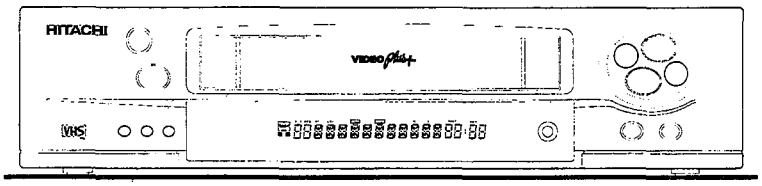
HITACHI

TP | No.0002E

VT-M500 Series

SERVICE MANUAL
Wartungsanleitung
Documentation Technique



VT-M500EL
VT-M501ECT
VT-M502EL
VT-M502EUK
VT-M505EVPS
VT-M510EPV
VT-M510EUK
VT-M530ECT
VT-M530EUK
VT-M532EL
VT-M535EVPS

VHS

This video desk 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-Casseten 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 76565 GB

June 1996 HITACHI HOME ELECTRONICS EUROPE

TABLE OF CONTENTS

Features

	TV system								Mechanism								Programming									Features						
	2 µP Concept	PAL BG	PAL I UK	PAL BG, SECAM L-L´,Secam BG	Autostrore with Preset	Autoinstall	Modulator Pal G/I	Splitter	Videoheads	Longplay Pal/Secam	Quick view	Winding Time 260	Tape counter non linear	Super Slow Motion	Frame	Field	Gemstar Showview	Gemstar Video+	VPS	PDC without TXT / VPT	Transm. identif. via VPS / PDC	OTR	Frequency entry	Record prep. mode Scart 1&2	Number of events	Daily / weekly	Synchrotime	Time / Date download	Number of Scartconnectors	Back-up time (min.)	Tuner only mode	Hyp./ Cable - Tuner	VISS next/previous index search
VT-M500EL	✔			✔	✔			✔	2		✔	✔	✔		✔							✔	✔	✔	6				2	30	✔	✔	✔
VT-M501ECT	✔	✔			✔		✔		2		✔	✔	✔		✔		✔					✔	✔	✔	6	✔			2	30	✔	✔	✔
VT-M502EL	✔			✔	✔			✔	2		✔	✔	✔		✔		✔					✔	✔	✔	6	✔			2	30	✔	✔	✔
VT-M502EUK	✔		✔		✔		✔		2	✔	✔	✔	✔		✔			✔				✔	✔	✔	6	✔			1	30	✔		✔
VT-M505EVPS	✔	✔			✔		✔		2		✔	✔	✔		✔		✔		✔		✔	✔	✔	✔	6	✔			2	30	✔	✔	✔
VT-M510EPV	✔	✔			✔		✔		2	✔	✔	✔	✔		✔		✔		✔	✔	✔	✔	✔	✔	6	✔	✔		2	30	✔	✔	✔
VT-M510EUK	✔		✔			✔	✔		2	✔	✔	✔	✔		✔			✔		✔	✔	✔	✔	✔	6	✔	✔	✔	1	30	✔		✔
VT-M530ECT	✔	✔			✔		✔		4	✔	✔	✔	✔	✔		✔	✔				✔	✔	✔	✔	6	✔			2	30	✔	✔	✔
VT-M530EUK	✔		✔			✔	✔		4	✔	✔	✔	✔	✔		✔		✔		✔	✔	✔	✔	✔	6	✔	✔	✔	2	30	✔	✔	✔
VT-M532EL	✔		✔	✔	✔			✔	4	✔	✔	✔	✔	✔		✔	✔			✔	✔	✔	✔	✔	6	✔	✔		2	30	✔	✔	✔
VT-M535EVPS	✔	✔			✔		✔		4	✔	✔	✔	✔	✔		✔	✔		✔		✔	✔	✔	✔	6	✔			2	30	✔	✔	✔

Survey of sets and PCB`s

	MOTHERBOARD (MOBO)													OPERATING PANEL				I/O	PS	TAPE DECK			
	- VS signal processing - IO Input / Output - FV Frontend - AL Audio linear - HA Head amplifier - DE Deck electronics - OSD / Follow me											MOBO Deck-µP pos. 7400		PDC- µP pos. 7201									
	MB-DCS16138	MB-DCHI165011	MB-DCHI165021	MB-DCHI165031	MB-DCHI165052	MB-DCCO165051	MB-DCHI165391	MB-DCHI465011	MB-DCHI465021	MB-DCHI465051	MB-DCHI465391	PTDP1-xU	PTDP3-xU	PDCH1/2P30MAI	PDCH1/2P30M	PDCE1-xP	PDCE2-xU	PIO	PSM1	WDM-P2/0	WDM-P2/0LP	WDM-P4/0	WDM-S4/0
Page 3 -	15	15	15	15	15	15	15	15	15	15	15	18	18	27	27	28	28	26	11	2 heads PAL	2 heads, longplay PAL	4 heads PAL	4 heads SECAM
VT-M500EL	✔											✔			✔		✔	✔	✔	✔			
VT-M501ECT		✔										✔			✔		✔	✔	✔	✔			
VT-M502EL							✔						✔		✔		✔	✔	✔	✔			
VT-M502EUK						✔							✔	✔		✔			✔		✔		
VT-M505EVPS			✔									✔			✔		✔	✔	✔	✔			
VT-M510EPV				✔								✔			✔		✔	✔	✔		✔		
VT-M510EUK					✔								✔	✔		✔			✔		✔		
VT-M530ECT								✔				✔			✔		✔	✔	✔			✔	
VT-M530EUK										✔		✔		✔		✔		✔	✔			✔	
VT-M532EL											✔	✔			✔		✔	✔	✔				✔
VT-M535EVPS									✔			✔			✔		✔	✔	✔			✔	

(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 conneted 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). Unvorschriftmässige 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'aprés réparation l'appareil soit remis dans son état d'origine et que soient utilisées les piéces de rechange identiques à celles spécifiées.

  Les composants de sécurité sont marqués ⚠

- Tout les IC et beaucoup d'autres semi-conducteurs sont sensibles aux décharger statiques (ESD). Leur longévité pourrait étre considérablement écourté par le fait qu'aucune précaution n'est prise à leur manipulation. Lors de réparations s'assurer de bien étre relié au méme potential que la masse de l'appareil et enfiler le bracelet serti d'une résistance de sécurité. Veiller à ce que les composants ainsi que les outils que l'on utilise soient également à ce potentiel.
- 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 mésure 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 côte primaire èn Live GND.
- La mésure 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 mésurées en mode RECORD ou PLAY.
- Les semi-conducteurs indiqués dans le schéma de principe et à la liste des compostants, 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, indentiek 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 ditzelfde 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 gelijksspanningen en oscillogrammen dienen gemeten te worden ten opzichte van de apparaat aarde.
- De gelijksspanningen en oscillogrammen vermeld in de schema's dienen gemeten te worden met een kleurbalkensignaal beelddraaggolf op 503.25 MHz (C25).
- De oscillogrammen en gelijksspanningen zijn in RECORD of PLAY mode gemeten.
- De halfgeleiders, die in het pricipeschema 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). Cosí si evitano cortocircuiti e collegamenti instabili.

Osservazioni

- Misurare le tensioni continue e gli oscillogrammi riferiendosi 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.

(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 estan 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 traves 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 evitaran 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 en 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.

(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 fascher 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 onderelen vervangen worden.

(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 possone soltituire solo con pezzl di ricambio originali.

(E) AVISO!

Bateria 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 ma kun foretages af en sagkyndig, og som beskrevet in servicemanualen.

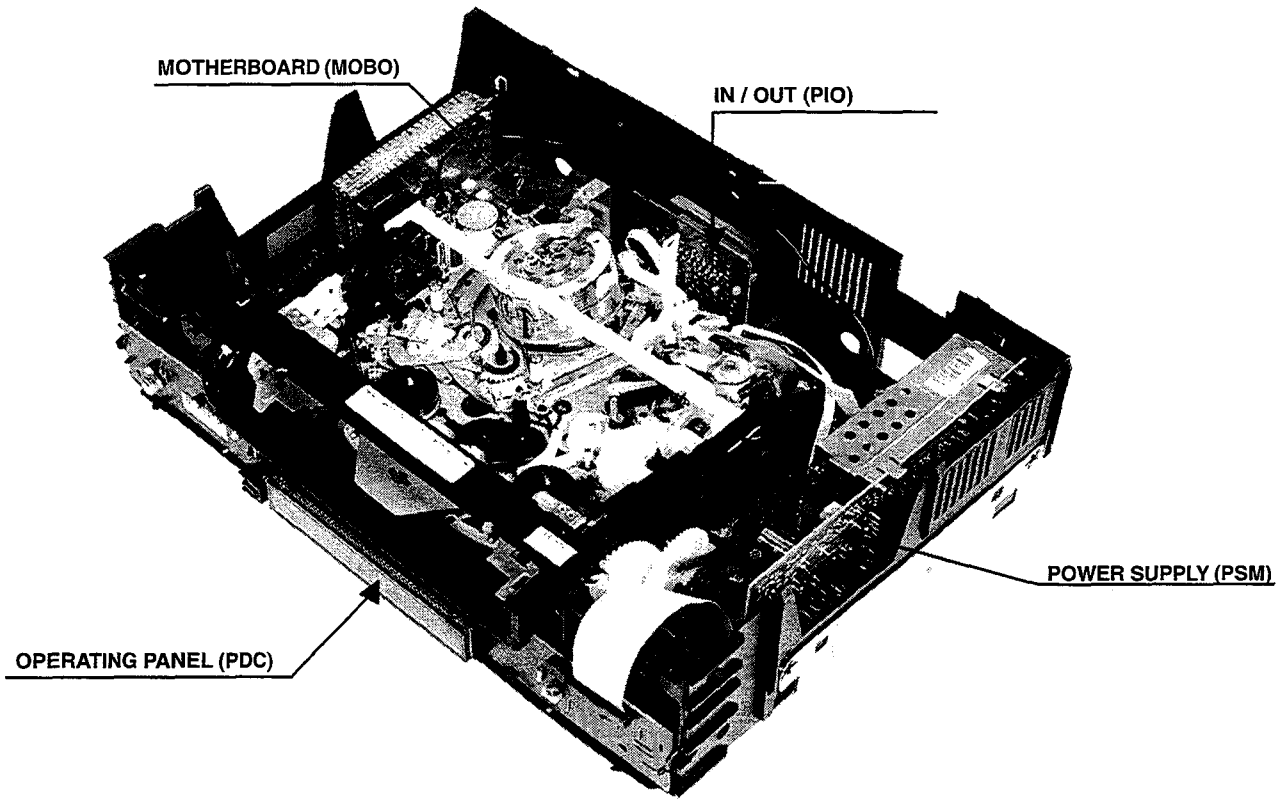
(S) VARNING!

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

(SF) VAROITUS!

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

Remarks:



(GB)

TECHNICAL DATA

Mains voltage	220 - 240 V
Mains frequency	45 - 65 Hz
Power consumption:	typ.15 W during operation
without Low Power Standby	typ.10 W during standby
with Low Power Standby	< 6 W standby
Ambient temperature	+10°C to +35°C
Relative humidity	20 - 80 %
Dimensions	380 x 320 x 94 mm
Weight	3,7 kg
Fast forward/rewind time (turbo)	typ. 95s (E180 cass.)
Position of use	horizontally, max 15°
Video resolution	≥240 lines
Audio	Audio SP: 80Hz - 10kHz (≤8dB)
	Audio LP: 80Hz - 5kHz (≤8dB)

(D)

TECHNISCHE DATEN

Netzspannung	220 - 240 V
Netzfrequenz	45 - 65 Hz
Leistungsaufnahme:	typ.15 W during operation
Standby	typ.10 W during standby
Standby mit geringem Verbrauch	< 6 W standby
Raumtemperatur	+10°C to +35°C
Relative Luftfeuchtigkeit	20 - 80 %
Abmessungen	380 x 320 x 94 mm
Gewicht	3,7 kg
Vor-/Rückspulzeit (turbo)	typ. 95s (E180 cass.)
Betriebslage	horizontally, max 15°
Video-Auflösung	≥240 lines
Audio	Audio SP: 80Hz - 10kHz (≤8dB)
	Audio LP: 80Hz - 5kHz (≤8dB)

(F)

CARACTERISTIQUES

Tension secteur	220 - 240 V
Fréquence	45 - 65 Hz
Puissance absorbée:	typ.15 W during operation
sans la fonction veille faible consommation	typ.10 W during standby
avec la fonction veille faible consommation	< 6 W standby
Température ambiante	+10°C to +35°C
Humidité relative	20 - 80 %
Encombrement	380 x 320 x 94 mm
Poids	3,7 kg
Temps (re-)bobinage (turbo)	typ. 95s (E180 cass.)
Position d'emploi	horizontally, max 15°
Puissance absorbée	≥240 lines
Audio SP:	80Hz - 10kHz (≤8dB)
Audio LP:	80Hz - 5kHz (≤8dB)

(NL)

TECHNISCHE GEGEVENS

Netspanning	220 - 240 V
Netfrequentie	45 - 65 Hz
Opgenomen vermogen:	typ 15 W during operation
zonder Low Power Standby	typ.10 W during standby
met Low Power Standby	< 6 W standby
Omgevingstemperatuur	+10°C to +35°C
Relatieve vochtigheid	20 - 80 %
Afmetingen	380 x 320 x 94 mm
Gewicht	3,7 kg
Vooruit/terugspoeltijd (turbo)	typ. 95s (E180 cass.)
Gebruikspositie	horizontally, max. 15°
Opplossend vermogen	≥240 lines
Audio	Audio SP: 80Hz - 10kHz (≤8dB)
	Audio LP: 80Hz - 5kHz (≤8dB)

(E)

DATOS TECNICOS

Tensión de red	220 - 240 V
Frecuencia de red	45 - 65 Hz
Consumo de potencia:	typ 15 W during operation
sin standby de bajo consumo	typ.10 W during standby
con standby de bajo consumo	< 6 W standby
Temperatura ambiente	+10°C to +35°C
Humedad relativa	20 - 80 %
Dimensiones	380 x 320 x 94 mm
Peso	3,7 kg
tiempo de (re-)bobinado (turbo)	typ. 95s (E180 cass.)
Posición de uso	horizontally, max. 15°
Resolución video	≥240 lines
Audio	Audio SP: 80Hz - 10kHz (≤8dB)
	Audio LP: 80Hz - 5kHz (≤8dB)

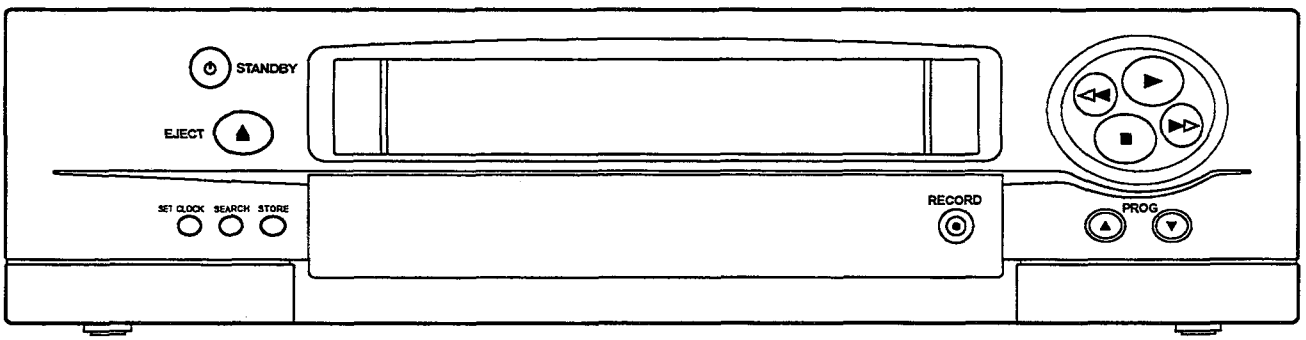
(I)

DATI TECNICI

Tensione di alimentazione	220 - 240 V
Frequenza di rete	45 - 65 Hz
Potenza assorbita:	typ 15 W during operation
in attesa non a basso consumo	typ.10 W during standby
in attesa a basso consumo	< 6 W standby
Temperatura ambiente	+10°C to +35°C
Umiditá relativa	20 - 80 %
Dimensioni	380 x 320 x 94 mm
Peso	3,7 kg
Tempo di (ri-)avvolgimento (turbo)	typ. 95s (E180 cass.)
Posizione di funzionamento	horizontally, max. 15°
Risoluzione video	≥240 lines
Audio SP:	80Hz - 10kHz (≤8dB)
Audio LP:	80Hz - 5kHz (≤8dB)

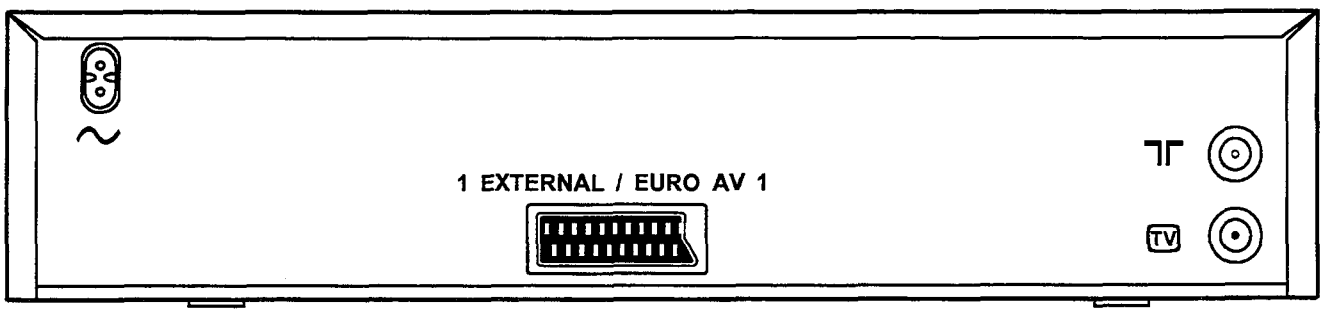
Front of the set

- ⏻STANDBY Standby switch
- EJECT▲ Cassette eject
- SET CLOCK Supplementary installation button
- SEARCH Channel search
- STORE Store TV channel
- ◀◀ Rewind/Reverse scanning
- ▶ Playback
- ▶▶ Forward wind/ Forward scanning
- ■ Pause/Stop
- RECORD● Record
- PROG▲ Up/Plus, programme number
- PROG▼ Down/Minus, programme number

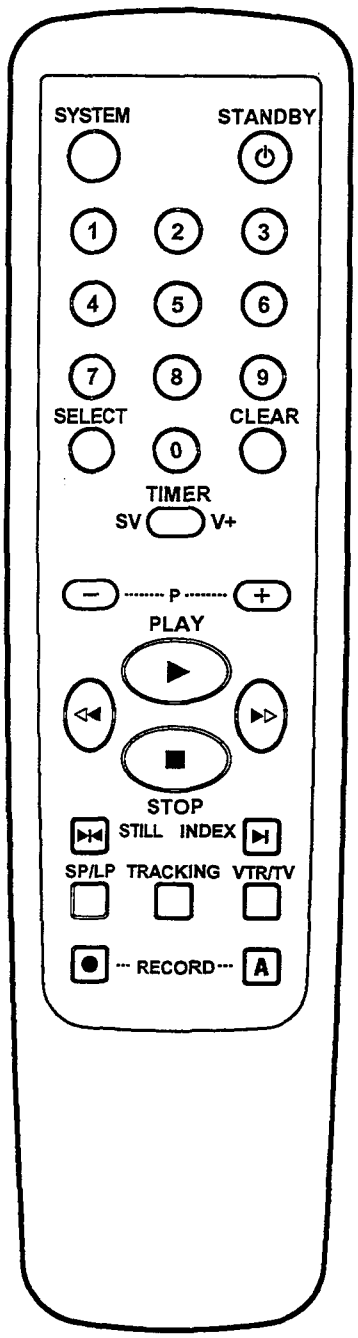


Back of the set

- ~ Mains socket
- 1 EXTERNAL/EURO AV 1 Scart (AV-Euro) socket
- ⊓ Aerial input socket
- TV Aerial output socket



The remote control



STANDBY⏻ Standby switch

0-9 Digit buttons 0-9

SELECT Function selector

CLEAR Reset, clear

TIMER SV/V+ 'VIDEOplus' or 'TIMER' programming

P− Down/Minus, programme number

P+ Up/Plus, programme number

◁◀ Rewind/Reverse scanning

PLAY▶ Playback

▶▷ Forward wind/ Forward scanning

STOP■ Pause/Stop

▶◀STILL Still picture

INDEX▶| Index search

SP/LP Tape speed selection (SP/LP)

TRACKING Tracking

VTR/TV TV monitor function

●RECORD Record

A Activate record button (●RECORD and A button simultaniously).

Buttons that are not described in the list have **no** function.

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.

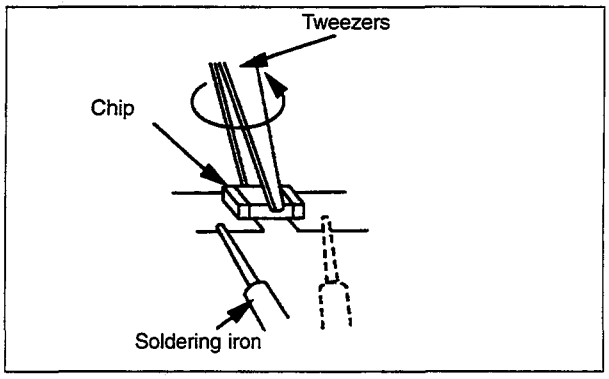


Fig. 2-1

3. Installation of leadless components

a. Presolder the contact points on the circuit board.

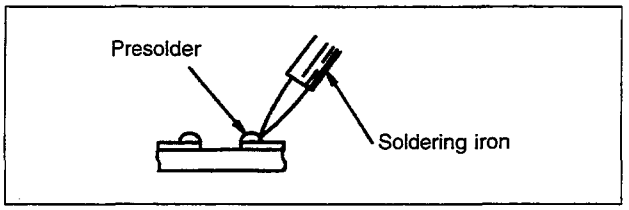


Fig. 2-2

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

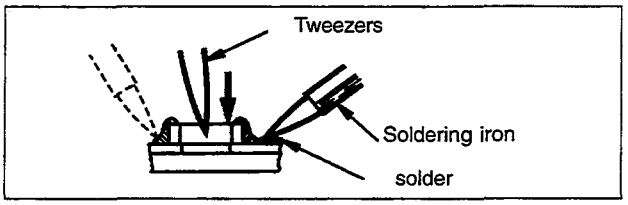


Fig. 2-3

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

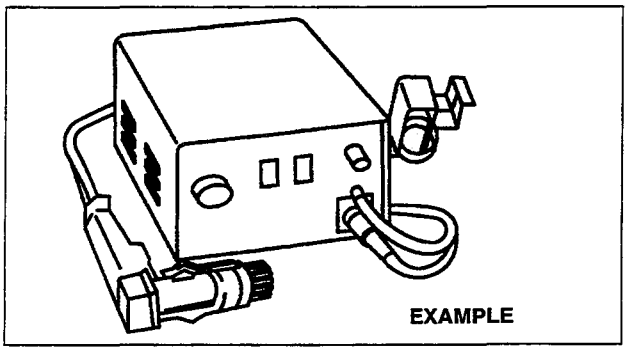


Fig. 2-4

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.

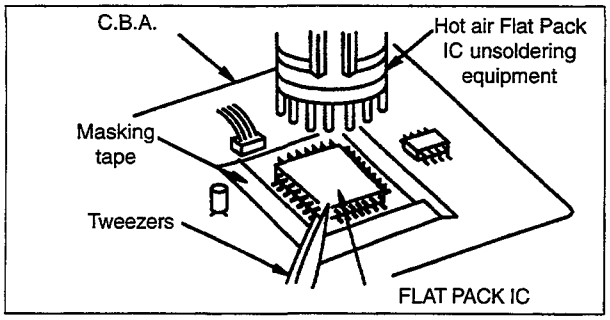


Fig. 2-5

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.

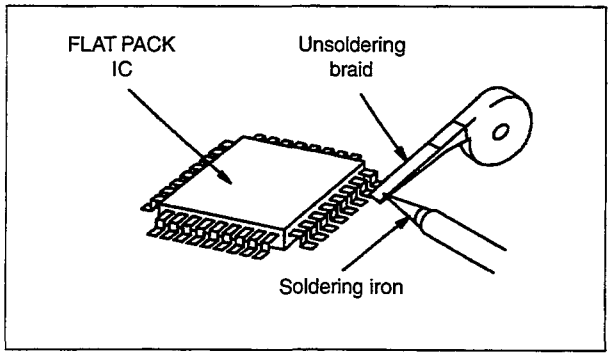


Fig. 2-6

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.

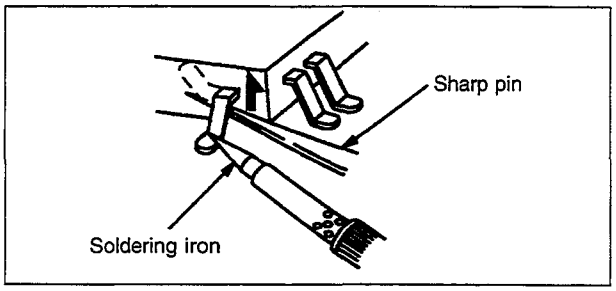


Fig. 2-7

• *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.

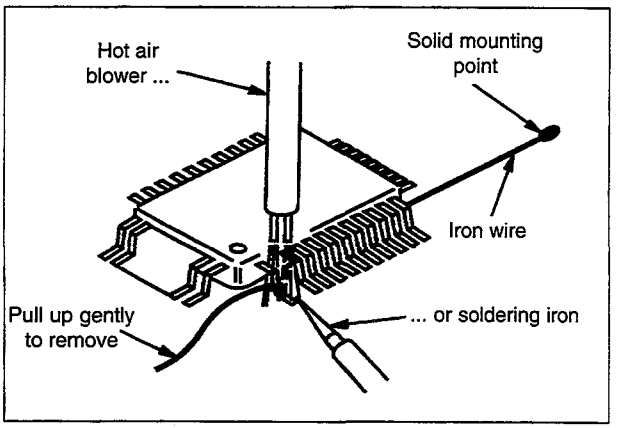


Fig. 2-8

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).

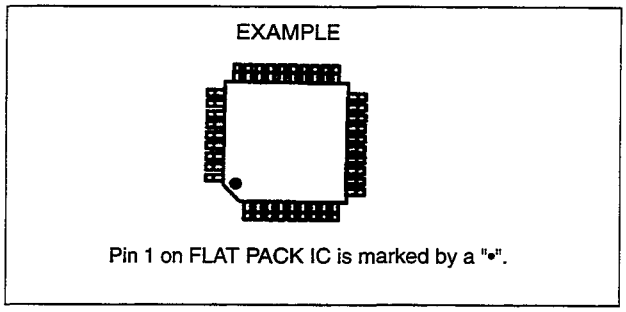


Fig. 2-9

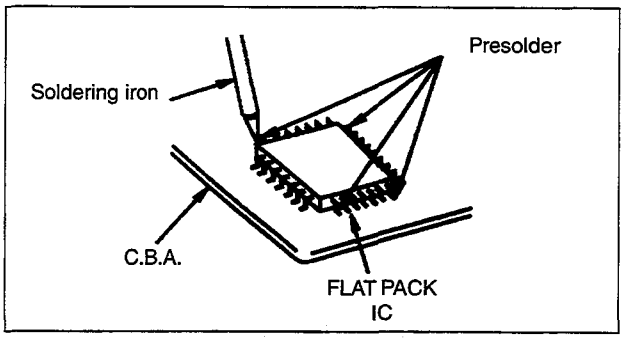


Fig. 2-10

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:

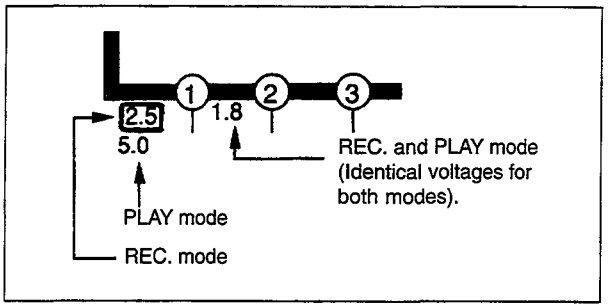


Fig. 2-11

How to read wave forms

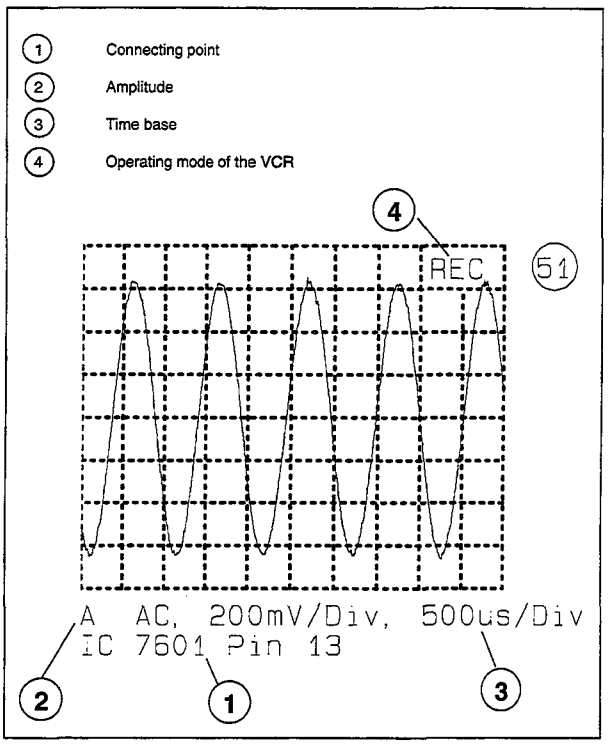


Fig. 2-12

Voltage indication of Zener diodes

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

Example:
BZX79C**20**.....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:

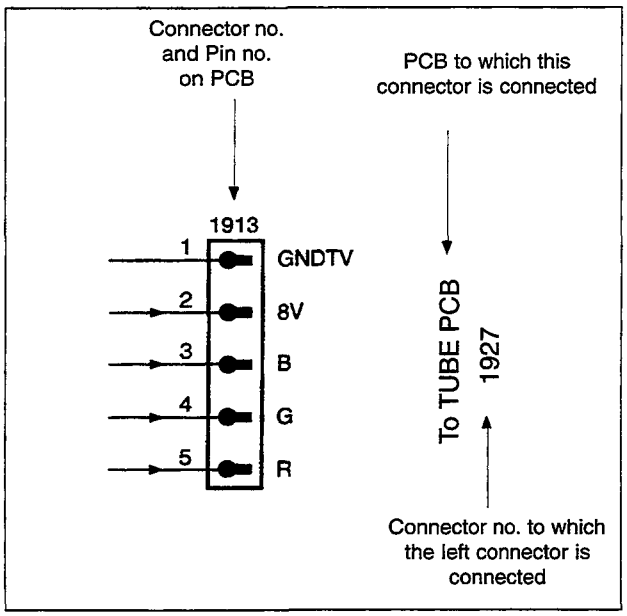


Fig. 2-13

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).

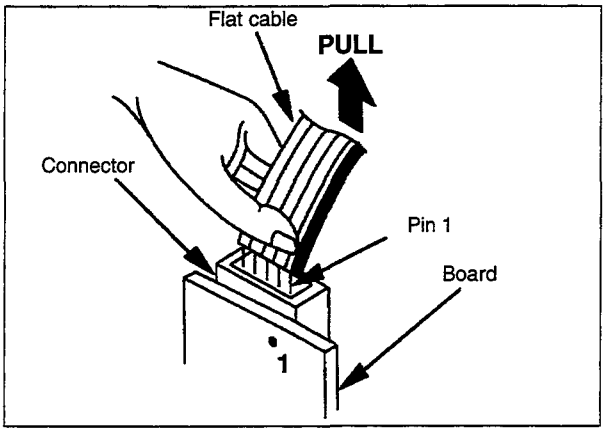


Fig. 2-14

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 the housing components, the electronics and the drive.

Always disconnect from mains before dismantling or assembly.

Due to supply voltages (hot circuit) on the input side of the switched-mode power supply, an isolating transformer must be used to operate the unit.

The drive or the drive - motherboard combination may not be lifted by holding the cross struts of the lift!

To detect power supply faults, we recommend the use of a variable transformer.

After assembling the unit, check for the earthing screw (M) on the underside of the housing.

1. Housing cover (Fig. 1)

- Remove screws A,B,C and D with Torx screwdriver 10 *
- Push centre of housing cover sides on underside approx. 1 cm outwards and lift the housing cover back over the three latch positions.
- Move cover up at least 4 cm.
- Remove housing cover.
  Assemble in reverse order.

2. Base plate (Fig. 2)

Preparation:
Remove housing cover as described in section 1.

- Turn over unit (underside facing upwards).
- The base plate can be lifted after unlocking the nine snap holders (S1-S9) from left to right.

3. Front panel (Fig. 3)

Preparation:
Remove housing cover as described in section 1.

- Push both snap holders (P1) outwards and tilt panel top forward up to stop (approx. 3mm).
- Then undo both snap holders on the top (P2).
- Finally, undo the three snap holders (P3) on the underside and remove front panel by pulling it forward.

Installation:
- Insert front panel parallel to the operating print until snap holders engage.
- Connect lift flap lever to guide of lift flap.

Important!
- Check whether all snap holders have engaged!

4. Operating print - PDC (Fig. 4)

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

- By undoing the four snap holders D3,D4 (side) and D1,D2 (top) below the drive position, the operating print can be folded out of its position.
- When changing the operating print, first undo the motherboard cable connection.

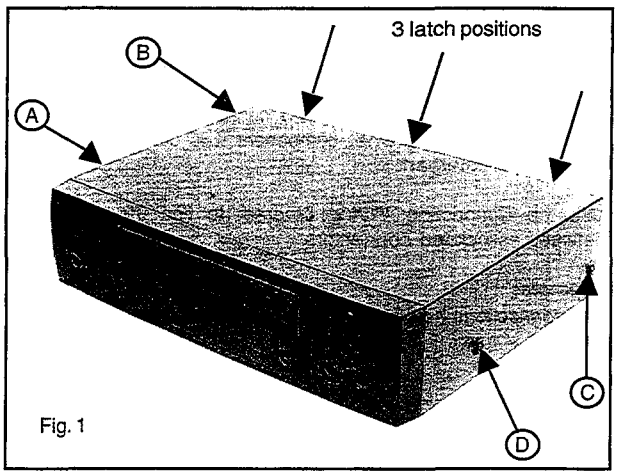


Fig. 1

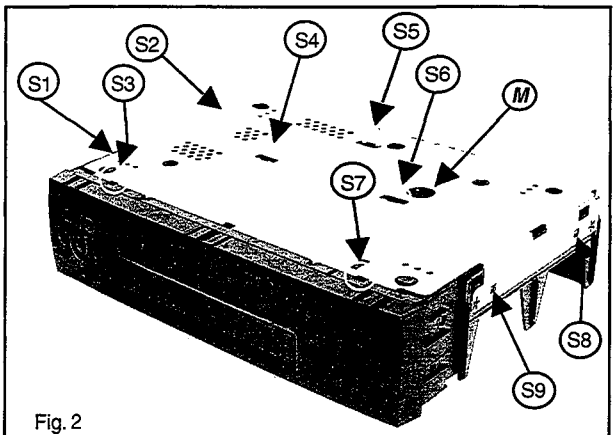


Fig. 2

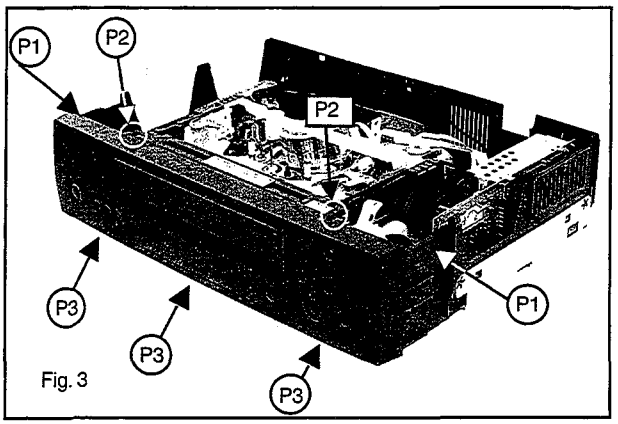


Fig. 3

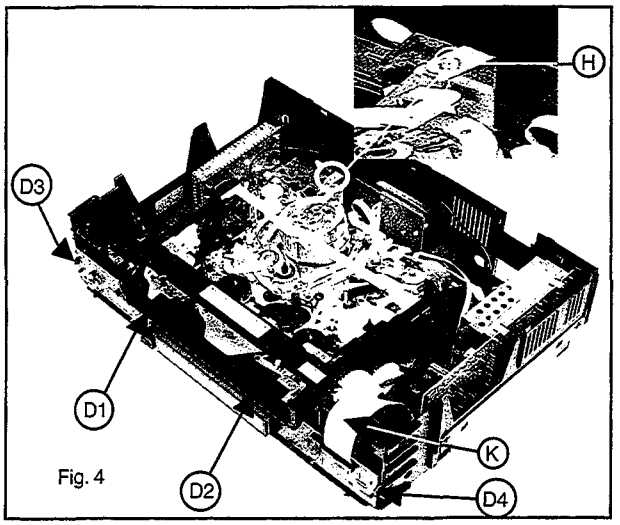


Fig. 4

* ...available from dealers

5. Dismantling the motherboard-drive combination

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

- Remove the three holding screws (F) from the motherboard (Fig. 5), most of the models do not have this screws.
- Push lift back by 5 cm, after unlocking both lift stops.
- Undo the three drive screws (G), (Fig. 5).
- Carefully undo cable (K) of the motherboard operating print plate (Fig. 4)
- Undo the snap holders of the power supply (1) (Fig. 5) and lift power supply slightly.
- Turn the unit round (Fig.2).
- Remove the earthing screw (M), (Fig. 2).
- Release snap holder (2) by pushing the snap holder downwards and lift up the frame.
- Undo release the snap holders (3) by pushing the snap holder downwards and lift the frame (Fig. 5).
- Now the frame can be carefully lifted off
- Turn the motherboard-drive combination and place in the service position (Fig. 6) if necessary. The unit can be operated in this position.
- Reconnect the cable between the operating print and the motherboard.

