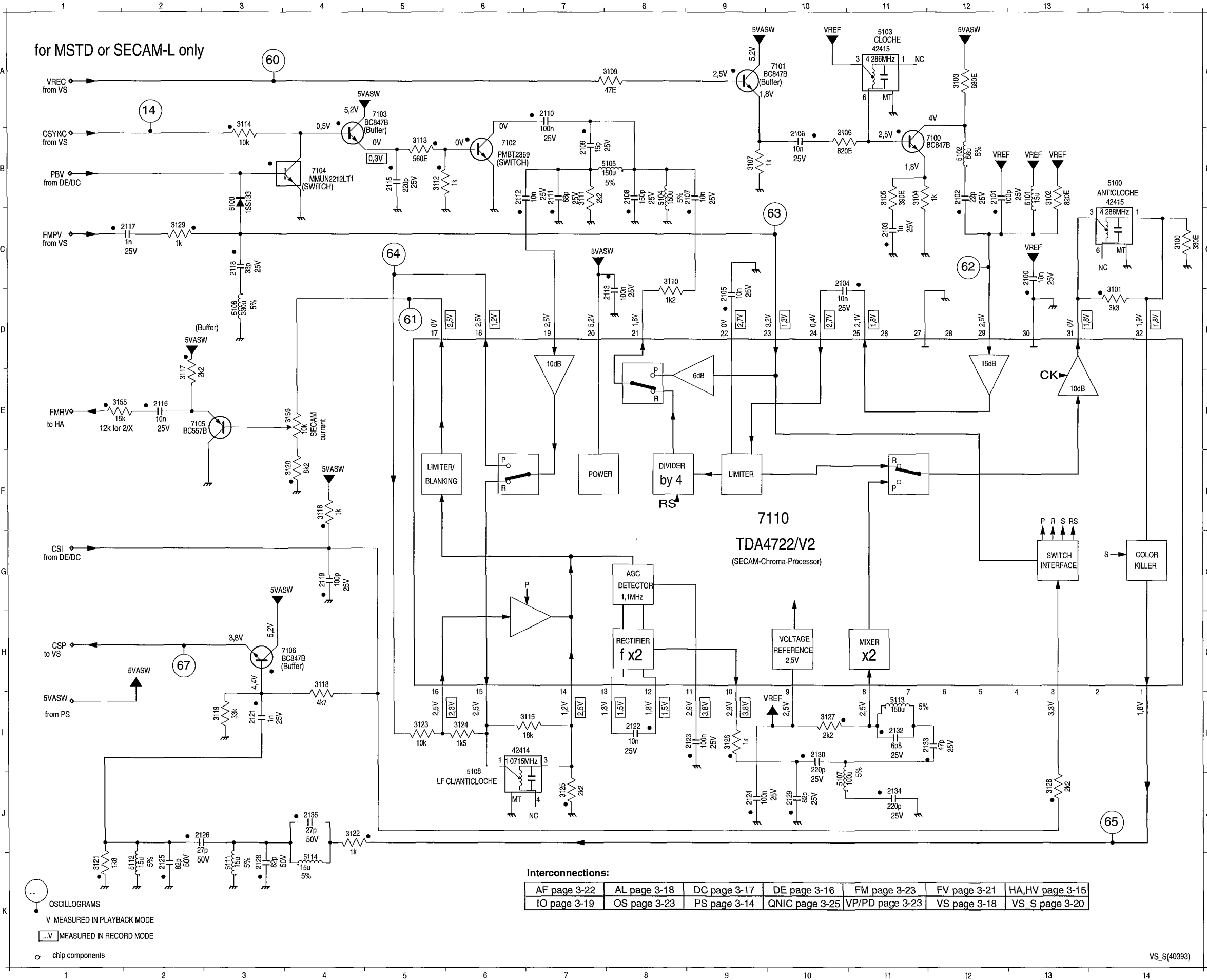


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	1002 E12	3024 N15	7510 H28
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	1712 H 4	3027 G 3	7512 N30
	1908 D 4	3028 J 3	7513 J26
	1911 B 8	3029 I 7	7600 L 5
	1912 C 8	3030 D20	7601 L 5
	1913 B33	3031 N21	7602 M 5
	1918 I33	3032 N17	7603 O 4
B	1961 O 8	3033 K 8	7604 N 4
	1962 H10	3034 K 8	7605 O 5
	2022 N14	3035 N17	9007 F27
	2002 M15	3036 N20	9013 I 7
	2003 N15	3038 M20	9014 M 7
	2004 M17	3039 C11	9073 N 8
	2005 M17	3047 C11	9154 O12
	2008 N19	3048 C10	
	2007 O18	3050 M16	
	2008 M18	3052 A22	
C	2009 O21	3054 M18	
	2010 E22	3055 M19	
	2011 N22	3134 C 5	
	2012 C14	3135 C 5	
	2013 N16	3160 O13	
	2014 J20	3500 A26	
	2015 J20	3501 A28	
	2016 D20	3502 J28	
	2017 I20	3503 B29	
	2018 N18	3505 B31	
D	2019 H20	3506 E26	
	2020 F21	3507 E26	
	2021 F20	3512 D31	
	2022 K21	3513 H30	
	2023 B17	3514 I28	
	2024 D11	3515 H30	
	2025 B18	3516 H30	
	2026 P17	3517 I28	
	2027 D17	3519 I 4	
	2028 D17	3519 I 4	
E	2029 B18	3520 J30	
	2030 A21	3521 K31	
	2031 A22	3522 D32	
	2032 C16	3523 F32	
	2033 C15	3524 J31	
	2034 A14	3525 K31	
	2035 C14	3526 J30	
	2036 N20	3527 N30	
	2037 L20	3528 I 4	
	2038 I20	3529 C32	
F	2039 E16	3530 J30	
	2040 E15	3531 F27	
	2041 D14	3532 F26	
	2042 D14	3533 J31	
	2043 D13	3534 C32	
	2044 M14	3535 M30	
	2045 D11	3536 N31	
	2046 P11	3537 O28	
	2047 C17	3538 K31	
	2049 I 8	3539 N31	
G	2051 G 7	3540 O27	
	2052 D20	3541 J31	
	2053 N15	3542 F30	
	2059 N 9	3544 G31	
	2060 F21	3545 A31	
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	2138 D 6	3560 I 3	
	2501 I26	3561 I28	
	2502 I27	3562 I27	
	2503 N29	3563 I27	
H	2504 E31	3600 L 5	
	2505 F31	3601 K 5	
	2506 G31	3602 M 4	
	2507 H32	3603 J 5	
	2508 H26	3604 N 9	
	2509 M31	3605 N11	
	2510 M31	3606 M10	
	2511 N32	3607 O12	
	2512 O32	3608 N13	
	2514 C29	3609 M13	
I	2515 A32	3610 I13	
	2516 A32	3611 O12	
	2517 A29	3612 M 4	
	2518 I 5	3613 K 5	
	2520 I 3	3618 N 8	
	2521 I21	3619 O 5	
	2523 D26	3620 N 6	
	2524 D26	3621 N 6	
	2525 D26	3622 O 4	
	2526 C26	3624 N 3	
J	2527 C28	3625 N 3	
	2528 O24	3626 J 3	
	2530 A32	3627 P 3	
	2600 O11	3638 O 6	
	2601 M11	3635 M 9	
	2602 E 5	3636 I 7	
	2603 N12	3657 L 7	
	2604 P12	5000 E20	
	2605 O13	5001 B18	
	2606 N14	5002 M16	
K	2607 M 4	5004 O18	
	2608 K 5	5005 M18	
	2610 N 3	5020 N18	
	2612 N16	5021 N 7	
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	2620 O 6	5115 C27	
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	2647 K 8	5602 N 9	
	2648 I 7	5603 O 7	
L	2650 E 5	5604 M 6	
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	2652 K 8	5831 A12	
	2656 M 8	6136 D 5	
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	2831 B12	6501 C33	
	3001 P14	6502 E32	
	3003 P16	6509 J32	
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	3008 M21	7001 O16	
	3009 M19	7002 A11	
	3010 D22	7003 C20	
	3011 P19	7004 O17	
	3012 D20	7005 F22	
	3013 D20	7006 O20	
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	3015 D13	7008 E91	
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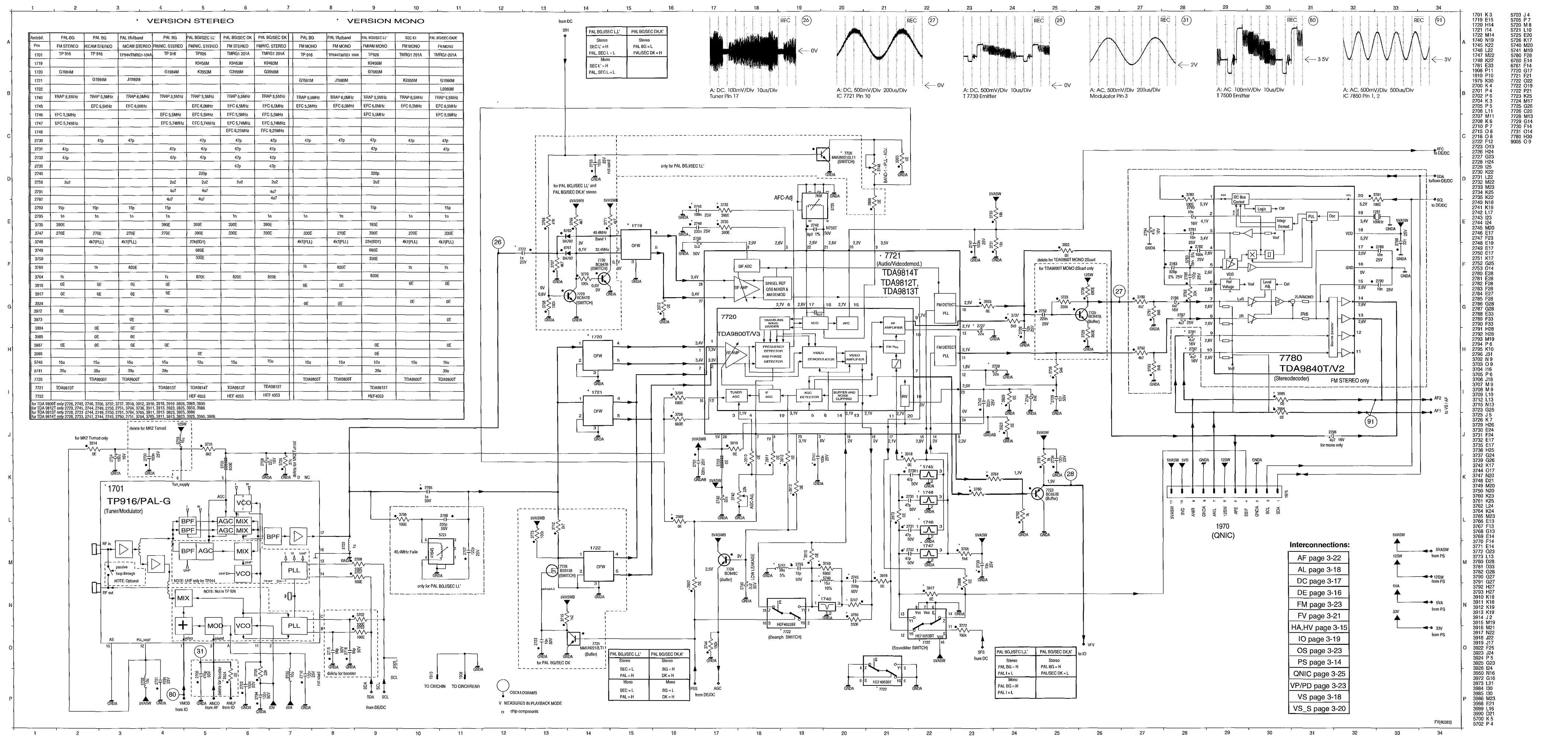
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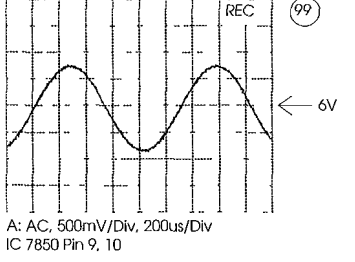
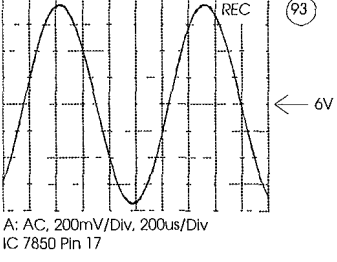
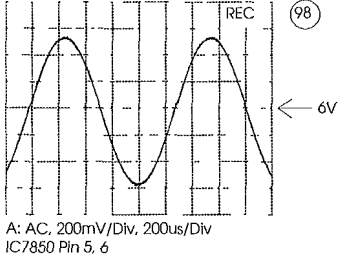
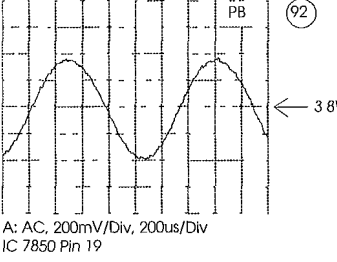
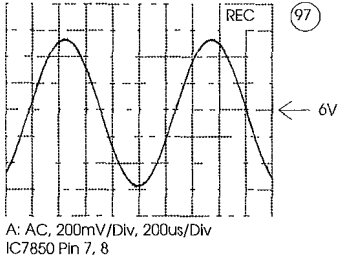
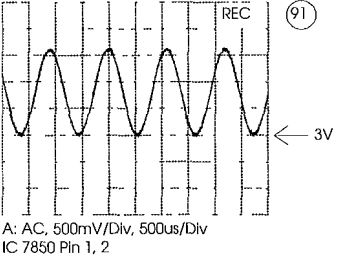
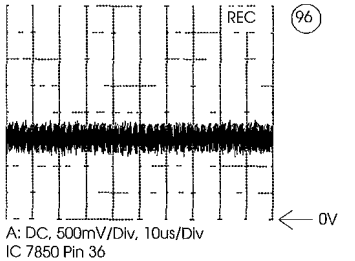
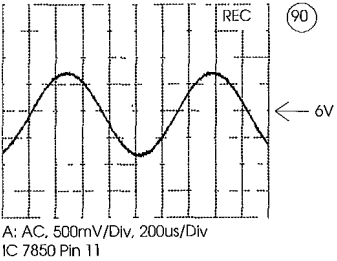
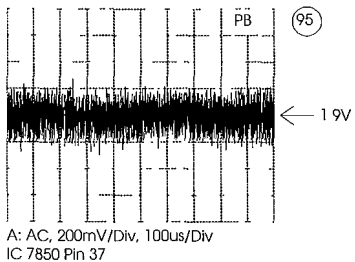
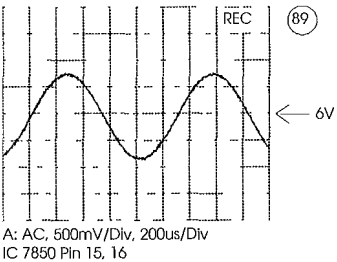
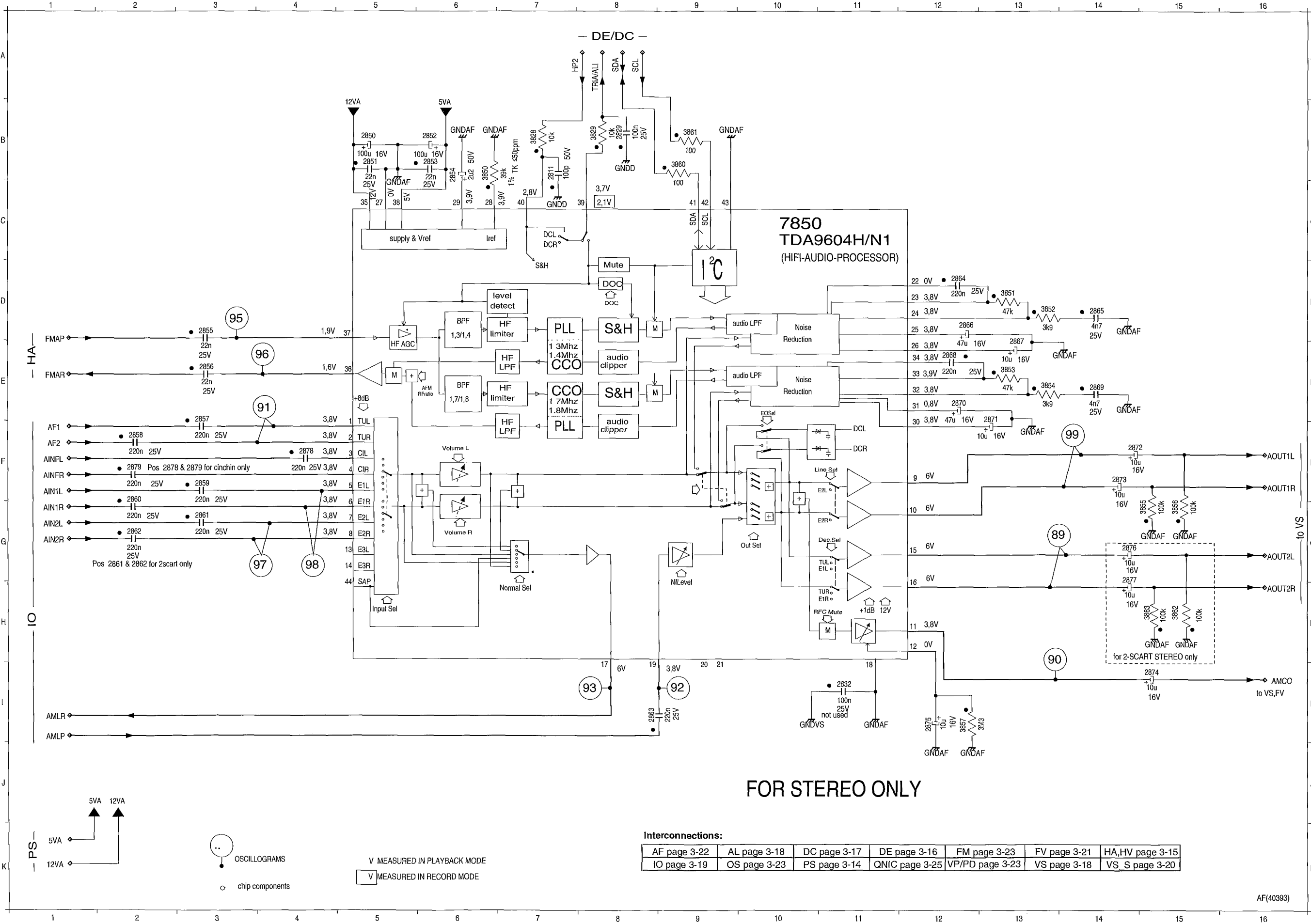
Video Signal Processing Secam (VS_S)