Important!
For carrying out electrical adjustments, or to evaluate the picture quality, the earthing screw (M) (Fig 2) must be replaced (earthing for the head amplifier)

Installation:
- Position on an even surface with the frame opened to the top.
- Hold the drive on the side at the lift and insert the motherboard drive into the frame.
- Check that the power supply and Scart socket positions are in openings.
- Check that all motherboard snap holders are engaged !
- Turn the unit round and replace the earthing screw (M) !
- Replace screws (F), if applicable (Fig. 5)
- Replace the drive screws (G) (Fig.5)
- Reconnect the cables.

6. Dismantling the drive

Preparation:
Remove housing cover as described in section 1
Remove front panel as described in section 3

- Position unit with underside facing upwards.
  Undo earthing screw of drive M (Fig. 2)
- Return unit to initial position.
- Push lift back by 5 cm after unlocking both lift stops.
- Undo the three drive screws G (Fig. 5).
- Position lift up to the stop in the "Eject" position.
- Undo screw H with Torx screwdriver 8* (Fig.4)
- Carefully undo all cable connections to the motherboard.
- Slightly lift the left rear side of the drive to undo the plug-in connection.
- Loosen both snap holders with pliers (L) and lift up the drive around the snap holders (Fig. 5).
- The drive can now be released from the motherboard (Fig. 7).

Important!
Push back the "head line cover" at screw level (H) approx. 1cm. (Fig.4).

Assemble in reverse order.

Important!
Push back the "head line cover" at screw level (H) approx. 1cm. (Fig.4) and position drive parallel to motherboard on left guide pin of frame.
Check that all snap holders have engaged.

* ...available from dealers

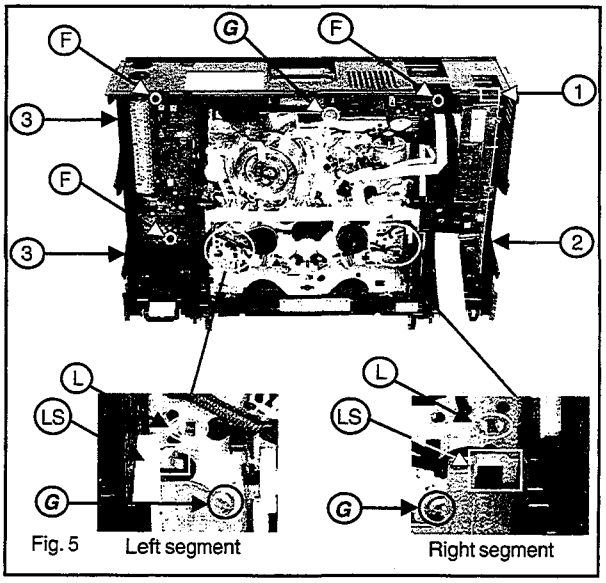


Fig. 5 Left segment Right segment

Service position

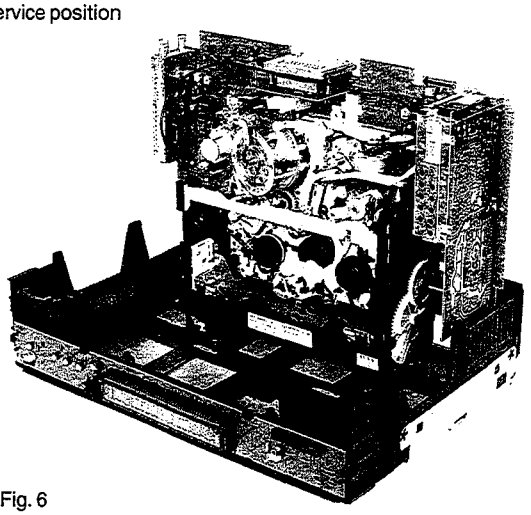


Fig. 6

Remove drive

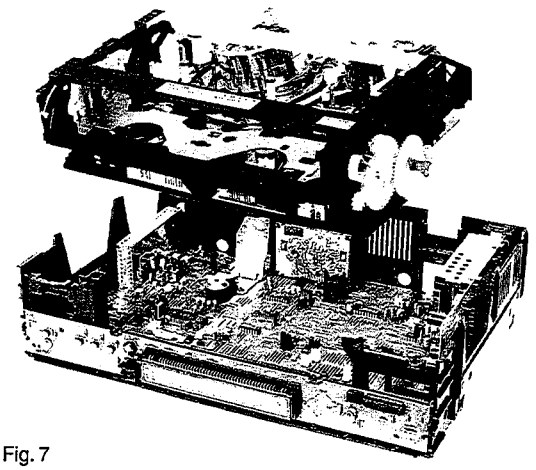


Fig. 7

FAULT LOCATING HELP 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 is also 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: Setting the gap positions
Step 52: Studio Picture control' adjustment
Step 53: Input of clock correction
Step 54: ATS threshold input (3-µP only)
Step 99: Clock frequency output

Head disc cleaning

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

2. Service test program

2.1 Introduction

The software program for the control, deck and operating microprocessors includes a service test program. The service test program applies for the 2- and 3-µP concept. The recognition characteristic of the 3-µP recorders is that the IO print contains a further microprocessor. It was divided into the following steps, with the following 'modes'

Step 00: Display of mask version number
Step 01: Checking 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 05: Display of bus communication error (3-µP only)
Step 10: Operation without drive - dummy mode
Step 11: Drive condition in dummy mode (3-µP only)
Step 40: Option code input
Step 41: 'Guide channels' change (3-µP only)
Step 51: Setting the gap positions
Step 52: Studio Picture control' adjustment
Step 53: Input of clock correction
Step 54: ATS threshold input (3-µP only)
Step 99: Clock frequency output

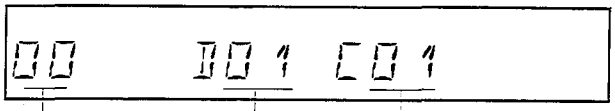
In the service test program, all drive functions apart from the channel search and channel change mode can be carried out. The program position set before entering the service test program is maintained.

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 selection mode. The recorder and all drive functions are fully operational in the service mode.

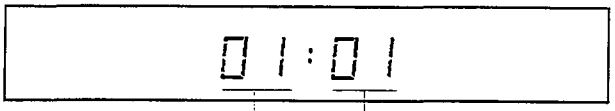
The 2 µP concept shows for instance:

Alphanumerical display (O45):



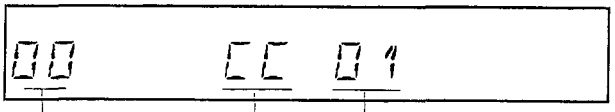
Step Deck mask Control mask

Numerical display (OE1):



Deck mask Control mask

The 3 µP shows:



Step Control mask

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

Step

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 whilst the step is flashing

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

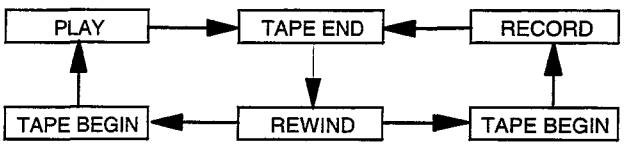
Step

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, use a cassette and activate "PLAY" or "REC". The function is 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

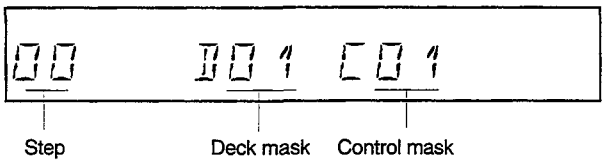


2.4 Description of steps with modes:

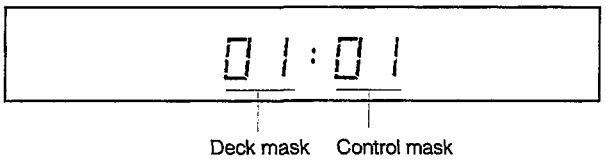
Step 00: Display of mask version number

After activating the service test program, step 00 with the mask version number is automatically displayed. In the 2µP concept, both microprocessors are shown in a display.

On alphanumerical O45 displays, the following message appears:

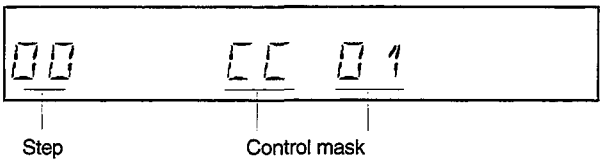


On numerical OE1 displays, only the following message can appear:

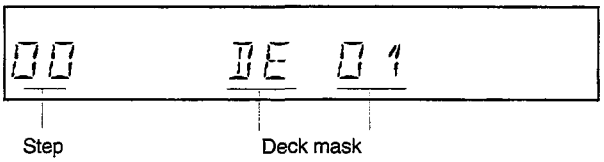


In the 3 µP concept, this mode is displayed in 3 groups:

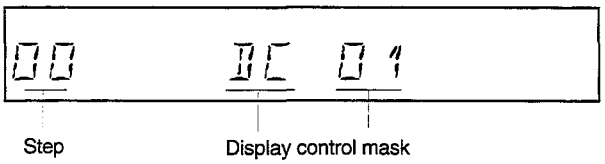
a) after activating the service test program the control microprocessor appears,



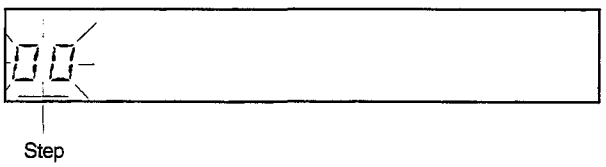
after pressing the DOWN key
b.) the deck microprocessor,



and after pressing the DOWN key again
c.) the operating microprocessor will be 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, once Step 01 is flashing, the drive position appears on the display.
The FTA signal from the light barriers which controls the speed of the threading motor is used to check the drive condition.
The drive position is shown as 2-digit hex. number by counting the FTA pulses on the display.

(e.g. 07 = Eject)

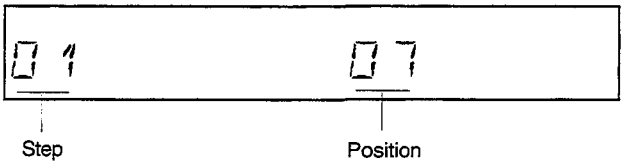
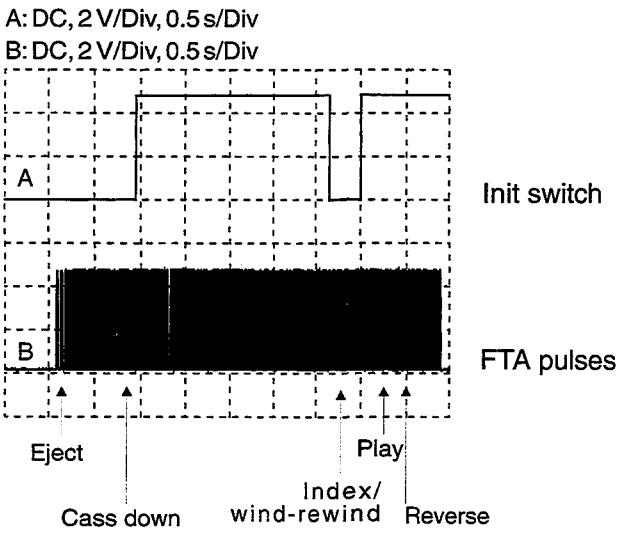


Table of drive positions:

Status	Position (FTA dec)	Display (FTA hex)
Eject	7 +2/-2	07 +2/-2
Index	191 +0/-2	BF +0/-2
Stop	200 +4/-4	C8 +4/-4
Play	211 +4/-4	D3 +4/-4 with Swing Search
	213 +4/-4	D5 +4/-4 no Swing Search
Reverse	237 +2/-0	ED +2/-0

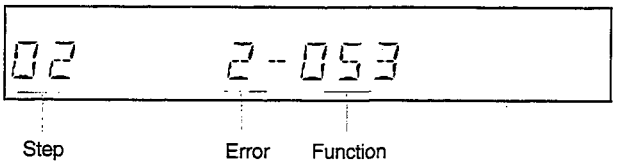
Function of the Init switch:
The diagram shows the function of the Init switch, depending on the position of the drive. The number of FTA pulses is important for the position of the drive.



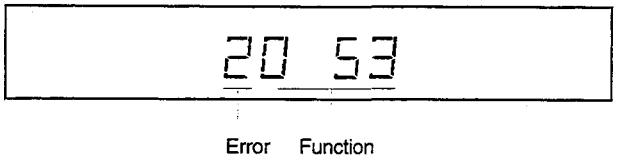
Step 02: Display of the deck error codes

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

Alphanumerical O45 display:



Numerical OE1 display:



(e.g.: Error 2 = Capstan fault)

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 = for 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 with the CLEAR key.

Checking the drive function
Threading and unthreading time
The signal of the photoelectric barrier which controls the revolutions of the threading motor is used as a reference for the threading and unthreading time

Stopping of left or right winding disk
The tacho signals of the left (WTL) and right (WTR) winding disks are used as a control reference.

Stopping of axial head 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 axial head motor, showing the position of the head cylinder.

Capstan motor fault
This is monitored with the FGD signal.

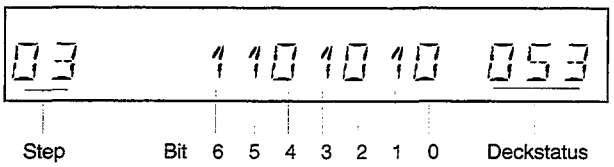
If one of the above sensor signals is not available, the recorder tries to put the lift in the "EJECT" position.

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 during the service mode.

Step 03: Deck sensors and manual tracking

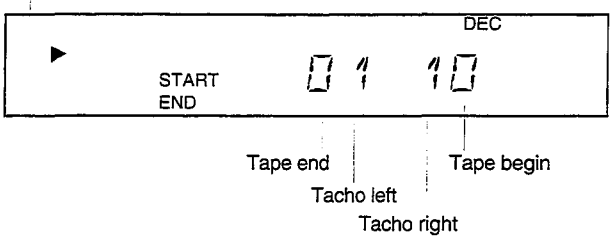
By pressing the SELECT key whilst step 03 is flashing, the deck sensors will be displayed in one digit as either 1 or 0.

Alphanumerical display O45:



Bit 0 .... Tape begin
Bit 1 .... Tacho right
Bit 2 .... Threading tacho (butterfly)
Bit 3 .... Record protection switch
Bit 4 .... Init switch
Bit 5 .... Tacho left (for 2µP always 1, non TURBO)
Bit 6 .... Tape end

Numerical display OE1:



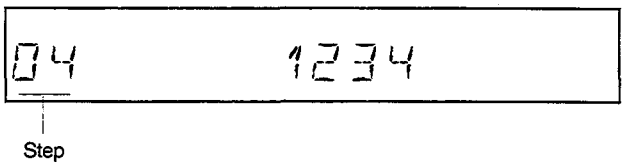
■ ● ◀ ▶ are used to display the deck status.
▶ flashes during tracking
START init switch
END record protection
DEC threading tacho

In the service test program, the tracking is always in the centre position.
Press the TRACKING key:
Only in this step can the value for the necessary tape running setting be changed using the UP / DOWN keys.
After leaving the mode with the SELECT key, the tracking value always resets itself to the middle position and cannot be changed.

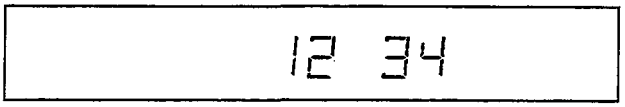
Step 04: Display of the operating hours counter:

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.

Alphanumerical display O45:

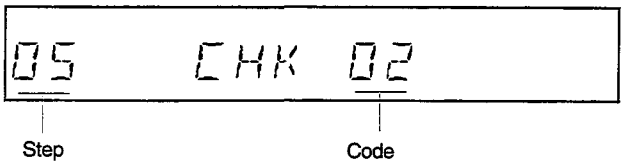


Numerical display OE1:



Step 05: Bus communication error display (3 µP concept only)

By pressing the SELECT key whilst step 05 is flashing, the error code of the malfunctioning or missing IIC - assembly is displayed.



By pressing the DOWN key, all error codes can be viewed. If a version does not contain the IIC bus component, this is also shown as an error.

Error code table:

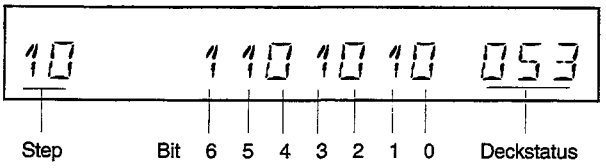
Code	Description
00	no error, all expected devices are available
01	Tuner
02	Modulator
03	A/V switch
04	EEProm
05	VPS / PDC
06	Teletext
07	Audioprozessor
08	Videomatrix
09	Nicam
10	

Step 10: Operation without drive - dummy mode

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

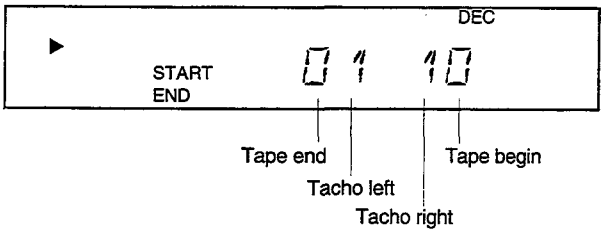
Enter the mode by pressing the SELECT key. The motors are then switched off and the sensors will be ignored by the deck microprocessor. The drive can now be dismantled from the motherboard (see dismantling instruction). Only install drive if recorder is disconnected from mains. For signal tracking, the recorder can be set to all drive conditions, i.e. signal electronic, audio and IO processing are switched to the respective operating mode. In the 2 µP concept, the current condition is shown in the display as a 3-digit BCD number (see step 03 list).

Alphanumerical display O45:



bit0.... tape begin
bit1.... tacho right
bit2.... threading tacho (butterfly)
bit3.... record protection switch
bit4.... init switch
bit5.... tacho left (not for 2µP)
bit6.... tape end

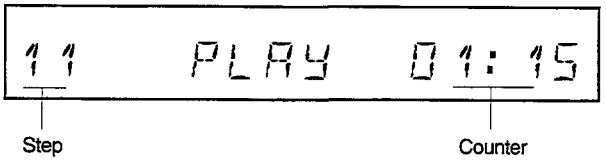
Numerical display OE1:



■ ● ◄ ► are used to show the deck status
► ... flashes during tracking
START ... init switch
END ... record protection
DEC ... threading tacho

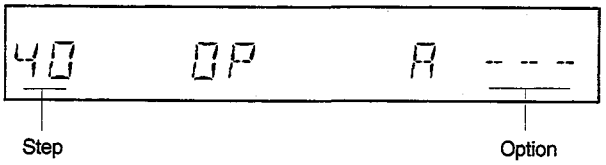
Step 11: Drive condition in dummy mode (3 µP concept only)

By pressing the SELECT key whilst step 11 is flashing, the current drive condition is shown in the display.

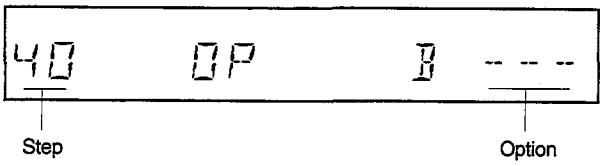


Step 40: Option code input

If, as part of repair work, a new EEPROM is installed, it has to be initialised.
By pressing the SELECT key whilst step 40 is flashing, option A appears in the display.

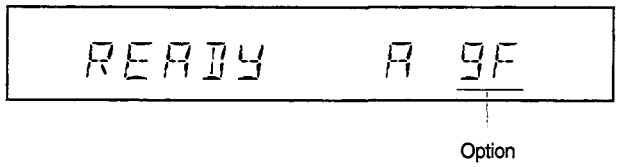


The available options can be selected with the UP and DOWN keys.



By entering a 3-digit decimal code (see type sign on recorder), the correct features are set. After pressing the STORE key on the recorder, or OK (for 3 µP), the entered code is saved and shown on the display for approx. 5 sec. in hex. format (decimal for 3 µP concept).

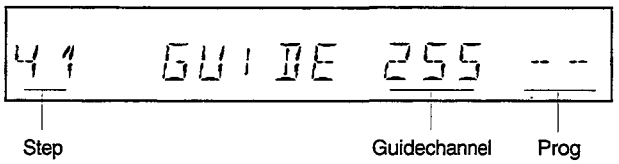
Code check:
By pressing the STORE key on the recorder, or OK (for 3 µP), the code of the EEPROM in the current position is shown in the display for approx. 5 sec. in hex. format (decimal for 3 µP concept).



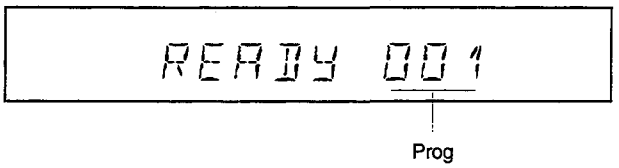
By using the CLEAR key on the remote control, incorrectly entered values can be cancelled (µP sets default base configuration).

Step 41: "GUIDE" channel changes (3 µP concept only)

By pressing the SELECT key whilst step 41 flashes, guide channels can be assigned to a program number between 1 - 99. Select a guide channel between 001 and 255 with the UP or DOWN keys and enter a program number for the selected channel with the numerical keys. More than one guide channel can be assigned to a program number.



The value can be corrected at any time with the CLEAR key and stored with the STORE or OK key.



Step 51: Setting the gap position

Purpose: To determine the head changeover pulse during playback.

Symptom if incorrectly set:
Head changeover fault and/or vertical picture flickers.

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

After correct adjustment, the recorder switches automatically to STAND BY.
In case of unsuccessful adjustment, the recorder ejects the test cassette.

Causes : Incorrect standard video signal.
Scanner defect.
Microprocessor defect.

Step 52: "Studio Picture control" adjustment

If, as part of repair work, a new EEPROM is installed, it must be newly initialised for the Studio Picture control feature.

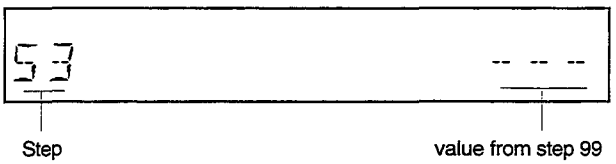
- Video signal via Scart or aerial
  (Input signal via Scart or RF should show a constant level grey or red image during the adjustment).

- Enter the service test program and, whilst the step is flashing, input the step number using the numerical keys.
- Insert cassette (not SVHS cassette).
- Press the PLAY key.
- By pressing the SELECT key whilst step 52 is flashing, the recorder will make a recording in SP mode (approx. 4 sec.) and in LP mode (approx. 4 sec.), rewinds and carries out a playback with automatic adjustment.
- After the successful adjustment, the VCR returns to STAND BY mode!
  (In case of incorrect adjustment, the recorder ejects the cassette)

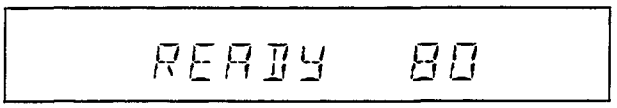
Step 53: Inputting the clock correction

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:



Using the numerical keys on the remote control, the correction value established from step 99 is entered as a 3-digit figure (value must be between 0 and 255).
By pressing STORE or OK (for 3 µP), the value is stored in the EEPROM so that the VCR can automatically correct the time.



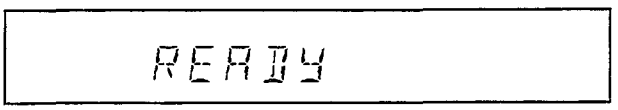
The entered value is shown in the display for approx. 5 sec. in hex. format (decimal for 3 µP concept). The default value for the new EEPROM is 80 hex. (128 dec).

Step 54: ATS - threshold (3 µP concept only)

Purpose: Setting the ATS threshold value for the station sequencing according to the reception strength during automatic channel search.

Symptom if incorrectly set:
Stations without VPS or PDC station detection are not ideally sequenced.

- Feed in a 50dBµV white image from the pattern generator on channel 27.
- Enter the service test program and, whilst the step display is flashing, enter the step number with the numerical keys.
- Set recorder to STOP.
- By pressing the SELECT key whilst step 54 is flashing, the threshold is stored in the EEPROM.



If correctly stored, the display shows a "ready" message for 5 sec.

Step 99: Clock frequency output

After activation with SELECT, the display is switched to dark and all functions on the recorder are blocked.
At pin 19 (HEST), of connector 1921(PDC), the uncorrected clock frequency 2048 Hz is always output.
Use a calibrated counter (minimum 6 digit resolution) to measure the output frequency and note down the value (f_{mess}).

Determining the deviation (in ppm):

f_{mess}.....measured frequency
f_{nom}..... Set frequency (2048,00 Hz)

Deviation = $1x10^6 x (f_{mess} - f_{nom}) / f_{nom}$

Example:

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

Deviation= $1x10^6$ x (2047.97 - 2048) / 2048 = -14.648

Correction value = -14.648 / 0.763 + 128 = 108.80 = **109**

Determining the correction value for step 53:

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

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

This step can only be left by a mains reset, after which the service test program has to be entered again to call up step 53.

Hexadecimal - Decimal Conversion Table :

(2)

Hex upper digit \ Hex lower digit	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	000	001	002	003	004	005	006	007	008	009	010	011	012	013	014	015
1	016	017	018	019	020	021	022	023	024	025	026	027	028	029	030	031
2	032	033	034	035	036	037	038	039	040	041	042	043	044	045	046	047
3	048	049	050	051	052	053	054	055	056	057	058	059	060	061	062	063
4	064	065	066	067	068	069	070	071	072	073	074	075	076	077	078	079
5	080	081	082	083	084	085	086	087	088	089	090	091	092	093	094	095
(1) 6	096	097	098	099	100	101	102	103	104	105	106	107	108	(109)	110	111
7	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
8	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
9	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
A	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
B	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
C	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
D	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
E	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
F	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255

For example: If the indication is `6D` (upper digit is `6` and lower digit is `D`), a decimal value of 109 is optained from the intersection of (1) and (2) in the above table.

Circuit Description

Operating Circuit - PDC Version

Microcomputer [7201] is the heart of the operating circuit. Its respective functions and tasks are indicated in the list below:

- Shuttle evaluation.
- Jog evaluation.
- Keyboard matrix evaluation.
- Decoding of remote control commands from the Infrared Receiver Pos7203.
- Quartz clock.
- OSD (for BASIC).
- Integrated RAM for storing timer data.
- Display control.
- Bi-directional serial interface for data exchange between the operating section and the sequence control computer.
- I2C bus interface (SDA - pin 77, SCL - pin 23) to TUMOD [1701], VPS/PDC decoder [7540] and the EE-PROM [7890] on the motherboard.

Any drift caused by the tuner or the aerial input signal will generate a AFC control voltage. This voltage is requied by the receiving circuit (FV) on the motherboard. The AFC voltage is generated at pin 78, via this pin the operating computer will adjust the tuning voltage as required.
In the event of a power failure, the backup cell (connected to pin 33) will supplly the clock and the RAM for 7 days in the case of [2998, 11 mAh NiMH Accu] or 7 hours [2997, 220 mF gold capacitor], dependent on model. Diode [6299] prevents the backup cell from discharging totally. When the voltage across the cell drops, pin 2 will be at at low level and so preventing the IC from funtioning. The low level at pin 2 will prevents the Quartz System clock from running [1298 is connected to pins 13 / 14].

Switch-mode power supply PSM 2/2A/3

Specification:

Mains voltage:	187-264 Vrms
Maximum output:	50 W
Operating frequency:	100 kHz
Efficiency:	78 % at maximum output

Functional principle (Flyback converter):
During the conductive phase of the switching transistor, energy is transferred from the mains to the transformer. This energy is passed to load during the blocking phase. The energy transferred in each cycle is regulated by the switch-on time in such a way that the output voltages are not affected by load or input voltage changes. The integrated circuit [7020] takes over the control of the power transistor.

Low power standby mode: (PSM2 /3)
The switch-mode power supply operates in burst mode. The power input is less than 1 watt. In Standby mode only the 5VSTBY will remain present.

Standby mode: (PSM 2a)
The switch-mode power supply operates at a controlled low frequency of approx. 50 kHz, to minimize switching losses.

Reversal Point
At this point (IDmax) of the output characteristic, maximum output is transferred.

Overload:
The power supply operates in burst mode. The energy of every cycle is limited so that the output performance is low (Fig. 1).

Circuit description:
The power supply system is protected by coil [5010] from faults originating in the power supply. The supply voltage is rectified by the bridge rectifier [6050] and filtered by the electrolytic capacitor [2070]. Electrolytic capacitor [2036] will be charged via [3050, 3052] and supplies the IC [7020] during the start-up phase, after which transformer winding 4-3 and diode [6036] maintain the supply. During the time that the switching transistor is switched on, current flows from the rectified supply voltage through the primary winding of the transformer, the transistor [7040] and resistors [3048, 3046] to ground. As the positive voltage at pin 9 of the transformer is constant (in this example), the current will rise linearly, forming a ramp irrespective of the supply voltage and inductivity of the primary winding. A magnetic field representing a certain energy quantity will be generated within the transformer. At this period in time the secondary voltages are polarized in such a way that the diodes on the secondary of the Transformer will be blocked. A voltage image of the primary current is passed to the IC [7020] at pin7 via resistors [3048, 3046,3026]. This is checked and, upon reaching a stipulated value depending on the control voltage at pin14, Transistor [7040] will be switched off.
After the switching transistor has been switched off, no further energy is transferred into the transformer. The inductivity of the transformer now attempts to maintain the current which has passed through it at a constant level (U=L*di/dt). The current, however falls and di/dt will as a result become negative. At this same point in time the polarity of the voltages generated on the secondary of the transformer reverse. This will cause a current to pass through the secondary windings of the transformer, the diodes (now forward biased), electrolytic capacitors and the load. This current is also ramp shaped (but decreasing). The power supply is controlled by changing the conductive phase of the switching transistor, so that either more or less energy is transferred from the supply to the transformer. The control information arrives from reference element [7074], which compares the 5 V with an internal 2.5V reference voltage. The output voltage from the reference element [7074] passes via an optocoupler (for isolation) to a pin on the IC [7020], where the voltage is compared to the internal reference. The resulting value changes the level with which the voltage at pin 7 (primary current image!) is compared. The voltage at pin 5 of the IC is used for fold back in the case of an overload.
The maximum secondary output which can be drawn is determined by resistors [3046,3048].

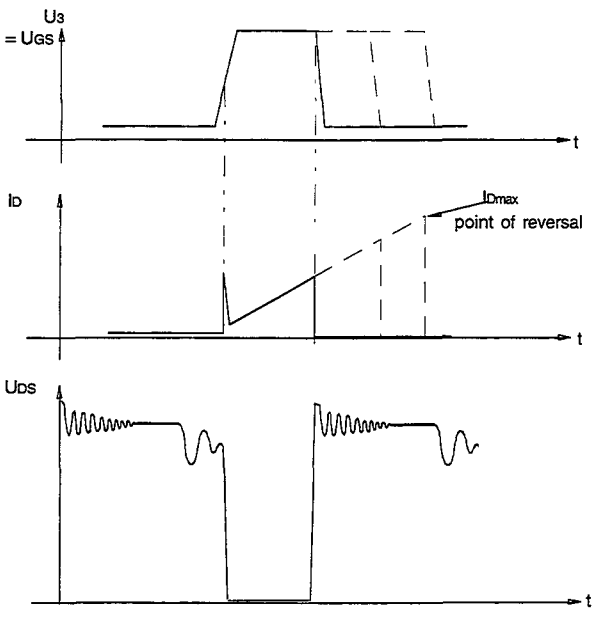


Fig.1

From a certain voltage (typically 1 V) at pin 7 of the IC, the power supply reaches its point of reversal. The circuitry at pin 11 of the IC is optional. By using [2014], the start-up phase is started with shorter pulses so that the switching frequency lies beyond the audible range. On the secondary side, seven voltages are available, all are rectified by [6076, Y6082, 6081, Y6092, 6080, Y6088, 6098, Y6096]. An alternating voltage, generated by transistors [7058, 7060], is used for heating the display. The motor voltage 8/17M is switched by transistor [Y7090].

PSM2/3:

A high-level STBY (pin 18 of connector strip 1509) switches the power supply to the LOW POWER STAND BY MODE, in which only the 5VSTBY will remain present.

Description of the start-up phase

After connection to the mains supply, the following voltages at the connectors of the IC [7020] (see Fig. 2) increase at time to.. Vcc(pin 1), according to the half-cycle charge via resistors [3050, 3052] to Vccstart. The power consumption is in this situation typically 0.3 mA. The internal reference voltage Vref of the IC is switched on andhen reaching the Vccstart (approx. 13 V). The oscillator starts to run. The frequency is determined by the capacitor at pin 10 (approx. 100 kHz), which is charged/discharged by power sources. The power consumption then rises 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 Vcc falls below the limit value Vdis2 before reaching the point of reversal, or if Vcc (control loop fault) rises to Vccprot (typically 16 V), the start-up is stopped (pin 3 is switched off) and the IC (Uref) is switched off. Vcc rises according to a half-cycle load and a new start-up cycle begins.

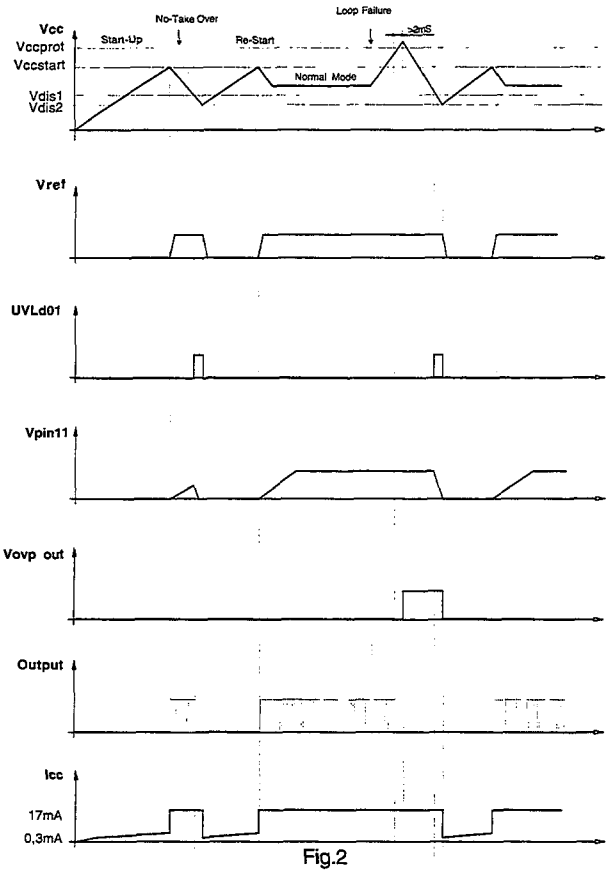


Fig.2

Nominal operation, overload, standby

After the start-up, the IC runs [7020] inside its control range. The voltage at connector 14 is typically 2.5 V. If the load rises on the secondary side of the Transformer, 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 (typically 1 V at pin 7) of the IC reduces the pulse width of U3 (reversal point).

The IC supply Vcc behaves like the secondary voltages. Consequently, Vcc also decreases with increasing load. In case of the condition Vcc < Vdis1 (approx. 9 V), the IC changes to the burst mode (query operation).

The short-circuit power is low, due to the large last interval between the half-cycle start-ups.

A decreasing load reduces the switch-on time. If the load drops any further, the IC switches the frequency back to approx. 50 kHz (Standby Mode) from a certain voltage threshold at pin 7 (depending on the circuitry at pins 12, 15). This keeps the switching losses in the transistor low.

Excess temperature

The IC [7020] contains excess temperature protection, blocking the logic in case of excessive chip temperature (typically 155 °C). After the temperature has decreased, a new start-up cycle will be made.

Front-end - FV

The receiving section contains the following functional blocks :

1.) TUMOD = Tuner + modulator
2.) IF amplifier & video demodulator IC TDA 9800 including the FM demodulator
3.) IF amplifier & video demodulator IC TDA 9812 including FM and AM demodulator

The following TUMODs are used:

TP 916 VHF/UHF, PAL G modulator.
TP 916 L VHF/UHF, PAL G modulator, passive loop-through.
TP 926 VHF/UHF, without modulator.
TP 926 L VHF/UHF, without modulator, passive loop-through.
TP 944 UHF, PAL I modulator.
TMRG1X104A VHF/UHF PAL I modulator.
TMRG1X103A VHF/UHF PAL I modulator, passive loop-through.
TMRG1X201A VHF/UHF PAL G/K switchable modulator.

The Front-end has been designed for the reception of the following systems:

PAL B/G	=/01	
PAL I	=/05	
PAL I Republic of Ireland	=/07	Pal I incl. VHF/UHF Reception
SECAM L,L',PAL B/G	=/39	
PAL B/G,SECAM D/K	=/59	not suitable for EN55020
PAL B/G,SECAM D/K	=/59	Suitable for EN55020

1. Tuner and IF selection:

The intermediate frequency of the picture carrier is 38.9 MHz, except for SECAM L', where the picture carrier has an intermediate frequency of 33.9 MHz. In these sets consequently, the AFC circuit is changed from 38.9 MHz to 33.9 MHz.