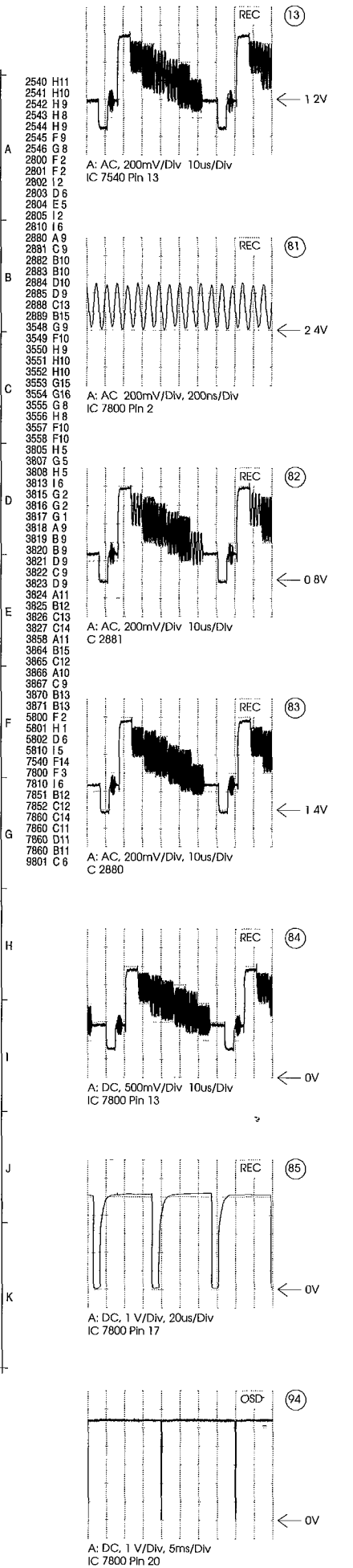
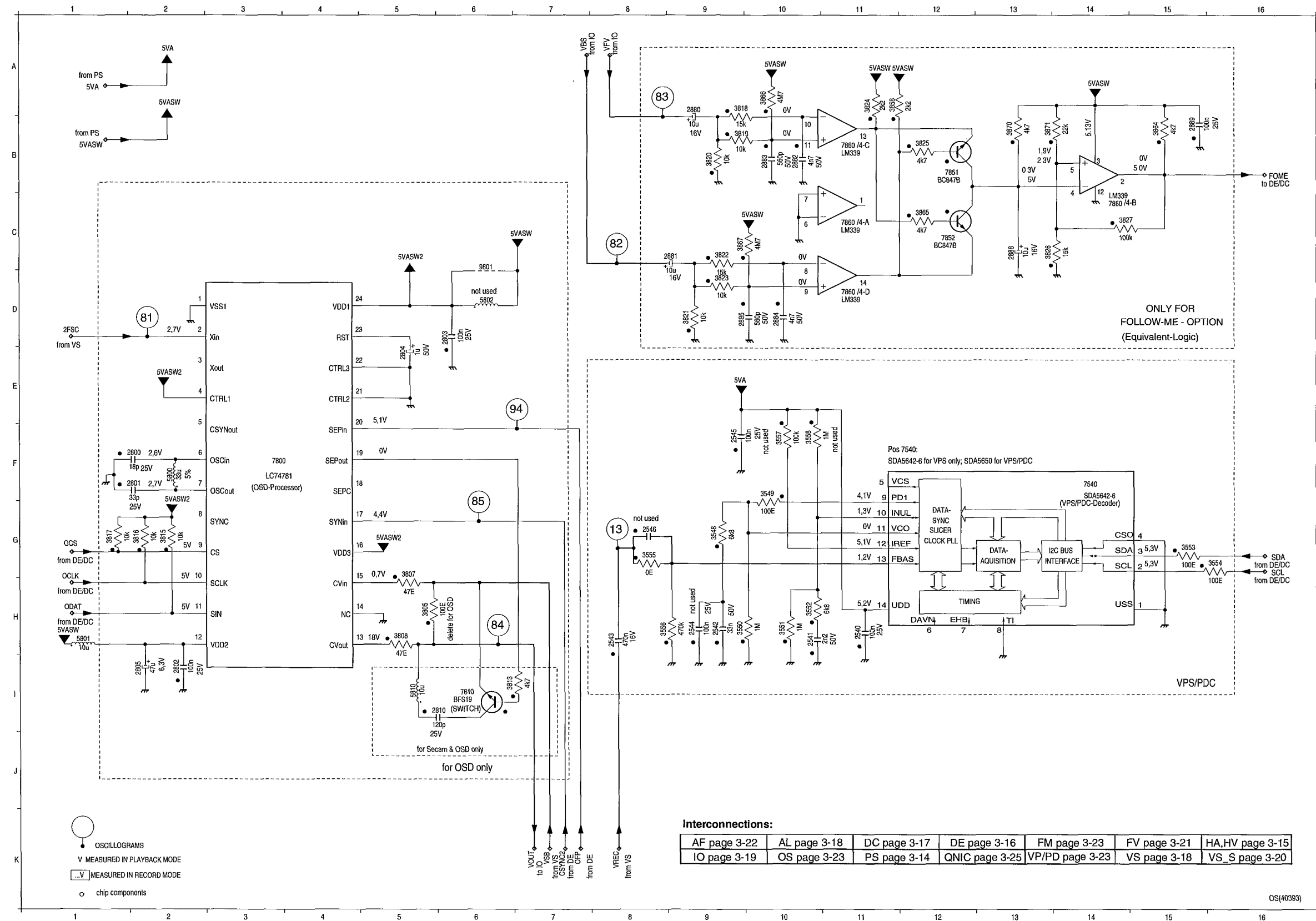
Frontend (FV)



Audio FM Processing (AF)



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



7700 SAA7284ZP/M2

Interconnections:

AF page 3-22	AL page 3-18	DC page 3-17	DE page 3-16	FM page 3-23	FV page 3-21	HA,HV page 3-15
IO page 3-19	OS page 3-23	PS page 3-14	QNIC page 3-25	VP/PD page 3-23	VS page 3-18	VS_S page 3-20

Oscillograms:

- 8: 2V
- 9: 2.5V
- 10: 5V

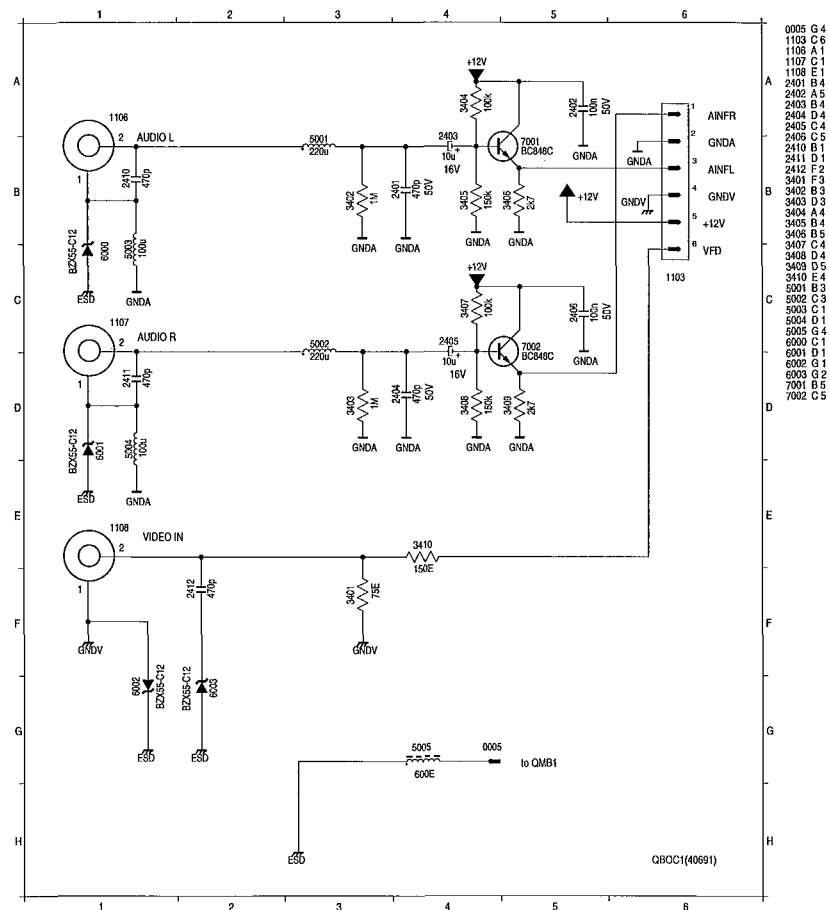
Legend:

- ..V MEASURED IN PLAYBACK MODE
- chip components

TO QMB 1975

QNIC(40523)

Socket Board QBOC1



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

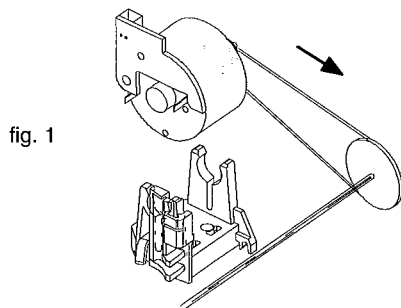
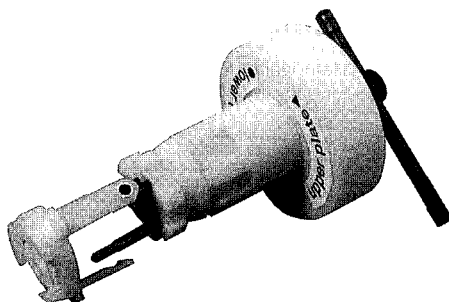


fig. 1

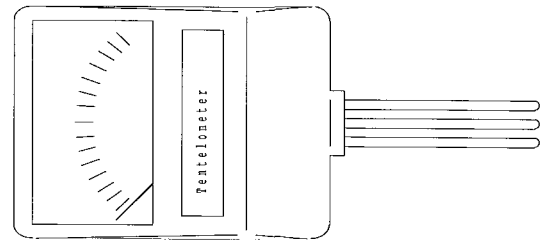
IMPORTANT:

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:



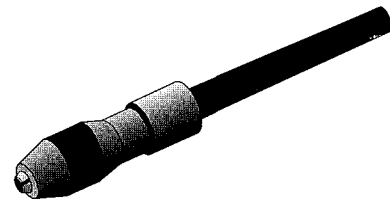
Tool for removing the head disc R4822 395 90977



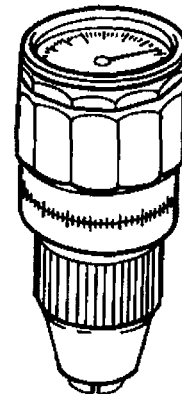
Tentelometer R4822 395 90584



Tool for tapetension adjustment R4822 395 50188



Handle R4822 256 90493



Torquemeter

600 gf-cm R4822 395 90232
90 gf-cm R4822 395 80196



Post adjustment screwdriver R4822 395 50275

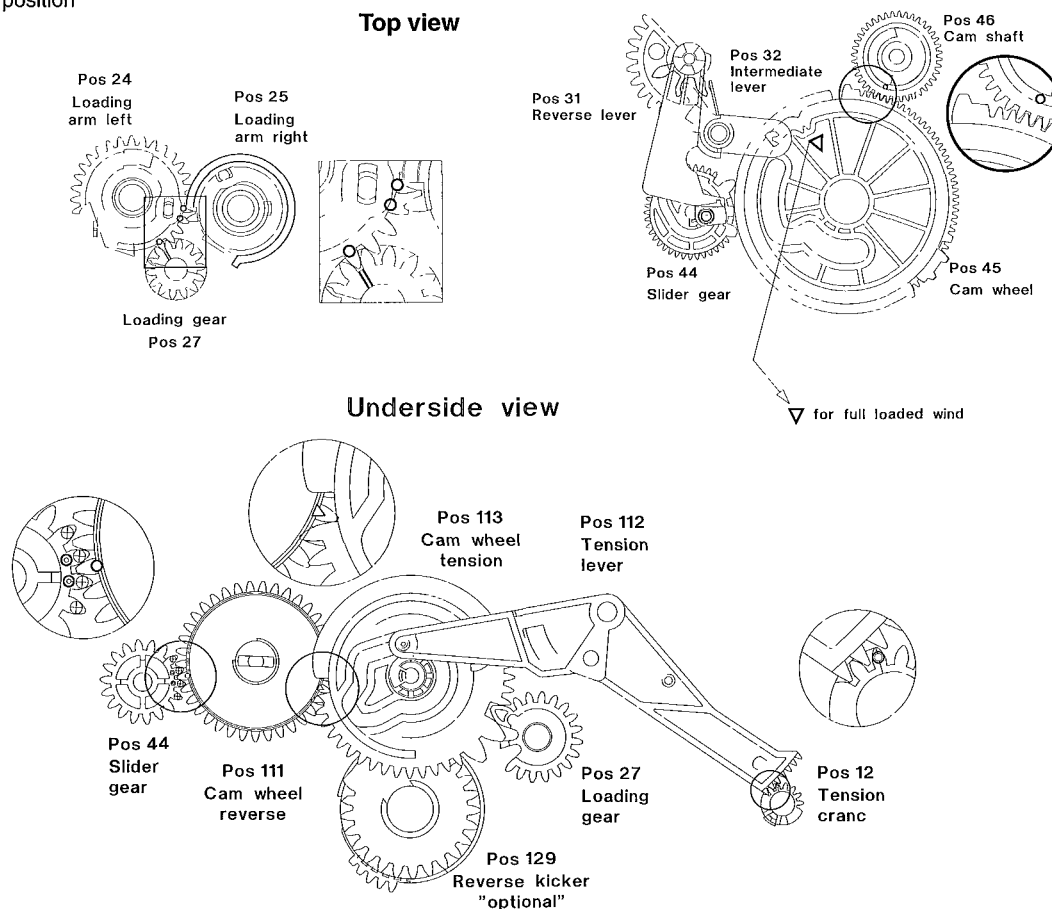
Testcassette R4822 397 30103

Nylon gloves R5322 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.

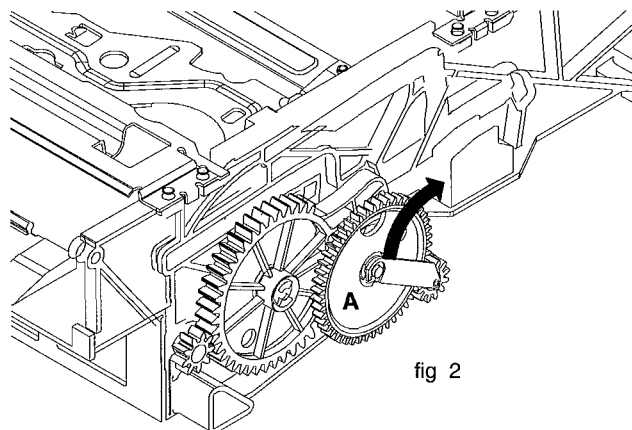
The removal and refitting of the lift can be carried out in all deck positions with the exception of „eject“ (ensure that gears 103/105 are free)

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.



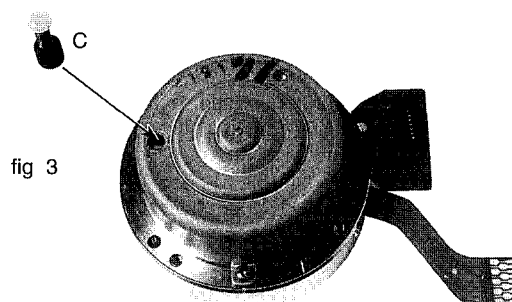
4.1.3 Head disc replacement

Removal :

Nylon gloves should be worn when handling the head disc

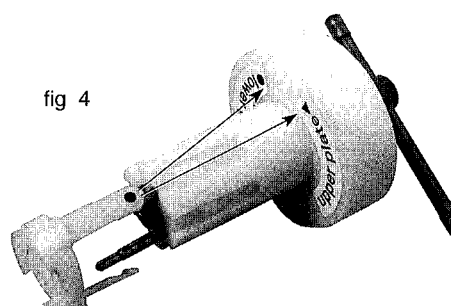
Turn the head disc until the long hole of the rotor appears in the bigger hole of the scanner motor

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)



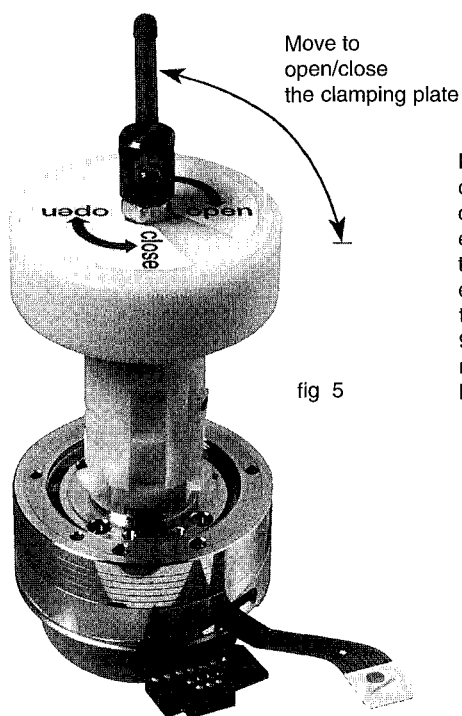


fig 5

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)

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)

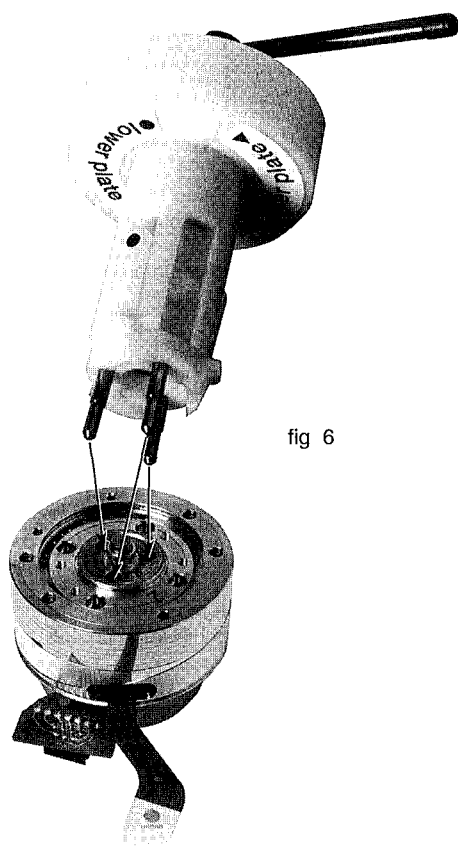


fig 6

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)

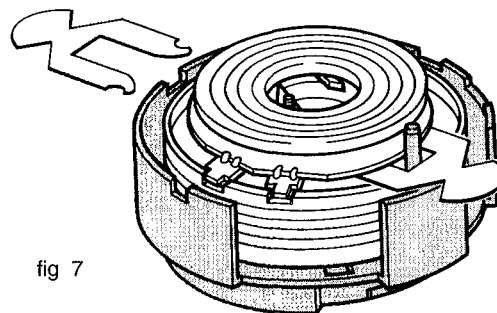


fig 7

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)

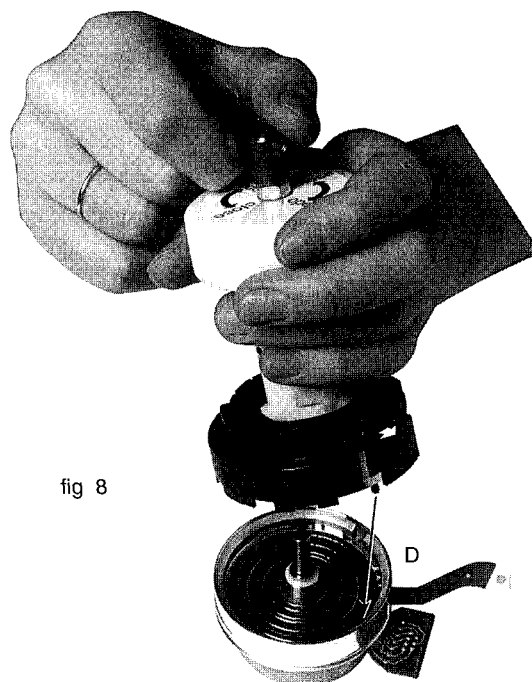


fig 8

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)

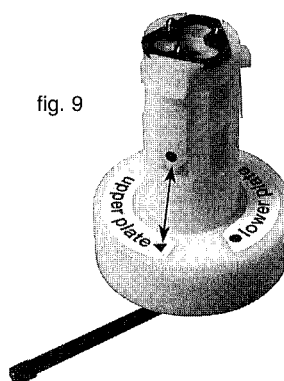


fig. 9

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.

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)

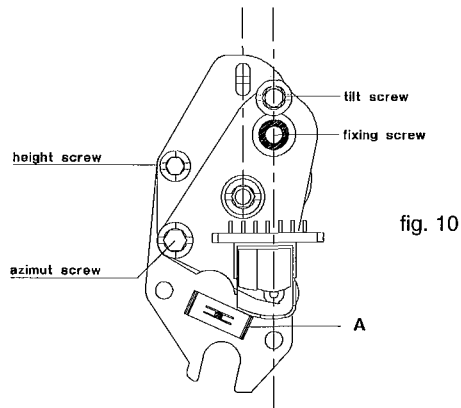
4.1.4 A/C Head (Combi head) (Pos. 36)

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/C head) 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.

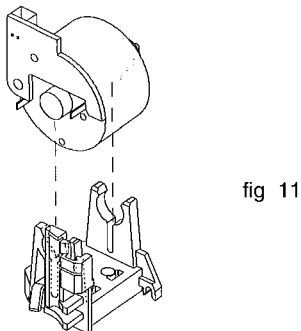


4.1.5 Threading motor (Pos. 38)

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.



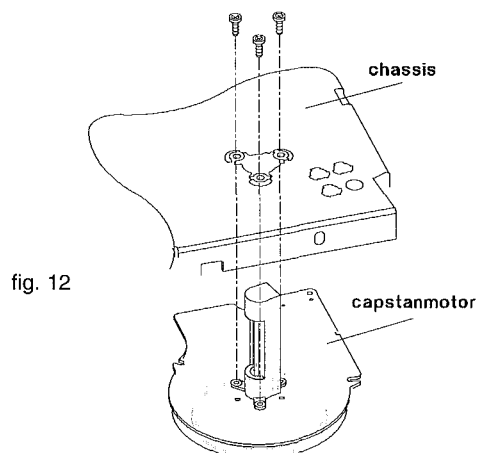
4.1.6 Capstan motor (Pos. 127)

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 assembly.

The reassembly is carried out in reverse order. Make sure that the capstan is free of grease

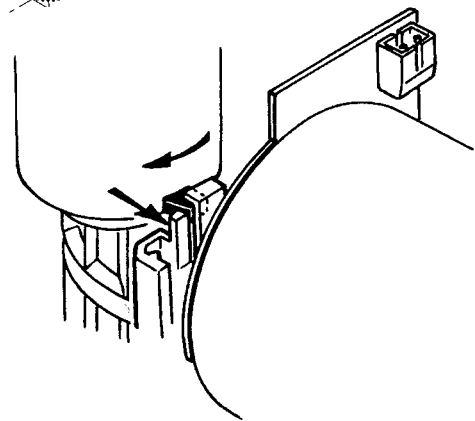
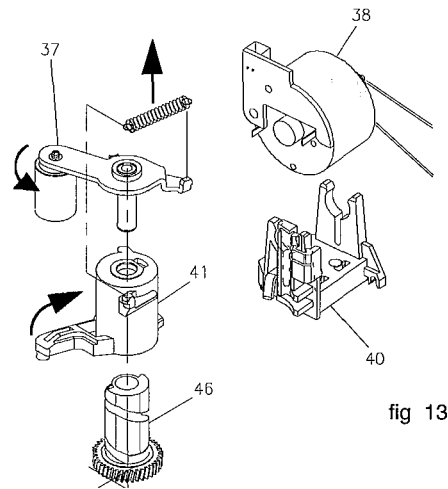


4.1.7 Pressure roller (Pos. 37)

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)

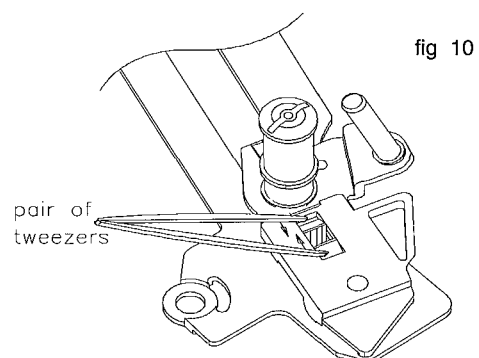
Remove the tape deck

Compress the two snap hooks by means of a pair of tweezers and remove the roller assembly 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)

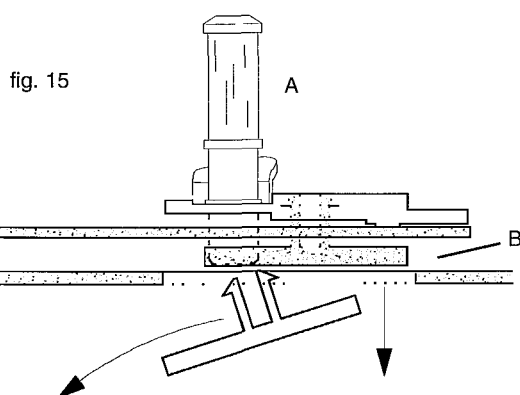
The reassembly is carried out in reverse order.

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.

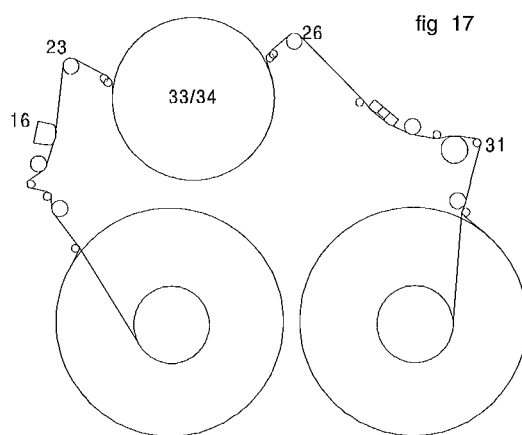
After replacing the roller unit (left) the tape path has to be checked (paragraph 4.2 1), and adjusted if necessary



4.2 Adjustments

Adjustments must not be made in the service position

4.2.1 Tape path



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.

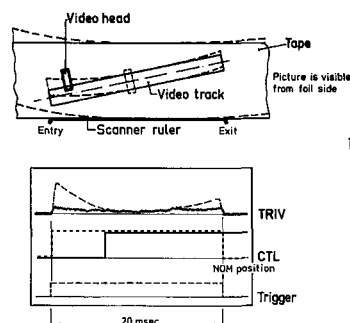


fig. 18

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).