The Surface wave filter(SAW /39) contains 2 Nyquist slopes and as a result is able to present a faultless picture carrier at either 33.9 MHz or 38.9 MH to the demodulator IC TDA9812 [7721].

2. The IF amplifier & demodulator IC TDA 9800/9812 (Depending on Version):

For models with front-end versions /01, /05, /07 and /59 (/59 is not suitable for EN 55020), the TDA 9800 is used as it has an integrated FM demodulator.

For /39 sets, the TDA9812 with an integrated AM demodulator is used. To receive respective selected IF signals, a second SAW [1722] is provided for /59 versions.

To comply with the EN requirements, the IF in /39 sets is passed through an additional 40.4 MHz trap [5721]. Both versions of the ICs (TDA9800 and TDA 9812) use PLL demodulation.

The integrated VCO which uses the double picture carrying frequency is set by the AFC-Adj coil.

The loop filter is connected to pin 6 of the [TDA 9800] or pin on the [TDA9812]. This VCO voltage is used for generating the AFC control voltage at pin 15 of the [TDA9800] or pin 20 on the [TDA9812].

The demodulated video signal is passed internally via a 12 MHz lowpass filter at an amplitude of 1 Vpp to pin 13 of the [TDA9800] or pin 18 in the case of a [TDA9812] being present. This level being kept constant by the AGC circuit with the aid of an internal reference level.

The sound carrier is then suppressed by the sound carrier trap and the now amplified (by 6 dB) video signal is available at pin 7 of the [TDA9800] or pin 8 of the [TDA 9812] with an amplitude of 2 Vpp. The switch-over IC [7722] matches the group delay to the PAL or Secam TV standards and is hence therefore only fitted in the /39 version.
The audio IF is filtered by a band-pass filter which is connected to pin 13 of the [TDA9800] or pin 17 in the case of the [TDA9812]. It is then passed on to the adjustment-free FM PLL audio demodulator connected on pin 11 of the [TDA9800] and pin 15 for the [TDA9812]. (Note: Not F.M PLL demodulator in versions using the TDA9812, A.M)
The audio signal is available at pin 9, with an amplitude of 350 mVeff at a FM modulation of 1 kHz with +/-27 kHz deviation.
It is then passed to a transistor amplifier stage [7723] for (TDA 9800 only) to 500 mVeff.
The TDA9812 supplies 500 mVeff. to pin 10 at the aforementioned deviation.
The RF AGC crossover point is determined by the adjusting regulator at pin 3 of the [TDA9800] of pin 4 for the [TDA9812]. The adjustment is necessary to achieve a good signal/noise ratio and maximum input interference immunity.
The AGC voltage at pin 19 or pin 25 of the TDA9812 is passed to the respective input on the Deck microprocessor which, in turn, sends the information via the Signal Level Line to the operating processor on the front panel This is used to determine the program sequence that will be stored in the autostore mode.

3. AM demodulator IC TDA 9812: (for /39 only)

For SECAM-L models the amplitude-modulated sound carrier which is situated at (32.4 MHz) is available from pin 28 of the SAW Filter [1719]. After filtering it is then passed to the AM demodulator within the TDA9812.
For SECAM-L' sets, the sound carrier is situated at 40.4 MHz due to the interchanged picture and sound carriers.
The control signal SECAM BAND 1 (SB1) along with diodes is used to control the selection signal at pin 1of [1719]. The demodulated audio signal now passes through to the internal switch within the TDA9812. This provides the change between FM orAM audio at pin 10. This selection is requierd for multistandard reception.

Video Signal Processing - VS

Switch-over functions of the signal electronics IC LA7437:
REC/PB:
The switch-over between REC and Playback-modes is controlled by the 5 VPB voltage via diode 6000 which is connected to pin 6:

PB	> 3.8 V
REC	< 3.8 V

NTSC/SECAM BG/PAL
The switch-over between colour systems (NTSC playback only) is activated by the voltages at pin 30 (INTSC):

NTSC	>3.3 V
(ME-)SECAM B/G	=1.8... 2.7 V
PAL	<1.2 V

SP/LP/SLP
The change-over of speed modes (NTSC: SP/LP/SLP, PAL/SECAM: SP/LP) is activated by the signal at pin 25 (LP):

SLP	>3.3 V
LP	=1.8... 2.7 V
SP	<1.2 V

VIDEO ENTRY
The artificial picture pulse for playback features and the internal test pattern (Installation Screen) enters at pin 19 (FFP):

Loop through	< 0.8 V
Test picture	= 1.2 ... 3.3 V
Artificial picture pulse	> 3.7 V

COLOUR VECTOR
The colour vector is influenced by pin 27 (HSC2):

normal	< 1.2 V
LP features colour (⎍⎍)	= 2 ... 2.7 V
NTSC playback colour	> 3.9 V

FEATURE
In feature modes, pin 33 (TRICK) > 3.9 V is pulled up.

Recording :

1. Luminance
Pin 12 is the Video input pin. In IC7051 the video signal first passes through amplification control (time constant determined by C 2085). After this form of AGC, the signal path divides into a branch which is looped through via the clamping, output amplifier and emitter follower by the signal electronics and to further signal processing in the signal electronics IC. The latter path runs via a 6 dB attenuator, is also clamped onto a d.c. level and passed via a 3.5 MHz lowpass filter for the chroma separation and for vertical emphasis, which contains an 1H-CCD delay line in IC 7060 (in pin 20, out via pin 18). The signal then passes through an internal amplifier / impedance transformer and an external emitter follower (pin 4). The filter found at the base of the emitter follower does not operate in the REC mode, due to the low resistance of the emitter follower. The Y signal then passes through the detail enhancer, the linear and non-linear preemphasis (time constants) determined by the switching of pin 6, 7, 8 and the white/ dark clipping stage.
The signal generated thus then directly controls the FM modulator. The Y-FM signal leaves IC 7051 via pin 2, and is passed through an emitter follower and a lowpass filter before it is finally passed on to the head amplifier [7150] as the FMRV signal.

2. Chrominance PAL
The chroma signal is separated from the incoming video signal (pin 12) by a lowpass filter and passes via 2 switches to an ACC stage. The ACC amplifier stage controls the chroma amplitude for the subsequent stages (time constant by a capacitor and pin 41). The chroma signal is then passed to the main converter. The main converter mixes the 5.06 MHz subcarrier of the auxiliary converter with the 4.43 MHz chroma signal to the 627 kHz output signal (at pin38).
The subcarrier is a mixture of 4.43 MHz (the REC-APC time constant at pin 33 compares the quartz and burst frequency) and (40+ 1/8) fH = 627 kHz (generated by 321fH -VCO, time constant pin 36/37 and phase rotation according to the VHS standard, control pin 17). By the use of a band-pass filter and the colour killer stage, the converted chroma signal is passed to pin 38 of the IC, from where it is added directly to the Y-FM signal via a adjustment controller. The colour killer can either identify the incoming signal automatically (PAL/yes/ no) or by the control line CKPAL at pin 39 (forced mode: PAL < 2.5 V, SECAM L > 2.5 V). In addition to the reference frequency and chroma processing, the quartz oscillation (pin 32) also serves for the clock frequency generation of the combi CCD [7060, pin 12].

3. SECAM B/G
The signal path is nearly identical to that of PAL.
The exceptions are:
- No phase rotation.
- The filter characteristics of the chroma band-passes are wider.
- Free running quartz oscillator frequency
- The deck microprocessor [7410] generates the control signal for SECAM B/G.

4.SECAM L
The FBAS Signal (VREC) for the I/O circuit passes via emitter follower [7101] to the cloche filter, which cancels the transmitter-introduced RF preemphasis. In Secam L, pin 29 of[7110] the signal passes through a 15 dB amplifier and via pin 24 and pin 25 to a limiter with a subsequent frequency divider.
The latter generates the 1.1 MHz signal for recording through frequency division (1:4) of the chroma signal, which is then activated at pin 21 with the subsequent band-pass filter. The band-pass filter attenuates the harmonics generated from the frequency division. At the same time, the chroma signal is output at this stage during the period of the synchronous line pulse. Consequently, it then passes through a 10 dB amplifier and is switched to pin 15 at an anti-cloche filter. Consequently, the FM preemphasis, which is provided as standard for a SECAM chroma signal, is generated again.
This is then passed to the signal electronics path as a CSR signal, where it is added to the luminance FM signal (FMRV).

Control of recording / playback :

The switchover between record and playback is generated by the 5 VPB voltage [7105]. If the 5 VPB voltage is missing, the CB diode of the transistor Pos7105 (Collector 0V) is conductive and pulls the voltage of pin 23 to 1.3 V, switching the IC from playback to record. The 5 VPB voltage pulls pin 23 to 3.2 V.

Playback :

1. Luminance

The FM playback signal from the (FMPV) is passed from the head amplifier [7150] to the signal electronics. During FM processing, the signal is amplified, filtered and passed via pin 1 to the signal electronics IC [7051]. At this stage, the level of the envelope is controlled (FM-AGC, pin 10), limited via a double limiter, and the signal is FM demodulated and filtered with a lowpass. The demodulated Y signal still contains the recording-sided preemphasis. This, in turn, removes the linear deemphasis at the base of the emitter follower [7007]. Additionally, the frequencies are raised by approx. 2 MHz (peaking). The filter circuit is effective as pin 4 becomes an open-collector output in the playback mode, whose last impedance is determined by the deemphasis/peaking circuit. The Y signal is then clamped, filtered by a lowpass and is passed via the vertical noise canceller or dropout compensator. For this, the Y signal leaves the IC7051 and is delayed in the IC7060 by 1 H (out pin 20, in pin 18). The CCD 1H delay line operates for the Y signal as a comb filter (vertical noise suppression), and as a line storage for the dropout compensation. The subsequent circuit stages are: the non-linear deemphasis, horizontal noise canceller and the picture control circuit for sharpness. The chroma signal is then added to the luminance signal and is output as a FBAS signal (pin 16, VSB).

2. Chroma PAL

The FMPV signal is connected via pin 38 to the signal electronics IC, from which the subsequent lowpass filter filters the 627 kHz. The ACC amplifier amplifies and controls 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 is generated from the free running quartz oscillator and the (40+1/8) fH = 627 kHz frequency derived from the 321fH -VCO. After the main converter, the chroma signal is almost completely free of crosstalk from adjacent tracks by the 2 H comb filter (CCD IC Pos7060). The chroma signal is then filtered via a band-pass filter, checked by the colour killer, looped through pin 28 and 29, and finally added to the Y signal.

3. Chroma SECAM B/G

The signal path is nearly identical to that of PAL.
With the following exceptions:

- The 321 fH VCO is synchronized by the sync.
- No phase rotation.
- The comb filter is not active.
- Internal band-pass filters have a wider band width.
- No colour killer function, the colour is always switched on.
- The deck microprocessor [7410] generates the control signal for SECAM B/G (MES, pin 30).

4. Chroma SECAM L

In playback mode the FM signal on the tape (FMPV) is connected to pin 23, amplified by 6 dB and then passed through the same band-pass as that used during recording, and is once again amplified by 10 dB. After pin 16, the RF preemphasis introduced in the recording process is cancelled. The anti-cloche circuit used in the record mode operates as a cloche circuit in this case.
In the subsequent stages, the signal is adjusted (AGC) and its frequency doubled. The band-pass at pin 10 removes any unwanted harmonics from the signal, before doubling its frequency once again. To turn the signal into a standard Secam Chrominance signal, it is provided with RF preemphasis (anti-cloche). The chroma signal then passes through a colour killer stage, a band-pass filter and an emitter follower before it passes as a CSP signal via a coupling capacitor to pin 29 of the signal electronics IC on the motherboard [7051].

5. NTSC

During playback of NTSC signals, the original NTSC chroma signal is converted to a PAL chroma signal (control signals, see above). Along with the internal switch-over caused by this Colour system within the chroma IC, a switch-over is also required by the CCD IC 7060 to a 1 H comb filter for crosstalk reduction. Line and picture frequencies remaining unchanged, but however according to the NTSC standard.

Audio Linear - AL

The signal input for recording or loop through (EE) is pin 11 of the LA7282 (ALC, automatic level control). During Record and EE modes, the signal passes a mute stage and then leaves the IC at pin13. This output is then connected to the IN/OUT circuit. The attenuation chain at pin 13 provides the required level for the ALC detector, whose time constant is determined at pin 10 and also for the recording amplifier. L5601, R3616 and C2613 form the preemphasis for the recording amplifier.
The output signal from the recording amplifier is present at pin 17. The recording current is then added to the bias current and flows via the head to pin 2, where the switch is closed. During playback, pin 1 is closed. The playback signal is amplified in the equalizer stage (time constant between pins 6 and pin 8) and is adjusted by the PB level adjustment control [3606]. Pos3606 provides compensation for amplifier and or head tolerances. The resistor in Pos3601 and the capacitor in Pos2600 determine the head resonance during playback mode.
In longplay mode, the frequency characteristic is adapted with the aid of RC networks connected at pins 4, 5 and 15.
A by now well known circuit runing at a frequency of approx 70 kHz, is used as the erase oscillator. This circuit is used by the erase heads and also to provide the bias voltage. To avoid peaks, the oscillator must be switched on slowly (switching stage T7604, time constant C2617, R3623 and current limiter R3625).
For sound-dub VCRs, a second erase oscillator is activated by Pos7608, which will only operate the main erase head. For devices without sound-dub, the main erase head and track erase head are connected to Pos3908.

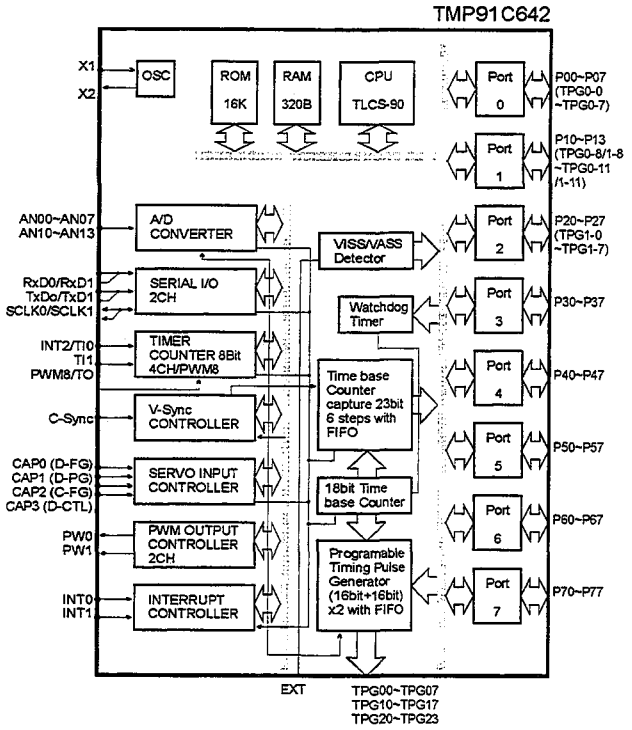
Deck electronics - DE

1. General :

The TVC (Toshiba Video Controller) is a single chip microcontroller offering 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 Servo inputs

The TVC contains two serial interfaces for data exchange with other µPs. The component is supplied in a QFP (64 pin) or SDIP housing (64 pin).
8+4 analogue inputs are available. The resolution of the converter is 8 bit. The maximum possible input voltage range is 0...5 V (determined by the reference voltages AVSS and AVCC). Three analogue outputs are provided, two with 12 bit and one with 8 bit resolution. These outputs supply a signal with a constant frequency (PWM8 approx. 20 kHz, PWM1, PWM2 approx. 39 kHz) with variable pulse/pause proportions.



2. SAA 1310 Interface DM - DE :

a) CTL Stage :

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

The CTL head voltage can consequently vary considerably if Vmax / Vmin >> applies. The LP mode has the slowest tape speed. The fastest speed is reached during FAST WIND or FAST SEARCH. To guarantee that the pulse/pause ratio of the band sync is always reproduced correctly under the above conditions (important for the detection of VISS markings), the amplifier cannot be over driven.

The two-stage AGC cannot process the large dynamic range of the input voltage on its own. Consequently, the amplifier also contains a lowpass characteristic (fg = 3 kHz typically) (internal). The amplification is also further reduced by the transistor in Pos7469 for all WIND modes.

In this case, signal IWIND = "L" and T7469 are blocked. The transistor is intentionally polarized inversely, as inverse operation produces an improved attenuation characteristic for this application. If T7469 is blocked, amplification is determined mainly by the internal negative feedback resistors in the SAA 1310, [7460] and the external resistor in Pos3488. Through optional short-circuiting of R3488 with T7469, the amplification can be reduced in the following ratio:

Von / Voff = 1 + R3488 / 100

The RC element containing capacitor Pos2464 and resistor Pos3489 is located parallel to the CTL head. The capacitor and the CTL head inductivity cause excessive resonance at approx. 10 kHz. R3489 attenuates this excessive resonance. It causes aperiodic oscillation caused by this resonance. Beyond the resonance frequency, a steep drop occurs in the frequency transmission. This effectively suppresses high frequency interference. The CTL head signal amplitude in SP is (typically) approx. 1 mVp.

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

The playback amplifier can switch over this its polarity with Video - Index - Search - System (VISS) voltage. This is the only way in which the TVC can write a VISS marking without making spikes on the tape. The write/read (W/R) signal is used for switching between recording and playback:

W = "H", R = "L".

b) POR (Power On Reset) generator :

The POR generator in the SAA1310 [7460] requires only one external capacitor [2467], determining the length of the POR pulse. For a value of 33 nF, tPOR is approx. 30 msec. The response threshold of the reset circuit lies between 4.5 and 4.8 V. Supply voltage dips which are shorter than tPOR/100 and do not fall below a level of 3.5 V and hence do not produce a POR.

c) The sensor interface :

The four comparators in the SAA 1310 are used for converting the sensor signals to 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 limiters and thermal overload protectors. Only the non-inverted input of each comparator is externally accessible. The other inputs are positioned at the internal reference of nom. 2.5 V. The fixed hystereses of the comparators of approx. 10 mV is also positioned internally.

Switching the comparator:

Comparator 1 : In = FTA, pin 5; Out = FTAD, pin 15:
FTA = Threading tachometer. This signal stems from a light barrier in the deck. An infrared light barrier is interrupted by a 4-blade butterfly wheel. The output amplitude of the light barrier must fluctuate at least between the voltage levels 2 V and 3 V to guarantee safe evaluation. An additional hystereses is realized with a resistor [3492]

Comparator 2 : In = WTR, pin 6; Out = WTRD, pin 14 :
WTR = Winding tachometer right, stems from a reflex light barrier. For this level, the same as for FTA applies.

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 is provided by the Tachometer Hall Sensor on the motor unit, it is then amplified. The output impedance is approx. 10 kOhm. The amplitude of the near sinus-shaped signal is normally 1 Vp. and may not fall below 300 mVpp. The signal is AC coupled by capacitor [2468]. To allow a bias current to flow, the input pin 8 must be connected to the reference voltage pin 3 via a resistor [3491]. A capacitor [2465] for filtering high-frequency interference is provided in parallel to the bias resistor.

3. Interface to head-wheel motor driver :

The head-wheel motor driver IC TDA5241 contains a fully integrated 'Start-up' circuit.

The connection of the HMO driver TDA5241 [7300] to the head-wheel motor on the motherboard print is made by connector Pos1930.

- REEL is the speed-phase control signal. The resolution is 14 bit

- PG/FG is the combined POS/tachometer signal from the TDA5241.

The current input from the +14M1 is 70 mA at ambient temperature (normal). During motor start-up, approx. 0.5 A may flow for a short period.

4. Interface to the Capstan motor :

The driver IC on the Capstan motor is controlled via connector 1946. CAP is the signal for the Capstan speed. It is a voltage which can vary between 0 and 5 V without load.
The rotational direction of the motor is influenced with CREV (Capstan reversed). The maximum current input of the motor is limited to 1 A. Typical values for the PLAY mode are 0.2...0.3 A.

5. Threading motor driver :

The TMO driver is constructed as a bridge circuit and includes a dual power opamp L2722. The element can supply an output current of +/ -1 A. It contains short circuit and thermal overload protection and integrated flyback diodes at the outputs. The output current is limited to approx. 0.7 A by the internal resistance of the threading motor (normally 18 Ohm) (start-up or motor block).
A Boucherot element (1E5, 100 nF) is contained between the IC outputs (pin 1 and 3), suppressing a 3 MHz oscillation tendency of the output stage. One half of the bridge is controlled by the TMO line and operates as a comparator. The other half is an amplifier integrator with Vu = 3.9 times. A change of input voltage (THIO) between 0 and 5 V causes a voltage variation between 0 V and near operating voltage at the output. In case of 50% adjustment (THIO = 2.5 V), pin 3 has approx. 7 V. The capacitor in the negative feedback of the opamp filters the PWM frequency of approx. 21.5 kHz. At POR, the TVC outputs "L" at line THIO, whilst the TMO is "H". To ensure that no current flows in the motor during the POR pulse, the above polarity must be maintained. This prevents damage to the motor during longer control and blocking periods. However, this circuit also has a negative consequence Residual voltages can be passed to the IC input from still applied 14 V voltages in case of failure of the 5 V supply (i.e. activation of Pos1402 fuse). These countertrip the comparator and the opamp leading after approx. 1 minute to a short-circuit in the blocked threading motor. To avoid this problem, a separate reference voltage divider [3445, 3446] is provided for the comparator. Both L2722 [7440] outputs will now enter the "common-mode" in the above case.

6. Analogue interface to the TVC :

The following analogue levels are passed to the TVC internal A/D converter :

- TRIV	Tracking Information Video.
- TAE/TAS	Tape End/Tape Start Detection.
- I/R	Linked information from INIT and record protection.
- AGC	Automatic Gain Control

7. End of tape - LED control :

The LED current is switched by the transistor in Pos7463. The ON-time is approx. 1 msec for an ON/OFF- ratio of 0.09.
The LED current is normally 200 mA. To avoid any radiation or spreading of interference caused by the relatively large pulsed current throughout the entire set, the LED is fed from the +14M1 and is filtered with a 220 µF electrolytic capacitor [2459].

8. Evaluation of drive switch :

The drive contains two switches :

- INIT	Initialization switch
- RECP	Record protection

The condition of both switches can be read with a single line (I/R) into one of the analogue inputs of the TVC. For this, all switch outputs whose level may be "H" (5 V) or "L" (0 V) are connected via a resistor network. Every possible switch condition combination corresponds thus to a certain direct voltage at line I/R

9. Shift register (not always present)

The HEF4094B [7401] serves as the port extension for the TVCs. This component is connected to the serial bus of the TVC and absorbs the information if a TVC strobe pulse is present. 7 hardware lines are used predominantly in the control in the I/O.

10. Test picture generation for non-VPT/OSD sets :

A test picture is generated with the resistor network R3430, R3431, R3433 and R3434 (Sync, black, white), and is fed to the signal electronics IC [7051].

11. Version definition :

Different ROM masks are used. All respective settings are stored in the EE-PROM as up to 7 option bytes.

12. EE-PROM :

An EE-PROM is an electrically erasable and writable, non-volatile ROM (information remains stored in case of operating voltage failure). The R/W cycle is carried out via the serial bus SDA, SCL. It is thus possible to store set or deck specific parameters such as X distance, gap position, tuning limits and possibly also differences between TAE and TES, left-right tolerance of the tape-end light barriers (in the past only paired photo-transistors have been fitted in production) in the EE-PROM.
The gap position is adjusted automatically with the use of a test cassette while in the service test program. The preset station and several options are also stored in the EE-PROM.

13. CMT detection :

This is extended due to possible identification problems with weak transmitters and non-standard video signals. The CSYNC line is offered to the TVC at pin 6 HW integration of the picture pulse compensates for co-channel interference and low-signal levels.

IN/OUT - I/O Circuit

Video: 2-Scart Sets

The following signals are connected to the STV6400 [7552] at inputs: VFV, VIN1, VIN2, VFR, VIDOUT. In the STV6400, the signal that is fed to the used for the signal electronics VIDOUT (2 Vpp) has in its path a divider (1/2). The outputs at pins 15 (VOUT2) and pin 16 (VOUT1) contain a 6 dB amplifier and feed the signal to the respective SCART connector. OUT1 pin 2 does not contain an amplifier, this output connects to the signal electronics VS (VBS / VREC). The individual input signals are switched by the controller via the IIC-bus to the respective outputs. The modulator is connected to the output of the signal electronics (VSB / VOSD / VIDOUT).

Video: 1-Scart sets

The video signal (VBS / VREC) for the signal electronics is selected by the HEF4052 [7551].
The output signal of the signal electronics is passed via an emitter follower [7820] to the Scart output (VSB / VOSD / VIDOUT / VOUT1).

OSD:

The output from the signal electronics (VSB) is passed via the OSD IC LC7481 [7800], where the OSD information is keyed in. For sets without the OSD option, the output signal VOSD is directly connected to the input signal VSB [3814]. The output signal VOSD is passed from the Pos3574 as VIDOUT to the I/O IC STV6400 [7552] and the modulator.

TXT:

The input signal for the signal electronics (VREC, Pos1952 pin 2) is known as the VBS signal (Pos1952 pin 4) this is connected via connection PVIO, and allows subtitles to be keyed into the video signal [3531 not fitted].
The output signal from the signal electronics (VSB/VOSD) is passed via subprint PVIO [1952 pin 6/VOSD] [3574 not fitted]. At this stage, the TXT or OSD information is added and passed via line VIDOUT [1952 pin 8] to the I/O IC STV6400 7552] and the modulator.

Audio:

The audio source is selected from the signals AIN1/AIN2/AFV and AFR (for 1-Scart units for AIN1 and AFV) through HEF4052 [7551] with the control signals, IS1, IS2 and is passed via the AMLR line to the audio circuit.
The output signal for the Scart socket and also to the modulator is known as the AMLP signal for 1-Scart sets. For 2-Scart sets, the output signal for Scart 1 is selected by the 1/3 HEF4053 [7550] with the MON control line from AMLP or AIN2. The output signal for Scart 2 is selected with 1/3 HEF4053 [7550] by the DEC and IPBV from AIN1 and AFV and passed to the AMLP playback signal.

Decoder operation: (REC or STOP)

a.) Program position with decoder (front-end)
The front-end signal is passed to the decoder connected which can be connected to Scart 2, and is then returned from herre by VIN2 or AIN2 back to the VCR. Case b is not possible for these program positions.

b.) External input with decoder
The signal from Scart 1 (normally TV set) is passed to the decoder connected to Scart 2. For scrambled transmissions, the decoder switches pin 8 to high. The VCR then switches the encoded signal from Scart 2 to Scart 1.

VPS :

The VPS IC SDA5642 [7540] reads the data sent from the transmitter in line 16 in the video signal and passes the information required for the timer start to the Control µP. Data such as transmitter name, country detection, etc. is also passed to the µP.

PDC/VPS:

The VPS/PDC decoder IC SDA5648 [7540] recovers the VPS and PDC data from the vertical blanking interval and then provides them to the µP by using the IIC-bus.

In the case of the PDC, two data formats exist:
1.) PDC format 1 (transmitter name)
2.) PDC format 2 (programming data)

As the SDA5648 does not completely decode format 1, the SDA5649 (upgrade of the SDA5648) cannot be used for sets with the "Autoinstall" and the „Time-download" features.

Follow Me Part:

The video signal from the internal front-end of the VCR (VFV) and the video signal of the TV set connected to Scart 1-in, (VIN1) are "digitized" via comparators and are then compared to one another. A low at the output of the circuit means that the picture contents of both the video signals and the transmitter must be identical.

PIO - IO:

The PIO only contains the second Scart socket with various ESD protective diodes. The selection of different inputs/outputs takes place in the I/O circuit on the motherboard. The R/G/B and blanking signals are only looped through passively between both Scart sockets and the blanking signal can be interrupted by the MON control line as required, (Connector 1951 pin 12) by transistor [7540].

POIO 3µP - OSD - IO

1. Controller [7800 at POIO Print] :

The µP circuit consists of an 8032 microprocessor with a external 512k x 8 PROM and an 8k or 32k x 8 RAM. The address lines are partly passed via a latch as at port 0 of the processor addresses and data are applied. As the 8032 supports only 16 ports for address control, the highest addresses A16 to A18 must be switched with a standard port pin. Due to the internal timing, an RC element is required for protection. The control processor is connected to the Display µP via the IIC-bus and via the UART interface to the Deck µP via the shift register mode. For speed reasons, the display processor is additionally triggered to the bus via an interrupt line (INT).
With increasing speed, the controller controls all other IIC-bus components in the set via the IIC-bus.
All non-volatile data such as program file, source codes, preferred pages, etc. are stored in a 2k x 8 EE-PROM on the familyboard.
The Control µP controls also the SAT control socket (SACO), the signal being connected to the OSD via the data line,
so that, during data transfer to the OSD, the SACO signal is blocked (SAKI).

2. OSD Circuit [7800 Fitted on the Motherboard] :

The OSD IC (LC74781 or LC74782) is controlled via 3 lines by the Control P (Clock: OCLK; Data: ODAT; Select: OCS). The video signal VSB passes from the signal electronics on the motherboard via an emitter follower [7821] required for level adjustment to the input of the OSD IC's [7800 pin 15]. At the same time, the CSYNC is offered to the IC via an inverter [7801] for synchronization.
From the OSD IC pin 13 video output, the signal passes via an emitter follower [7802] to the I/O circuitt.
In case of entries in a Secam signal, the Control P activates a bypass between the Video-In and Video-Out, via the OSD IC [7810, 7811, ...].
Using an LC oscillator [5800, 2800,2801], the IC generates its internal reference, the entry time, character size, etc. The TVC (Deck P) supplies a "Frame-Pulse" (OFP) for vertical synchronization and applies it to pin 20 of the IC.
The quartz oscillator [1820] generates the Pal colour carrier oscillation for a colour background in case of "Full Page" and is adjusted to 4 times fsc using Pos 2820.
The adjustment is carried out by connecting pin 23 of the OSD IC to ground (i.e. shortening Pos 2804) and setting 17,734476 MHz via C-Trimmer [2820] at pin 5.
For sets with only one background colour (i.e. Blue Back), a frequency doubling circuit is used in the „Full Page" instead of the quartz oscillator, which is generated from the 4.43 Mhz colour-carrier oscillation of the signal electronics 8.86 Mhz and is then passed to the OSD IC at pin 2.

3. I/O Circuit:

The POIO only contains the second Scart socket with various ESD-protective diodes. The selection of different inputs/outputs takes place in the I/O circuit on the motherboard. The signals R/G/B and blanking are only looped through passively between both Scart sockets and the blanking may be disrupted via the MON control line (Connector 1951 pin 12) with transistor [7540].

PVIO 3µP - TXT - IO

1. Controller [7800] :

The µP part consists of a 80CL580 microprocessor with an external 1M x 8 PROM and a 32k x 8 RAM. The address lines are partly passed via a latch as at port 0 of the processor addresses and data is applied. As the 80CL580 supports only 16 ports for address control, the highest addresses A16 to A19 must be switched with a standard port pin. Due to the internal timing, an RC element is required for protection.
The control processor is connected to the Display µP via the IIC-bus and via the UART interface to the Deck µP via the shift register mode. Due to speed reasons, the display processor is additionally triggered to the bus via an interrupt line (INT).
With increasing speed, the controller controls all other IIC-bus components of the set via the IIC-bus, also the decoder SAA 5281 [7820] required for decoding the Teletext.
All non-volatile data such as program data, source codes, preferred pages, etc. is stored in a 2k x 8 EE-PROM.
The Control µP controls also the SAT-Control socket [1982] on the motherboard.
For Fast-Finder sets, two to four 8k x 8 EE-PROMs [7850 to 7853] are provided, depending on the required number of archivable recordings, which are also controlled by the Control µP (via the IIC)

2. Teletext part:

2.1 Integrated Video Processor and TXT Decoder [7820]:

The teletext data cycle of 6.93 MHz and the display timing up to a line frequency of 15625 Hz are generated internally from the 27 MHz Colpitts oscillator circuit.
The data slicer separates the teletext information from the video signal vertical blanking interval. The teletext data is stored in the internal RAM and is, if necessary, converted to RGB signals in the display generator. The amplitude of the RGB signals is set via an external voltage divider. These RGB signals are encoded to an FBAS signal.
Using the line frequency, the teletext controller generates an artificial Sync for the TV (STTV). This STTV is not interlaced for a Full Page (312 / 312 lines), but is interlaced when used as the background picture for subtitles (312.5 / 312.5 lines).
When entering Playback modes, the TXT IC is switched to external synchronization and a synchronous pulse will be generated by the CSYNC in the signal electronics and a frame pulse (OFP) by the Deck µP.
The output (BLANK) indicates at what time the Teletext information is present. BLANK consequently allows for subtitles to be inserted in the picture .
Depending on the procedure, the teletext controller stores 4 or 8 pages in the internal RAM to reduce the access speed for new page selection.

2.2 Colour Encoder [7845]:

For TV sets equipped with teletext, the RGB signals pass directly to the colour picture tube. As video recorders do not usually have an RGB output, and TVs have no RGB input, an FBAS signal must, in this case, be generated from the RGB signals.
The colour encoder (CXA1645M) encodes this FBAS signal from the RGB signals, as composite sync (STTV) and a 4.43 MHz oscillation (FSC). This colour subcarrier is set to the correct phase position by a phase adjuster [7832].
As keying in can take place before or after the signal electronics, this phase adjustment can be switched by Pos7833/2841 and the control line ITI-REC from the Control µP.
The H/2 correction is carried out by selective amplification of a ripple from the subcarrier PLL in the signal electronics. Using this generated H/2 sinusoidal oscillation, the encoder can be synchronized via a transistor stage [7836], so that subtitles will appear in the correct phase. The inverter [7837] is required for the correct polarity of the signal. This correction circuit is inactive for Full Page.

2.3 Keying in and switch-over [7875]:

The video switch BA7605N [7875] is used for keying in, which clamps all inputs to 2.0 VDC and the outputs to 0.6 VDC Synctop.
The input video VBS from the I/O circuit on the motherboard and the teletext information are offered to one of the two conmmutators (at pins 1 and pin 3) with 1 Vpp . The BLANK pulse keys in the subtitles, if present. The output signal VREC is then passed to the signal electronics and consequently to a possible recording. This switch is only active for „Title Record" and can be controlled by the TI-REC signal from the Control µP.
The output of the signal electronics VOSD (at pin 10) and the teletext information or OSD information (at pin 8) with 2 Vpp is offered to the second switch. This switch is also switched by the BLANK pulse and is only deactivated during „Title Record" by the Control µP by the use of the ITI-REC control signal. This switch is necessary due to the coupling of the colour subcarrier with the Burst of the video signal at the input of the signal electronics.
For keying in Secam signals, a bypass [7880] can be activated for both switches from Control µP via the SEC-BP control line.

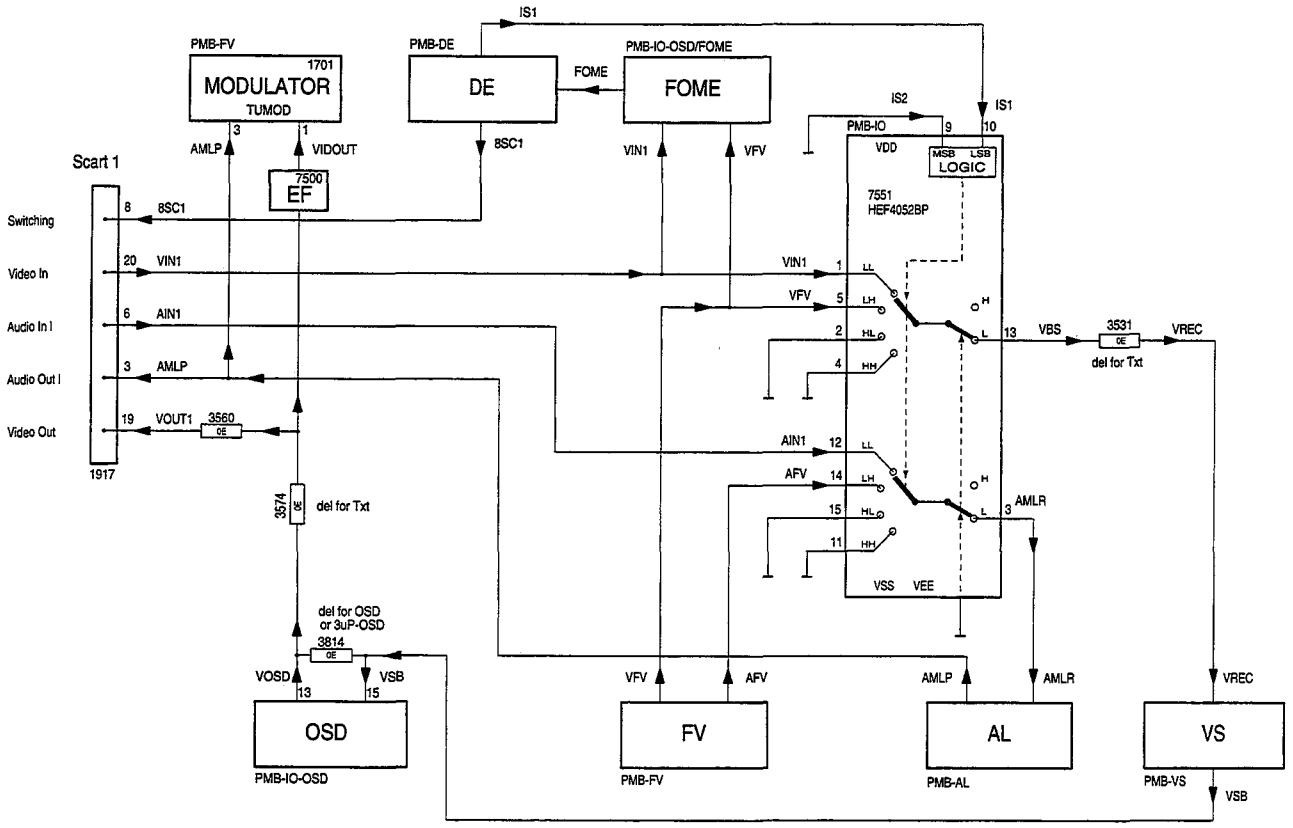
2.4 VPS/PDC:

As the SAA5281 is able to decode VPS and PDC data, the VPS IC SDA5642 or VPS/PDC decoder SDA5648/49 is not required for familyboards with PVIO subprint.