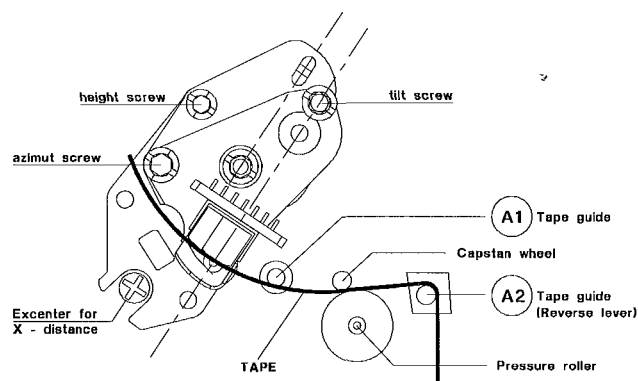


fig.19

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 \pm 25% (105gFcm \pm 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 \pm 3mNm (70 gFcm \pm 30gFcm) (Fig. 21)

fig. 20

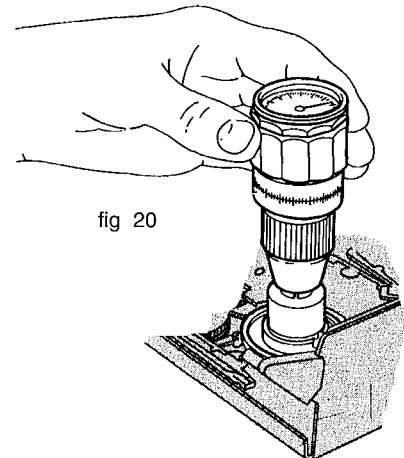
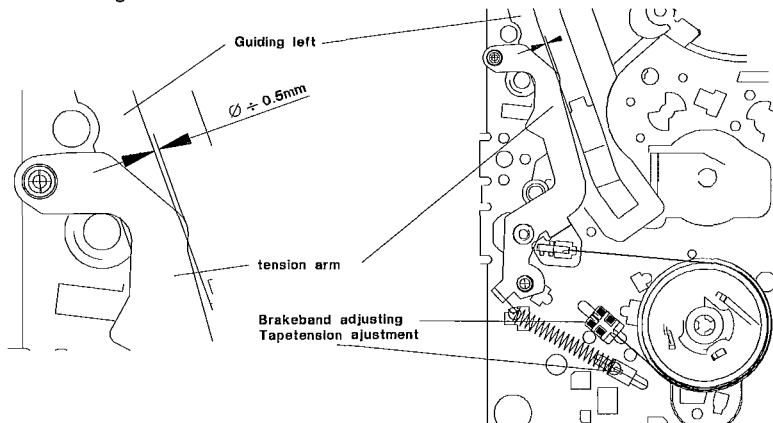
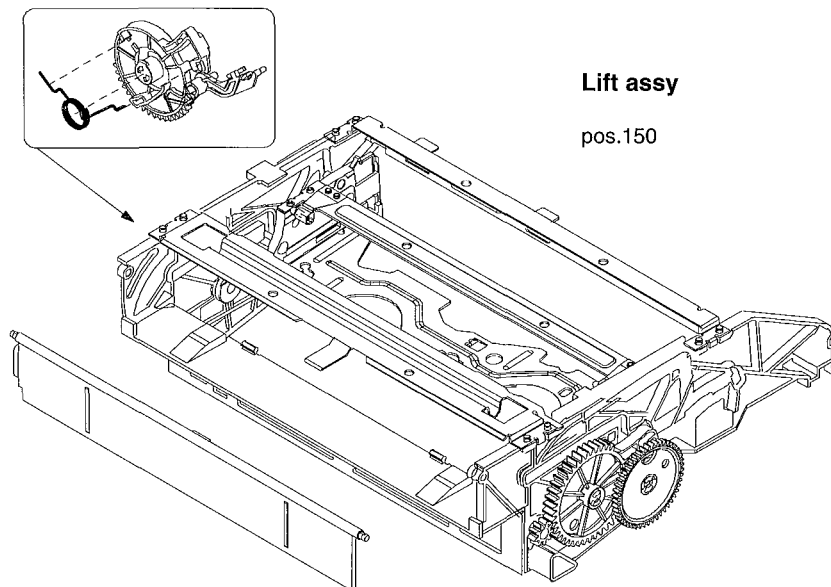


fig. 20

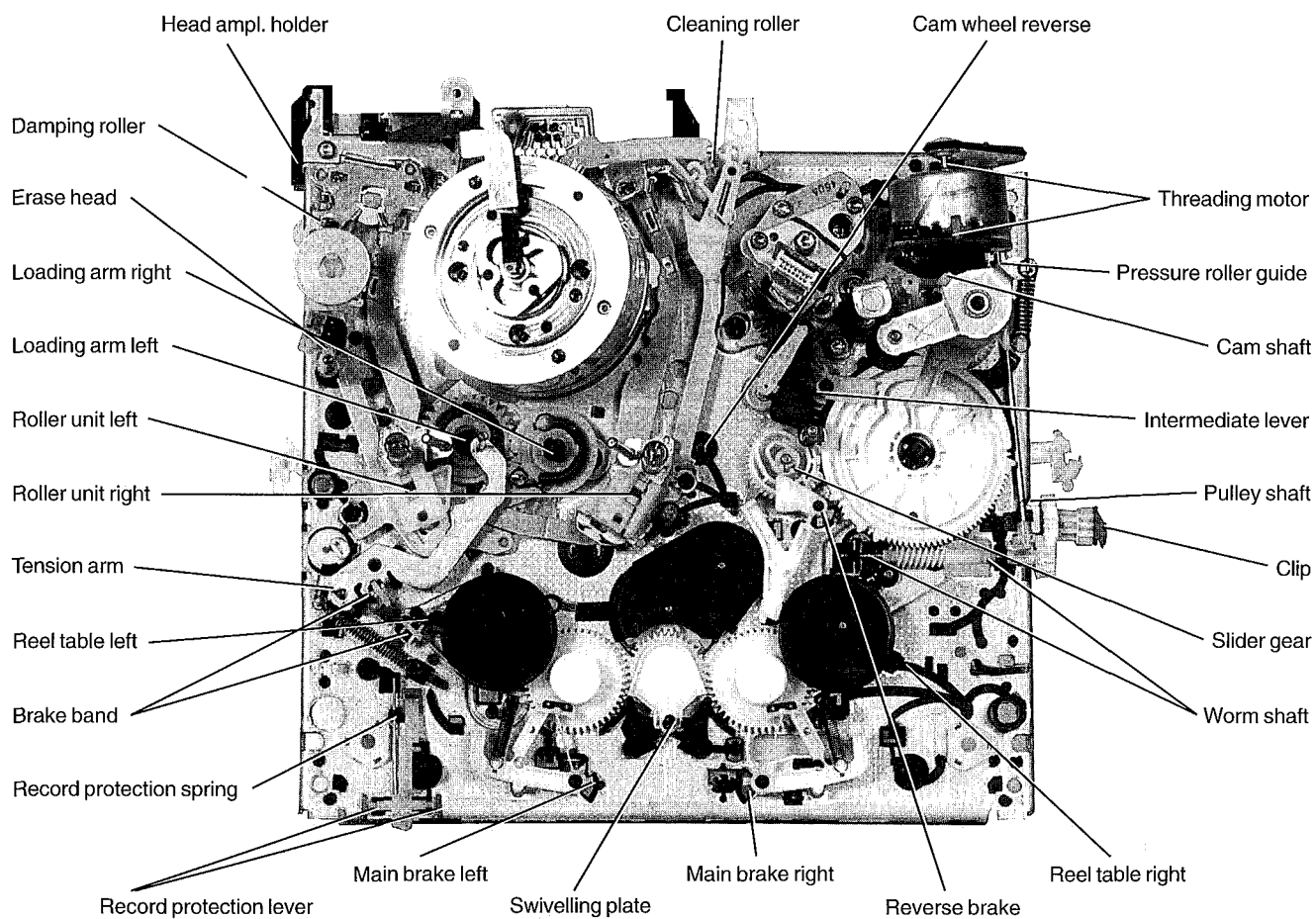


Lift assy

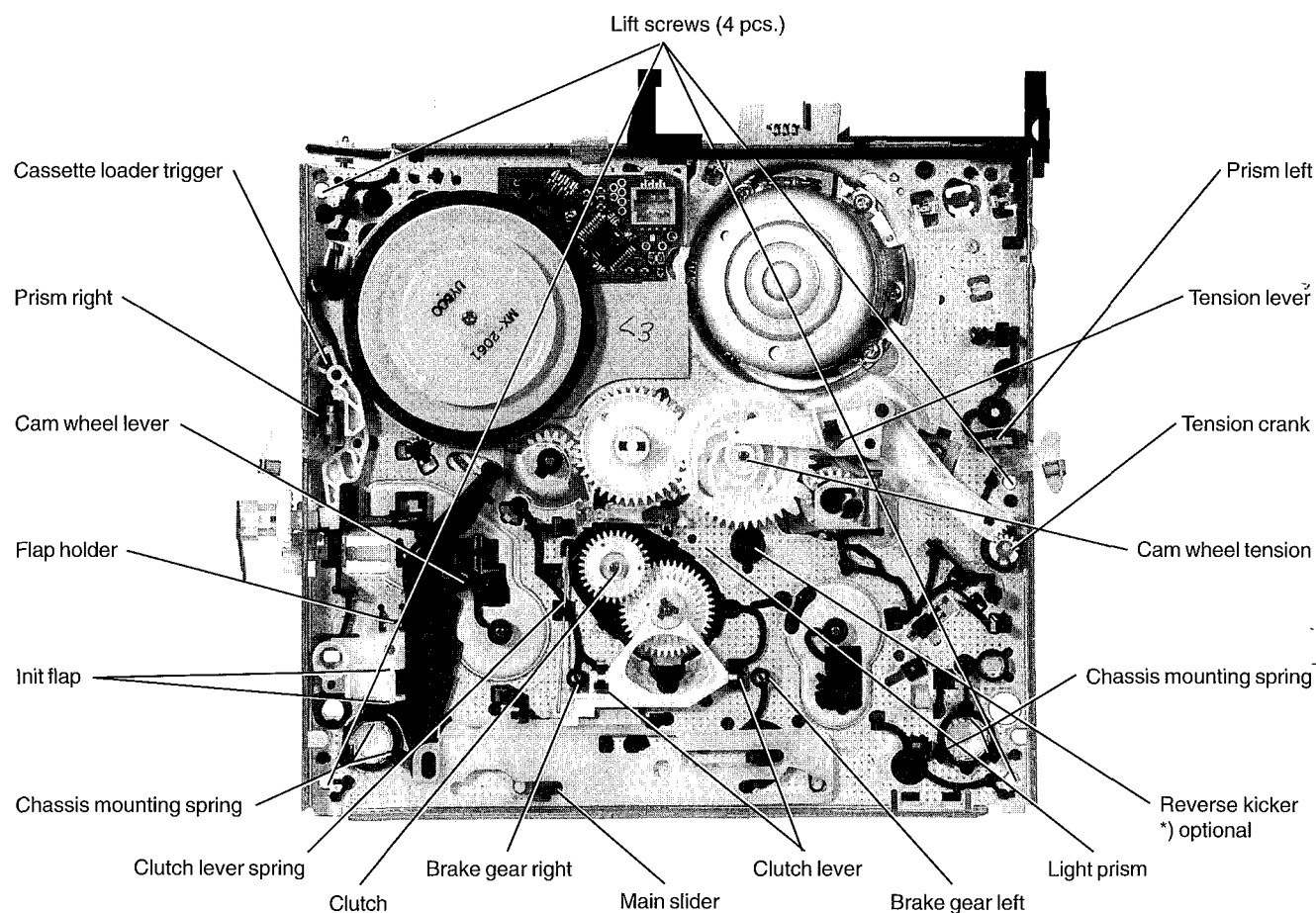
pos.150

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

TOP VIEW

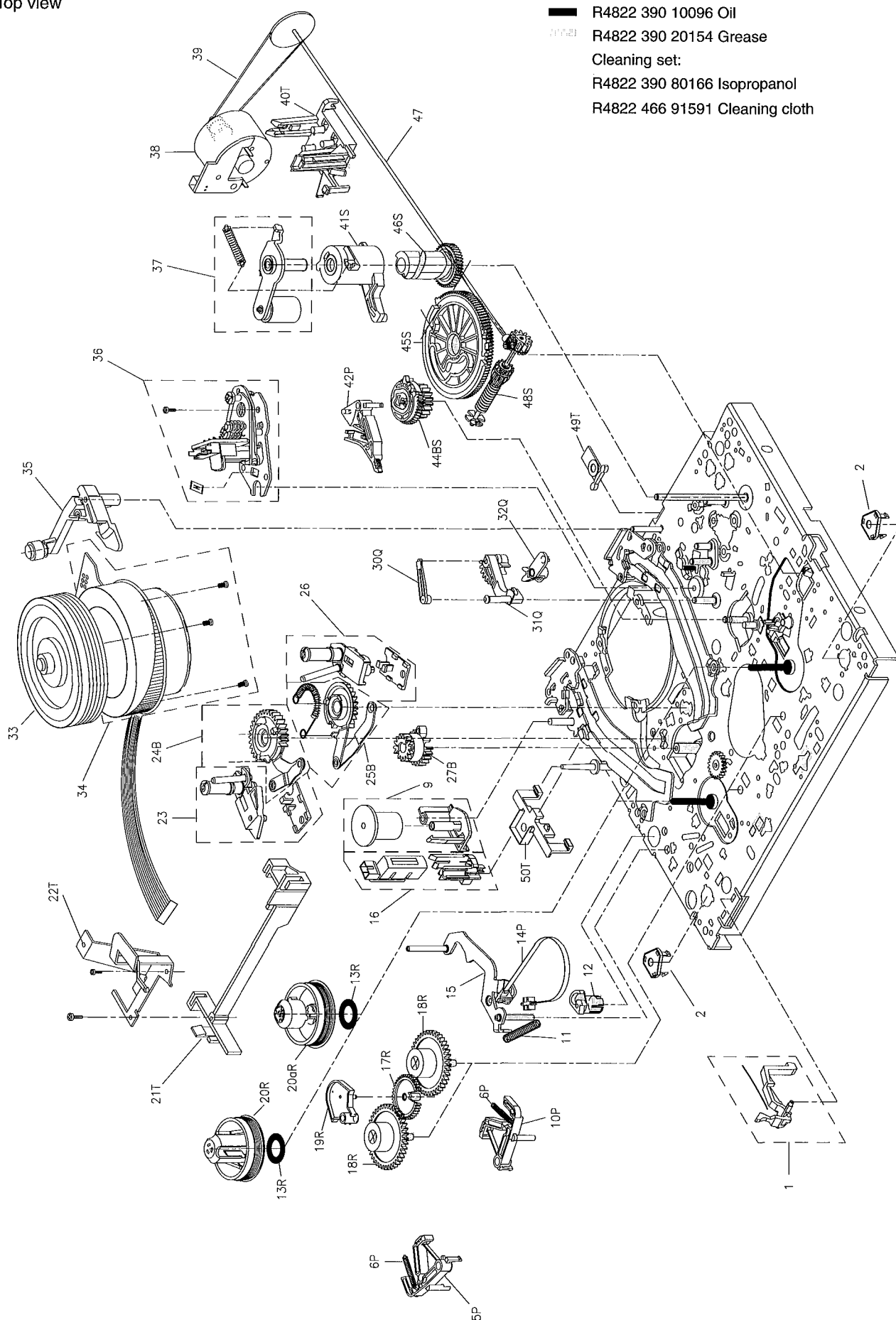


UNDERSIDE VIEW

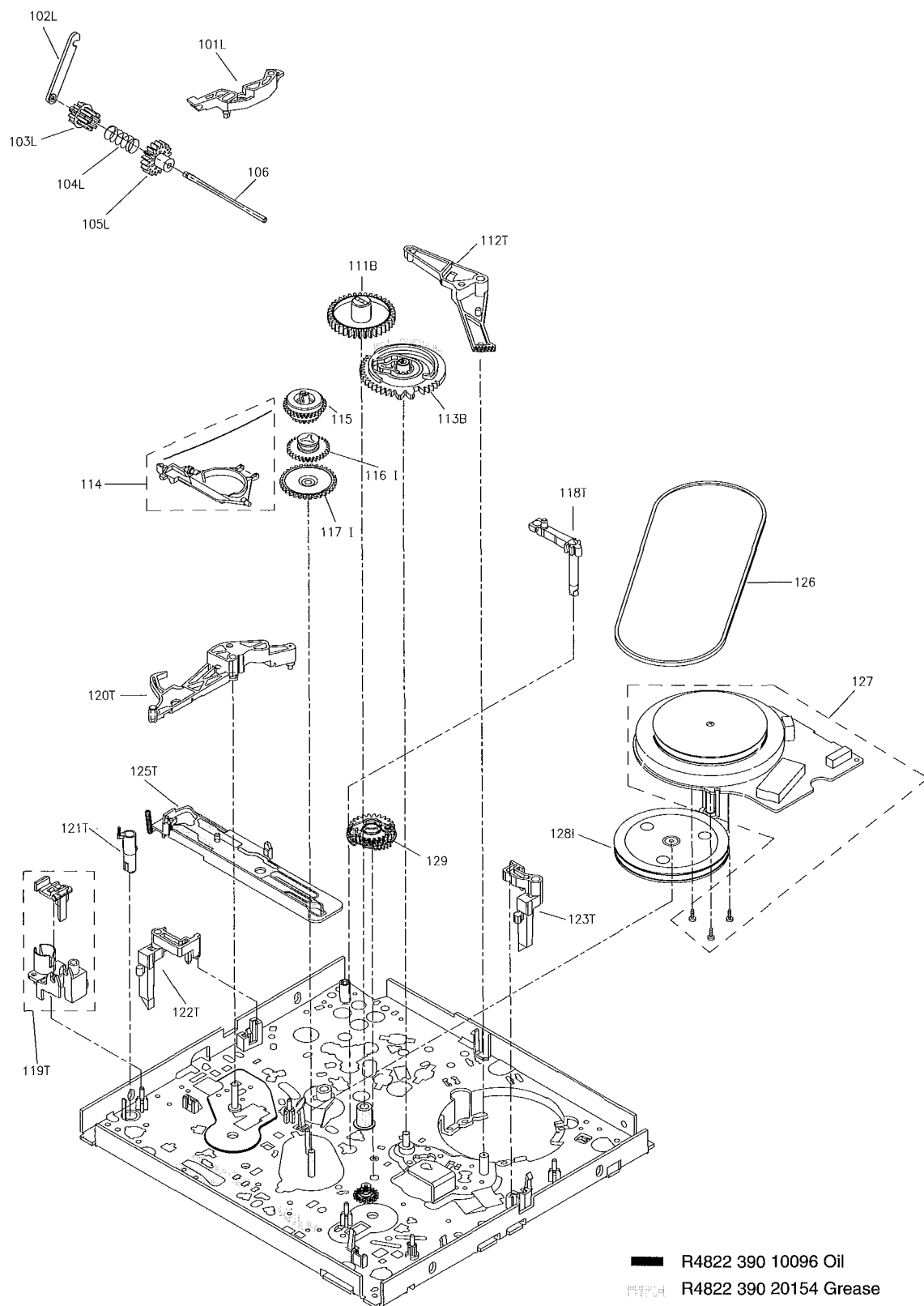


4.3 Exploded view

Top view



Underside viw



- R4822 390 10096 Oil
- R4822 390 20154 Grease
- Cleaning set:
- R4822 390 80166 Isopropanol
- R4822 466 91591 Cleaning cloth

MECHANICAL PARTS LIST

Pos.	Description	K I T S								Code number R4822
		B	I	L	P	Q	R	S	T	
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 R4822
		B	I	L	P	Q	R	S	T	
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.

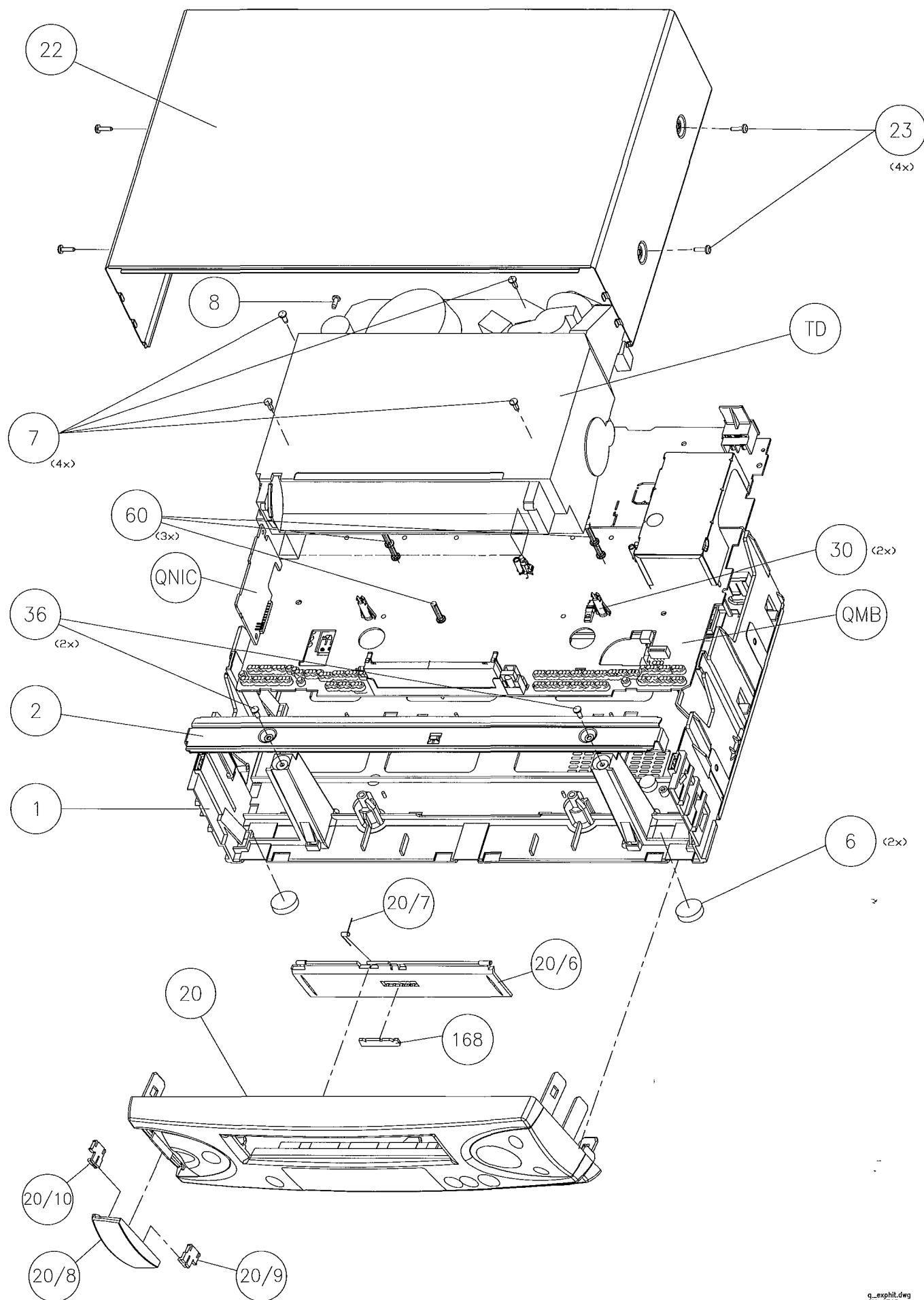
Per una riparazione garantita occorre sostituire tutti i pezzi contenuti nei kit, fatta eccezione per il kit T

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**



Parts lists

Pos	Service Code	Description	VT-F641ENA	VT-F641EUKN	VT-F641EVPS	VT-F652ELN	VT-M602EL	VT-M605EVPS	VT-M610EPV	VT-M610EUK	VT-M631EUK	VT-M631EVPS	VT-M632EL
1	R3103 138 86290	Frame 2 SCART					✓	✓	✓	✓	✓	✓	✓
	R3103 138 86070	Frame CINCH	✓	✓	✓	✓							
2	R3103 141 22800	Bracket	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	R3103 184 00830	Foot	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	R3103 100 42400	Screw 3,5X16	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	R3103 100 42530	Screening screw	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
20	R3103 138 87270	Control panel	✓										
	R3103 138 87120	Control panel		✓									
	R3103 138 87280	Control panel			✓								
	R3103 138 87260	Control panel				✓							
	R3103 138 86870	Control panel					✓						
	R3103 138 86830	Control panel						✓					
	R3103 138 87230	Control panel							✓				
	R3103 138 86820	Control panel								✓			
	R3103 138 87110	Control panel									✓		
	R3103 138 87240	Control panel										✓	
	R3103 138 87250	Control panel											✓
20/6	R3103 178 21500	Lift flap	✓										
	R3103 178 21210	Lift flap		✓									
	R3103 178 21510	Lift flap			✓								
	R3103 178 20970	Lift flap				✓							
	R3103 178 20430	Lift flap					✓						
	R3103 178 20410	Lift flap						✓					
	R3103 178 21420	Lift flap							✓				
	R3103 178 20970	Lift flap								✓			
	R3103 178 21220	Lift flap									✓		
	R3103 178 21430	Lift flap										✓	
	R3103 178 21440	Lift flap											✓
20/7	R3103 111 02450	Leg spring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
20/8	R3103 178 21470	Flap front				✓							
20/9	R3112 404 10420	Hinge				✓							
20/10	R3112 404 10431	Hinge				✓							
22	R3103 141 23160	Cover lacquered	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
23	R3112 400 40220	Screw 3,5X10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
30	R3103 107 61760	Distance holder deck	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
36	R3103 100 41320	Screw P2,9X12	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
60	R3103 104 20110	Distance holder MOBO	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
151	R8622 661 73301	Remote RT173/301	✓	✓	✓			✓	✓	✓	✓	✓	
	R8622 661 73304	Remote RT173/304				✓	✓						✓
152	R3103 166 19270	Direction for use S	✓										
	R3103 166 19280	Direction for use DK,F,NL,I	✓										
	R3103 166 18990	Direction for use GB		✓									
	R3103 166 19290	Direction for use D			✓								
	R3103 166 19300	Direction for use I			✓								
	R3103 166 19210	Direction for use F				✓							
	R3103 166 18850	Direction for use F					✓						
	R3103 166 18720	Direction for use D,E,S						✓					
	R3103 166 18730	Direction for use F,I,NL,DK						✓					
	R3103 166 19130	Direction for use N,S							✓				
	R3103 166 19140	Direction for use D,F,NL,E							✓				
	R3103 166 18740	Direction for use GB								✓			
	R3103 166 18970	Direction for use GB									✓		
	R3103 166 19150	Direction for use DK,F,I,NL										✓	
	R3103 166 19160	Direction for use D,E,S										✓	
	R3103 166 19220	Direction for use F											✓
168	R3103 110 01280	Wordmark HITACHI	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

MONO, STEREO

ITORS

R4822 126 10002	100	nF	25V
R4822 122 33177	10	nF	50V
R4822 126 10002	100	nF	25V
R4822 122 33177	10	nF	50V
R4822 124 23055	22	µF	16V
R4822 126 13222	390	pF	63V
R5322 122 32966	39	pF	50V
R5322 122 32658	22	pF	50V
R4822 126 10002	100	nF	25V
R4822 124 80987	220	µF	6,3V
R4822 122 33177	10	nF	50V
R4822 124 11569	4,7	µF	25V
R4822 126 10002	100	nF	25V
R4822 124 80975	0,47	µF	50V
R4822 126 10002	100	nF	25V
R4822 126 10002	100	nF	25V
R4822 124 22826	10	µF	16V
R5322 122 32658	22	pF	50V
R4822 124 22826	10	µF	16V
R4822 124 22826	10	µF	16V
R4822 124 22826	10	µF	16V
R4822 126 10002	100	nF	25V
R4822 122 33177	10	nF	50V
R4822 126 10002	100	nF	25V
R4822 124 11568	47	µF	16V
R4822 122 33575	220	pF	50V
R4822 122 33177	10	nF	50V
R4822 122 33177	10	nF	50V
R4822 122 33177	10	nF	50V
R4822 122 33177	10	nF	50V
R4822 126 10002	100	nF	25V
R4822 124 11568	47	µF	16V
R4822 126 10002	100	nF	25V
R4822 122 33177	10	nF	50V
R4822 122 33177	10	nF	50V
R4822 122 33515	82	pF	63V
R4822 126 14124	220	pF	
R5322 122 32659	33	pF	50V
R5322 122 32658	22	pF	50V for 2 heads
R4822 124 23053	1	µF	63V
R5322 122 32654	22	nF	63V
R4822 124 23053	1	µF	63V
R4822 122 33797	47	nF	50V
R4822 124 41969	1	µF	50V
R4822 124 23053	1	µF	63V
R4822 122 33797	47	nF	50V
R5322 122 34123	1	nF	50V
R4822 122 33177	10	nF	50V
R4822 124 11568	47	µF	16V
R4822 124 41969	1	µF	50V
R4822 122 33177	10	nF	50V
R4822 124 23053	1	µF	63V
R5322 122 31946	27	pF	63V
R4822 122 33177	10	nF	50V
R5322 122 32658	22	pF	50V
R4822 122 33177	10	nF	50V
R4822 122 33177	10	nF	50V
R4822 122 33177	10	nF	50V
R4822 122 33177	10	nF	50V
R4822 126 10002	100	nF	25V
R4822 124 11568	47	µF	16V
R4822 122 33177	10	nF	50V
R4822 122 33575	220	pF	50V
R4822 122 33177	10	nF	50V
R5322 122 32531	100	pF	50V
R5322 122 32658	22	pF	50V
R5322 122 34123	1	nF	50V
R4822 122 33177	10	nF	50V
R4822 122 33177	10	nF	50V
R4822 122 33177	10	nF	50V
R4822 122 33177	10	nF	50V
R5322 122 33538	150	pF	63V
R5322 122 32481	15	pF	50V
R4822 126 10002	100	nF	25V
R4822 126 13694	68	pF	63V
R4822 122 33177	10	nF	50V
R4822 126 10002	100	nF	25V
R4822 122 33575	220	pF	50V

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Motherboard QMB PAL, SECAM, MONO, STEREO