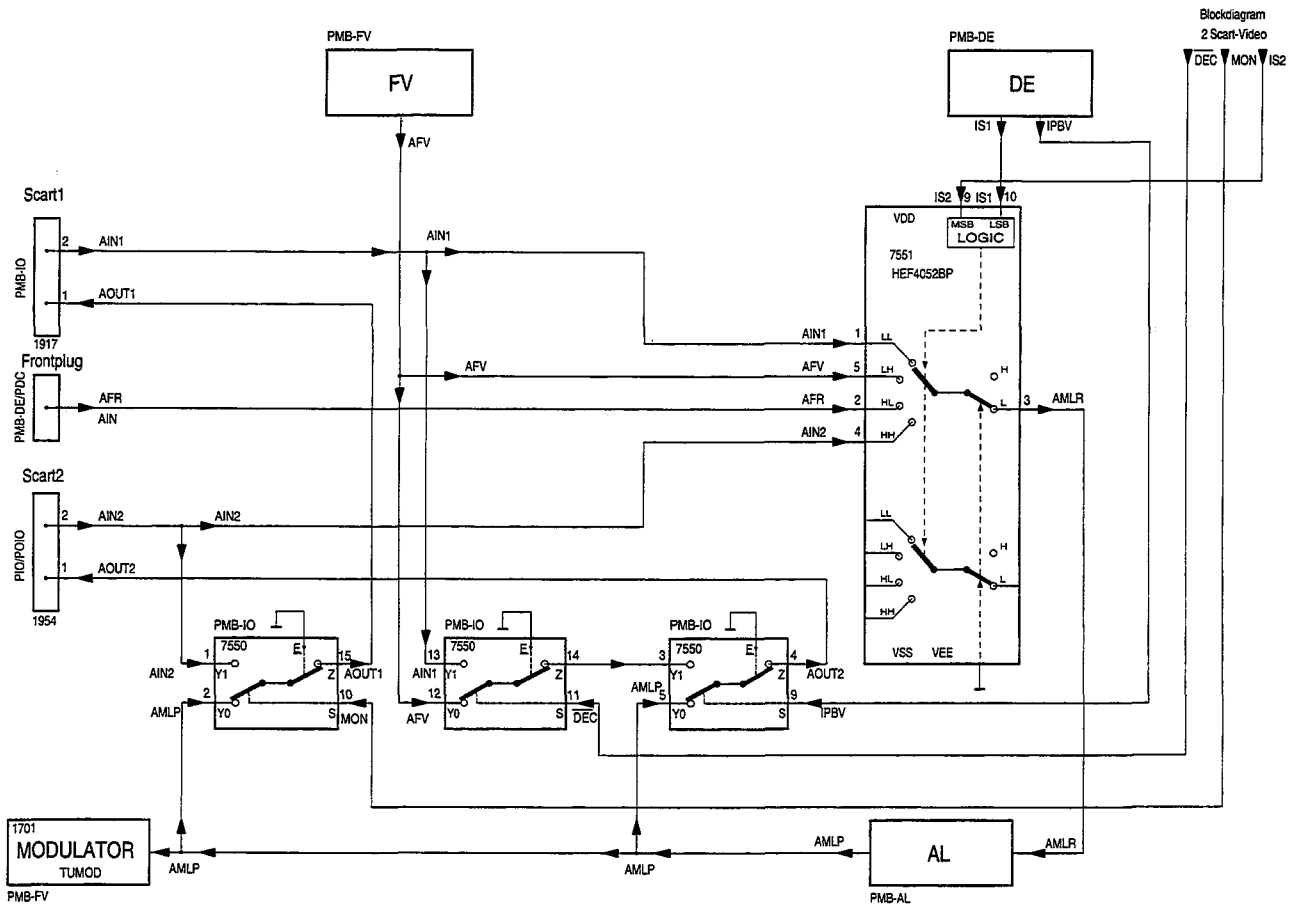
3. I/O part:

The PVIO only contains the second Scart socket, with various protective diodes. The selection of the various inputs/outputs takes place in the I/O circuit on the motherboard. The R/G/B and Blanking signals are only looped through passively between the two Scart sockets, during which Blanking can be interrupted via the MON-control line (Connector 1951, pin 12) with transistor [7540].

Simple Blockdiagrams PMB

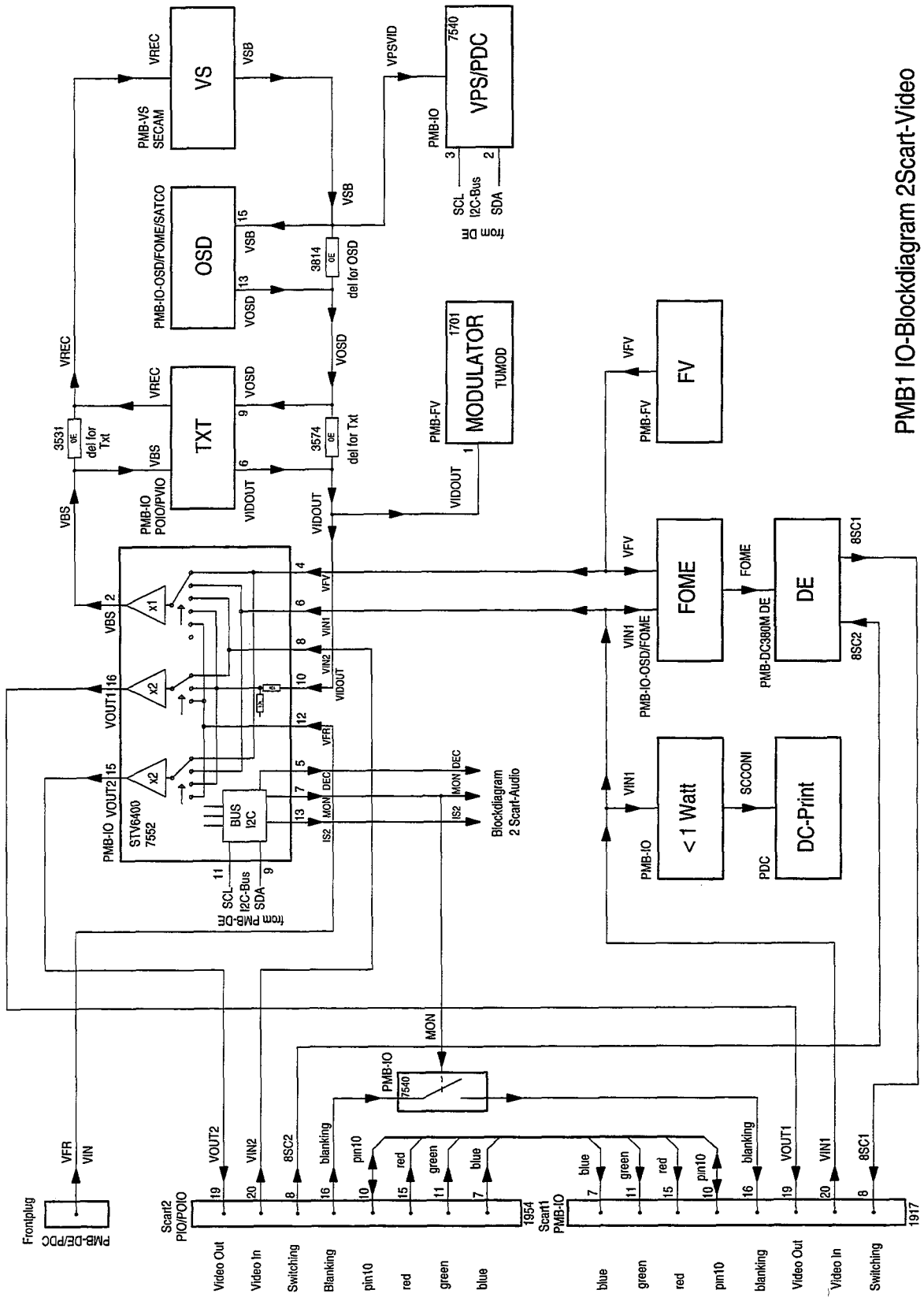


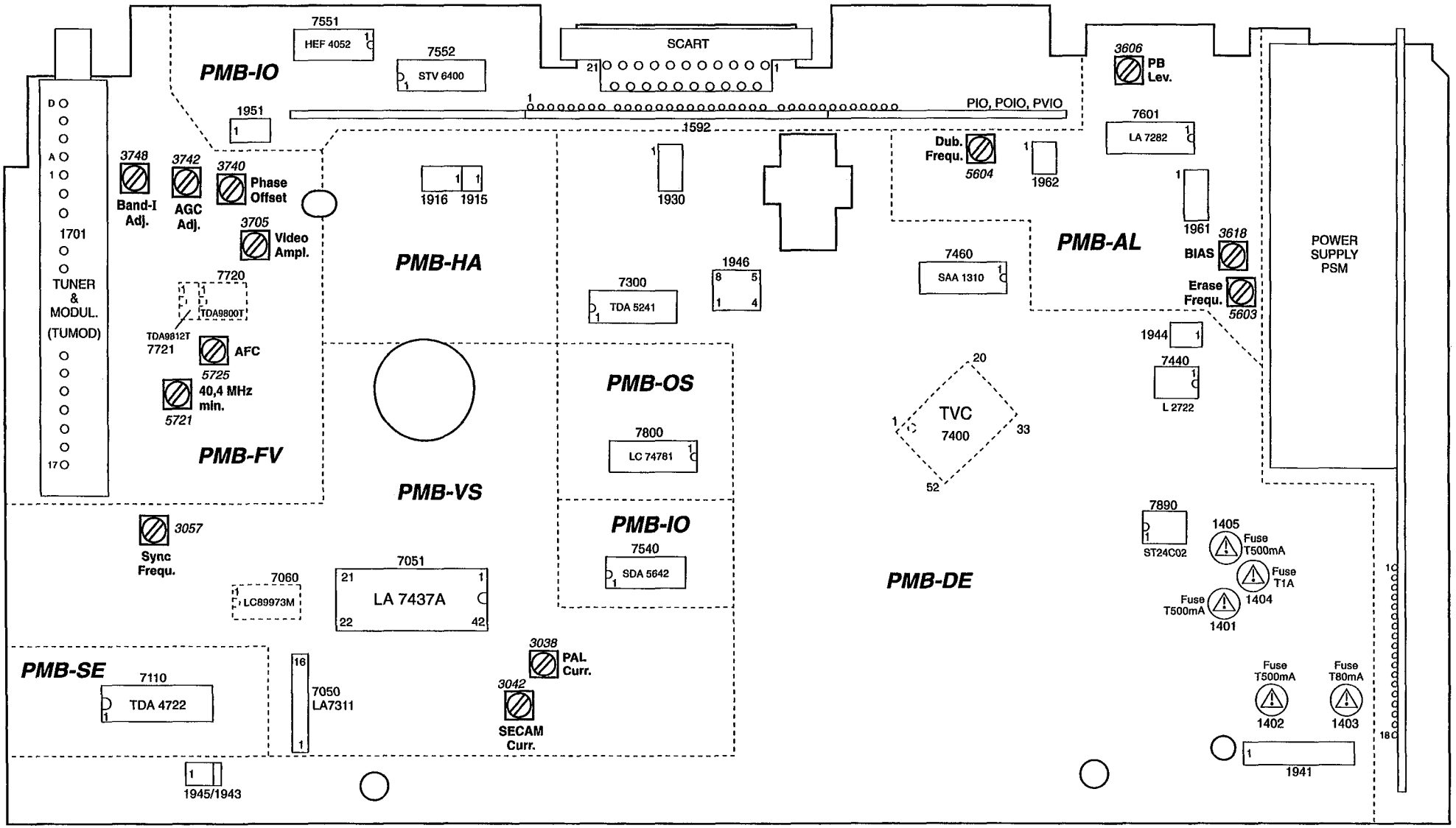
PMB1 IO-Blockdiagram 1Scart



PMB1 IO-Blockdiagram 2Scart-Audio

Simple Blockdiagram PMB



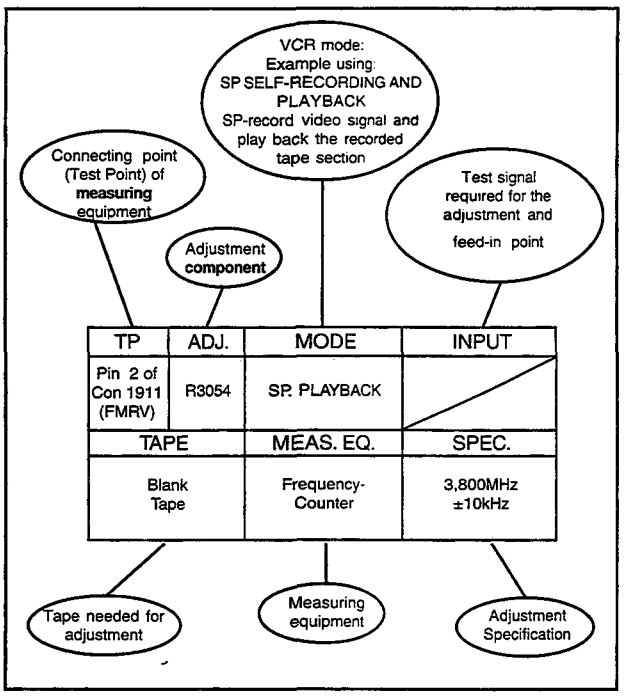

PMB-IO
7551
HEF 4052
7552
STV 6400
SCART
21
1
3606
PB
Lev.
1951
PIO, POIO, PVIO
1592
7601
LA 7282
3748
Band-I
Adj.
3742
AGC
Adj.
3740
Phase
Offset
1916
1915
1930
Dub.
Frequ.
5604
1962
1961
3618
BIAS
Erase
Frequ.
5603
POWER
SUPPLY
PSM
1701
TUNER
&
MODUL.
(TUMOD)
3705
Video
Ampl.
PMB-HA
7720
TDA9800T
TDA9812T
7721
AFC
5725
40,4 MHz
min.
5721
PMB-FV
7300
TDA 5241
1946
7460
SAA 1310
PMB-AL
1944
7440
L 2722
PMB-OS
TVC
7400
20
33
52
7800
LC 74781
PMB-VS
PMB-IO
7540
SDA 5642
7890
ST24C02
1405
Fuse
T500mA
Fuse
T1A
1404
Fuse
T500mA
1401
PMB-DE
3057
Sync
Frequ.
7060
LC89973M
7051
LA 7437A
22
42
3038
PAL
Curr.
3042
SECAM
Curr.
PMB-SE
7110
TDA 4722
16
7050
LA7311
Fuse
T500mA
Fuse
T80mA
1402
1403
1941
1945/1943

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:



Video signal processing - PMB (VS)

1. Sync level frequency (3057):

Purpose: To maintain the recording interchangeability by adjusting the sync frequency and deviation.

Symptom, if incorrectly set:
Record interchangeability is insufficient.

TP	ADJ.	MODE	INPUT
Pos. 9013 (FMRV)	R3057	Record Preset E1	No input signal
TAPE		MEAS. EQ.	SPEC.
Blank Tape		Frequency-Counter	3,800MHz ±10kHz

2. Chrominance record current adjustment:

Purpose: To set the optimum record chrominance 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.

2.1 PAL Chrominance record current adjustment (3038): (3 µP concept only)

Before commencing adjustment, connect pin 2 of IC7051 to pin 13 (+5V).

TP	ADJ.	MODE	INPUT
Pos 9013 (FMRV)	R3038	Record of Preset E1	(VIDEO IN E1) Red Picture 75% Saturation
TAPE		MEAS. EQ.	SPEC.
Blank Tape		Oscilloscope Video Pattern Generator	X=71mV$_{pp}$ (-12,5dB relative to the luminance signal) see Fig.1

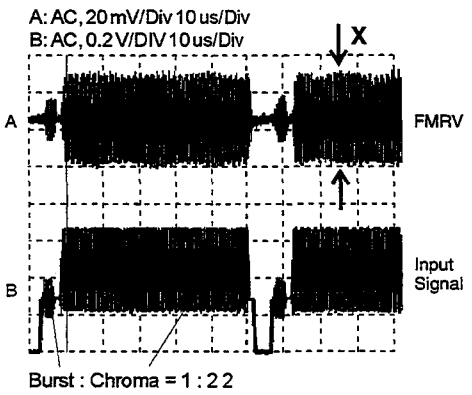


Fig. 1

2.2 SECAM Chrominance record current adjustment (3042)

Before commencing adjustment, connect pin 2 of IC7051 to pin 13 (+5V).

TP	ADJ.	MODE	INPUT
Pos 9013 (FMRV)	R3038	Record of Preset E1	(VIDEO IN E1) Red Picture 75% Saturation
TAPE		MEAS. EQ.	SPEC.
Blank Tape		Oscilloscope Video Pattern Generator	X=42mV$_{pp}$ (-17dB) relative to the luminance signal) see Fig.1

Front End - PMB (FV)

1. AFC Adjustment:

Purpose: Correct adjustment of demodulator AFC - circuit

Symptom, if incorrectly set:
Bad or disturbed TV channel reception.

1.1 PAL - AFC Adjustment (5725) :

TP	ADJ.	MODE	INPUT
IC 7720 Pin 15	L5725	E to E	38,9MHz 100mV$_{pp}$ at Tuner 1701 Pin 17
TAPE		MEAS. EQ.	SPEC.
		DC Voltmeter Frequ. Generator	2,5V ±0,2V

1.2 PAL/SECAM - AFC Adjustment (5725) :

TP	ADJ.	MODE	INPUT
IC 7721 Pin 20	L5725	E to E	38,9MHz 200mV$_{pp}$ at Tuner 1701 Pin 17
TAPE		MEAS. EQ.	SPEC.
		DC Voltmeter Frequ. Generator	2,5V ±0,2V

1.3 SECAM band 1 - AFC Adjustment(3748) :

Before commencing adjustment:

- Connect pin 7 of IC 7721 (PSS) to ground (activates SECAM)
- Connect collector of 7726 to ground (activates band 1)

TP	ADJ.	MODE	INPUT
IC 7721 Pin 20	R3748	E to E	33,9MHz 200mV$_{pp}$ at Tuner 1701 Pin 17
TAPE		MEAS. EQ.	SPEC.
		DC Voltmeter Freq. Generator	2,5V ±0,2V

2. Phase offset Adjustment (3740) :

After replacement of the IC TDA9800T (7720), the potentiometer pos. 3740 has to be removed from the motherboard. The demodulator IC is automatically adjusted to a default value.

3. HF - AGC Adjustment (3742) :

Purpose: Set amplifier control.

Symptom, if incorrectly set:
AGC synchronises incorrectly if input level is too low and causes picture distortion if input level is too high.

TP	ADJ.	MODE	INPUT
Tuner 1701 Pin 17	R3742	Set tuned to channel 27	2,2mV(67dBµV) 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. Teletext amplitude adjustment (3765) :

Purpose: Correct setting of video amplitude after changing the demodulator IC.

Symptom, if incorrectly set:
Brightness variation when fading in TXT.

TP	ADJ.	MODE	INPUT
Emitter T 7725	R3765	Set tuned to channel 27 E to E	2,2mV(67dBµV) on aerial input PAL white picture
TAPE		MEAS. EQ.	SPEC.
		Oscilloscope Video Pattern Generator	1V$_{pp}$ +/-100mV (use a 10:1 probe)

If the unit does not contain a regulator, the amplitude should be checked after the demodulator IC has been changed and the tolerance should be set with the basic voltage divider (3760,3762).

Audio linear - PMB (AL)

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
Pin 1 of IC 7601 (ARH)	L5603	Set tuned to channel 27 Record	PAL white picture, audio IF and modulation on
TAPE		MEAS. EQ.	SPEC.
Blank Tape		Frequency Counter	70kHz ±10kHz

2. 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 frequency response deteriorates.
If the level is too low, sound distortion may occur.

TP	ADJ.	MODE	INPUT
R3600 (difference measurement)	R3618	Set tuned to channel 27 Record	PAL white picture, audio IF and modulation on
TAPE	MEAS. EQ.		SPEC.
Blank Tape	AC Millivolmeter		$15mV_{RMS}$ (70kHz)

Checking the 'bias' adjustment:

After the bias has been adjusted to the indicated level, record some music and play back the recording. 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.

3. Adjustment of playback amplitude (3606) :

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)	R3606	SP Self-recording and Playback	(AUDIO IN E1) $700mV_{RMS}$ 1kHz
TAPE		MEAS. EQ.	SPEC.
Blank Tape		AC Millivoltmeter	$500mV_{RMS}$ ±50mV

OSD - PMB (OS)

1. Frequency adjustment :

Purpose: To set the frequency for the background colours.

Symptom, if incorrectly set:
No OSD background colour.

- Connect pin 23 with pin 22 (ground) of IC7800.

TP	ADJ.	MODE	INPUT
Pin 5 of Pos. 7800	C2820	Set tuned to channel 27 Stop	PAL white picture, audio IF and modulation on
TAPE	MEAS. EQ.		SPEC.
Blank Tape	Frequency-counter		17,734475 MHz ±100Hz

Deck electronics - PMB (DE)

1. Software adjustment of gap positions:

Information about this adjustment is contained in the Fault Locating document, Chapter 2-1, and in the service test program in Step 51.

2. "Studio Picture control" adjustment:

Information about this adjustment is contained in the Fault Locating document, Chapter 2-1, and in the service test program in Step 52.

Operating panel - PDC (DC)

1. Clock frequency adjustment :

Purpose: Setting the exact clock function.

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

In the Paolina range, the clock is corrected with a software correction factor.

Information about this adjustment is contained in the Fault Locating document, Chapter 2-1, and in the service test program in Steps 53 and 99.

2. ATS threshold (3 µP concept only)

Purpose: Setting the ATS threshold value for the station sequencing according to the reception strength during automatic channel search.

Symptom if incorrectly set:
Stations without VPS or PDC station detection are not ideally sequenced.

Information about this adjustment is contained in the Fault Locating document, Chapter 2-1, in the service test program in Step 54.

Power supply - PSM (PS)

1. Setting the output voltage +5V :

Purpose: To set the correct supply voltage.

Symptom, if incorrectly set:
VCR functions are not operating correctly.

TP	ADJ.	MODE	INPUT
Pin 16 of Con. 1509 (+5A)	R3078	Playback	
TAPE		MEAS. EQ.	SPEC.
Any tape		DC Voltmeter	5,3V ±0,03V

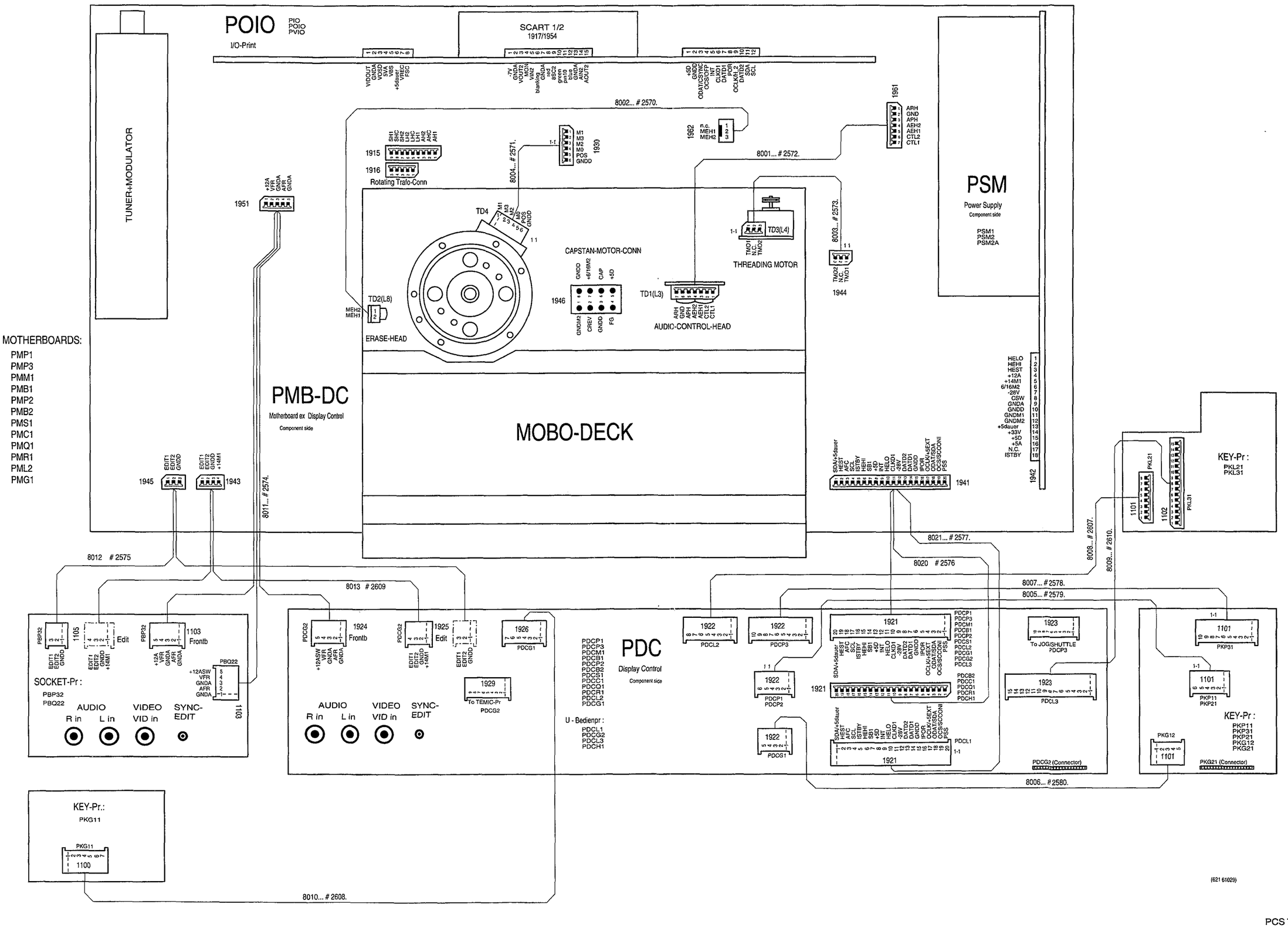
List of abbreviations

Signal	Description	Application											
+12A	+12V analog	DE	IO		AL	FV				PS			
+12AS	+12V analog, after coil 5703					FV							
+12ASW	+12V analog, switched								DC				
+14M1	+14V for threading- and headmotor	DE							DC	PS			
+33V	+33V for tuner tuning voltage	DE				FV				PS			
+5A	+5V analog from power supply	DE								PS			
+5D	+5V digital after fuse 1402	DE	IO		AL				OS	DC	PS		
+5DAUER	+5V permanent	DE	IO						DC				
+6/16M2	Capstan motor supply, switched	DE											
-28V	-28V display supply	DE	IO						DC	PS			
-7V	-7V I/O-switches supply		IO								PIO	PVIO	POIO
5ASW	+5V analog (< 6W switched)	DE	IO	VS		FV	HA	SE	OS				
5DDA	+5V analog, after coil 5820											PVIO	
5DDC	+5V digital, for Control board								DC				
5DS	+5V digital, after coil 5800											PVIO	POIO
5EXT	Back up voltage	DE							DC				
5S	+5V from power supply									PS			
5VA	+5V analog	DE	IO			FV			OS				
5VA1	+5V analog after coil 5000			VS									
5VA11	+5V analog after coil 5000 and 5060			VS									
5VA3	+5V analog after coil 5802								OS				
5VAF	+5V analog after coil 5727					FV							
5VPB	+5V playback		IO	VS				SE					
5VSTBY	+5V permanent									PS			
5VSWA	+5V analog, for PVIO											PVIO	
6/16M2	Capstan motor supply, switched	DE											
8/17M	Capstan motor supply, switched									PS			
8SC1	Scart 1 pin 8 output	DE	IO										
8SC1H	Scart 1 pin 8 high level	DE											
8SC1M	Scart 1 pin 8 medium level	DE											
8SC2	Scart 2 pin 8 input	DE	IO								PIO	PVIO	POIO
A0-19	Adress lines											PVIO	POIO
AD16-19	Adress and Data lines											PVIO	POIO
AEH1/2	Audio erase head				AL								
AFC	Automatic frequency control	DE				FV				DC			
AFR	Audio from front connector		IO							DC			
AFV	Audio from frontend		IO			FV							
AGC	Automatic gain control	DE				FV							
AIN1	Audio input scart 1		IO										
AIN2	Audio input scart 2		IO										
AIN2L	Audio input from scart 2										PIO	PVIO	POIO
AMLP	Audio mono playback		IO		AL	FV							
AMLR	Audio mono record		IO		AL								
AOUT2	Audio output from scart 2		IO										
AOUT2L	Audio output from scart 2										PIO	PVIO	POIO
APH	Audio playback head				AL								
ARH	Audio record head				AL								
BLANKING	Blanking pulse RGB loopthrough		IO								PIO	PVIO	POIO
BLUE	Blue signal between scart 1/2		IO								PIO	PVIO	POIO
CAP	Capstan control voltage	DE											
CKPAL	Colour killer PAL	DE		VS									
CLKD1	Serial bus clock	DE	IO						DC			PVIO	POIO
CREV	Capstan reverse	DE											
CROT	Colour rotation on/off			VS									
CSI	Colour system information	DE		VS				SE					
CSP	Chrominance secam playback			VS				SE					

CSR	Chrominance secam record			VS				SE					
CSW	8V/14V switching for capstan motor	DE									PS		
CSYNC/1	Composite sync pulse	DE	IO	VS			HA	SE	OS			PVIO	
CTL1/2	Control track signal	DE			AL								
D0-7	Data lines											PVIO	POIO
DATD1/2	Serial bus data	DE	IO							DC		PVIO	POIO
DEC	Audio switching voltage		IO										
DO	Drop-out compensation on/off	DE		VS									
EDIT1/2	Synchro-Edit control signal	DE								DC			
ENVC	Envelope comparator signal	DE					HA						
FFP	Feature frame pulse	DE		VS									
FG	Capstan tacho pulse	DE											
FGD	Capstan tacho pulse digital	DE											
FMPV	FM video playback			VS			HA	SE					
FMRV	FM video record			VS			HA						
FOME	Follow Me (video signals equal)	DE							OS				
FSC	Colour subcarrier		IO	VS					OS			PVIO	
FTA	Threading tacho	DE											
FTAD	Threading tacho digital	DE											
GAA	Ground audio										PIO	PVIO	POIO
GND	Ground					FV							
GNDA	Ground analog	DE	IO			FV				DC	PS	PIO	PVIO	POIO
GNDD	Ground digital	DE								DC	PS		PVIO	POIO
GNDD1	Ground IO-Board												PVIO	POIO
GNDM/2	Ground capstan motor	DE									PS			
GNDM1	Ground threading- and headmotor	DE									PS			
GNDVID	Ground video											PIO	PVIO	POIO
GNDVS	Ground signal electronics						HA	SE						
GREEN	Green signal between scart1/2		IO									PIO	PVIO	POIO
H_2	Half line frequency		IO	VS									PVIO	
HEHI	Heater for displaytube high	DE								DC	PS			
HELO	Heater for displaytube low	DE								DC	PS			
HEST	Heater voltage control signal	DE								DC	PS			
HSC2	Colour phase switching for LP feature mode	DE		VS										
IEO	Main erase oscillator on/off	DE			AL									
IFP	Inverse full page												PVIO	
INIT	Deck switch	DE												
INT	Interrupt	DE	IO							DC			PVIO	POIO
INTSC	Inverse NTSC-playback	DE		VS										
IPAL	Inverse playback audio linear	DE			AL									
IPBV	Inverse playback video	DE	IO	VS										
IPOR	Inverse power on reset	DE								DC				
IPSEN	Output enable for ROM												PVIO	POIO
IREV	Dubbing oscillator on/off	DE		VS	AL									
IS1	Input select 1	DE	IO											
IS2	Input select 2		IO											
ISTBY	Inverse stand by	DE								DC	PS			
ITI_REC	Titel insertion on/off (low=off)												PVIO	
ITRICK	Comb filter by-pass during feature mode	DE		VS										
IWIND	Control pulse amplification low	DE												
LE	Latch enable												PVIO	POIO
LED	LED-tower supply													
LH1/2/C	Long play heads						HA							
LPA	Longplay audio	DE			AL									
LPV	Longplay video	DE		VS										
MEH1/2	Main erase head				AL									
MES	Middle East secam	DE		VS										
MON	Monitor loop through scart 1/2		IO									PIO	PVIO	POIO
MOT0-3	Head motor Control lines	DE												

MTA	Audio mute	DE			AL									
NC	Not connected	DE												
OCLK	OSD-bus clock	DE	IO						OS	DC				POIO
OCS	OSD chip select	DE	IO						OS	DC				POIO
ODAT	OSD-bus data	DE	IO						OS	DC				POIO
OE	Output enable for RAM												PVIO	
OFP	Frame pulse	DE	IO						OS				PVIO	
PG/FG	Head wheel position/-speed	DE												
PIN10	Pin 10 scart 1/2 for project 50		IO									PIO	PVIO	POIO
PIN10-IN	Pin 10 scart 1/2 output												PVIO	POIO
PIN10-OUT	Pin 10 scart 1/2 input												PVIO	POIO
POR	Power on reset	DE	IO										PVIO	POIO
POS	Position pulse headwheel	DE												
PSS	PAL or secam-L	DE				FV				DC				
RALM	Record audio linear + mute	DE			AL									
RECP	Record protection	DE												
RED	Red signal between scart 1/2		IO									PIO	PVIO	POIO
REEL	Head wheel control	DE												
SACO	Sat receiver control bus	DE	IO						OS					
SAKI	Sat bus on/off (OSD bus active)	DE							OS					
SB1	Secam band 1	DE				FV				DC				
SCCONI	Video-in on scart1 detection (Low P. Stdby on/off)	DE	IO							DC				
SCL/1	IIC bus clock	DE	IO			FV							PVIO	
SDA	IIC bus data	DE	IO			FV				DC			PVIO	POIO
SEC-BP	Secam band-pass filter												PVIO	
SH1/2/C	Standard play heads						HA							
SPC1/2	Studio Picture Control	DE		VS										
STBY	Low Power Stand-by on/off	DE												
STROBE	Strobe pulse for shiftregister	DE												
SWIN	Head switching pulse	DE					HA							
SYNC	Control track pulse	DE												
TAE	Tape end detection	DE												
TAS	Tape start detection	DE												
THIO	Threading motor in/out	DE												
TI_REC	Titel record on/off (low=off)												PVIO	
TMO	Threading motor on/off	DE												
TMO1/2	Threading motor connection	DE												
TRIV	Tracking information video	DE					HA							
VBS	Video input		IO										PVIO	
VFR	Video from front connector		IO							DC				
VFV	Video from frontend		IO			FV			OS					
VH1/2/C	Video heads						HA							
VIDOUT	Video to output		IO			FV							PVIO	
VIN1	Video input scart 1		IO						OS					
VIN2	Video input scart 2		IO									PIO	PVIO	POIO
VISS	Control sync pulse inversion	DE												
VOSD	Video from OSD part		IO						OS				PVIO	
VOUT1	Video output scart 1		IO											
VOUT2	Video output scart 2		IO									PIO	PVIO	POIO
VPSVID	video for VPS circuit		IO						OS					
VREC	Video record from I/O		IO	VS				SE					PVIO	
VREF	Reference voltage							SE						
VSB	Video from signal electronics			VS					OS					
W/R	Control track write/read	DE												
WE	Write enable for RAM												PVIO	
WTL	Wind tacho left	DE												
WTLD	Wind tacho left digital	DE												
WTR	Wind tacho right	DE												
WTRD	Wind tacho right digital	DE												

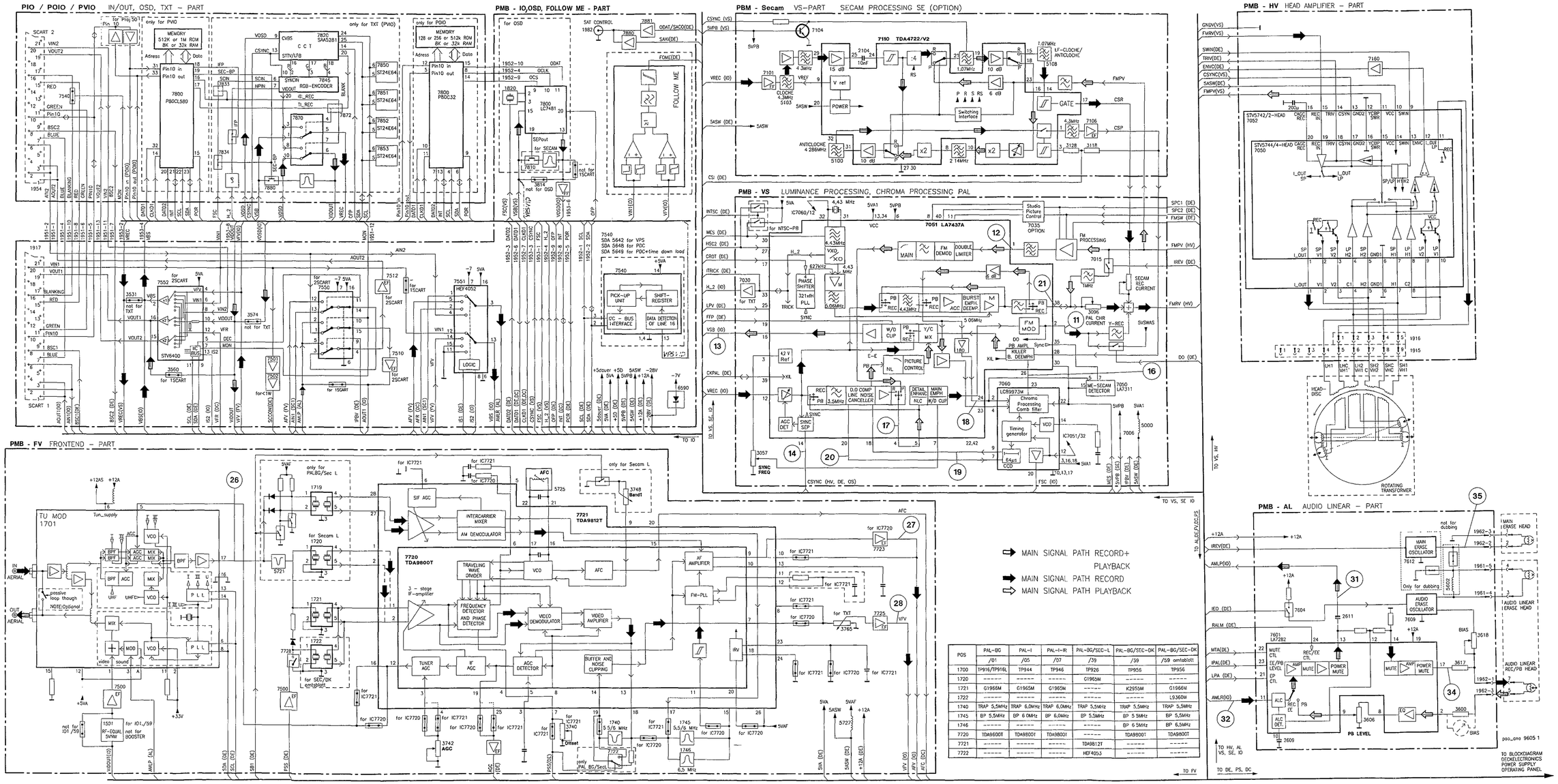
Wiring Diagram



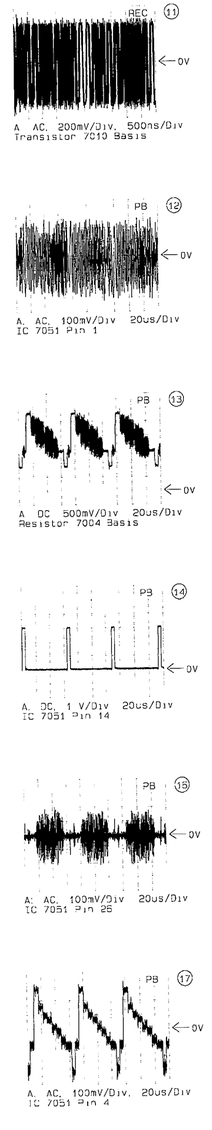
PCS 76164

3-9

Block Diagram Analog Part Paolina Mono

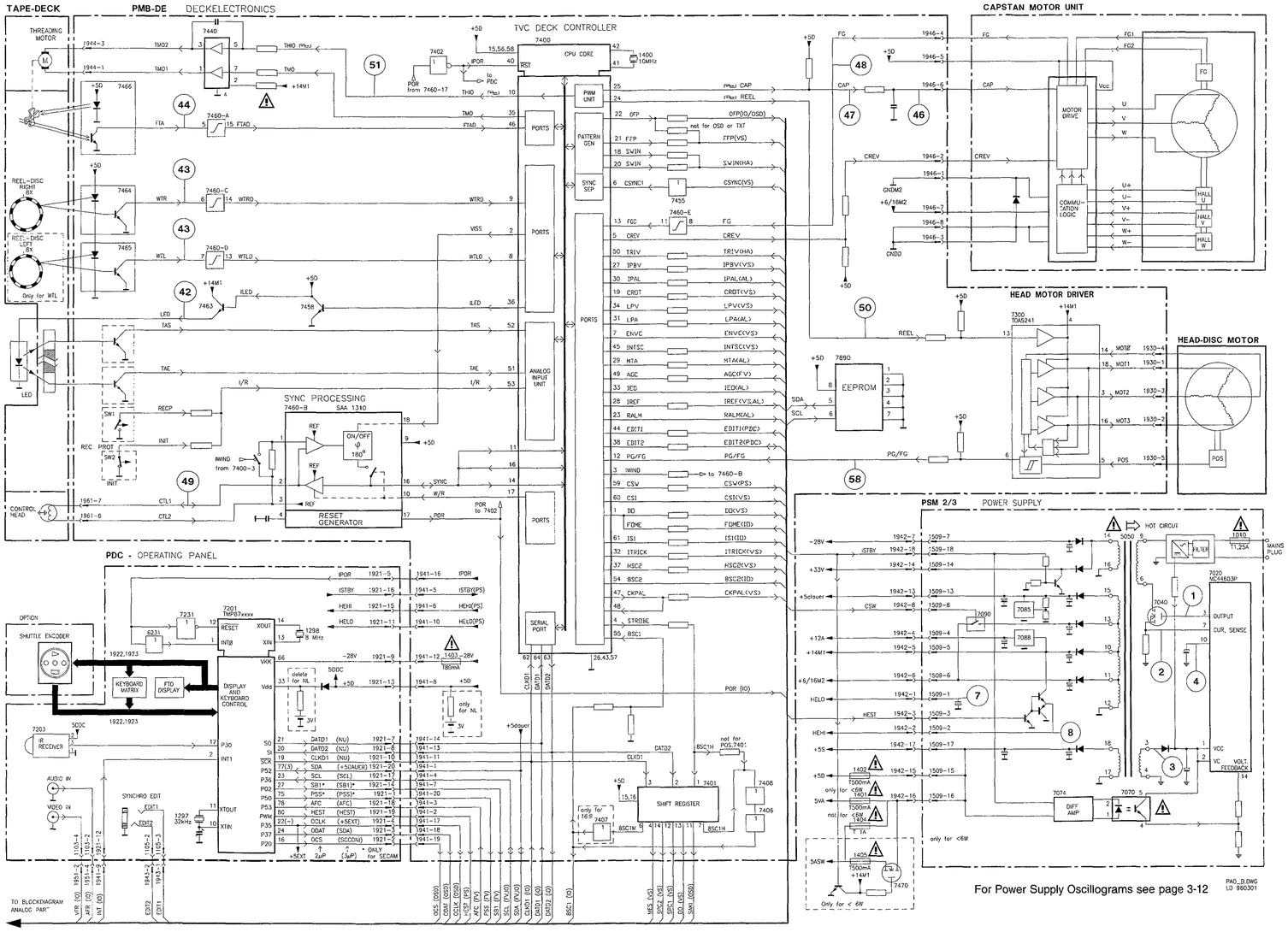


POS	PAL-BG /01	PAL-I /05	PAL-I-IR /07	PAL-BG/SEC-L /39	PAL-BG/SEC-DK /59	PAL-BG/SEC-DK /59 amtablott
1700	TP916/TP916L	TP944	TP946	TP926	TP956	TP956
1720	------	------	------	G1965M	------	------
1721	G1966M	G1965M	G1965M	------	K2955M	G1966M
1722	------	------	------	------	------	L9360M
1740	TRAP 5,5MHz	TRAP 6,0MHz	TRAP 6,0MHz	TRAP 5,5MHz	TRAP 5,5MHz	TRAP 5,5MHz
1745	BP 5,5MHz	BP 6,0MHz	BP 6,0MHz	BP 5,5MHz	BP 5,5MHz	BP 5,5MHz
1746	------	------	------	------	BP 6,5MHz	BP 6,5MHz
7720	TDA9800T	TDA9800T	TDA9800T	------	TDA9800T	TDA9800T
7721	------	------	------	TDA9812T	------	------
7722	------	------	------	HEF4053	------	------

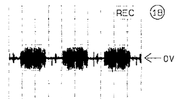


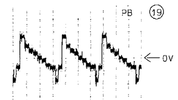
3-10

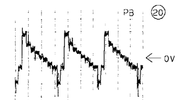
Block Diagram Digital Part Paolina Mono

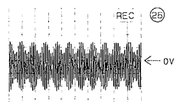


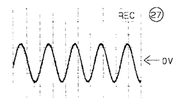
Oscillograms Block Diagram

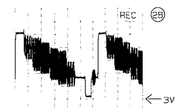


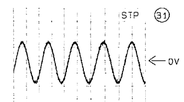


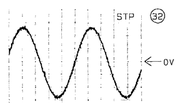


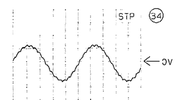


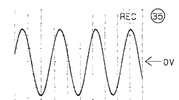


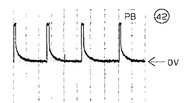


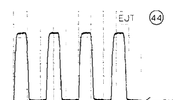


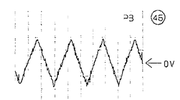


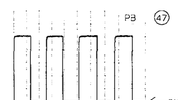


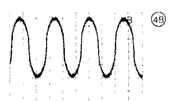


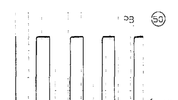


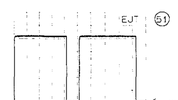


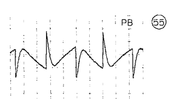


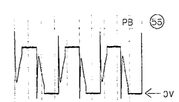


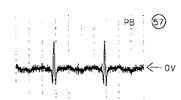


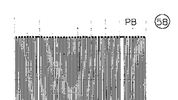






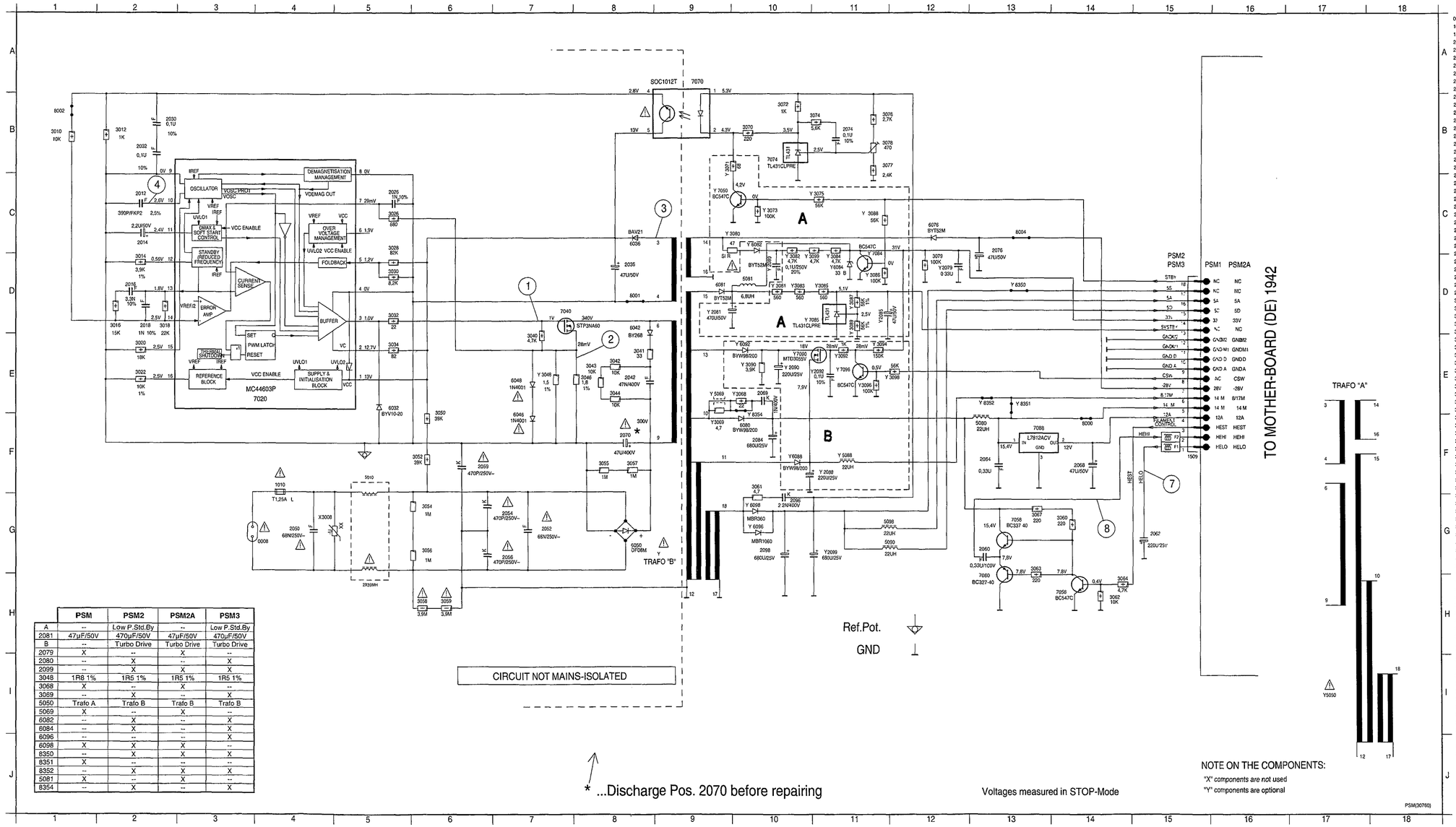






3-11

Power Supply PSM (PS)



	PSM	PSM2	PSM2A	PSM3
A	--	Low P.Std.By	--	Low P.Std.By
2081	47µF/50V	470µF/50V	47µF/50V	470µF/50V
B	--	Turbo Drive	Turbo Drive	Turbo Drive
2079	X	--	X	--
2080	--	X	--	X
2099	--	X	X	X
3048	1R8 1%	1R5 1%	1R5 1%	1R5 1%
3068	X	--	X	--
3069	--	X	--	X
5050	Trafo A	Trafo B	Trafo B	Trafo B
5069	X	--	X	--
6082	--	X	--	X
6084	--	X	--	X
6096	--	--	--	X
6098	X	X	X	--
8350	--	X	X	X
8351	X	--	--	--
8352	--	X	X	X
5081	X	--	X	--
8354	--	X	--	X

0008 G4
1010 F4
1509 F15
2012 C2
2014 C2
2016 D2
2018 D2
2026 C5
2030 B2
2032 B2
2036 D8
2042 E8
2050 G4
2052 G7
2054 G7
2056 G7
2059 F6
2060 G13
2062 G15
2064 F13
2068 F14
2069 E10
2070 F8
2074 B11
2076 C13
2079 D12
2080 D10
2081 D9
2084 F10
2085 D11
2088 F11
2090 E10
2092 E11
2096 G10
2098 G10
2099 G11
3008 G4
3010 B1
3012 B2
3014 D2
3016 D2
3018 D2
3020 E2
3022 E2
3026 C5
3028 C5
3030 D5
3032 D5
3034 E5
3040 E7
3041 E8
3042 E8
3043 E8
3044 E8
3046 E8
3048 E7
3050 E6
3052 F6
3054 G6
3055 F8
3056 G6
3057 F8
3058 H6
3059 H6
3060 G14
3061 G10
3062 H14
3063 G13
3064 H14
3067 G13
3068 E10
3069 F9
3070 B10
3071 B9
3072 B10
3073 C10
3074 B11
3075 C11
3076 B11
3077 B11
3078 B11
3079 D12
3080 C10
3081 D10
3082 D10
3083 D10
3084 D11
3085 D11
3086 D11
3087 D11
3088 C11
3089 D11
3090 E10
3092 E11
3094 E11
3096 E11
3098 E12
3099 D11
5010 F5
5050 G9
5069 E9
5080 F13
5081 D10
5088 F11
5089 G12
5098 G12
6032 E5
6036 C8
6042 D8
6046 F7
6048 E7
6050 G8
6076 C12
6080 F10
6081 D9
6082 C10
6084 D11
6088 F10
6092 E10
6096 G10
6098 G10
7020 E4
7040 D7
7050 C9
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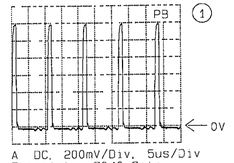
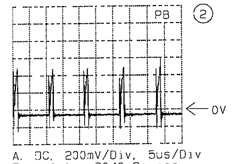
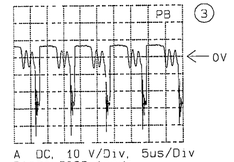
7085 D11
7088 F13
7090 E10
7096 E11



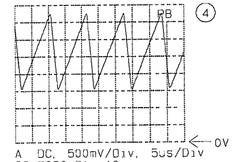
A DC, 200mV/Div, 5us/Div
Transistor 7040 Gate



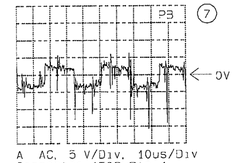
A DC, 200mV/Div, 5us/Div
Transistor 7040 Source



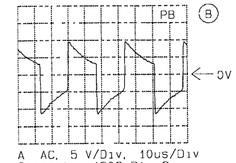
A DC, 10 V/Div, 5us/Div
Diode 6036 Anode



A DC, 500mV/Div, 5us/Div
IC 7020 Pin 10



A AC, 5 V/Div, 10us/Div
Connector 1509 Pin 1



A AC, 5 V/Div, 10us/Div
Connector 1509 Pin 2

Power Supply PSM (PS)

A **cut**

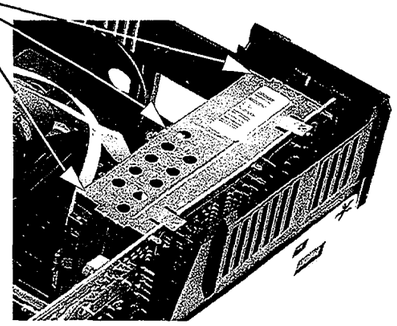


Fig.1

GB **How to remove the power supply shield**
Cut the three slicing plates **A** , see Fig. 1.

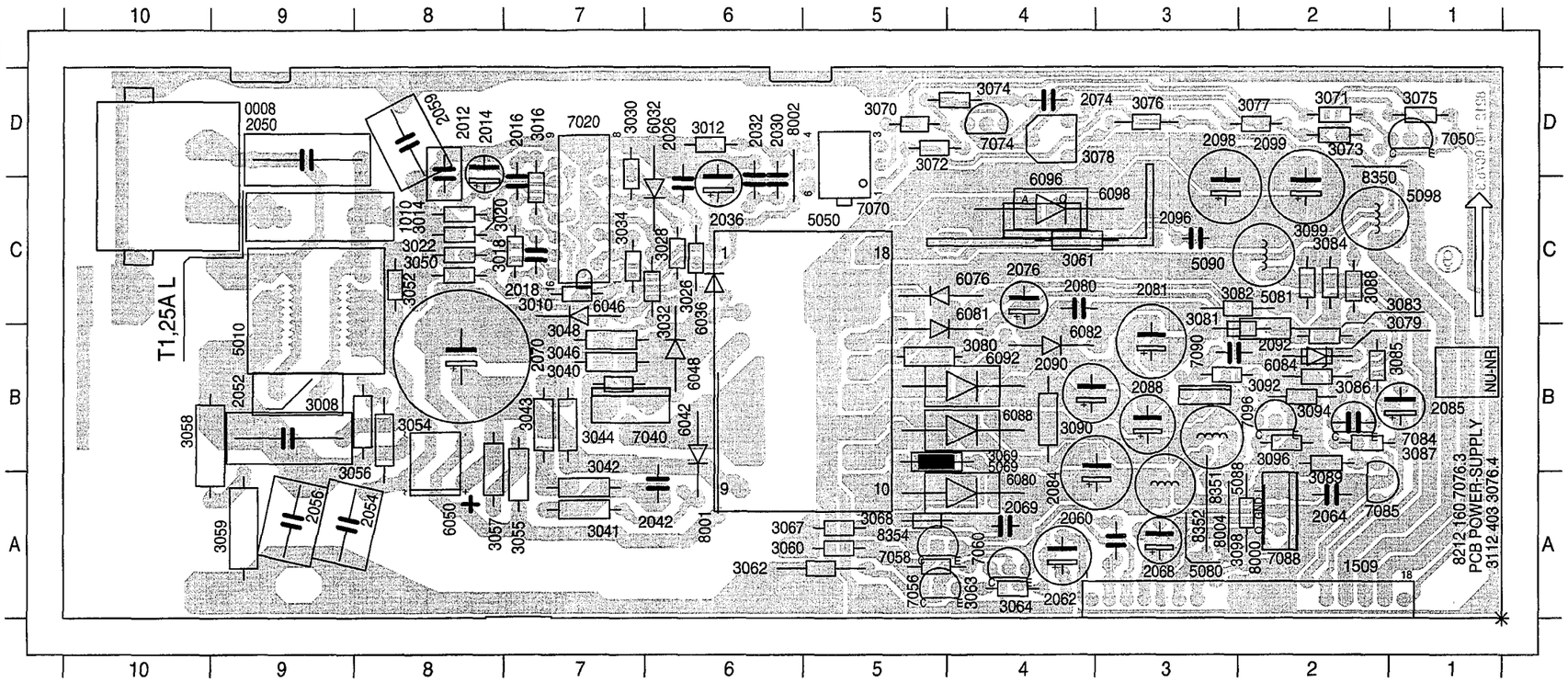
D **Wie entferne ich die Abdeckung des Power Supply**
Die 3 Stege **A** (mittels Seitenschneider) durchtrennen, siehe Fig. 1.

NL **Verwijderen afscherming voedingseenheid**
Knip de drie lipjes **A** (m b.v zijkniptang) door, zie fig. 1.

F **Comment retirer le blindage de l'alimentation**
Coupez les trois ergots métalliques **A** , voir Fig. 1.

I **Come rimuovere la schermatura dell'alimentatore**
Tagliare i tre punti di connesione **A** , vedere fig. 1.

E **Como retirar el apantallamiento de la fuente de alimentación**
Cortar las tres pestañas **A** , ver Fig 1.



0008 D 10	2032 D 6	2062 A 4	2081 B 3	3008 B 9	3028 C 6	3046 B 7	3059 A 9	3070 D 5	3079 B 2	3088 C 2	5050 B 5	6042 B 6	6088 B 4	7060 A 4	8001 B 6
1010 C 9	2036 C 6	2064 A 2	2084 B 3	3010 C 7	3030 D 6	3048 B 7	3060 A 5	3071 D 2	3080 B 4	3089 B 2	5069 B 4	6046 C 7	6092 B 4	7070 D 5	8002 D 5
1509 A 2	2042 A 6	2068 A 3	2085 B 1	3012 D 6	3032 C 6	3050 C 8	3061 C 3	3072 D 4	3081 B 2	3090 B 4	5080 A 3	6048 B 6	6096 C 4	7074 D 4	8004 A 2
2012 D 8	2050 D 9	2069 A 4	2088 B 3	3014 C 8	3034 C 6	3052 C 8	3062 A 5	3073 D 2	3082 C 2	3092 B 2	5081 B 2	6050 B 8	6098 C 4	7084 B 1	8350 D 1
2014 D 7	2052 B 9	2070 B 8	2090 B 3	3016 C 7	3040 B 7	3054 B 8	3063 A 4	3074 D 4	3083 B 2	3094 B 2	5088 B 2	6076 C 4	7020 C 7	7085 A 1	8351 A 2
2016 C 7	2054 A 8	2074 D 4	2092 B 2	3018 C 7	3041 A 7	3055 B 7	3064 A 4	3075 D 1	3084 C 2	3096 B 2	5090 C 2	6080 A 4	7040 B 6	7088 A 2	8352 A 2
2018 C 7	2056 A 9	2076 C 4	2096 C 3	3020 C 8	3042 A 7	3056 B 8	3067 A 5	3076 D 3	3085 B 1	3098 A 2	5098 C 1	6081 B 4	7050 D 1	7090 B 3	8354 A 4
2026 C 6	2059 D 8	2079 B 2	2098 C 2	3022 C 8	3043 B 7	3057 B 7	3068 A 4	3077 D 2	3086 B 2	3099 C 2	6032 C 6	6082 B 4	7056 A 4	7096 B 2	
2030 D 5	2060 A 3	2080 C 3	2099 C 2	3026 C 6	3044 B 7	3058 B 9	3069 B 4	3078 D 4	3087 B 1	5010 C 9	6036 C 6	6084 B 2	7058 A 4	8000 A 2	

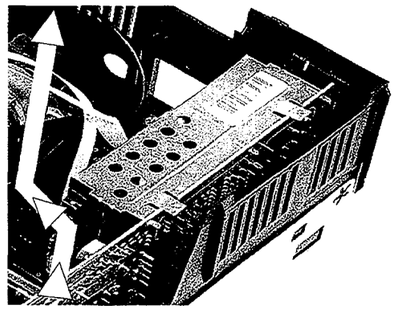


Fig. 2

GB Lift-up the shield cover about 3mm, disengage it and pull it out (see Fig. 2).
Note: To mount the shield cover please proceed in the reverse order

D Die Abdeckung an der Oberseite 3 mm anheben und nach innen abziehen, siehe Fig. 2. Die Montage erfolgt in umgekehrter Reihenfolge.

NL Til het afschermingsdeksel aan de bovenzijde 3 mm op, draai deze naar binnen, zie fig. 2. Nu kan de afscherming verwijderd worden. Opm: De montage van de afscherming geschiedt in omgekeerde volgorde.

F Soulevez le blindage de 3mm vers le haut, dégagez-le vers la gauche et retirez-le (voir Fig. 2).
Pour remettre en place le blindage, procédez dans l'ordrte inverse.

I Sollevare il coperchio dalla parte superiore di circa 3 mm e ruotarlo per toglierlo, vedere fig. 2.
Ora la schermatura può essere tolta.
Nota: Per rimontare la schermatura, procedere in ordine inverso.

E Levantar la tapa de pantalla 3 mm, girarla y tirar de ella hacia arriba, ver Fig. 2.
Ahora el apantallamiento puede ser retirado.
Nota· Para montar el apantallamiento proceder en el orden inverso.

B **solder**

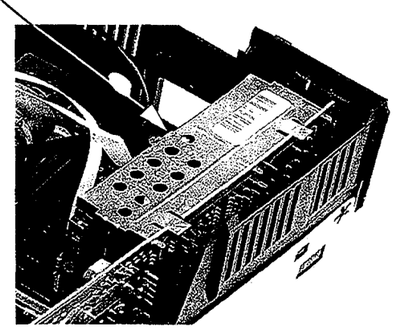


Fig.3

GB **Important:**
After mounting the shield plate it is indispensable that the splicing plate B is resoldered for safety reasons, see Fig. 3.

D **Achtung:**
Nach Montage des Deckels muß der Steg B unbedingt aus Sicherheitsgründen mit dem Gehäuse verlötet werden, siehe Fig. 3.

NL **Belangrijk:**
Na montage van de afschermplaat is het noodzakelijk dat het lipje B om veiligheidsredenen weer aan het huis gesoldeerd wordt, zie fig. 3.

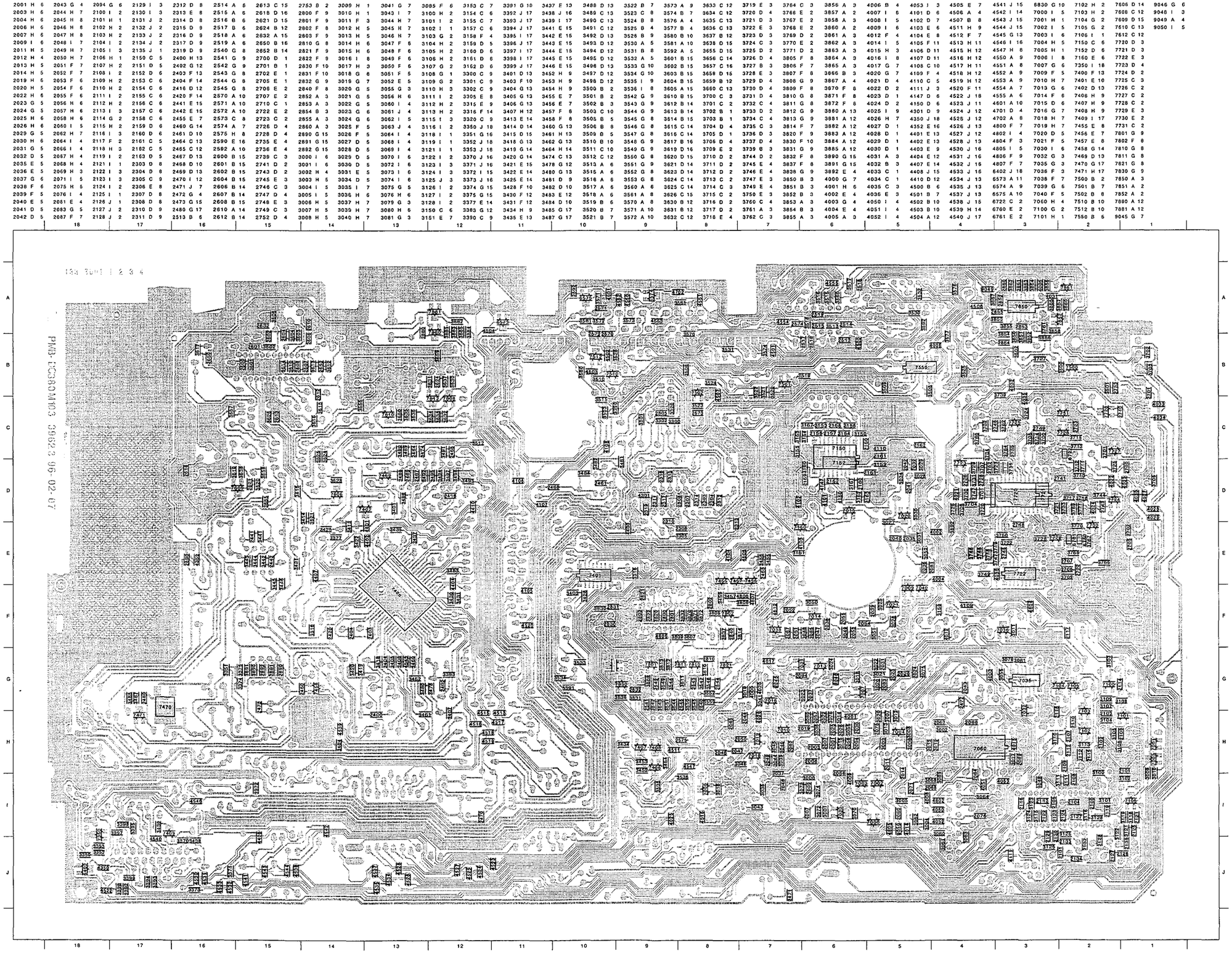
F **Important:**
Une fois le blindage remis en place, il est indispensable de resouder l'ergot B pour des raisons de sécurité. voir Fig. 3.

I **Importante:**
Dopo aver montato la schermatura è indispensabile per ragioni di sicurezza saldare accuratamente la piastra B , vedere fig. 3.

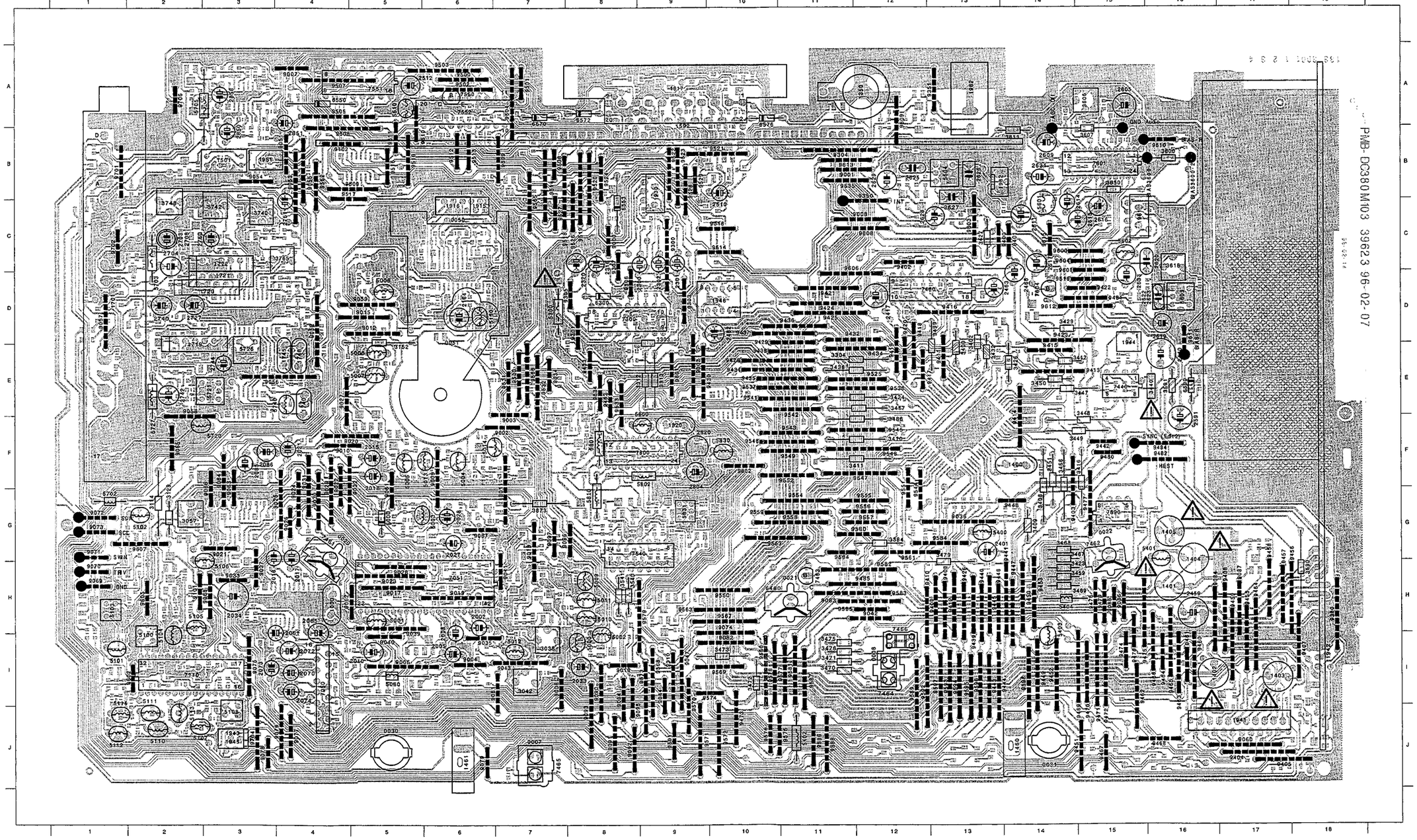
E **Importante:**
Despues de montar el apantallamiento es indispensable que la pestaña B quede soldada por razones de seguridad, ver Fig. 3.