2116	R4822 122 33177	10	nF	50V	
2117	R5322 122 34123	1	nF	50V	
2118	R5322 122 32659	33	pF	50V	
2119	R5322 122 32531	100	pF	50V	
2121	R5322 122 34123	1	nF	50V	
2122	R4822 122 33177	10	nF	50V	
2123	R4822 126 10002	100	nF	25V	
2124	R4822 126 10002	100	nF	25V	
2125	R4822 122 33515	82	pF	63V	
2126	R5322 122 31946	27	pF	63V	
2128	R4822 122 33515	82	pF	63V	
2129	R4822 122 33515	82	pF	63V	
2130	R4822 122 33575	220	pF	50V	
2132	R5322 122 32269	6,8	pF	50V	
2133	R5322 122 32452	47	pF	63V	
2134	R4822 122 33575	220	pF	50V	
2135	R5322 122 31946	27	pF	63V	
2137	R4822 116 10056 VDR 0805	1MA/ 8VMAX			
2138	R4822 116 10056 VDR 0805	1MA/ 8VMAX			
150	R4822 122 33177	10	nF	50V	
2151	R4822 126 13061	220	nF	25V	
2152	R4822 124 11568	47	µF	16V	
2153	R5322 122 32654	22	nF	63V	
2154	R4822 122 33177	10	nF	50V	
2155	R4822 122 33177	10	nF	50V	
2156	R4822 122 33177	10	nF	50V	
2157	R4822 122 33177	10	nF	50V	
2158	R4822 122 33177	10	nF	50V	
2159	R4822 122 33177	10	nF	50V	
2160	R4822 122 33177	10	nF	50V	
2161	R4822 122 33177	10	nF	50V	
2163	R5322 122 32531	100	pF	50V	
2203	R5322 122 32481	15	pF	50V	
2204	R5322 122 32481	15	pF	50V	
2210	R4822 122 33177	10	nF	50V	
2211	R4822 124 81112	220	µF	10V	
2212	R4822 126 13061	220	nF	25V	
2220	R4822 124 23055	22	µF	16V	
2230	R4822 122 33177	10	nF	50V	
2231	R4822 122 33797	47	nF	50V	
2232	R4822 122 33177	10	nF	50V	
2233	R4822 122 33177	10	nF	50V	
2251	R4822 126 10002	100	nF	25V	
2252	R4822 126 10002	100	nF	25V	
2297	R4822 124 11968	220	µF	5,5V	
2300	R4822 124 80407	1	µF	50V	
2301	R4822 124 80407	1	µF	50V	
2302	R4822 124 80407	1	µF	50V	
2308	R5322 122 32531	100	pF	50V	
2310	R4822 126 10002	100	nF	25V	
2311	R4822 122 33177	10	nF	50V	
2313	R4822 122 33575	220	pF	50V	
2314	R4822 126 10002	100	nF	25V	
2315	R4822 122 33177	10	nF	50V	
2316	R4822 122 33797	47	nF	50V	
2317	R5322 122 32654	22	nF	63V	
2318	R4822 124 22263	220	µF	25V	
2319	R5322 122 32654	22	nF	63V	
2320	R5322 122 32654	22	nF	63V	
2350	R4822 126 14125	470	pF		
2353	R4822 126 10002	100	nF	25V	
2355	R5322 122 34123	1	nF	50V	
2356	R4822 124 23053	1	µF	63V	
2357	R4822 126 13841	1	nF	250V	
2359	R4822 126 13061	220	nF	25V	
2360	R4822 121 10667	68	nF	275V	
2361	R4822 124 22864	47	µF	50V	
2362	R4822 124 11969	22	µF	400V	
2363	R4822 124 22864	47	µF	50V	
2364	R4822 124 11899	220	µF	25V	
2365	R4822 124 11994	470	µF	16V	
2366	R4822 126 14126	47	pF	2KV	
2367	R4822 124 11899	220	µF	25V	
2368	R4822 122 31175	1	nF	500V	
2369	R4822 126 10002	100	nF	25V	
2370	R4822 124 23052	100	µF	16V	
2371	R4822 124 11994	470	µF	16V	
2372	R4822 126 13061	220	nF	25V	
2373	R4822 124 11486	220	µF	16V	
2374	R4822 124 11994	470	µF	16V	
2375	R4822 121 42004	10	nF	400V	
2376	R4822 124 22833	10	µF	50V	
2378	R4822 121 42004	10	nF	400V	
2379	R5322 126 10223	4,7	nF	63V	
2385	R4822 124 11486	220	µF	16V	
2386	R5322 122 32268	470	pF	50V	
2400	R4822 122 33177	10	nF	50V	
2401	R4822 124 23055	22	µF	16V	
2403	R5322 122 32658	22	pF	50V	
2404	R5322 122 32658	22	pF	50V	
2416	R4822 126 10002	100	nF	25V	
2417	R4822 124 81295	47	µF	6,3V	
2440	R4822 124 81029	100	µF	25V	
2441	R4822 126 10002	100	nF	25V	
2442	R4822 122 33177	10	nF	50V	
2455	R4822 122 33175	2,2	nF	50V	
2459	R4822 124 22263	220	µF	25V	
2461	R5322 126 10223	4,7	nF	63V	
2463	R4822 124 23027	47	µF	6,3V	
2464	R5322 126 10223	4,7	nF	63V	
2465	R4822 122 33175	2,2	nF	50V	
2466	R4822 124 23027	47	µF	6,3V	
2467	R4822 122 33342	33	nF	63V	
2468	R4822 126 10002	100	nF	25V	
2470	R4822 122 33177	10	nF	50V	
2472	R5322 122 32531	100	pF	50V	
2473	R5322 122 32531	100	pF	50V	
2474	R5322 122 32531	100	pF	50V	
2501	R4822 126 10002	100	nF	25V	
2502	R4822 124 22826	10	µF	16V	
2503	R4822 124 22826	10	µF	16V	
2504	R4822 116 10056 VDR 0805	1MA/ 8V MAX		for stereo	
2504	R5322 122 32268	470pF		50V for mono	
2505	R5322 122 32268	470pF		50V for mono	
2505	R4822 116 10056 VDR 0805	1MA/ 8V MAX		for stereo	
2506	R4822 116 10056 VDR 0805	1MA/ 8V MAX		for stereo	
2506	R5322 122 32268	470pF		50V for mono	
2507	R4822 116 10056 VDR 0805	1MA/ 8V MAX			
2508	R4822 126 10002	100nF		25V	
2509	R5322 122 32268	470pF		50V for mono	
2509	R4822 116 10056 VDR 0805	1MA/ 8V MAX		for stereo	
2510	R5322 122 32268	470pF		50V for mono	
2510	R4822 116 10056 VDR 0805	1MA/ 8V MAX		for stereo	
2511	R4822 116 10056 VDR 0805	1MA/ 8V MAX		for stereo	
2511	R5322 122 32268	470pF		50V for mono	
2512	R4822 116 10056 VDR 0805	1MA/ 8V MAX			
2514	R4822 124 23027	47	µF	6,3V	
2515	R4822 126 10002	100	nF	25V	
2516	R4822 124 11568	47	µF	16V	
2517	R4822 126 10002	100	nF	25V	
2519	R4822 126 10002	100	nF	25V	
2520	R4822 126 10002	100	nF	25V	
2523	R4822 126 10002	100	nF	25V	
2524	R4822 126 10002	100	nF	25V	
2525	R4822 126 10002	100	nF	25V	
2526	R4822 126 10002	100	nF	25V	
2527	R4822 126 10002	100	nF	25V	
2528	R4822 126 10002	100	nF	25V	
2530	R4822 126 13061	220	nF	25V	
2540	R4822 126 10002	100	nF	25V	
2541	R4822 122 33175	2,2	nF	50V	
2542	R4822 122 33342	33	nF	63V	
2543	R4822 126 13482	470	nF	16V	
2545	R4822 126 10002	100	nF	25V	
2600	R5322 126 10184	680	pF		
2601	R4822 122 33175	2,2	nF	50V	
2602	R4822 124 22826	10	µF	16V	
2603	R4822 122 33177	10	nF	50V	
2604	R4822 124 22833	10	µF	50V for stereo	
2604	R4822 124 22739	100	µF	50V for mono	
2605	R5322 122 34123	1	nF	50V	
2606	R4822 126 10002	100	nF	25V	
2608	R4822 122 33177	10	nF	50V	
2617	R4822 124 11568	47	µF	16V	
2618	R5322 122 31863	330	pF	50V	
2619	R4822 124 11568	47	µF	16V	
2620	R4822 121 51655	47	nF	50V	
2621	R5322 122 34123	1	nF	50V	
2622	R4822 121 43873	27	nF	50V	
2647	R4822 126 10002	100	nF	25V	
2648	R4822 124 23055	22	µF	16V	

Motherboard QMB PAL, SECAM, MONO, STEREO

2650	R4822 126 10002	100 nF	25V
2651	R4822 124 11568	47 µF	16V
2652	R4822 124 22826	10 µF	16V
2656	R4822 126 14127	39 nF	
2657	R4822 122 33128	15 nF	63V
2700	R4822 126 10002	100 nF	25V
2701	R4822 126 10002	100 nF	25V
2702	R4822 126 10002	100 nF	25V
2704	R4822 124 23052	100 µF	16V
2705	R5322 122 32268	470 pF	50V
2706	R4822 122 33575	220 pF	50V
2707	R5322 122 33861	120 pF	50V
2708	R4822 124 23055	22 µF	16V
2715	R5322 122 32661	56 pF	50V
2716	R5322 122 32661	56 pF	50V
2722	R5322 122 34123	1 nF	50V
2726	R4822 126 12104	12 nF	63V
2727	R4822 124 23055	22 µF	16V
2728	R4822 124 23055	22 µF	16V
2729	R4822 122 33177	10 nF	50V
2730	R5322 122 32452	47 pF	63V
2731	R5322 122 32452	47 pF	63V
2732	R5322 122 32452	47 pF	63V
2733	R4822 122 33177	10 nF	50V
2734	R4822 126 10002	100 nF	25V
2740	R4822 124 41576	2,2 µF	50V
2741	R4822 126 10002	100 nF	25V
2742	R4822 124 23055	22 µF	16V
2743	R4822 126 13061	220 nF	25V
2744	R4822 124 40786	2,2 µF	63V
2745	R4822 122 33575	220 pF	50V
2746	R4822 126 10002	100 nF	25V
2747	R4822 126 10002	100 nF	25V
2748	R4822 126 12945	8,2 pF	
2749	R4822 126 13061	220 nF	25V
2750	R4822 124 40786	2,2 µF	63V
2752	R4822 126 13061	220 nF	25V
2780	R4822 124 22826	10 µF	16V
2781	R4822 122 33177	10 nF	50V
2782	R4822 126 10002	100 nF	25V
2783	R5322 126 10184	680 pF	
2784	R4822 124 11568	47 µF	16V
2785	R5322 122 32531	100 pF	50V
2786	R4822 124 11569	4,7 µF	25V
2787	R4822 124 11569	4,7 µF	25V
2788	R5322 122 32654	22 nF	63V
2789	R4822 122 33177	10 nF	50V
2790	R4822 122 33177	10 nF	50V
2791	R4822 124 11569	4,7 µF	25V
2792	R4822 124 11569	4,7 µF	25V
2793	R5322 122 32481	15 pF	50V
2794	R4822 126 10002	100 nF	25V
2795	R5322 122 34123	1 nF	50V
2796	R4822 124 11569	4,7 µF	25V
2800	R4822 126 13689	18 pF	63V
2801	R5322 122 32659	33 pF	50V
2802	R4822 126 14118	100 nF	Y5V
2803	R4822 126 10002	100 nF	25V
2804	R4822 124 23053	1 µF	63V
2805	R4822 124 23027	47 µF	6,3V
2810	R5322 122 33861	120 pF	50V
2811	R5322 122 32531	100 pF	50V
2831	R5322 122 32481	15 pF	50V
2850	R4822 124 23052	100 µF	16V
2851	R5322 122 32654	22 nF	63V
2852	R4822 124 23052	100 µF	16V
2853	R5322 122 32654	22 nF	63V
2854	R4822 124 40786	2,2 µF	63V
2855	R5322 122 32654	22 nF	63V
2856	R5322 122 32654	22 nF	63V
2857	R4822 126 13061	220 nF	25V
2858	R4822 126 13061	220 nF	25V
2859	R4822 126 13061	220 nF	25V
2860	R4822 126 13061	220 nF	25V
2861	R4822 126 13061	220 nF	25V
2862	R4822 126 13061	220 nF	25V
2863	R4822 126 13061	220 nF	25V
2864	R4822 126 13061	220 nF	25V
2865	R5322 126 10223	4,7 nF	63V
2866	R4822 124 11568	47 µF	16V
2867	R4822 124 22826	10 µF	16V

2868	R4822 126 13061	220 nF	25V
2869	R5322 126 10223	4,7 nF	63V
2870	R4822 124 11568	47 µF	16V
2871	R4822 124 22826	10 µF	16V
2872	R4822 124 22826	10 µF	16V
2873	R4822 124 22826	10 µF	16V
2874	R4822 124 22826	10 µF	16V
2875	R4822 124 22826	10 µF	16V
2876	R4822 124 22826	10 µF	16V
2877	R4822 124 22826	10 µF	16V
2878	R4822 126 13061	220 nF	25V
2879	R4822 126 13061	220 nF	25V

RESISTORS

3000	R4822 051 10102	1 k	0,25W
3001	R4822 051 10102	1 k	0,25W
3002	R4822 116 52228	680 R	0,5W
3003	R4822 116 52228	680 R	0,5W
3004	R4822 116 52228	680 R	0,5W
3005	R4822 116 52303	8,2 k	0,5W
3006	R4822 116 52238	12 k	0,5W
3007	R4822 100 12157	10 k	POT
3008	R4822 116 83883	470 R	0,5W
3010	R4822 051 10102	1 k	0,25W
3011	R4822 117 11449	2,2 k	0,1W
3012	R4822 117 11449	2,2 k	0,1W
3013	R4822 117 11721	1,3 k	0,1W
3014	R4822 116 83903	4,7 k	0,1W
3015	R4822 051 10102	1 k	0,25W
3016	R4822 051 20822	8,2 k	0,1W
3017	R4822 116 52249	1,8 k	0,5W
3018	R4822 116 83883	470 R	0,5W
3019	R4822 051 20562	5,6 k	0,1W
3020	R4822 051 20224	220 k	0,1W
3021	R4822 050 11002	1 k	0,4W
3022	R4822 050 11002	1 k	0,4W
3024	R4822 051 20822	8,2 k	0,1W
3024	R4822 051 20682	6,8 k	0,1W for 2/x
3027	R4822 116 52264	27 k	0,5W
3028	R4822 051 20332	3,3 k	0,1W
3029	R4822 051 20225	2,2 M	0,1W
3030	R4822 116 52256	2,2 k	0,5W
3031	R4822 116 52256	2,2 k	0,5W
3032	R4822 117 11449	2,2 k	0,1W
3033	R4822 116 52251	18 k	0,5W
3034	R4822 051 20153	15 k	0,1W
3035	R4822 117 11449	2,2 k	0,1W
3036	R4822 051 20471	470 R	0,1W
3045	R4822 116 83876	270 R	0,5W
3046	R4822 050 11002	1 k	0,4W
3048	R4822 116 83884	47 k	0,5W
3050	R4822 116 83872	220 R	0,5W
3050	R4822 116 52175	100 R	0,5W
3051	R4822 051 20224	220 k	0,1W
3052	R4822 116 52175	100 R	0,5W
3054	R4822 117 11449	2,2 k	0,1W
3055	R4822 117 10361	680 R	0,1W
3080	R4822 051 20568	5,6 R	0,1W
3081	R4822 051 20561	560 R	0,1W
3082	R4822 051 20101	100 R	0,1W
3083	R4822 051 20472	4,7 k	0,1W
3084	R4822 051 20472	4,7 k	0,1W
3085	R4822 051 20112	1,1 k	0,1W
3086	R4822 051 20331	330 R	0,1W
3087	R4822 116 52234	100 k	0,5W
3100	R4822 116 52219	330 R	0,5W
3101	R4822 051 20332	3,3 k	0,1W
3102	R4822 116 52231	820 R	0,5W
3103	R4822 116 52228	680 R	0,5W
3104	R4822 050 11002	1 k	0,4W
3105	R4822 116 52222	390 R	0,5W
3106	R4822 116 52231	820 R	0,5W
3107	R4822 050 11002	1 k	0,4W
3109	R4822 116 52195	47 R	0,5W
3110	R4822 116 52207	1,2 k	0,5W
3111	R4822 116 52256	2,2 k	0,5W
3112	R4822 051 10102	1 k	0,25W
3113	R4822 051 20561	560 R	0,1W
3114	R4822 117 10833	10 k	0,1W