3-13

Mother Board PMB - Layout 3 from WD1 till WD9

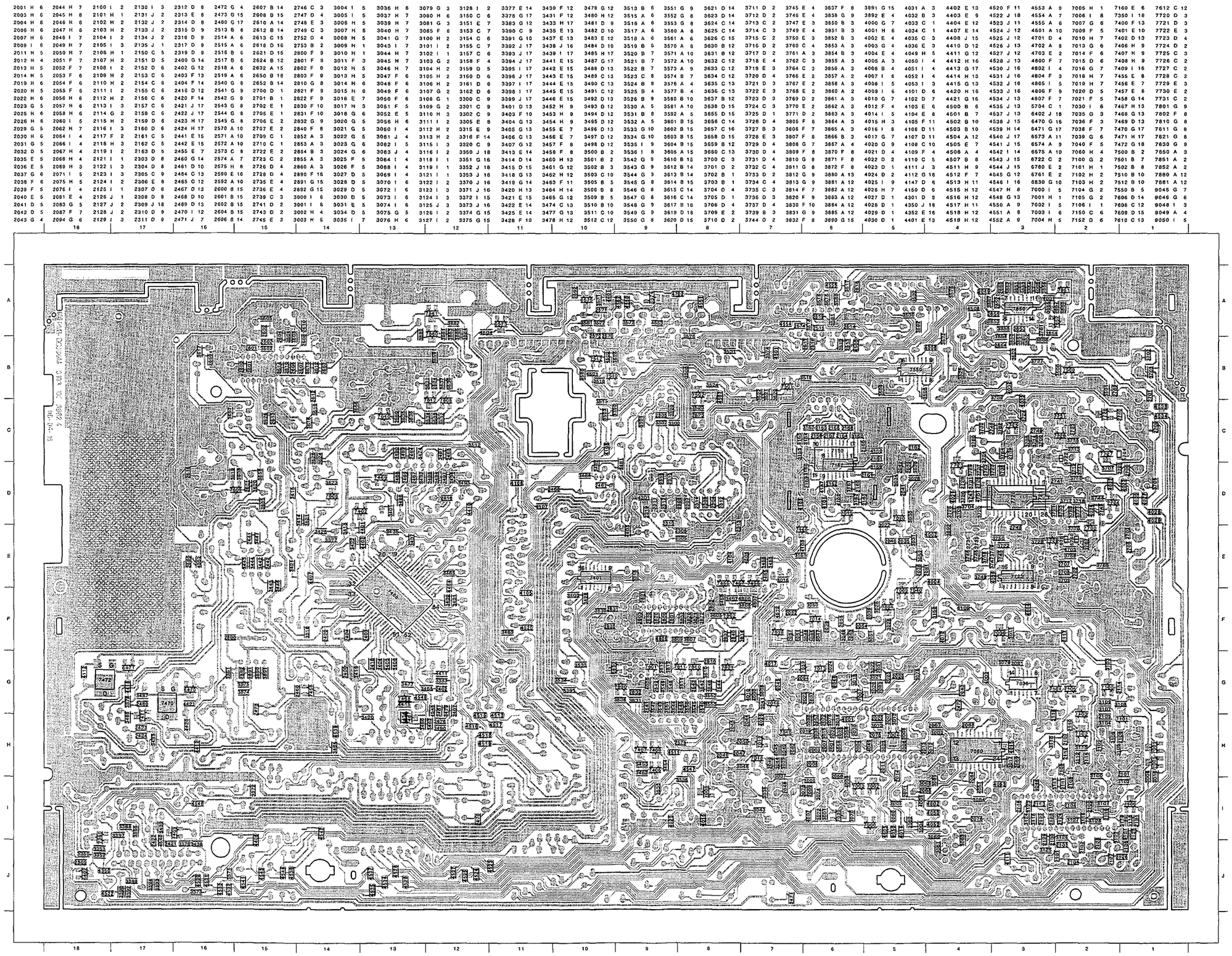


Mother Board PMB - Layout 3 from WD1 till WD9

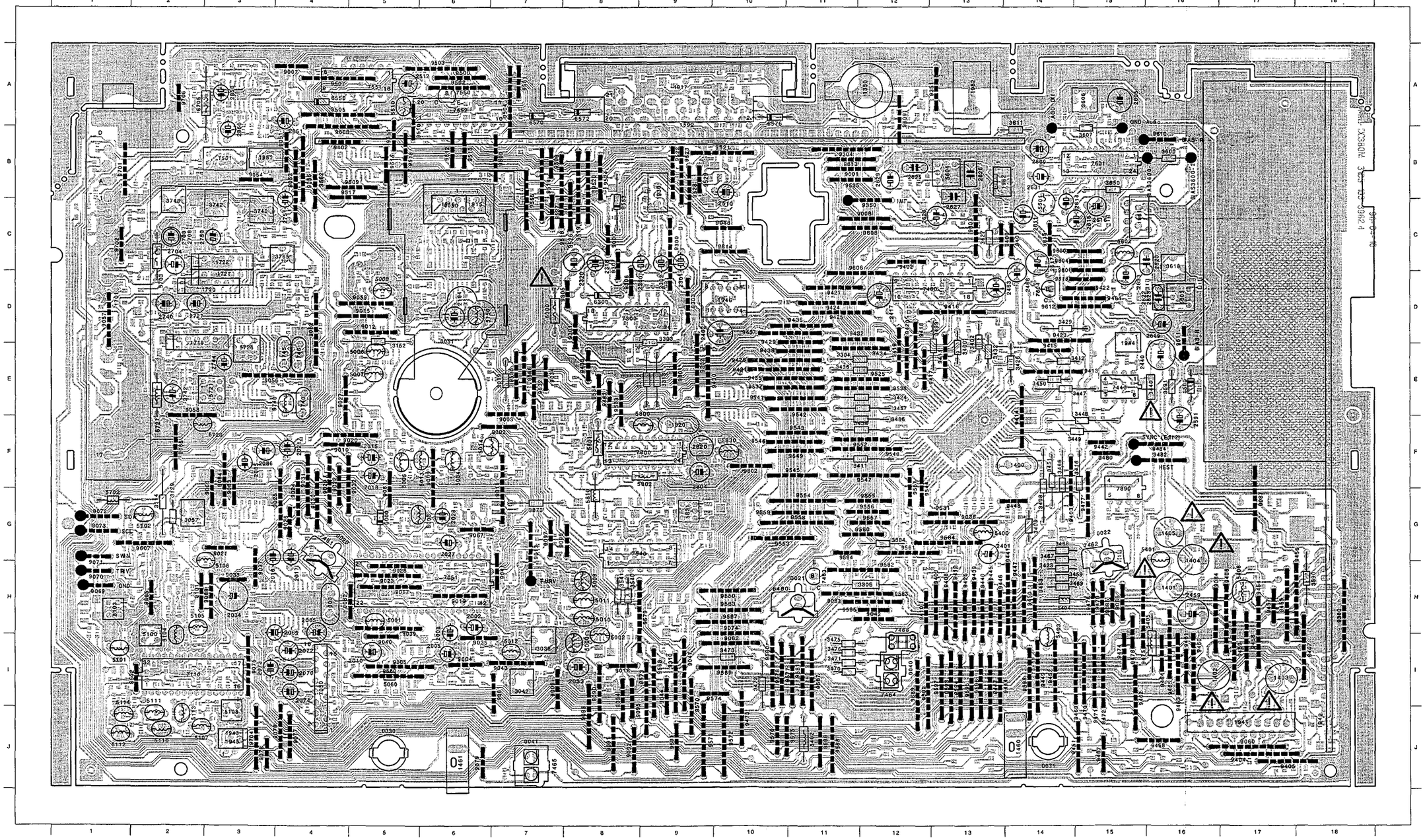


3-15

Mother Board PMB - Layout 4 from WD10 ownwards



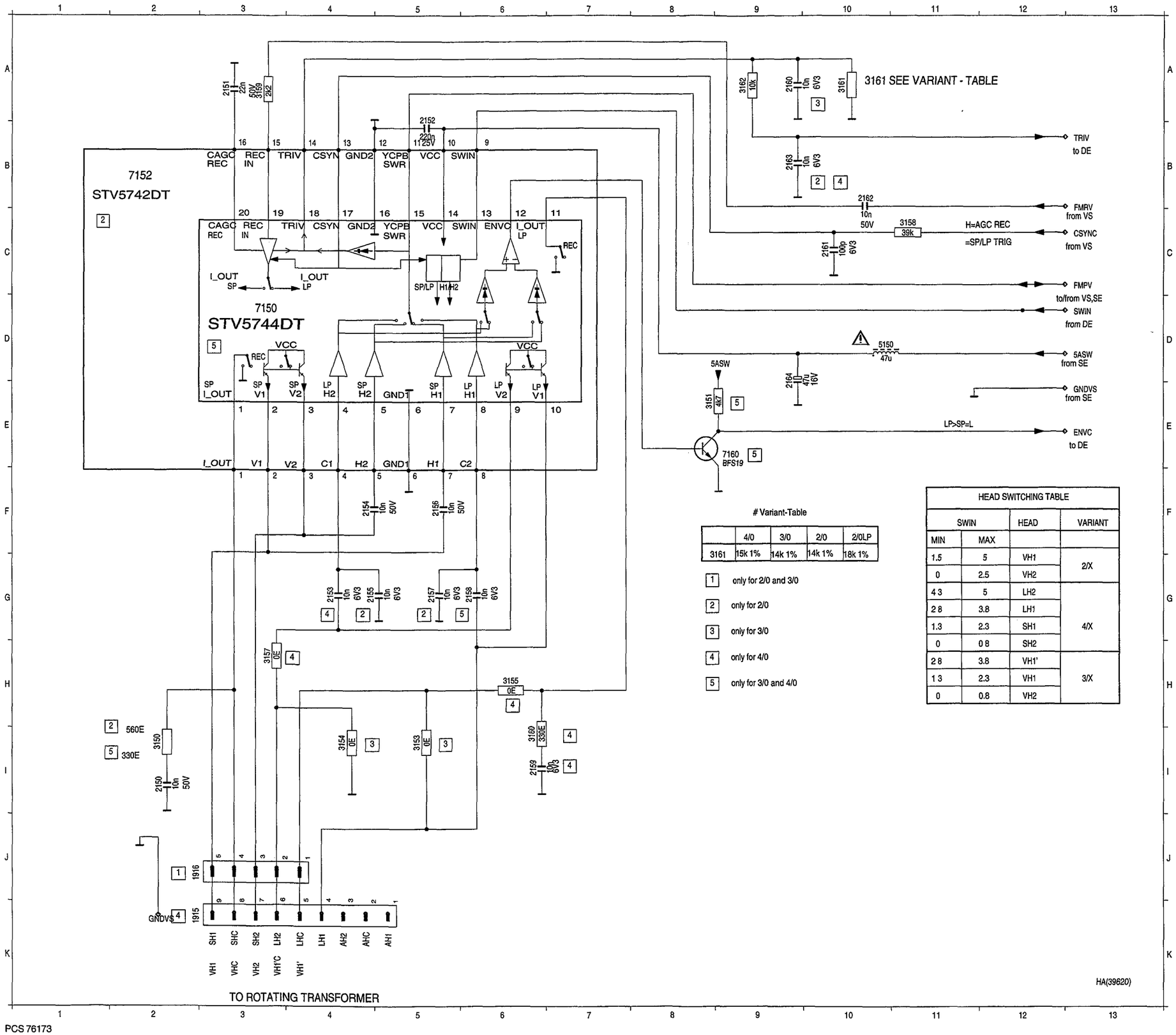
Mother Board PMB - Layout 4 from WD10 ownwards



PCS 76172

3-17

Mother Board PMB - Head Amplifier (HA)



1915 K2
1916 J2
2150 I2
2151 A3
2152 B5
2153 G4
2154 F4
2155 G4
2156 F5
2157 G5
2158 G6
2159 I6
2160 A9
2161 C10
2162 B10
2163 B9
2164 D9
3150 I2
3151 E8
3153 I5
3154 I4
3155 H6
3157 H3
3158 C11
3159 A3
3160 I6
3161 A10
3162 A9
5150 D10
7150 D3
7152 B2
7160 E9

Variant-Table

	4/0	3/0	2/0	2/0LP
3161	15k 1%	14k 1%	14k 1%	18k 1%

[1] only for 2/0 and 3/0

[2] only for 2/0

[3] only for 3/0

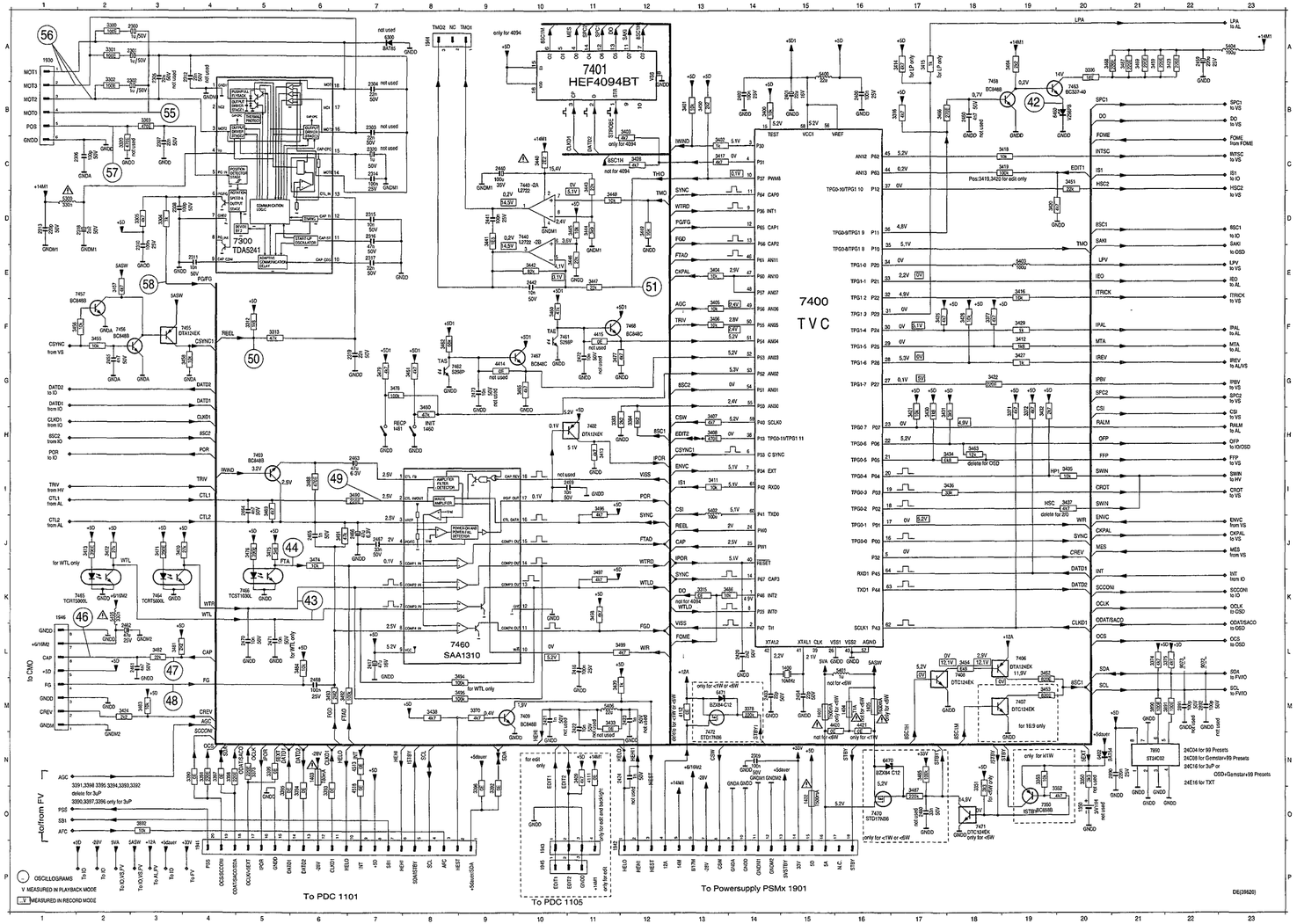
[4] only for 4/0

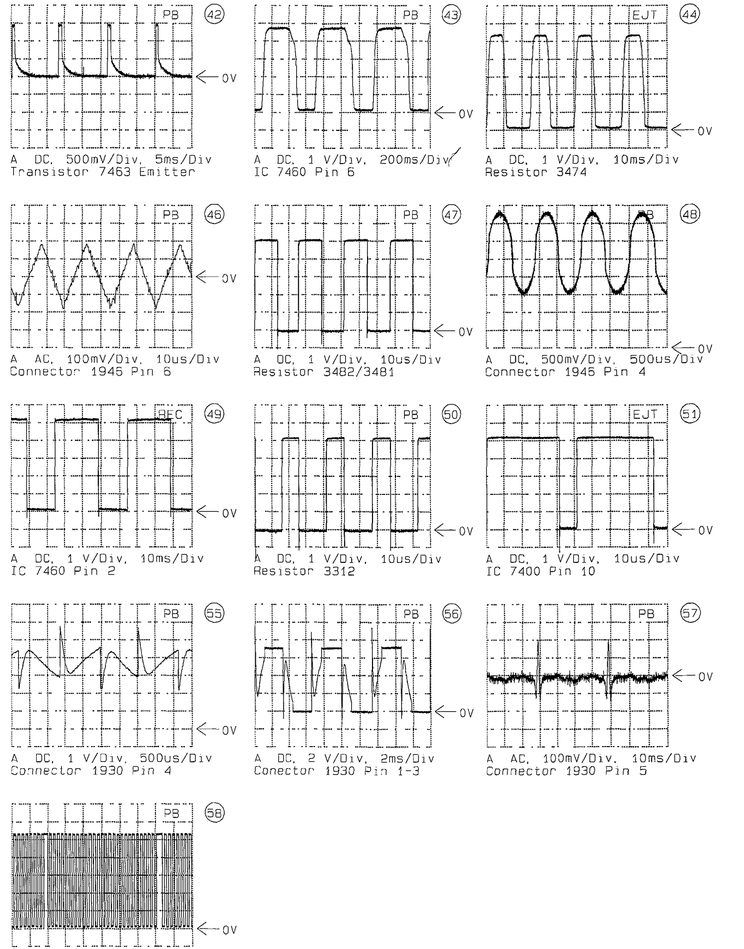
[5] only for 3/0 and 4/0

HEAD SWITCHING TABLE

SWIN		HEAD	VARIANT
MIN	MAX		
1.5	5	VH1	2/X
0	2.5	VH2	
4 3	5	LH2	4/X
2 8	3.8	LH1	
1.3	2.3	SH1	
0	0 8	SH2	
2 8	3.8	VH1'	3/X
1 3	2.3	VH1	
0	0.8	VH2	

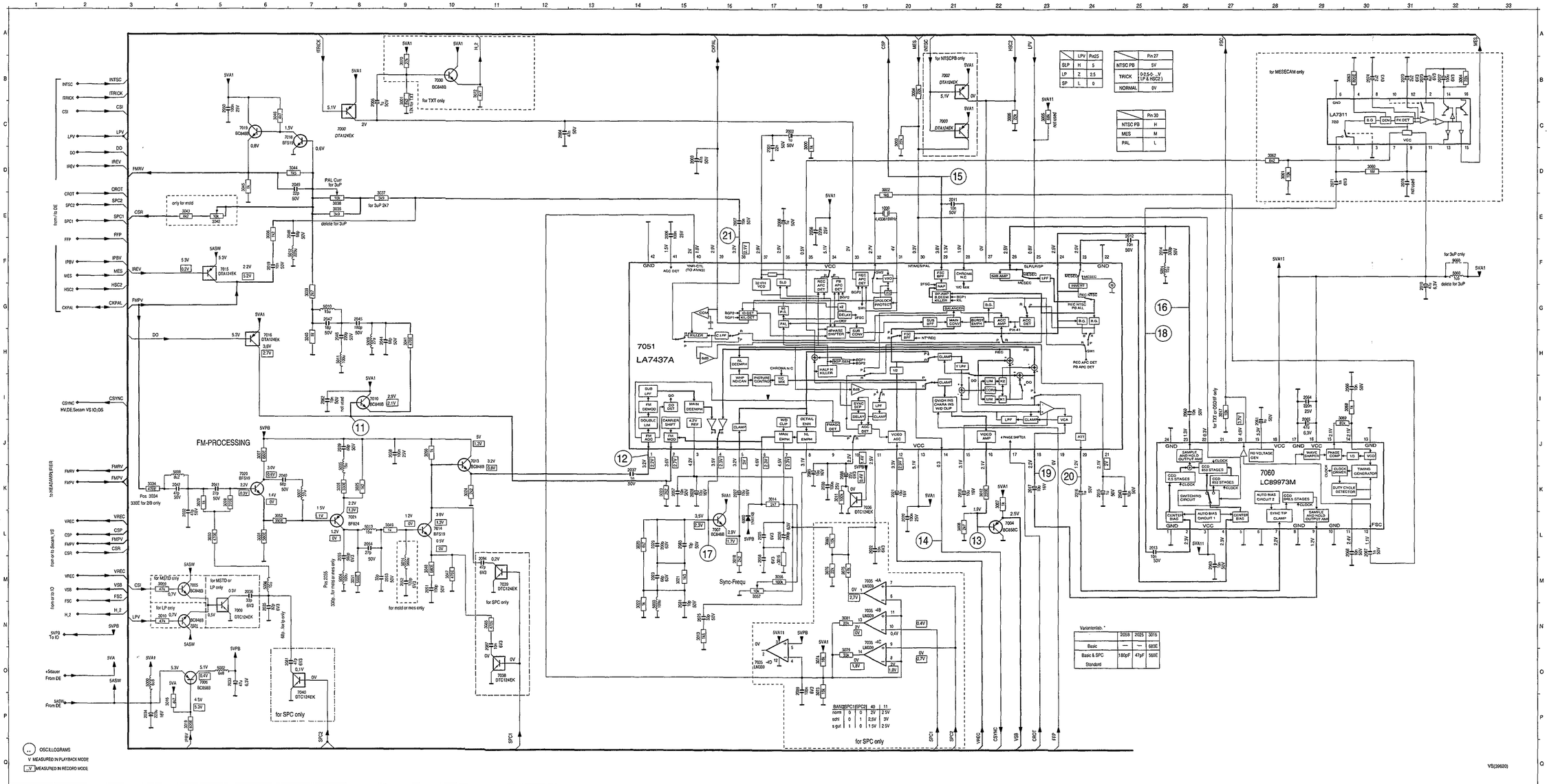
Mother Board PMB - Deck Electronics (DE)





3-19

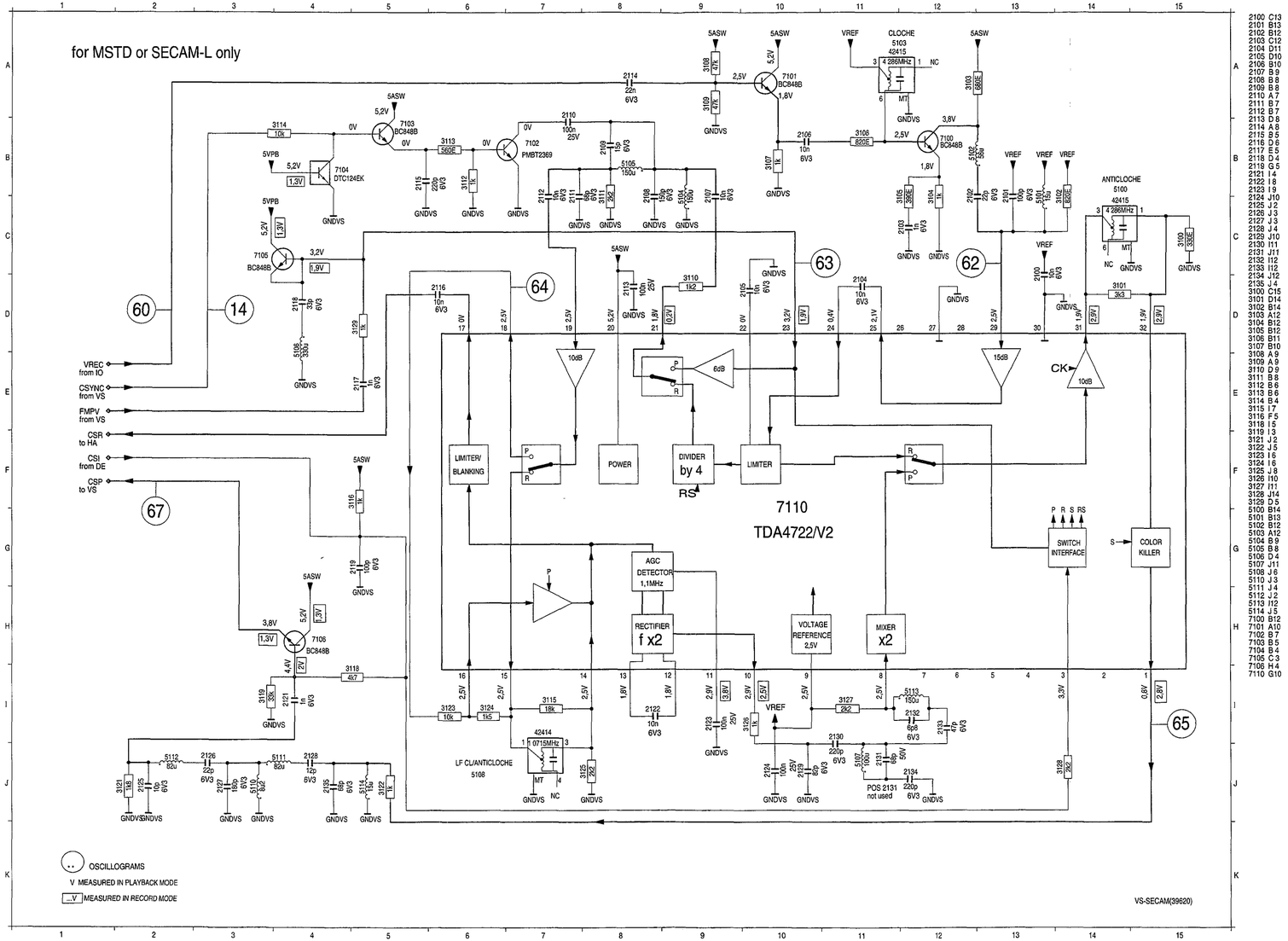
Mother Board PMB - Video Signal Processing (VS)



1000 E19 3074 Q18
2001 C17 3075 M19
2002 C17 3076 M18
2003 D15 3079 O18
2004 C12 3080 L18
2005 C 8 3081 N19
2006 E15 3085 N11
2007 E16 5000 O 3
2008 E17 5001 P26
2009 D18 5002 O 5
2010 G31 5003 N14
2011 E21 5004 M 8
2012 E25 5005 K 6
2013 L25 5006 M 6
2014 F26 5007 K 7
2015 K24 5008 K 4
2016 K24 5009 H 8
2017 K23 5010 G 7
2018 K21 5011 H 8
2019 F 6 5012 F 7
2020 L20 5013 L 9
2021 K20 5014 M 9
2022 L19 5060 P32
2023 M14 6000 L16
2024 L17 7000 C 6
2026 L17 7001 N 4
2027 K16 7002 B21
2028 K15 7003 C21
2029 L14 7004 L22
2030 K18 7005 M 4
2031 N15 7006 O 5
2032 L 4 7007 L16
2033 O 5 7009 N 5
2034 P 3 7010 I 8
2035 N 6 7013 J10
2036 M 6 7014 L10
2037 K14 7015 F 5
2038 J 9 7016 H 6
2039 J 8 7018 C 7
2040 K 6 7019 C 6
2041 K 5 7020 K 5
2042 K 4 7021 L 8
2043 K 3 7033 B10
2044 H 9 7035 O17
2045 G 8 7035 M19
2046 H 8 7035 N19
2047 G 7 7035 N19
2048 E 7 7036 K19
2049 D 7 7038 O11
2050 C 5 7039 M11
2051 M10 7040 P 7
2052 M 9 7050 C29
2053 M 9 7051 H14
2054 L 8 7060 K28
2055 M 8 9660 F32
2056 E18
2057 N15
2058 M17
2060 D26
2061 C8
2062 I 7
2064 C9
2065 D9
2066 D30
2067 L30
2068 L30
2069 M27
2070 D31
2071 D29
2072 B32
2073 B31
2074 B30
2075 N15
2076 D31
2081 D 7
2083 L15
2085 K18
2086 K19
2087 N11
2094 M11
3000 C18
3001 B 9
3002 D19
3003 C20
3004 B20
3005 C23
3006 C22
3007 K22
3008 L21
3009 M 4
3010 N 4
3011 K18
3012 K22
3013 N15
3014 K17
3015 M17
3015 P 4
3017 I27
3018 M16
3019 P 4
3020 L14
3021 M15
3022 N14
3023 K15
3024 K10
3025 K 8
3026 K 8
3027 J 6
3028 K 5
3029 K 5
3030 L 5
3031 L 6
3034 K 3
3035 E 8
3036 E 6
3037 E 8
3038 E 6
3039 G 7
3040 H 7
3041 H 9
3042 E 5
3043 E 4
3044 D 7
3045 D 6
3046 C 6
3047 M10
3048 M 9
3049 L 9
3050 J 9
3051 M 6
3052 L 6
3056 M17
3057 M17
3060 D30
3061 D29
3062 D28
3063 B30
3064 B32
3068 I30
3069 I29
3070 B 9
3072 B11
3073 G18

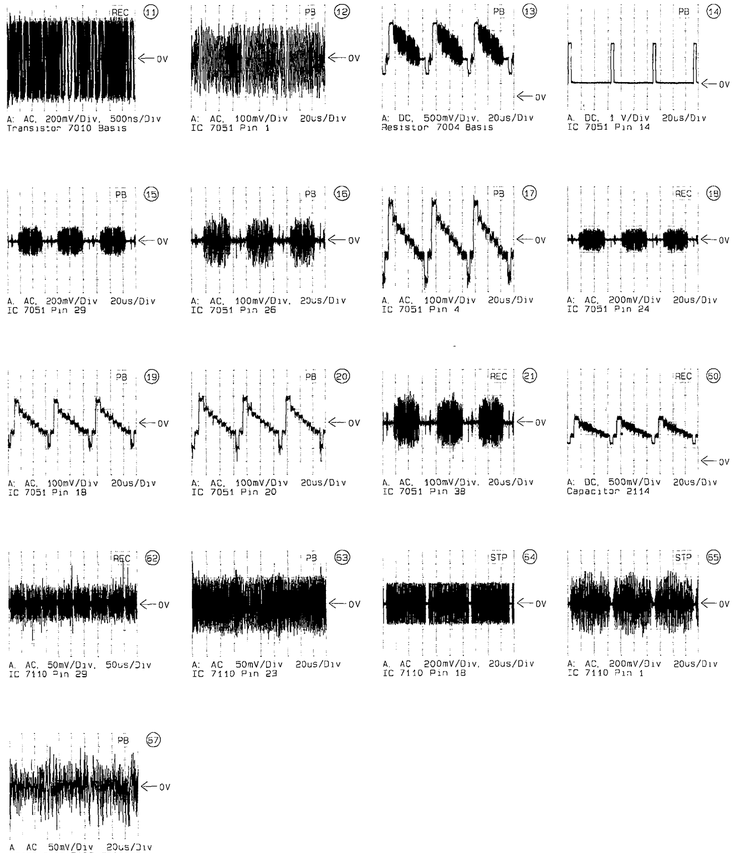
3-20

Mother Board PMB - Secam Processing (SE)



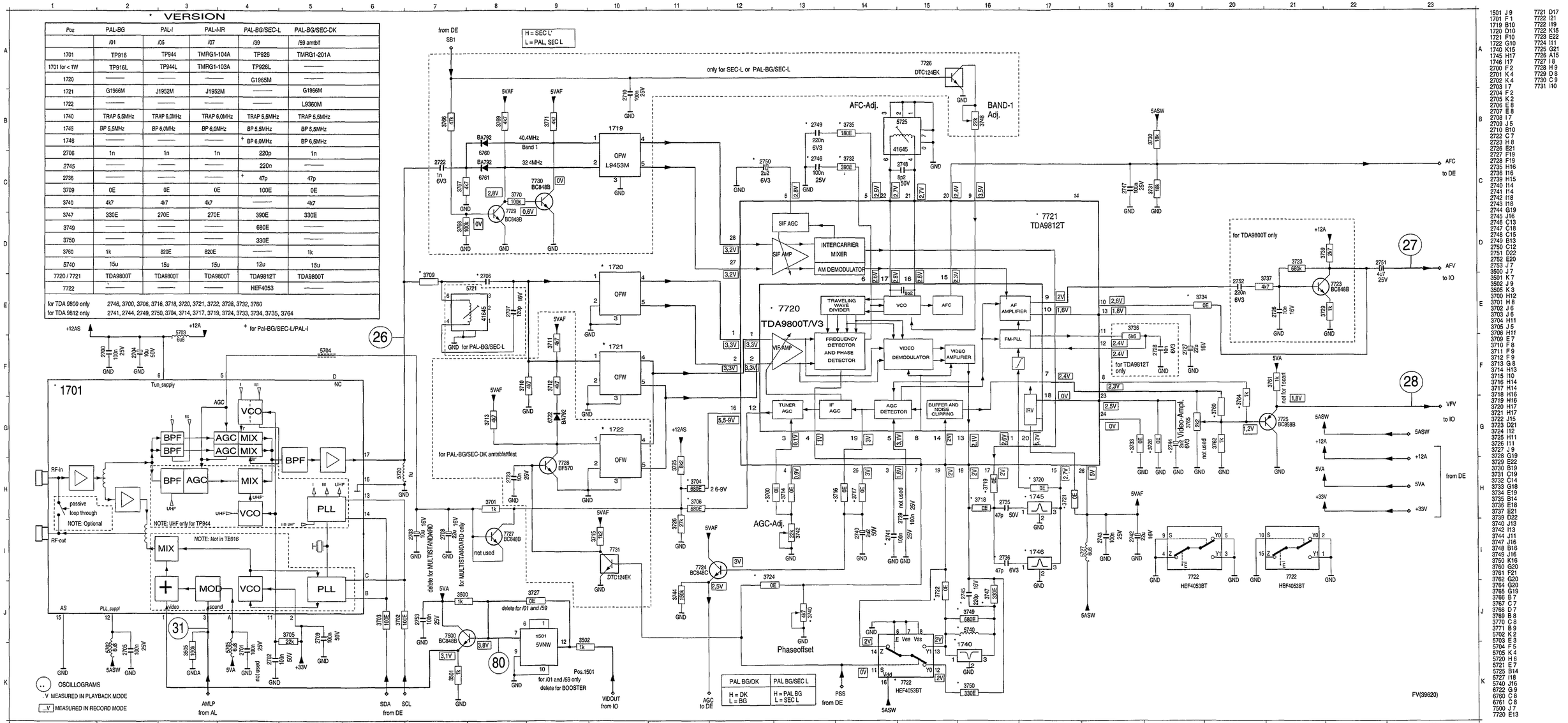
PCS 76176

Oscillograms



3-21

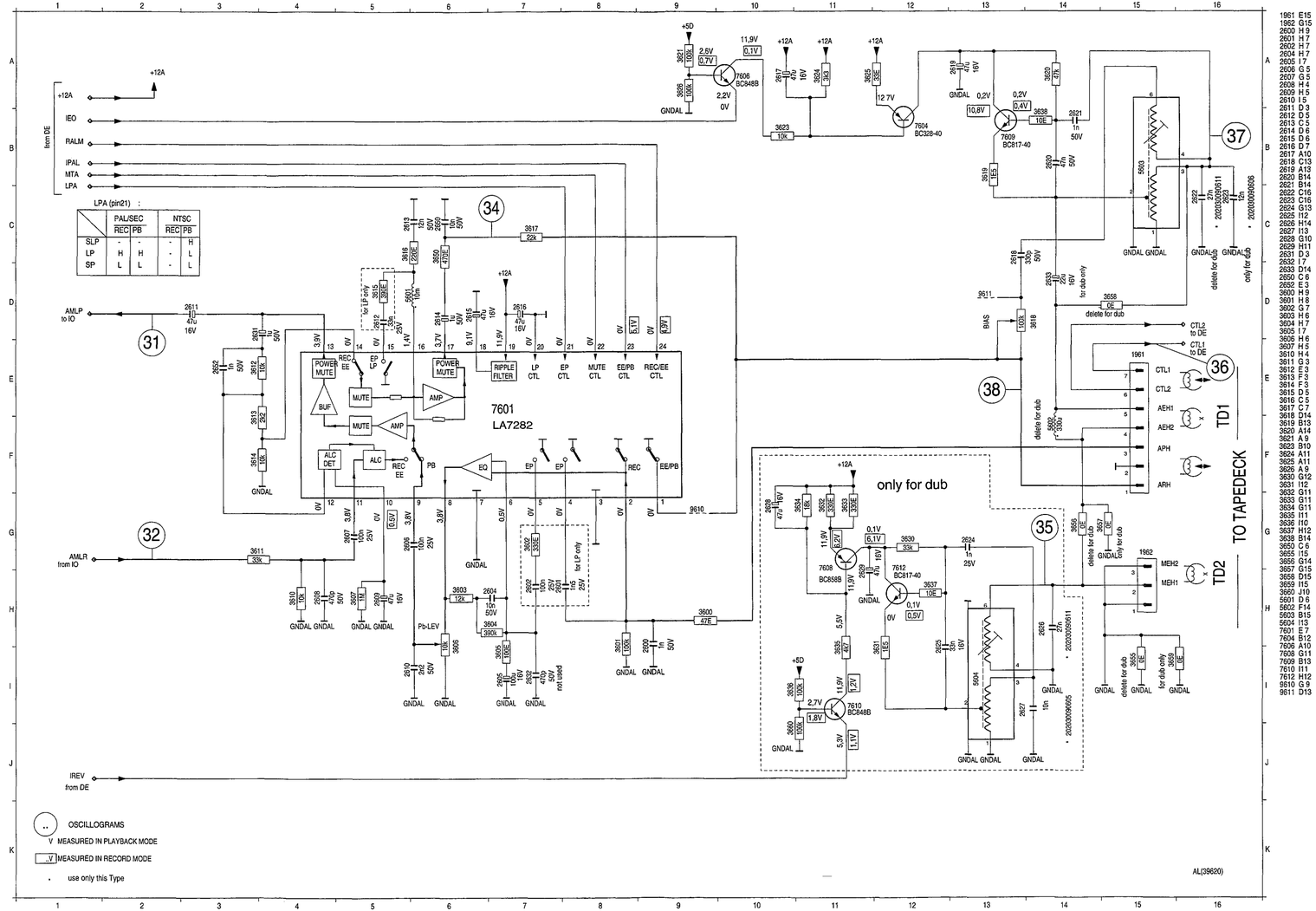
Mother Board PMB - Frontend (FV)



1501 J 9
1701 F 1
1719 B10
1720 D10
1721 F10
1722 G10
1740 K15
1745 H17
1746 I7
2700 F 2
2701 K 4
2702 K 4
2703 I 7
2704 F 2
2705 K 2
2706 E 8
2707 E 8
2708 I 7
2709 J 5
2710 B10
2722 C 7
2723 H 8
2726 E21
2727 F19
2728 F19
2735 H16
2736 I 6
2739 H15
2740 I 4
2741 I 4
2742 I 8
2743 I 8
2744 G19
2745 I 6
2746 C13
2747 C18
2748 C15
2749 B13
2750 C12
2751 D22
2752 E20
2753 J 7
3500 J 7
3501 K 7
3502 J 9
3505 K 3
3700 H12
3701 H 8
3702 J 6
3703 J 6
3704 H11
3705 J 5
3706 H11
3709 E 7
3710 F 8
3711 F 9
3712 F 9
3713 G 8
3714 H13
3715 I10
3716 H14
3717 H14
3718 H16
3719 H16
3720 H17
3721 H17
3722 J15
3723 D21
3724 I12
3725 H11
3726 I11
3727 J 9
3728 G19
3729 E22
3730 B19
3731 C19
3732 C14
3733 G18
3734 E19
3735 B14
3736 E18
3737 E21
3739 D22
3740 J13
3742 I13
3744 J11
3747 J16
3748 B16
3749 J16
3750 K16
3760 G20
3761 F21
3762 G20
3764 G20
3765 G19
3766 B 7
3767 C 7
3768 D 7
3769 B 8
3770 C 8
3771 B 9
5702 K 2
5703 E 3
5704 F 5
5705 K 4
5720 H 6
5721 E 7
5725 B14
5727 I18
5740 J16
6722 G 9
6760 C 8
6761 C 8
7500 J 7
7720 E13
7721 D17
7722 I21
7723 I19
7724 K15
7725 E22
7726 A15
7727 I8
7728 H 9
7729 D 8
7730 C 9
7731 I10