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3115	R4822 116 52251	18 k	0,5W		3378	R4822 051 20272	2,7 k	0,1W
3116	R4822 051 10102	1 k	0,25W		3379	R4822 101 11383	470, 3	R
3117	R4822 116 52256	2,2 k	0,5W		3383	R4822 116 83874	220 k	0,5W
3118	R4822 116 52283	4,7 k	0,5W		3384▲	R4822 052 10101	100 R	0,33W
3119	R4822 051 20333	33 k	0,1W		3385	R4822 116 52269	3,3 k	0,5W
3120	R4822 116 52303	8,2 k	0,5W		3386	R4822 116 52219	330 R	0,5W
3121	R4822 051 20182	1,8 k	0,1W		3387	R4822 050 11002	1 k	0,4W
3122	R4822 051 10102	1 k	0,25W		3388	R4822 050 11002	1 k	0,4W
3123	R4822 116 83864	10 k	0,5W		3389	R4822 117 11449	2,2 k	0,1W
3124	R4822 116 52243	1,5 k	0,5W		3392▲	R4822 053 21335	3,3 M	0,5W
3125	R4822 117 11449	2,2 k	0,1W		3393▲	R4822 053 21335	3,3 M	0,5W
3126	R4822 051 10102	1 k	0,25W		3394	R4822 116 52256	2,2 k	0,5W
3127	R4822 117 11449	2,2 k	0,1W		3395	R4822 116 52257	22 k	0,5W
3128	R4822 117 11449	2,2 k	0,1W		3396	R4822 116 52257	22 k	0,5W
3129	R4822 051 10102	1 k	0,25W		3400	R4822 116 83864	10 k	0,5W
3134	R4822 117 11503	220 R	0 1W		3401	R4822 116 83864	10 k	0,5W
3135	R4822 117 11503	220 R	0 1W		3402	R4822 050 11002	1 k	0,4W
3151	R4822 051 20104	100 k	0,1W		3403	R4822 116 52256	2,2 k	0,5W
3152	R4822 051 20393	39 k	0,1W		3404	R4822 116 83864	10 k	0,5W
3153	R4822 117 10833	10 k	0,1W		3405	R4822 116 83876	270 R	0,5W
3154	R4822 117 10354	22 k	0,1W for 4/0		3406	R4822 116 83864	10 k	0,5W
3154	R4822 117 12342	18, 1k	0,1W for 2/x		3407	R4822 116 83864	10 k	0,5W
3154	R4822 117 12605	27, 1k	0,1W for 4/2		3408	R4822 116 52256	2,2 k	0,5W
3155	R4822 117 11383	12 k	0,1W		3410	R4822 051 20472	4,7 k	0,1W
3156	R4822 051 20331	330 R	0,1W		3411	R4822 116 83864	10 k	0,5W
3157	R4822 051 20331	330 R	0,1W		3412	R4822 116 52249	1,8 k	0,5W
3158	R4822 051 20472	4,7 k	0,1W		3413	R4822 050 11002	1 k	0,4W
3159	R4822 100 12157	10 k	POT		3414▲	R4822 052 10109	10 R	0,33W
3160	R4822 100 12157	10 k	POT		3415▲	R4822 052 10109	10 R	0,33W
3162	R4822 051 20008	0 R	0,1W		3416	R4822 116 52257	22 k	0,5W
3164	R4822 051 20008	0 R	0,1W		3417	R4822 116 52283	4,7 k	0,5W
3228	R4822 116 83872	220 R	0,5W		3418	R4822 050 11002	1 k	0,4W
3229	R4822 117 10833	10 k	0,1W		3419	R4822 051 20472	4,7 k	0,1W
3230	R4822 117 10833	10 k	0,1W		3420	R4822 117 10833	10 k	0,1W
3231	R4822 116 52175	100 R	0,5W		3421	R4822 116 83864	10 k	0,5W
3232	R4822 116 52175	100 R	0,5W		3423	R4822 116 83876	270 R	0,5W
3233	R4822 116 83864	10 k	0,5W		3424	R4822 116 52256	2,2 k	0,5W
3234	R4822 116 83864	10 k	0,5W		3430	R4822 116 52249	1,8 k	0,5W
3235	R4822 116 83864	10 k	0,5W		3431	R4822 116 52276	3,9 k	0,5W
3238	R4822 116 83864	10 k	0,5W		3432	R4822 116 83864	10 k	0,5W
3240	R4822 116 52297	68 k	0,5W		3433	R4822 116 52256	2,2 k	0,5W
3244	R4822 050 11002	1 k	0,4W		3434	R4822 116 52257	22 k	0,5W
3245	R4822 051 20183	18 k	0,1W		3435	R4822 116 83864	10 k	0,5W
3250	R4822 051 20153	15 k	0,1W		3436	R4822 050 11002	1 k	0,4W
3252▲	R4822 117 11593	22 R			3437	R4822 116 83961	6,8 k	
3253	R4822 050 24708	4,7 R	0,6W		3438	R4822 051 20472	4,7 k	0,1W
3254	R4822 050 24708	4,7 R	0,6W		3440▲	R4822 052 10228	2,2 R	0,33W
3265	R4822 116 83864	10 k	0,5W		3441	R4822 116 80176	1 R	0,5W
3270	R4822 117 11503	220 R	0 1W		3442	R4822 116 52304	82 k	0,5W
3271	R4822 117 11503	220 R	0 1W		3443	R4822 116 52257	22 k	0,5W
3273	R4822 117 11503	220 R	0 1W		3444	R4822 116 52276	3,9 k	0,5W
3297	R4822 051 20562	5,6 k	0,1W		3445	R4822 116 83864	10 k	0,5W
3300	R4822 116 52175	100 R	0,5W		3446	R4822 116 52257	22 k	0,5W
3301	R4822 116 52175	100 R	0,5W		3447	R4822 116 52257	22 k	0,5W
3302	R4822 116 52175	100 R	0,5W		3448	R4822 116 83864	10 k	0,5W
3303	R4822 116 83883	470 R	0,5W		3449	R4822 117 10833	10 k	0,1W
3304	R4822 050 11002	1 k	0,4W		3450	R4822 116 52256	2,2 k	0,5W
3305	R4822 116 52283	4,7 k	0,5W		3451	R4822 116 83864	10 k	0,5W
3312	R4822 116 52249	1,8 k	0,5W		3452	R4822 116 52263	2,7 k	0,5W
3313	R4822 116 83884	47 k	0,5W		3453	R4822 116 52283	4,7 k	0,5W
3350	R4822 117 10833	10 k	0,1W		3454	R4822 116 52283	4,7 k	0,5W
3351	R4822 051 20223	22 k	0,1W		3455	R4822 116 52283	4,7 k	0,5W
3352	R4822 051 20562	5,6 k	0,1W		3456	R4822 117 10833	10 k	0,1W
3353	R4822 117 10833	10 k	0,1W		3457	R4822 050 11002	1 k	0,4W
3354	R4822 117 11449	2,2 k	0,1W		3458	R4822 051 20223	22 k	0,1W
3355	R4822 051 20822	8,2 k	0,1W		3459	R4822 116 83876	270 R	0,5W
3356	R4822 051 20223	22 k	0,1W		3460	R4822 116 83884	47 k	0,5W
3357	R4822 051 20472	4,7 k	0,1W		3461	R4822 051 20472	4,7 k	0,1W
3358	R4822 117 11149	82 k	0,1W		3462	R4822 051 20563	56 k	0,1W
3359	R4822 051 20471	470 R	0,1W		3463	R4822 116 52283	4,7 k	0,5W
3360	R4822 051 20689	68 R	0,1W		3464	R4822 116 52256	2,2 k	0,5W
3361▲	R4822 052 10479	47 R	0,33W		3466	R4822 116 83864	10 k	0,5W
3362	R4822 051 20472	4,7 k	0,1W		3469	R4822 116 83876	270 R	0,5W
3363	R4822 050 21208	1,2 R	0,6W		3470	R4822 116 52264	27 k	0,5W
3365	R4822 116 83874	220 k	0,5W		3471	R4822 116 52222	390 R	0,5W
3369	R4822 116 83882	39 k	0,5W		3472	R4822 116 52264	27 k	0,5W
3370	R4822 116 83882	39 k	0,5W		3473	R4822 116 52222	390 R	0,5W
3374	R4822 051 20271	270 R	0,1W		3474	R4822 116 83864	10 k	0,5W
3375	R4822 051 10102	1 k	0,25W		3475	R4822 116 52289	5,6 k	0,5W
3376	R4822 051 20008	0 R	0,1W		3476	R4822 116 52222	390 R	0,5W
3377	R4822 051 20472	4,7 k	0,1W					

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3477	R4822 116 52283	4,7 k	0,5W	3611	R4822 051 20681	680 R	0,1W for stereo
3478	R4822 051 20104	100 k	0,1W	3612	R4822 117 11449	2,2 k	0,1W
3479	R4822 116 52283	4,7 k	0,5W	3615	R4822 051 20101	100 R	0,1W
3480	R4822 116 83884	4,7 k	0,5W	3618	R4822 100 12159	100 k	POT
3481	R4822 116 52256	2,2 k	0,5W	3619	R4822 051 20158	1,5 R	0,1W
3482	R4822 116 52257	22 k	0,5W	3620	R4822 051 20473	47 k	0,1W
3483	R4822 116 83864	10 k	0,5W	3622	R4822 051 20335	3,3 M	0,1W
3484	R4822 116 52283	4,7 k	0,5W	3623	R4822 117 10833	10 k	0,1W
3488	R4822 051 20471	470 R	0,1W	3624	R4822 051 20332	3,3 k	0,1W
3489	R4822 116 52283	4,7 k	0,5W	3625	R4822 051 20339	33 R	0,1W
3490	R4822 116 83872	220 R	0,5W	3626	R4822 051 20224	220 k	0,1W
3491	R4822 116 83884	47 k	0,5W	3627	R4822 051 20563	56 k	0,1W
3492	R4822 051 20473	47 k	0,1W	3638	R4822 051 20109	10 R	0,1W
3493	R4822 051 20225	2,2 M	0,1W	3655	R4822 051 20681	680 R	0,1W
3495	R4822 051 20104	100 k	0,1W	3656	R4822 116 83961	6,8 k	
3496	R4822 051 20472	4,7 k	0,1W	3657	R4822 051 20391	390 R	0,1W
3498	R4822 051 20472	4,7 k	0,1W	3702	R4822 051 20101	100 R	0,1W
3499	R4822 116 52283	4,7 k	0,5W	3703	R4822 051 20101	100 R	0,1W
3501	R4822 051 10102	1 k	0,25W	3704	R4822 051 20681	680 R	0,1W
3502	R4822 051 10102	1 k	0,25W	3705	R4822 051 20223	22 k	0,1W
3505	R4822 051 20759	75 R	0,1W	3706	R4822 051 20681	680 R	0,1W
3512	R4822 051 20682	6,8 k	0,1W	3707	R4822 051 20101	100 R	0,1W
3513	R4822 116 83872	220 R	0,5W	3708	R4822 051 20101	100 R	0,1W
3514	R4822 116 83961	6,8 k		3709	R4822 051 20101	100 R	0,1W
3515	R4822 051 20682	6,8 k	0,1W	3723	R4822 051 20224	220 k	0,1W
3516	R4822 117 11503	220 R	0,1W	3725	R4822 051 20822	8,2 k	0,1W
3517	R4822 116 52234	100 k	0,5W	3726	R4822 051 20273	27 k	0,1W
3518	R4822 116 52234	100 k	0,5W	3729	R4822 051 20391	390 R	0,1W
3519	R4822 051 20822	8,2 k	0,1W	3730	R4822 051 20183	18 k	0,1W
3520	R4822 117 10353	150 R	0,1W	3731	R4822 051 20183	18 k	0,1W
3521	R4822 116 83961	6,8 k		3732	R4822 051 20391	390 R	0,1W
3522	R4822 051 20821	820 R	0,1W	3735	R4822 051 20391	390 R	0,1W
3523	R4822 051 20008	0 R	0,1W	3735	R4822 117 11448	180 R	0,1W for mono SEC
3524	R4822 051 20759	75 R	0,1W	3736	R4822 051 20562	5,6 k	0,1W
3525	R4822 051 20822	8,2 k	0,1W	3737	R4822 051 20392	3,9 k	0,1W
3526	R4822 117 11449	2,2 k	0,1W	3739	R4822 051 20681	680 R	0,1W
3527	R4822 051 20472	4,7 k	0,1W	3742	R4822 100 12158	22 k	
3528	R4822 116 83884	47 k	0,5W	3744	R4822 051 20154	150 k	0,1W
3529	R4822 051 20759	75 R	0,1W	3747	R4822 051 20331	330 R	0,1W for PAL
3530	R4822 051 20472	4,7 k	0,1W	3747	R4822 051 20391	390 R	0,1W for SEC
3531	R4822 051 20101	100 R	0,1W	3748	R4822 100 12156	4,7 k	POT for PLL adj
3532	R4822 051 20101	100 R	0,1W	3748	R4822 100 12158	22 k	POT for Bd. 1 adj.
3533	R4822 051 20759	75 R	0,1W	3749	R4822 051 20681	680 R	0,1W
3534	R4822 051 20008	0 R	0,1W	3750	R4822 051 20331	330 R	0,1W
3535	R4822 117 11503	220 R	0,1W	3760	R4822 051 10102	1 k	0,25W
3536	R4822 117 11503	220 R	0,1W	3760	R4822 051 20821	820 R	0,1W for PAL I
3537	R4822 116 83872	220 R	0,5W	3761	R4822 051 10102	1 k	0,25W
3538	R4822 116 83961	6,8 k		3762	R4822 051 10102	1 k	0,25W
3539	R4822 116 83961	6,8 k		3764	R4822 051 20821	820 R	0,1W for SECAM
3540	R4822 117 11503	220 R	0,1W	3764	R4822 051 10102	1 k	0,25W for PAL
3542	R4822 117 11503	220 R	0,1W	3765	R4822 051 20562	5,6 k	0,1W
3544	R4822 117 11503	220 R	0,1W	3766	R4822 051 20473	47 k	0,1W
3545	R4822 116 52256	2,2 k	0,5W	3767	R4822 051 20472	4,7 k	0,1W
3546	R4822 116 52256	2,2 k	0,5W	3768	R4822 051 20104	100 k	0,1W
3548	R4822 051 20682	6,8 k	0,1W	3769	R4822 051 20472	4,7 k	0,1W
3549	R4822 051 20101	100 R	0,1W	3770	R4822 051 20104	100 k	0,1W
3550	R4822 051 20105	1 M	0,1W	3771	R4822 051 20472	4,7 k	0,1W
3551	R4822 051 20105	1 M	0,1W	3772	R4822 051 20104	100 k	0,1W
3552	R4822 051 20682	6,8 k	0,1W	3780	R4822 051 20101	100 R	0,1W
3553	R4822 051 20101	100 R	0,1W	3781	R4822 051 20101	100 R	0,1W
3554	R4822 051 20101	100 R	0,1W	3782	R4822 051 20333	33 k	0,1W
3555	R4822 051 20008	0 R	0,1W	3790	R4822 051 20472	4,7 k	0,1W
3556	R4822 051 20474	470 k	0,1W	3791	R4822 051 20562	5,6 k	0,1W
3557	R4822 051 20104	100 k	0,1W	3792	R4822 051 20472	4,7 k	0,1W
3560	R4822 051 20008	0 R	0,1W	3793	R4822 051 20562	5,6 k	0,1W
3561	R4822 051 20472	4,7 k	0,1W	3807	R4822 051 20479	47 R	0,1W
3562	R4822 051 20473	47 k	0,1W	3808	R4822 051 20479	47 R	0,1W
3563	R4822 051 20822	8,2 k	0,1W	3813	R4822 051 20472	4,7 k	0,1W
3570	R4822 116 83864	10 k	0,5W	3815	R4822 117 10833	10 k	0,1W
3600	R4822 116 52257	22 k	0,5W	3816	R4822 117 10833	10 k	0,1W
3601	R4822 117 10833	10 k	0,1W	3817	R4822 117 10833	10 k	0,1W
3602	R4822 051 20472	4,7 k	0,1W	3828	R4822 117 10833	10 k	0,1W
3603	R4822 051 20101	100 R	0,1W	3829	R4822 051 20008	0 R	0,1W
3604	R4822 116 52257	22 k	0,5W	3850	R4822 117 12708	39,1 k	
3605	R4822 117 11449	2,2 k	0,1W	3851	R4822 051 20473	47 k	0,1W
3606	R4822 116 52195	47 R	0,5W	3852	R4822 051 20392	3,9 k	0,1W
3607	R4822 051 20394	390 k	0,1W	3853	R4822 051 20473	47 k	0,1W
3608	R4822 117 11383	12 k	0,1W	3854	R4822 051 20392	3,9 k	0,1W
3609	R4822 051 20822	8,2 k	0,1W	3855	R4822 051 20104	100 k	0,1W
3610	R4822 117 11449	2,2 k	0,1W	3856	R4822 051 20104	100 k	0,1W
3611	R4822 051 20101	100 R	0,1W for mono	3857	R4822 051 20335	3,3 M	0,1W

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3860	R4822 051 20101	100 R	0,1W
3861	R4822 051 20101	100 R	0,1W
3862	R4822 051 20104	100 k	0,1W
3863	R4822 051 20104	100 k	0,1W
3901	R4822 051 20008	0 R	0,1W
3902	R4822 051 20008	0 R	0,1W
3903	R4822 051 20008	0 R	0,1W
3905	R4822 051 20008	0 R	0,1W
3906	R4822 051 20008	0 R	0,1W
3907	R4822 051 20008	0 R	0,1W
3908	R4822 051 20008	0 R	0,1W
3910	R4822 051 20008	0 R	0,1W
3911	R4822 051 20008	0 R	0,1W
3912	R4822 051 20008	0 R	0,1W
3913	R4822 051 20008	0 R	0,1W
3915	R4822 051 20008	0 R	0,1W
3916	R4822 051 20008	0 R	0,1W
3917	R4822 051 20008	0 R	0,1W
3918	R4822 051 20008	0 R	0,1W
3919	R4822 051 20008	0 R	0,1W
3922	R4822 051 20008	0 R	0,1W
3923	R4822 051 20008	0 R	0,1W
3924	R4822 051 20008	0 R	0,1W
3925	R4822 051 20008	0 R	0,1W
3926	R4822 051 20008	0 R	0,1W
3927	R4822 051 20008	0 R	0,1W
3928	R4822 051 20008	0 R	0,1W
3929	R4822 051 20008	0 R	0,1W
3930	R4822 051 20008	0 R	0,1W
3931	R4822 051 20008	0 R	0,1W
3941	R4822 051 20008	0 R	0,1W
3942	R4822 051 20008	0 R	0,1W
3943	R4822 051 20008	0 R	0,1W
3944	R4822 051 20008	0 R	0,1W
3945	R4822 051 20008	0 R	0,1W
3946	R4822 051 20008	0 R	0,1W
3947	R4822 051 20008	0 R	0,1W
3950	R4822 051 20008	0 R	0,1W
3951	R4822 051 20008	0 R	0,1W
3956	R4822 051 20008	0 R	0,1W
3960	R4822 051 20008	0 R	0,1W
3961	R4822 051 20008	0 R	0,1W
3962	R4822 051 20008	0 R	0,1W
3965	R4822 051 20008	0 R	0,1W
3966	R4822 051 20008	0 R	0,1W
3967	R4822 051 20008	0 R	0,1W
3970	R4822 051 20008	0 R	0,1W
3972	R4822 051 20008	0 R	0,1W
3973	R4822 051 20008	0 R	0,1W
3984	R4822 051 20008	0 R	0,1W
3985	R4822 051 20008	0 R	0,1W
3986	R4822 051 20008	0 R	0,1W
3988	R4822 051 20008	0 R	0,1W
3989	R4822 051 20008	0 R	0,1W
3990	R4822 051 20008	0 R	0,1W
3998	R4822 051 20008	0 R	0,1W
3999	R4822 051 20008	0 R	0,1W
4523	R4822 117 10833	10 K	0,1W
4591	R4822 117 12708	39 K	0,1W
4659	R4822 051 20182	1,8 K	0,1W
4671	R4822 051 20472	4,7 K	0,1W
4684	R4822 117 12708	39 K	0,1W
4745	R4822 051 20008	0 R	0,1W
4758	R4822 051 20183	18 K	0,1W
4764	R4822 117 10833	10 K	0,1W
4772	R4822 051 20472	4,7 K	0,1W

COILS

5000	R4822 157 11234	10μH	5%
5001	R4822 152 20677	10μH	10%
5002	R4822 152 20677	10μH	10%
5004	R4822 157 11142	47μH	5%
5005	R4822 157 11145	150μH	5%
5020	R4822 157 10972	15μH	5%
5026	R4822 157 11228	100μH	5%
5036	R4822 157 11149	56μH	5%
5080▲	R4822 157 11226	47μH	5%
5100	R4822 157 63661	FIL LC VAR 4M286 5VS	
5101	R4822 157 10972	15μH	5%
5102	R4822 157 11149	56μH	5%
5103	R4822 157 63661	FIL LC VAR 4M286 5VS	
5104	R4822 157 11227	150μH	5%
5105	R4822 157 11227	150μH	5%
5106	R4822 157 11151	330μH	5%
5107	R4822 157 11228	100μH	5%
5108	R4822 157 63659	FIL LC VAR 1G072 5V2	
5111	R4822 157 11229	15μH	5%
5112	R4822 157 10972	15μH	5%
5113	R4822 157 11145	150μH	5%
5114	R4822 157 10972	15μH	5%
5115	R4822 157 63717	6,8μH	10%
5130	R4822 157 71206	BLM21A10PT	
5150▲	R4822 157 53906	47μH	10%
5200	R4822 152 20677	10μH	10%
5300▲	R4822 157 53005	0μH33	20%
5350	R4822 157 51462	10μH	10%
5351	R4822 157 71461	22μH	10%
5352▲	R4822 157 10454	LINE FILTER	
5353▲	R4822 146 10786	SRW32ES-E01	
5354	R4822 157 51462	10μH	10%
5355▲	R4822 157 53005	0μH33	20%
5358	R4822 157 60147	2,2μH	
5361	R4822 157 52286	22μH	
5368	R4822 157 60147	2,2μH	
5400	R4822 152 20677	10μH	
5402	R4822 152 20677	10μH	
5601	R4822 157 11249	10μH	5%
5602	R4822 157 11151	330μH	5%
5603	R4822 157 53531	coil	
5604	R4822 157 11251	3,3μH	10%
5605	R4822 157 71206	BLM21A10PT	
5700	R4822 157 71206	BLM21A10PT	
5702	R4822 152 20677	10μH	10%
5703	R4822 152 20677	10μH	10%
5705	R4822 152 20677	10μH	10%
5720	R4822 157 11231	LAN02TB1R0J	
5721	R4822 157 70877	H292ONS-6785NK	
5725	R4822 157 70877	H292ONS-6785NK	
5726	R4822 051 20008	OR00 JUMP (0805)	
5740	R4822 157 11232	12μH	5% for SECAM LL'
5740	R4822 157 11229	15μH	5% for PAL
5741	R4822 157 11223	39μH	5%
5780	R4822 157 70038	10μH	10%
5800	R4822 157 11233	LAN02TB330J	
5801	R4822 152 20677	10μH	10%
5810	R4822 157 11234	10μH	5%
5831	R4822 157 11235	LANO2TB220J	

Motherboard QMB PAL, SECAM, MONO, STEREO

DIODES

6100	R4822 130 32778	1SS133
6135	R4822 130 34197	BZX79-B12
6250	R4822 130 83514	MTZJ12C
6299	R4822 130 10869	RB441Q
6350	R4822 130 30842	BAV21
6351	R4822 130 31983	BAT85
6352	R4822 130 42488	BYD33D
6353	R4822 130 42488	BYD33D
6354	R4822 130 80858	1N5062
6355	R4822 130 42488	BYD33D
6356	R4822 130 42488	BYD33D
6357	R4822 130 10871	SBYV27-200
6358	R5322 130 31938	BYV27-200
6359	R4822 130 83909	BYW98-200RL
6359	R4822 130 32715	SB340
6360	R4822 130 83147	DF06M
6371	R4822 130 42488	BYD33D
6372	R4822 130 34142	BZX79-B33
6460	R4822 130 10231	SET:2X SENS + 1X LED
6460	R4822 130 10231	SET:2X SENS + 1X LED
6500	R4822 130 34197	BZX79-B12
6501	R4822 130 34197	BZX79-B12
6502	R4822 130 34197	BZX79-B12
6509	R4822 130 83514	MTZJ12C
6510	R4822 130 83514	MTZJ12C
6511	R4822 130 10884	MTZJ18C
6516	R4822 130 34278	BZX79-B6V8
6530	R4822 130 10654	BAT254
6601	R4822 130 30861	BZX79-B7V5
6760	R4822 130 10414	BA792
6761	R4822 130 10414	BA792

TRANSISTORS & IC's

7000	R4822 130 42353	BSF19-F2
7001	R4822 130 10872	MMUN2112L
7002	R4822 130 60511	BC847B
7003	R4822 209 15526	LC89980M
7004	R4822 130 42353	BSF19-F2
7005	R5322 130 60508	BC857B
7006	R4822 130 60511	BC847B
7007	R4822 209 15527	LA71525M
7008	R5322 130 60508	BC857B
7009	R4822 130 10872	MMUN2112L
7011	R4822 130 60511	BC847B
7020	R4822 130 63732	MMUN2212
7021	R5322 130 60508	BC857B
7080	R4822 209 90421	STV5712
7085	R4822 130 60511	BC847B
7100	R4822 130 60511	BC847B
7101	R4822 130 60511	BC847B
7102	R4822 209 73852	PMBT2369
7103	R4822 130 60511	BC847B
7104	R4822 130 63732	MMUN2212
7105	R5322 130 60508	BC857B
7106	R4822 130 60511	BC847B
7110	R4822 209 90189	TDA4722/V2
7150	R4822 209 13121	STV5742
7151	R4822 209 15548	STV5744AD
7153	R4822 130 63732	MMUN2212
7201	R4822 209 15516	TMP87CS71F QDCE1-xP
7201	R4822 209 15517	TMP87CS71F QDCE2-xU
7201	R4822 209 15521	TMP87CS71F QDCH1-xP
7201	R4822 209 15519	TMP87CS71F QDCH2-xU
7201	R4822 209 15573	TMP87CS71F QDCH5-xU
7202	R4822 135 00115	25U39113SA
7203	R4822 212 30842	TFMS5360
7231	R4822 130 63732	MMUN2212
7300	R4822 209 13126	TDA5241
7301	R4822 130 10872	MMUN2112L
7350▲	R4822 130 63794	STP3NA60
7351▲	R4822 209 32126	SOC1012T
7352	R4822 209 81397	TL431CLPST
7354	R4822 209 90025	MC44603P
7358	R4822 130 40995	BD438
7359	R4822 130 60511	BC847B
7400	R4822 209 15529	TMP91C642AF QTDP2-xU
7420	R4822 209 81726	MC7812CT for stereo

7420	R4822 209 15628	L4931CV120 for mono
7440	R4822 209 30146	L2722
7455	R4822 130 10872	MMUN2112L
7456	R4822 130 60511	BC847B
7457	R4822 130 60511	BC847B
7458	R4822 130 60511	BC847B
7460	R4822 209 30836	SAA1310/N2
7461	R4822 130 10231	SET:2X SENS + 1X LED
7462	R4822 130 10231	SET:2X SENS + 1X LED
7463	R4822 130 41344	BC337-40
7464	R4822 130 10233	TCRT5000L
7466	R4822 130 10234	TCST1030L
7467	R4822 130 60511	BC847B
7468	R4822 130 60511	BC847B
7469	R4822 130 60511	BC847B
7500	R4822 130 60511	BC847B
7501	R5322 130 60508	BC857B
7505	R4822 130 63732	MMUN2212
7506	R4822 130 10872	MMUN2112L
7507	R4822 209 90016	STV6400
7510	R5322 130 42136	BC848C
7511	R4822 130 42615	BC817-40
7512	R5322 130 42136	BC848C
7513	R5322 209 14481	HEF4053BT
7540	R4822 209 32728	SDA5642 for VPS only
7540	R4822 209 15504	SDA5650 for VPS/PCD
7600	R4822 130 60373	BC856B
7601	R5322 130 60159	BC846B
7602	R5322 130 60159	BC846B
7603	R4822 130 60511	BC847B
7604	R4822 130 41715	BC328-40
7609	R4822 130 42615	BC817-40
7720	R4822 209 90288	TDA9800T/V3
7721	R4822 209 90018	TDA9812T for SECAM mono
7721	R4822 209 90431	TDA9813T/V2 for PAL FM stereo
7721	R4822 209 90452	TDA9814T/V3 for SECAM stereo
7722	R5322 209 14481	HEF4053BT
7723	R5322 130 60508	BC857B
7724	R5322 130 42136	BC848C
7725	R4822 130 60511	BC847B
7726	R4822 130 63732	MMUN2212
7729	R4822 130 60511	BC847B
7730	R4822 130 60511	BC847B
7780	R4822 209 32501	TDA9840T/V2
7800	R4822 209 15524	LC74781-9663
7810	R4822 130 42353	BSF19-F2
7850	R4822 209 15525	TDA9604H/N1
7890	R4822 209 32283	ST24C08CB1

QNIC-NICAM, CABLES & SUB MODULS**MISCELLANEOUS**

1700	R4822 071 52501	Fuse	250mA
1710	R4822 242 10433	Crystal	8,192MHZ
1970	R4822 265 10943	CONN	11P

CAPACITORS

2700	R4822 122 33172	390 pF	50V
2701	R5322 122 32448	10 pF	50V
2703	R4822 126 10002	100 nF	25V
2704	R4822 122 33575	220 pF	50V
2705	R4822 124 22826	10 µF	16V
2706	R4822 124 22826	10 µF	16V
2707	R4822 126 13061	220 nF	25V
2708	R5322 122 32654	22 nF	63V
2709	R5322 122 32531	100 pF	50V
2710	R5322 122 32531	100 pF	50V
2714	R4822 124 23027	47 µF	6,3V
2716	R4822 124 23027	47 µF	6,3V
2718	R4822 126 10002	100 nF	25V
2719	R4822 122 33175	2,2 nF	50V
2720	R4822 122 33175	2,2 nF	50V
2721	R4822 126 13061	220 nF	25V
2722	R4822 122 33175	2,2 nF	50V
2723	R4822 122 33175	2,2 nF	50V
2725	R4822 124 23053	1 µF	63V
2726	R4822 122 33797	47 nF	50V
2727	R4822 124 23027	47 µF	6,3V
2728	R4822 126 10002	100 nF	25V
2729	R4822 124 22826	10 µF	16V
2731	R4822 124 22826	10 µF	16V
2732	R4822 126 10002	100 nF	25V
2733	R4822 124 23027	47 µF	6,3V
2734	R5322 122 32654	22 nF	63V
2736	R4822 126 10002	100 nF	25V
2752	R4822 126 13061	220 nF	25V
2753	R4822 126 13061	220 nF	25V

RESISTORS

3700	R4822 051 10102	1 k	0,25W
3701	R4822 051 20101	100 R	0,1W
3702	R4822 051 20223	22 k	0,1W
3703	R4822 051 20104	100 k	0,1W
3704	R4822 117 11449	2,2 k	0,1W
3705	R4822 051 20392	3,9 k	0,1W
3707	R4822 116 52276	3,9 k	0,5W
3708	R4822 117 11449	2,2 k	0,1W
3710	R4822 051 20334	330 k	0,1W
3711	R4822 116 52175	100 R	0,5W
3712	R4822 116 52175	100 R	0,5W
3713	R4822 051 20182	1,8 k	0,1W
3714	R4822 051 20333	33 k	0,1W
3715	R4822 117 10833	10 k	0,1W
3720	R4822 117 10833	10 k	0,1W
3721	R4822 117 10833	10 k	0,1W
3722	R4822 117 10833	10 k	0,1W
3723	R4822 117 10833	10 k	0,1W
3790	R4822 051 20008	0 R	0,1W
3792	R4822 051 20008	0 R	0,1W
3793	R4822 051 20008	0 R	0,1W
3794	R4822 051 20008	0 R	0,1W
3795	R4822 051 20008	0 R	0,1W
3796	R4822 051 20008	0 R	0,1W
3797	R4822 051 20008	0 R	0,1W

COILS

5700	R4822 157 63717	6,8µH	10%
5703	R4822 157 71206	BLM21A10PT	
5704	R4822 157 71206	BLM21A10PT	
5705	R4822 157 71206	BLM21A10PT	
5706	R4822 157 71206	BLM21A10PT	
5707	R4822 157 71206	BLM21A10PT	

DIODES

6700	R4822 130 10652	BB149
6701	R4822 130 83757	BAS216

TRANSISTORS & IC's

7700	R4822 209 14809	SAA7284ZP/M2
7701	R5322 209 61487	LM358N

CABLES

8001	R4822 320 11889	FFC TD1-1961
8002	R4822 323 10374	CABLE TREE TD2-1962
8003	R4822 320 11891	FFC TD1-1944
8004	R4822 320 11892	FFC TD4-1930
8006	R3103 140 26420	FFC 1103-1711
8007	R4822 320 11891	FFC 1710-1750
8008	R4822 323 10373	ESD-GND CONN.

▲ R4822 321 10886	MAINS CORD (+FUSE) for UK
▲ R4822 321 10249	MAINS CORD
R4822 320 50377	ANTENNA cable
R4822 321 63002	SCART cable

SUB MODULES

R4822 214 12238	Cinch print rear
R3103 198 69940	QBOC1Cinch print front