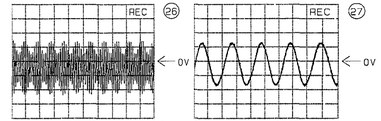
3-22

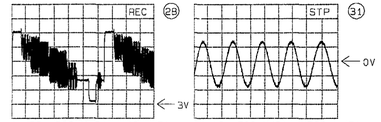
Mother Board PMB - Audio Linear (AL)

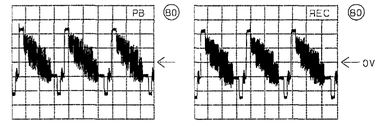


1961 E15
1962 G15
2600 H 9
2601 H 7
2602 H 7
2603 H 7
2604 H 7
2605 I 7
2606 G 5
2607 G 5
2608 H 4
2609 H 5
2610 I 5
2611 D 3
2612 D 5
2613 C 5
2614 D 6
2615 D 6
2616 D 7
2617 A10
2618 C13
2619 A13
2620 B14
2621 B14
2622 C16
2623 C16
2624 G13
2625 I12
2626 H14
2627 I13
2628 G10
2629 H11
2631 D 3
2632 I 7
2633 D14
2650 C 6
2652 E 3
3600 H 9
3601 H 8
3602 G 7
3603 H 6
3604 H 7
3605 I 7
3606 H 6
3607 H 6
3610 H 4
3611 G 3
3612 E 3
3613 F 3
3614 F 3
3615 D 5
3616 C 5
3617 C 7
3618 D14
3619 B13
3620 A14
3621 A 9
3623 B10
3624 A11
3625 A11
3626 A 9
3630 G12
3631 I12
3632 G11
3633 G11
3634 G11
3635 I11
3636 I10
3637 H12
3638 B14
3650 C 6
3655 I15
3656 G14
3657 G15
3658 D15
3659 I15
3660 J10
5601 D 6
5602 F14
5603 B15
5604 I13
7601 E 7
7604 B12
7606 A10
7608 G11
7609 B13
7610 I11
7612 H12
9610 G 9
9611 D13

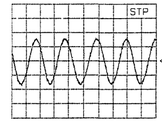
Oscillograms FV

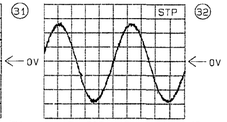


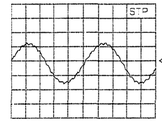


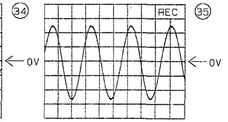


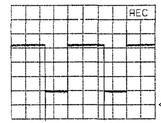
Oscillograms AL

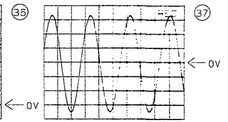


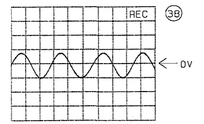






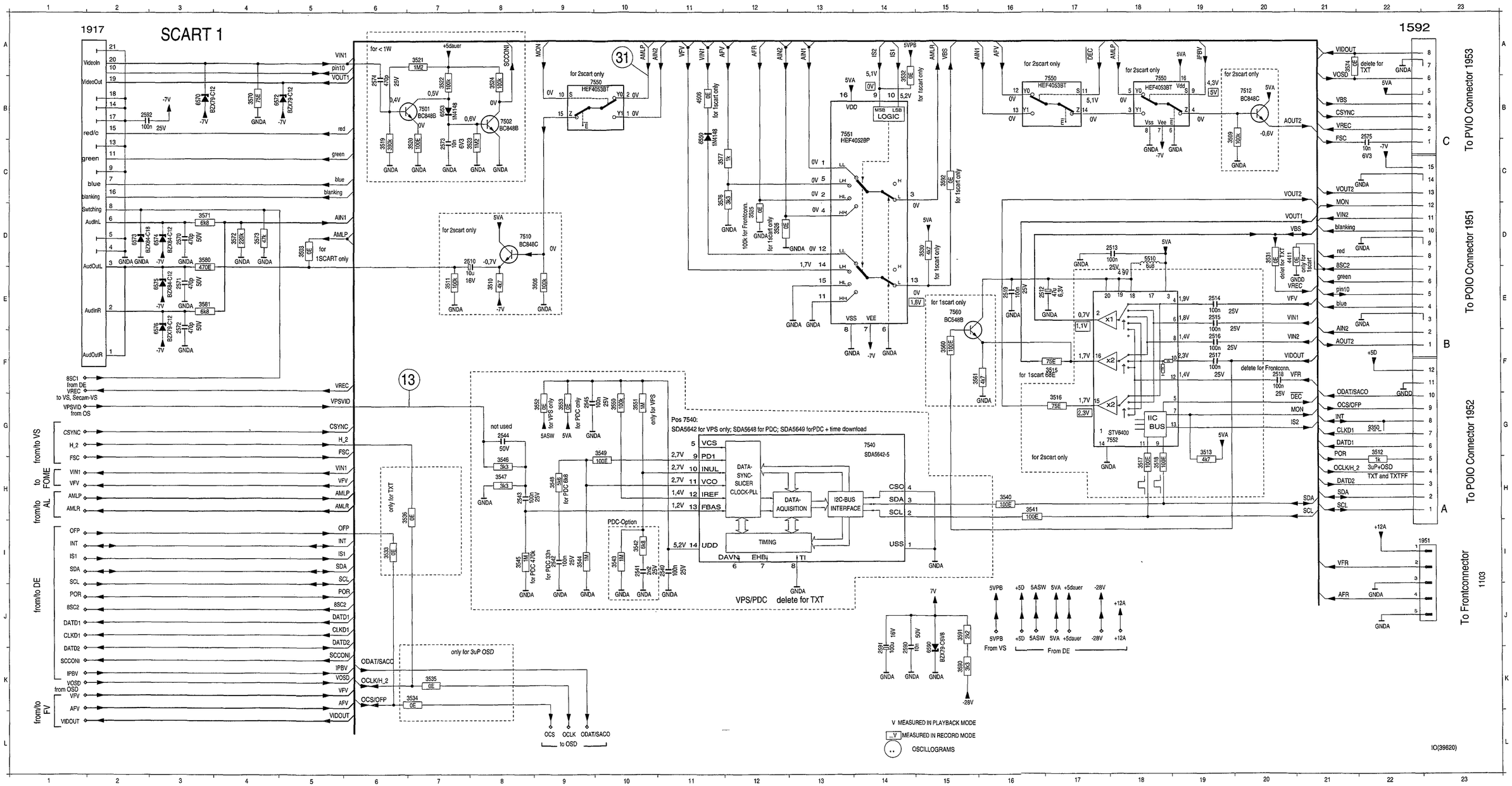






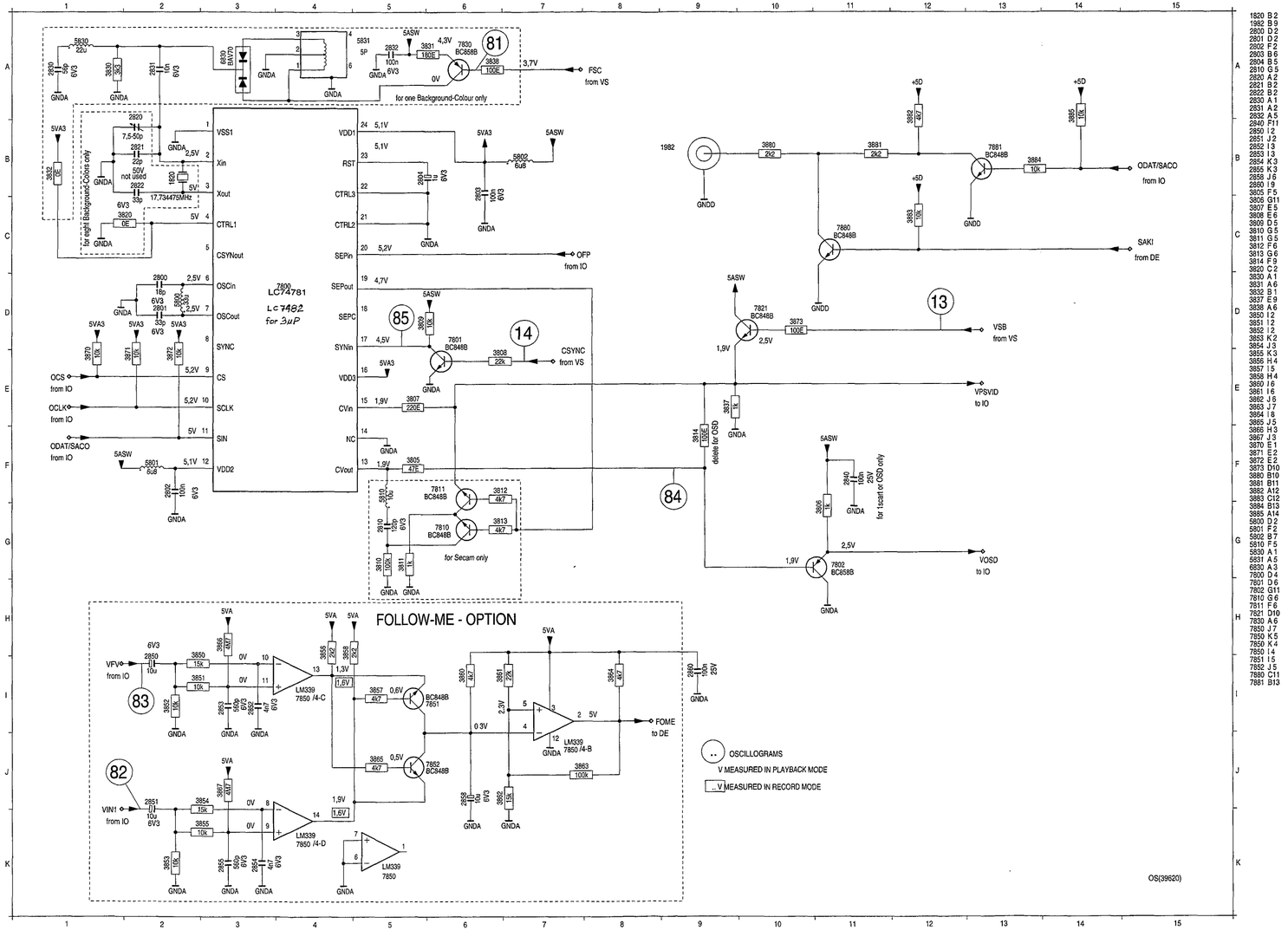
3-23

Mother Board PMB - In/Out (IO)



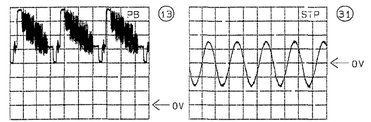
3-24

Mother Board PMB - On Screen Display (OS)

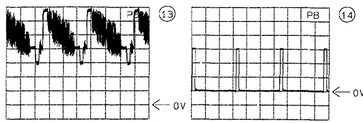


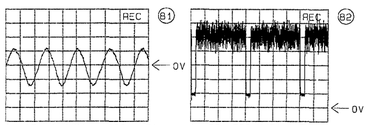
PCS 76180

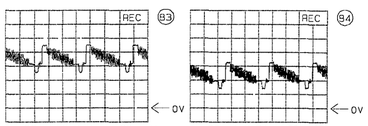
Oscillograms IO

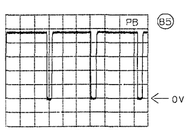


Oscillograms OS

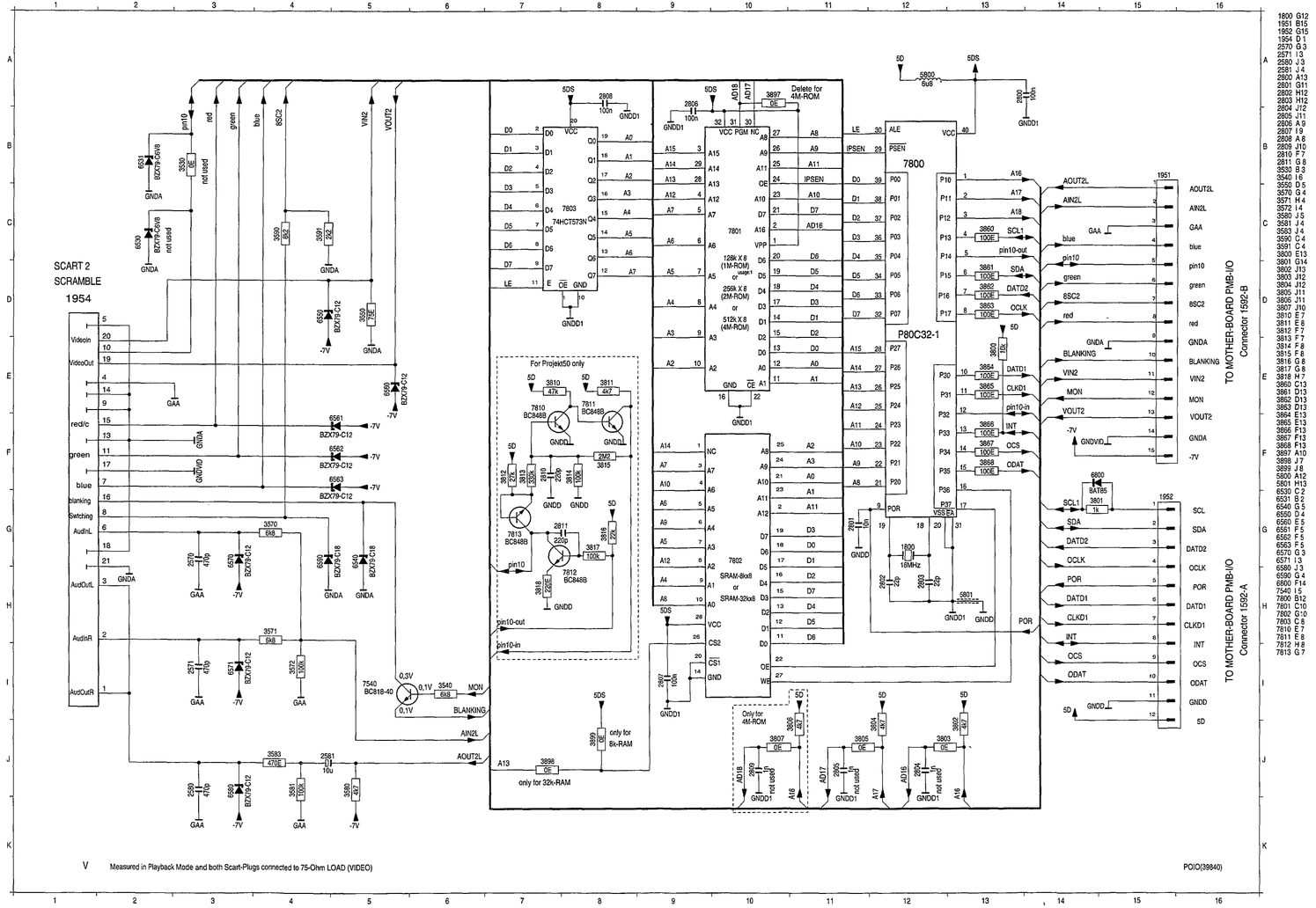


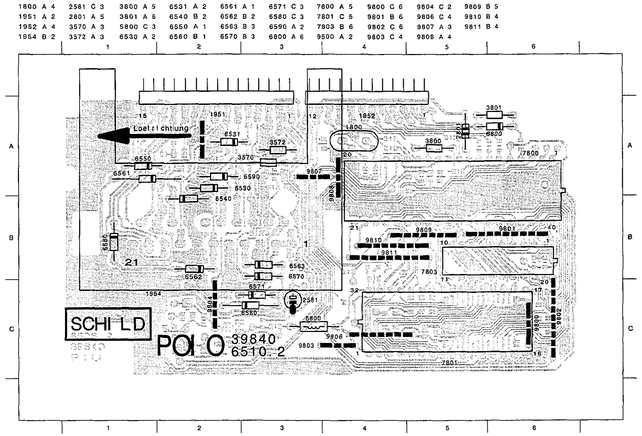


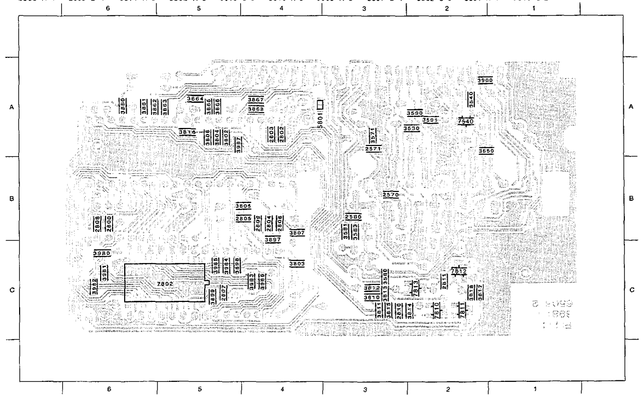




Input/Output Board POIO

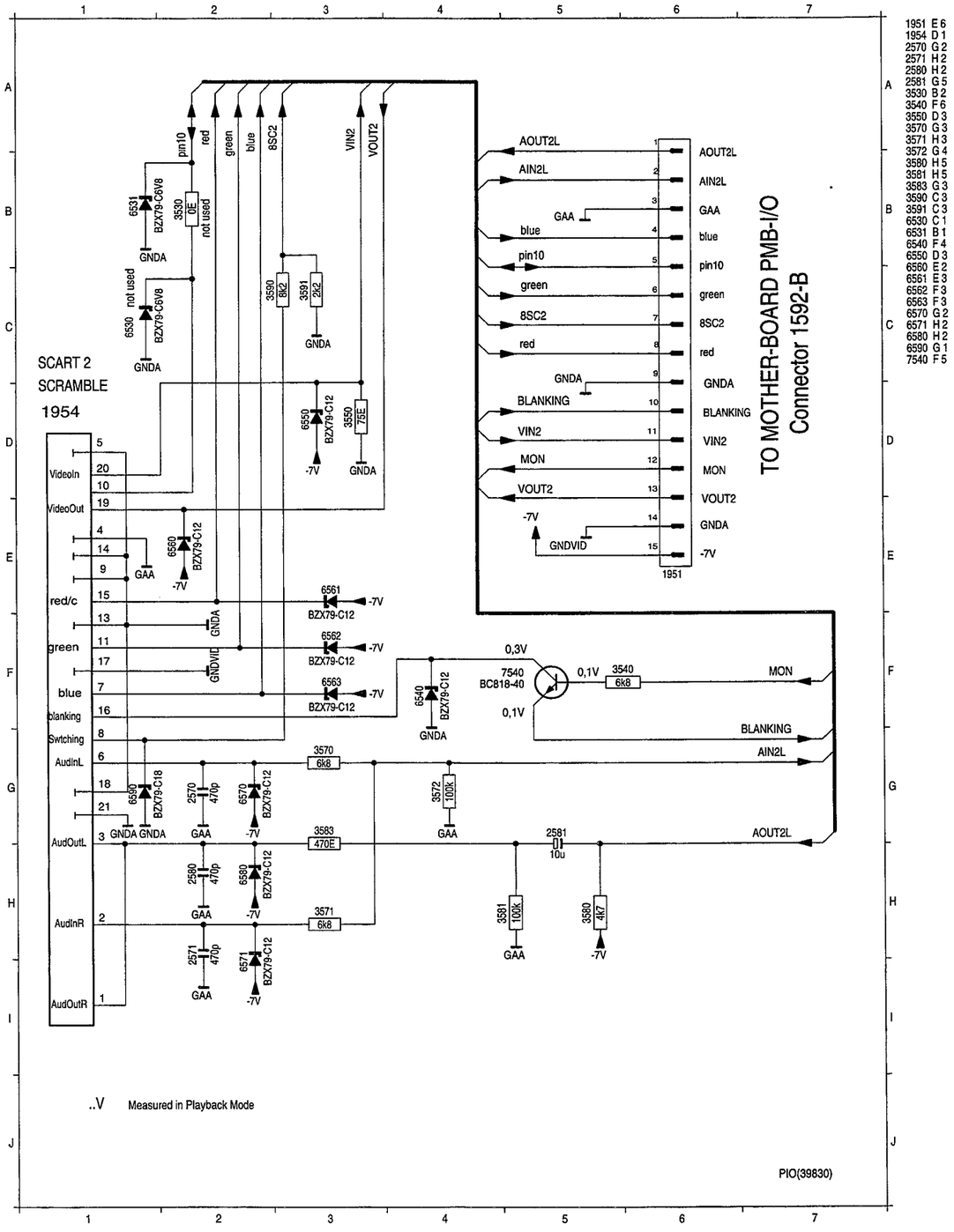


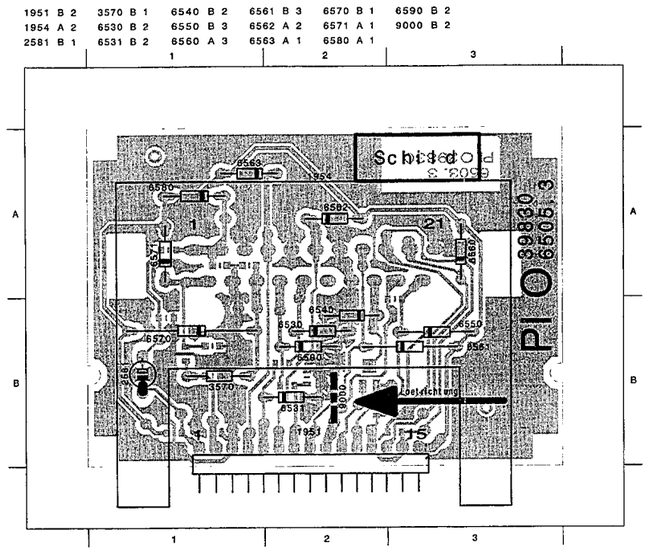


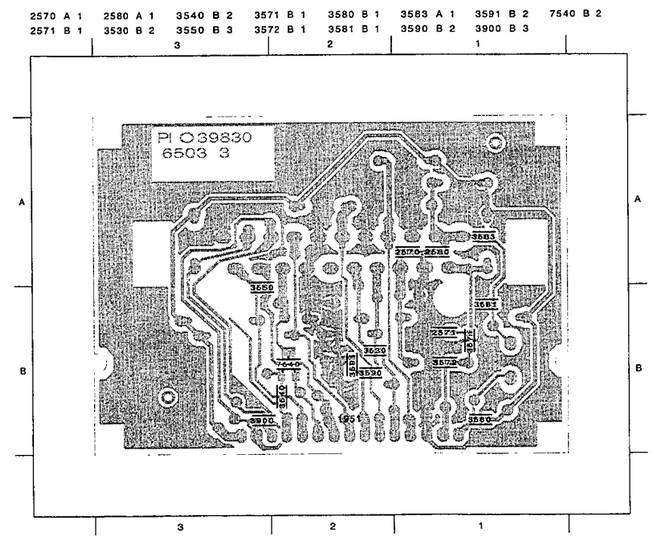


3-26

Input/Output Board PIO



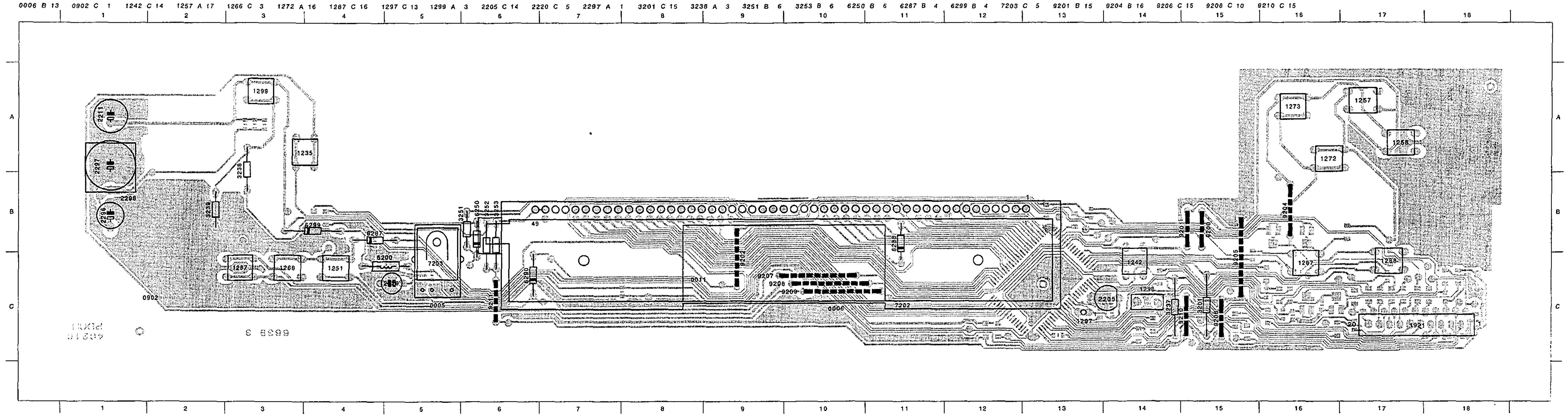




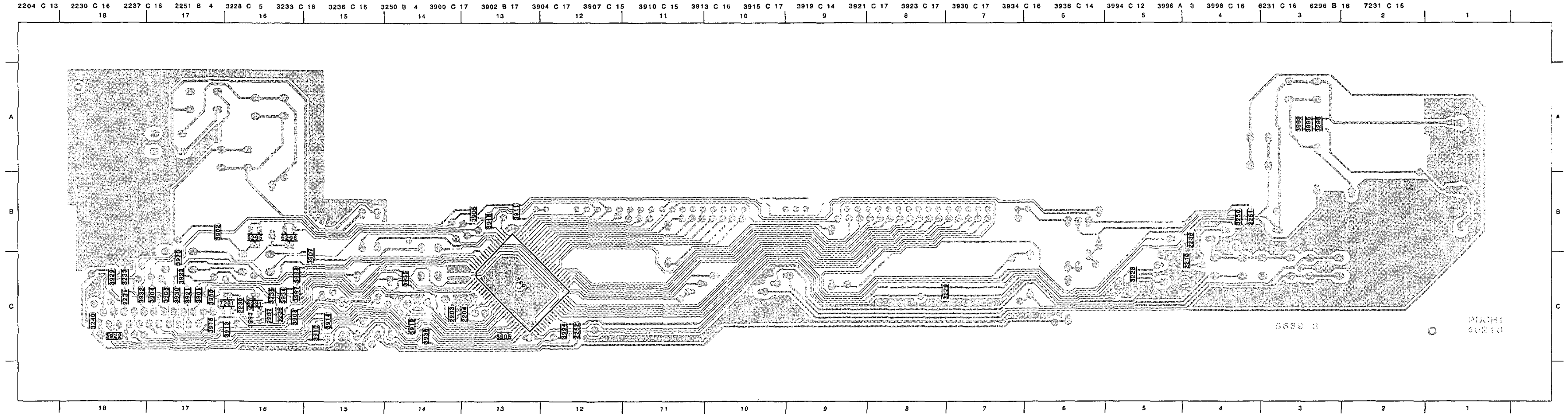
3-27

Operating Panel PDCH1 (DC)

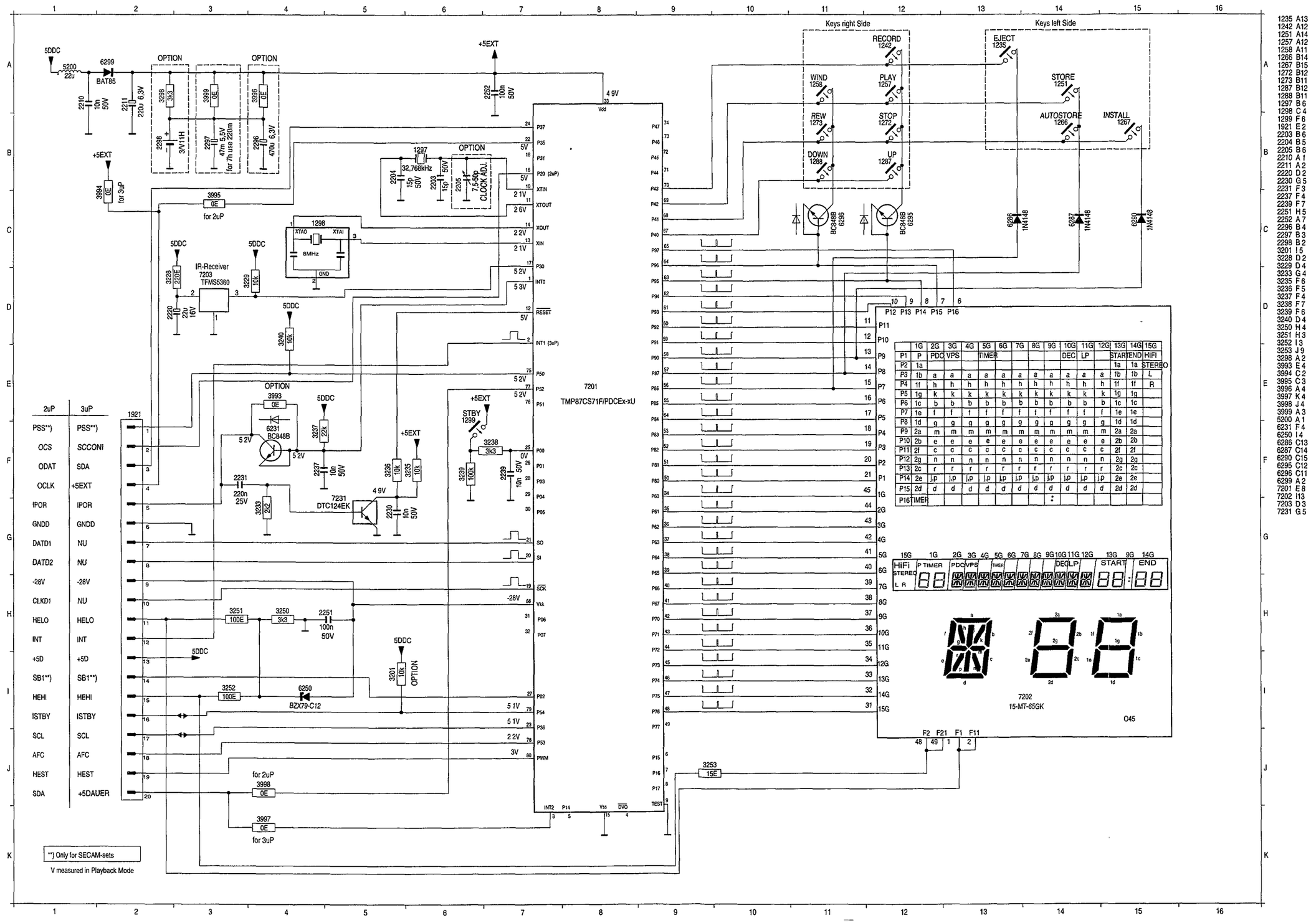
0005 B 5	0011 C 9	1235 A 4	1251 C 4	1258 A 17	1267 C 3	1273 A 16	1288 C 17	1298 C 14	1921 C 17	2211 A 1	2296 B 1	2298 A 1	3237 C 14	3239 B 2	3252 B 6	5200 C 5	6286 B 11	6290 C 6	7202 B 9	9200 B 15	9202 C 9	9205 C 15	9207 C 10	9209 C 10	9211 C 6	
0006 B 13	0902 C 1	1242 C 14	1257 A 17	1266 C 3	1272 A 16	1287 C 16	1297 C 13	1299 A 3	2205 C 14	2220 C 5	2297 A 1	3201 C 15	3238 A 3	3251 B 6	3253 B 6	6250 B 6	6287 B 4	6299 B 4	7203 C 5	9201 B 15	9204 B 16	9206 C 15	9208 C 10	9210 C 15		



2203 C 14	2210 C 4	2231 C 18	2239 B 4	2252 C 12	3229 C 8	3235 C 16	3240 C 18	3298 A 3	3901 C 17	3903 C 17	3905 B 13	3908 C 16	3911 B 13	3914 C 15	3918 B 13	3920 C 17	3922 C 18	3929 C 18	3932 C 18	3935 C 14	3993 C 16	3995 C 13	3997 C 16	3999 A 3	6295 B 16	7201 C 13
2204 C 13	2230 C 16	2237 C 16	2251 B 4	3228 C 5	3233 C 18	3236 C 16	3250 B 4	3900 C 17	3902 B 17	3904 C 17	3907 C 15	3910 C 15	3913 C 16	3915 C 17	3919 C 14	3921 C 17	3923 C 17	3930 C 17	3934 C 16	3936 C 14	3994 C 12	3996 A 3	3998 C 16	6231 C 16	6296 B 16	7231 C 16



Operating Panel PDCH1 (DC)



PCS 76576

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 developped 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.

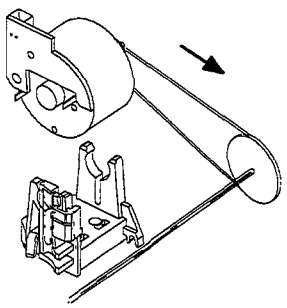
4.1 Deck parts replacement

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.

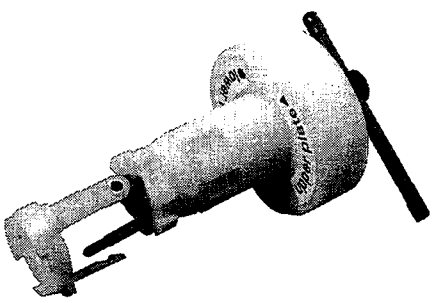
Manual extraction of cassette:
If, after the Eject button has been pressed, the drive does not unthread and eject the cassette, the dethreading/eject operation can also be carried out manually by turning the wheel at the rear of the threading motor.

fig. 1

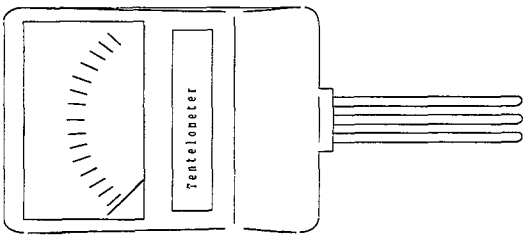


IMPORTANT:
After each repair has been carried out in the drive assembly, the first operation after repairing must be to bring the cassette compartment into „eject" position by hand.

Auxiliary tools for deck adjustment:

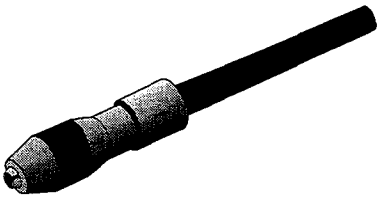


Tool for removing the head disc 4822 395 90977

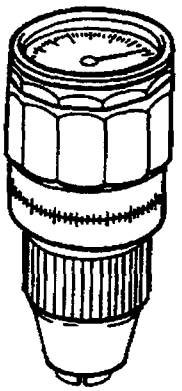


Tentelometer 4822 395 90584

Tool for tapetension adjustment 4822 395 50188



Handle 4822 256 90493



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

Post adjustment screwdriver 4822 395 50275

Testcassette 4822 397 30103

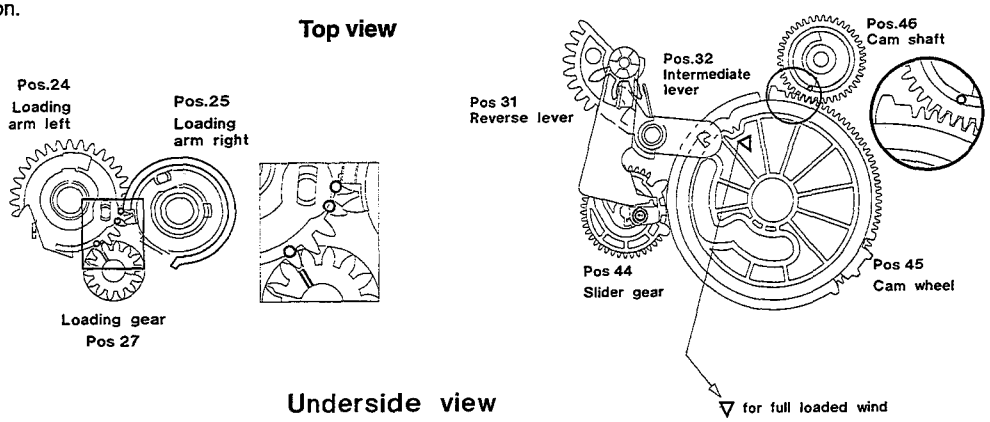
Nylon gloves 5322 395 94022

4.1.1 Deck lay out diagram

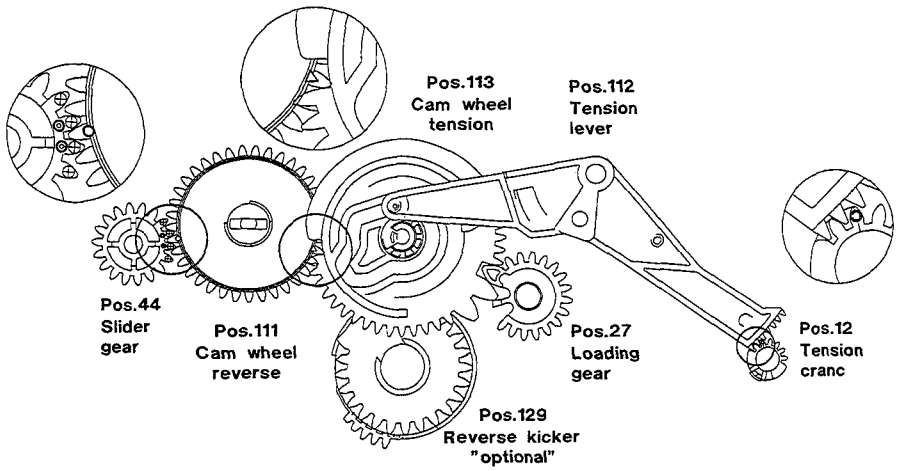
Deck in position „threaded out".

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

Top view



Underside view



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.

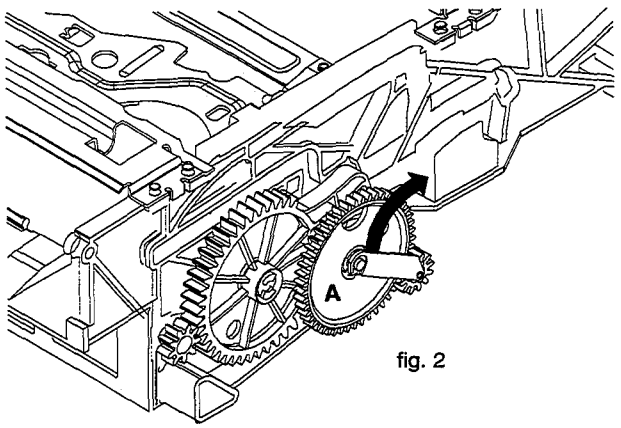


fig. 2

4.1.3 Head disc replacement

Removal :

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

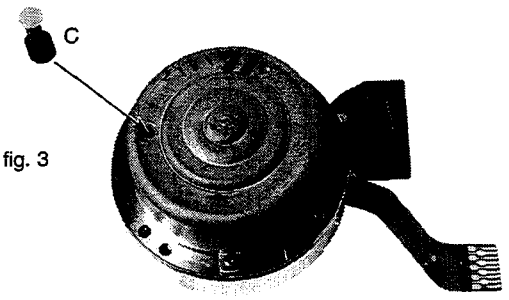


fig. 3

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

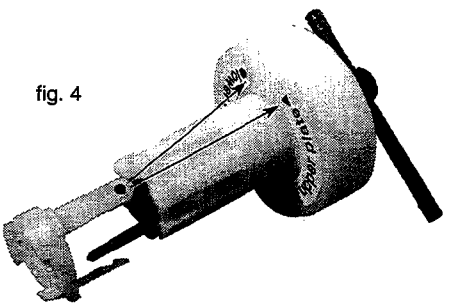


fig. 4

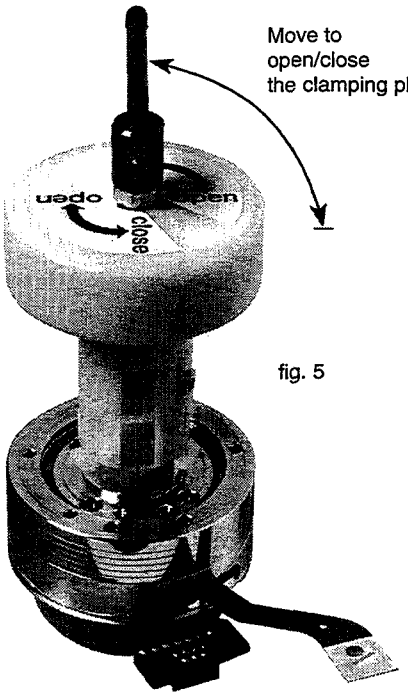


fig. 5

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)

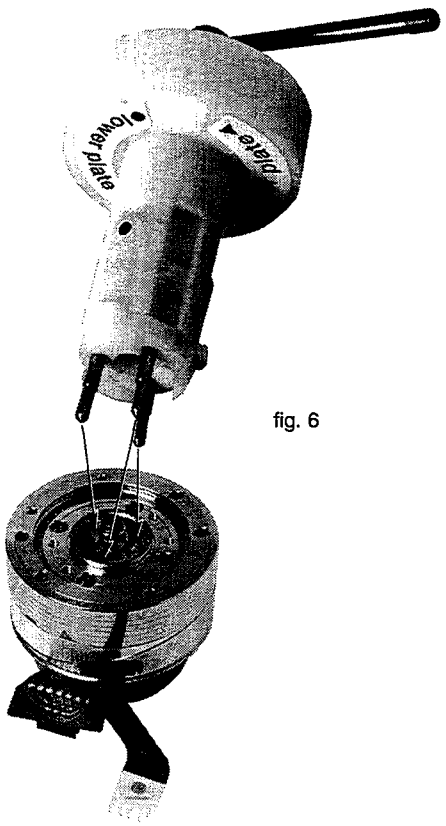


fig. 6

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)

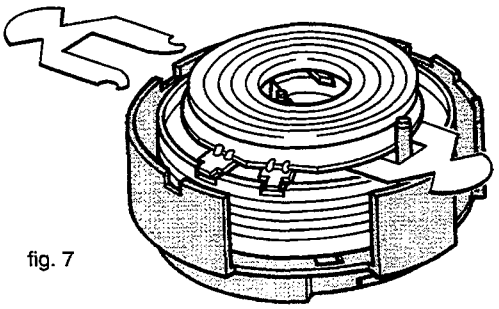


fig. 7

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)

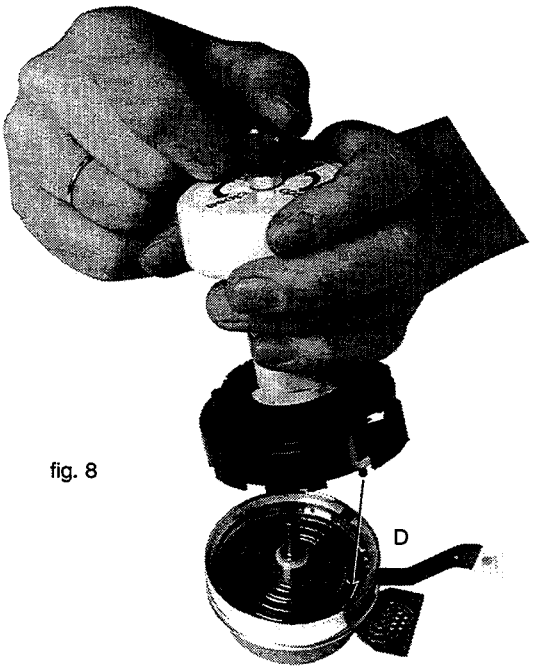


fig. 8

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)

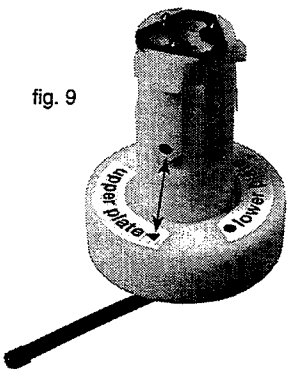


fig. 9

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/Chead) for reassembly.

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

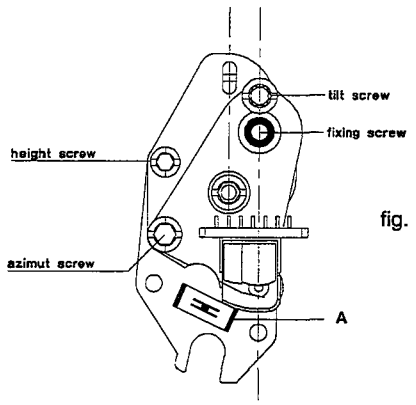


fig. 10

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.

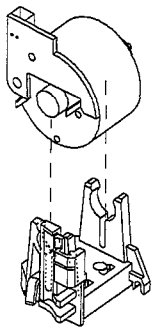


fig. 11

4.1.6 Capstan motor (Pos. 127)

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

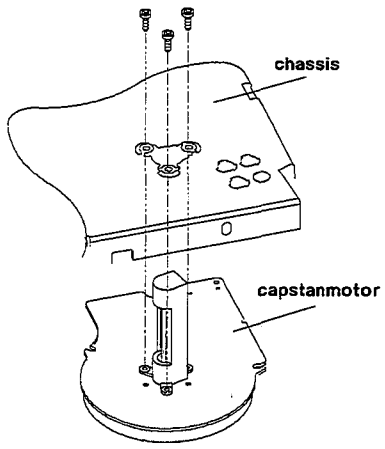


fig. 12

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.

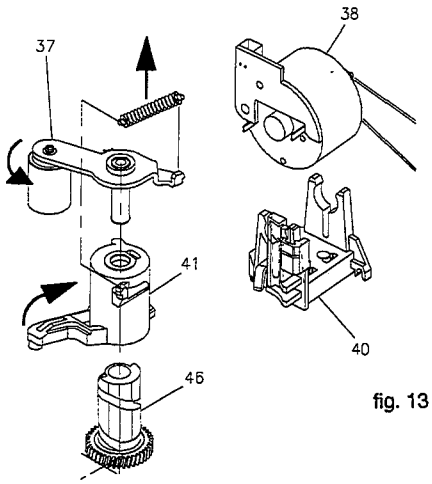
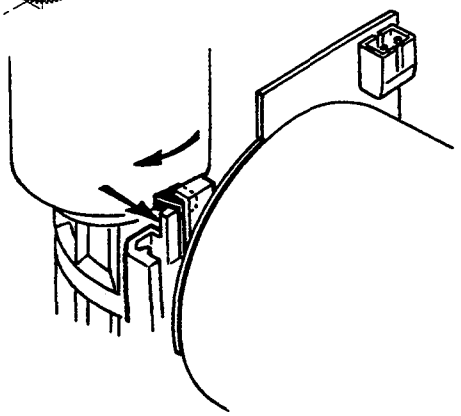


fig. 13



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

4.1.8 Roller unit right (Pos. 26)

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

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

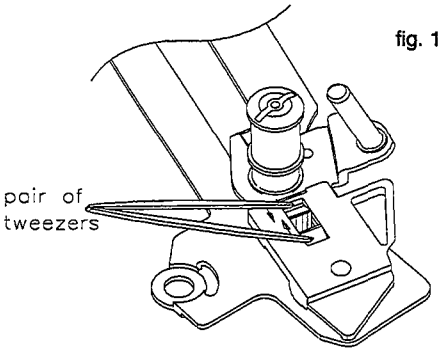


fig. 10

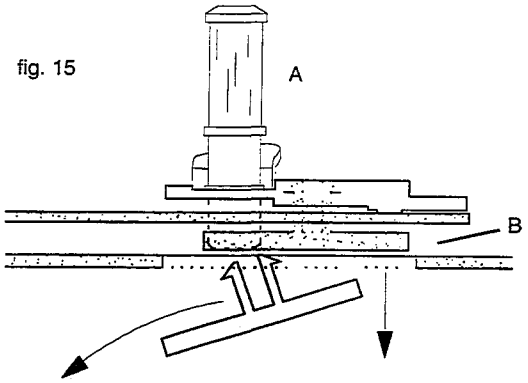
4.1.9 Roller unit left (Pos.23)

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

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

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

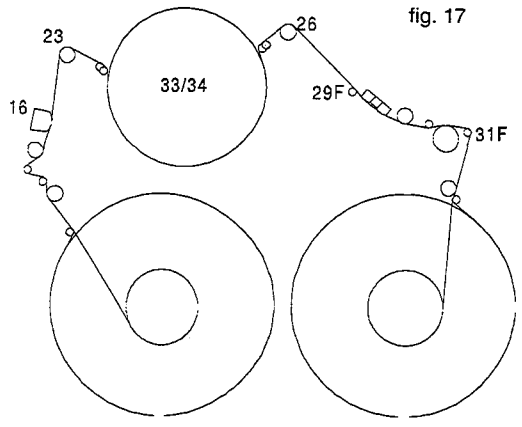
fig. 15



4.2 Adjustments

4.2.1 Tape path

fig. 17



4.2.1.1 Roller left unit/roller unit right

Preparation:
Connect one input of a dual trace oscilloscope to observe the tape sync pulse CTL. The other input (DC coupled) to observe the tracking information TRIV.
Trigger the oscilloscope externally on the head pulse HP1.
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 progam step 03 is left.
This condition works only if X-distance is adjusted.

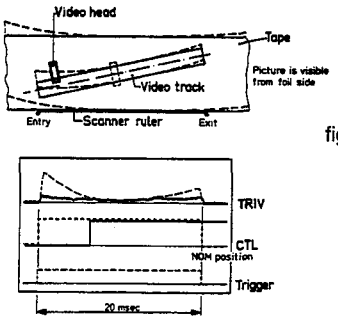


fig. 18

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).

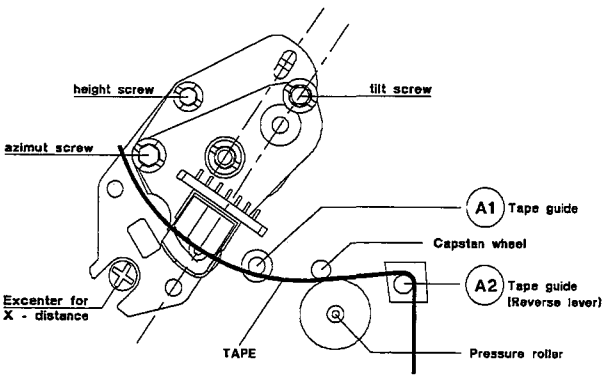


fig.19

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 theseadjustments after replacement of the brake band.
If the brake band or tape tension are completely misadjusted, set them to a center position; set the drive to „play" and adjust the brake band until the edge of the elbow of the tape tension arm is aligned with the left inner edge of the left guide (fig. 20).

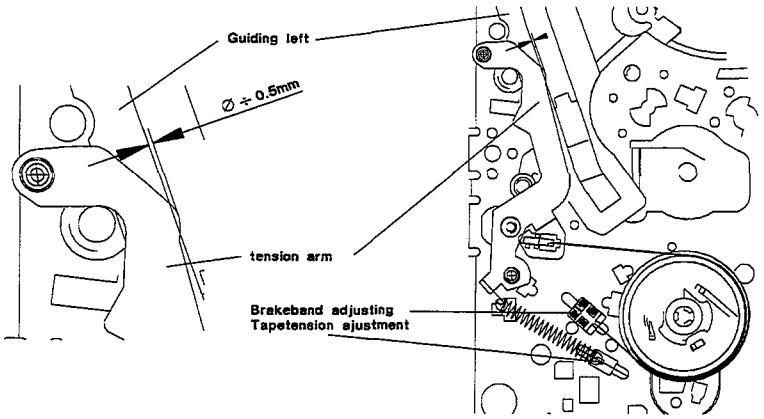
4.2.4 Friction clutch control check

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

4.2.5 Reverse brake control

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

fig. 20



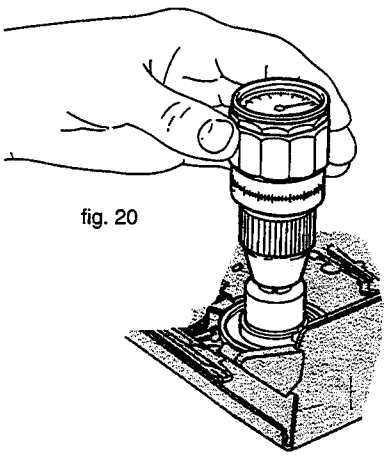
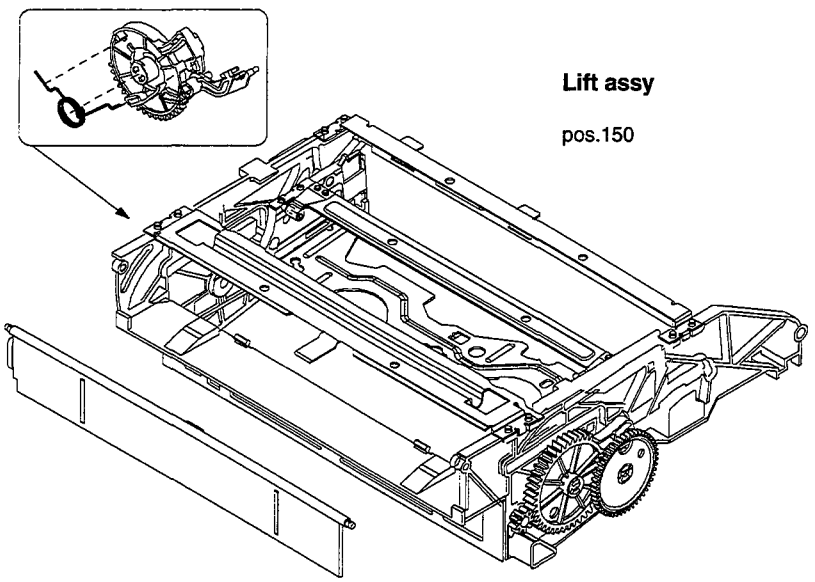


fig. 20

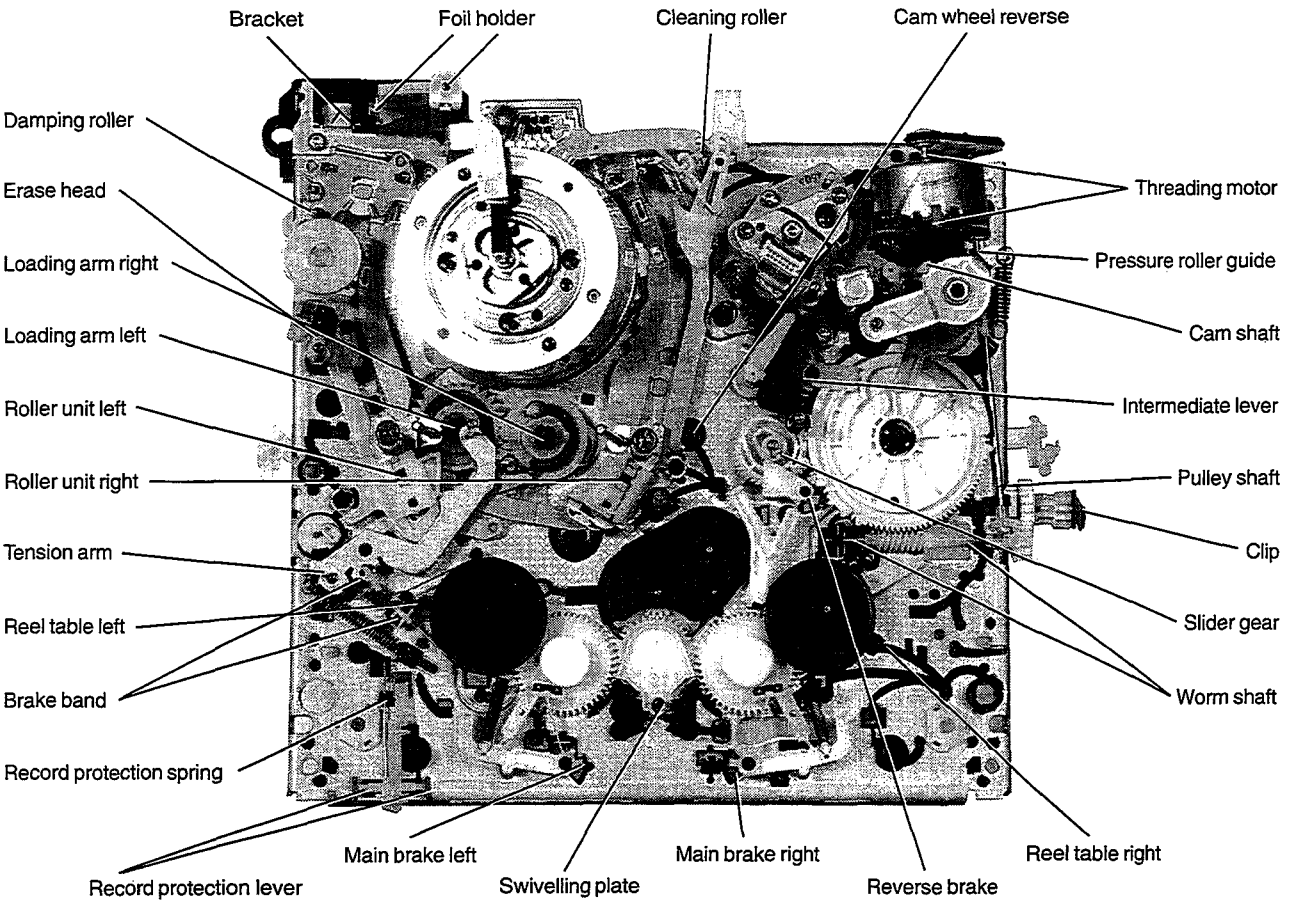


Lift assy

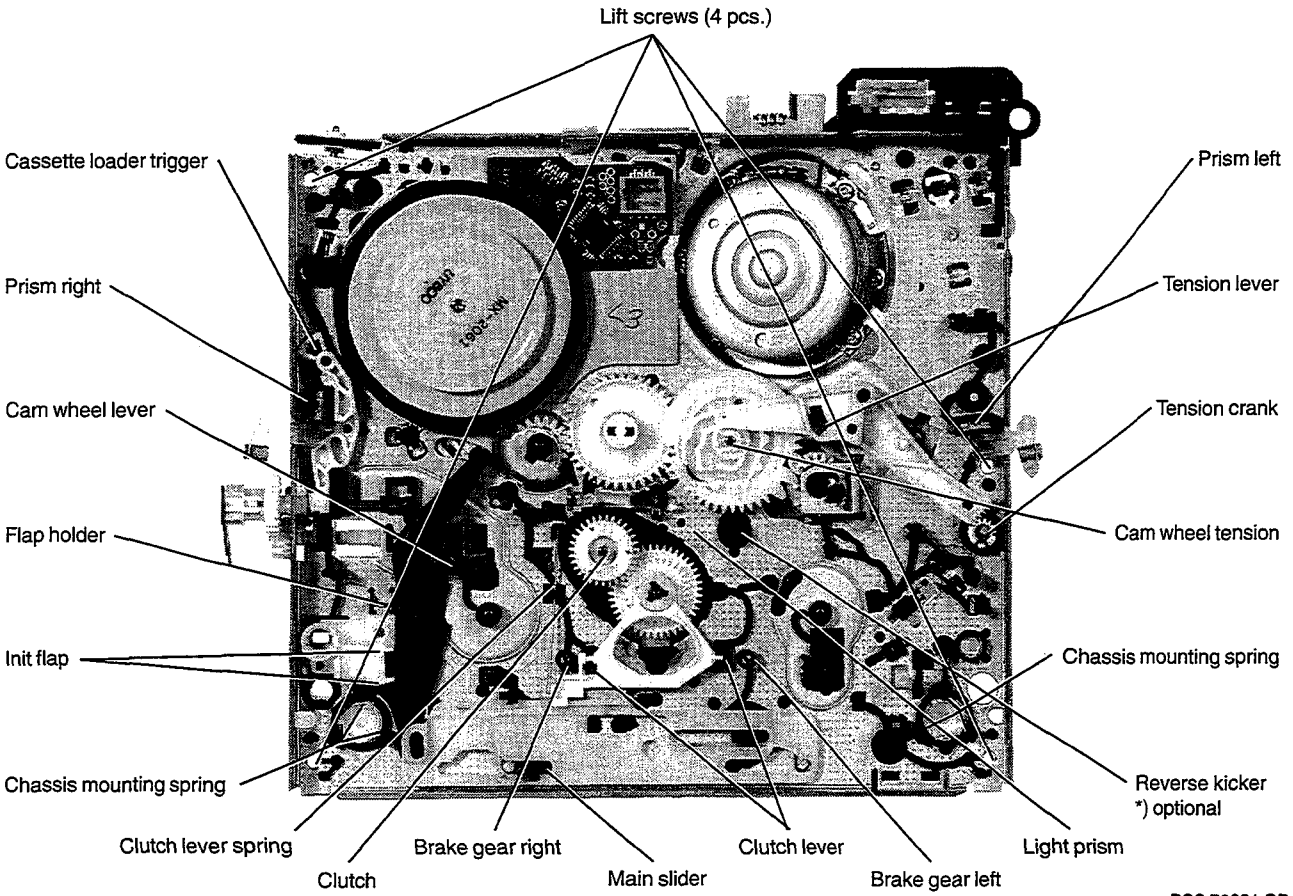
pos.150

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

TOP VIEW

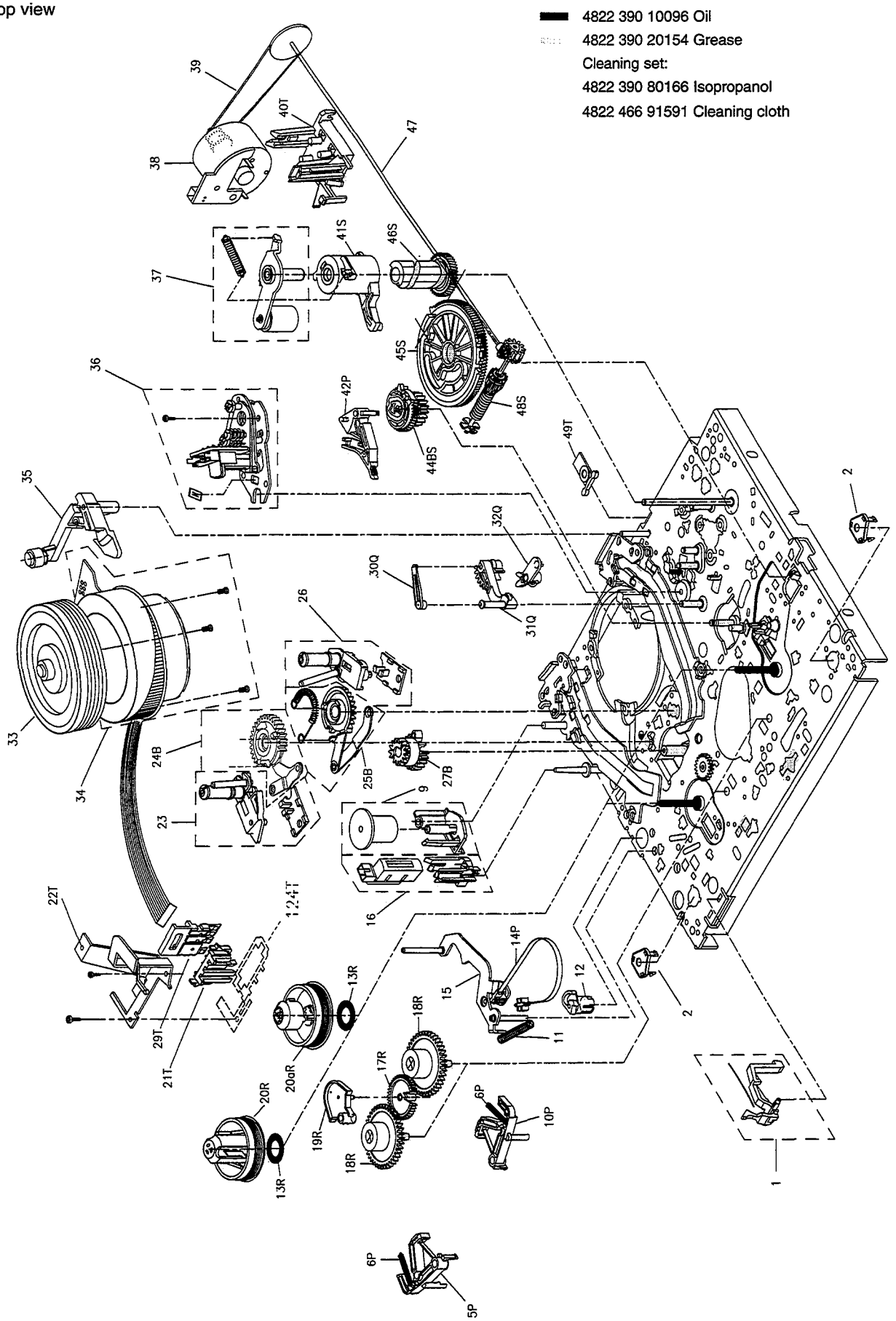


UNDERSIDE VIEW

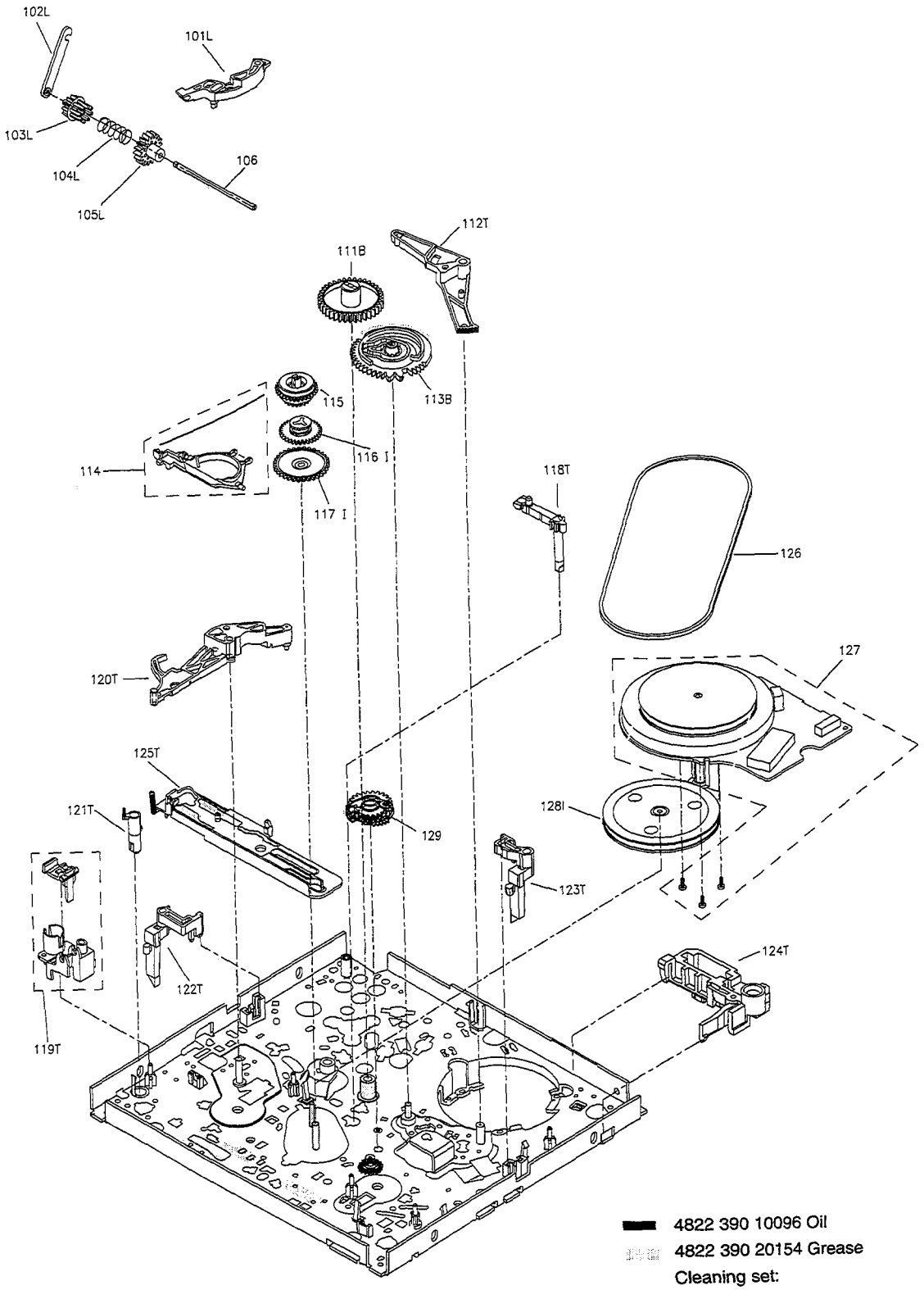


4.3 Exploded view

Top view



Underside viw



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

MECHANICAL PARTS LIST

Pos.	Description	KITS								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	Foil 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								
29	Plate								T	
30	Reverse clip					Q				
31	Reverse lever					Q				
32	Intermediate lever					Q				
33	Head disc 2/0									691 20926
33	Head disc 2/0-LP									691 20965
33	Head disc 3/0									691 20937
33	Head disc 4/0									691 21011
33	Head disc 4/0 Secam									691 21012
34	Scanner motor 2/0 (with screws)									361 10822
34	Scanner motor 3/0 (with screws)									361 10821
34	Scanner motor 4/0 (with screws)									361 10819
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	

*) for decks: WDMT-...

Pos.	Description	KITS								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	
124	Holder								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							
140	Flex cable									320 40287
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.

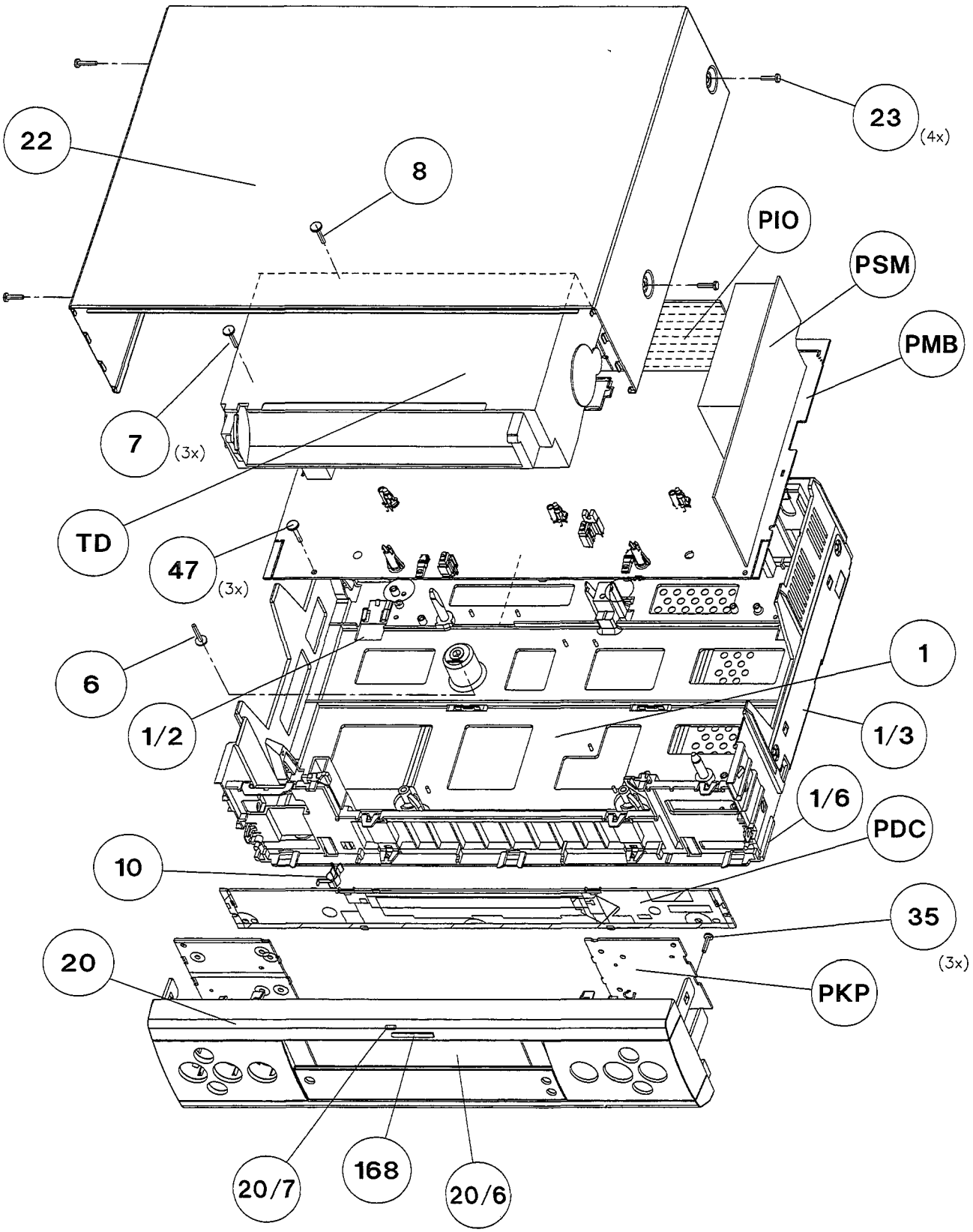
Per una riparazione garantita ocorre sostituire tutti i pezzi contenuti nei kit, fatta eccetione per il kit T.

Para obtener un estandár de reparaciones elevado,es necesario cambiar todas las partes contenidas en el kit, la única exceptión 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 waarbogen moeten, met uitzondering van kit T, altijd alle zich in een kit bevindende onderdelen worden vervangen.

PARTS LISTS
Exploded View set



Pos	12 NC	Description	VT-M500EL	VT-M501ECT	VT-M502EL	VT-M502EUK	VT-M505EVPS	VT-M510EPV	VT-M510EUK	VT-M530ECT	VT-M530EUK	VT-M532EL	VT-M535EVPS
1	R 3112 404 00510	Frame	✔	✔	✔		✔	✔		✔	✔	✔	✔
	R 3112 404 00420	Frame				✔			✔				
1/2	R 3112 401 20050	Spring	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
1/3	R 3112 401 20740	Bottom	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
1/6	R 3103 184 00830	Foot	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
6	R 3103 107 80120	Chassis Screw	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
7	R 3103 100 42400	Screw 3,5 x 16	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
8	R 3103 107 80100	Screw	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
20	R 3103 138 85130	Control Panel	✔										
	R 3103 138 85070	Control Panel		✔									
	R 3103 138 84980	Control Panel			✔								
	R 3103 138 83970	Control Panel				✔							
	R 3103 138 84960	Control Panel					✔						
	R 3103 138 85120	Control Panel						✔					
	R 3103 138 84970	Control Panel							✔				
	R 3103 138 85110	Control Panel								✔			
	R 3103 138 85100	Control Panel									✔		
	R 3103 138 85080	Control Panel										✔	
	R 3103 138 85090	Control Panel											✔
20/5	R 3103 178 13910	Lift Flap	✔										
	R 3103 178 13770	Lift Flap		✔							✔		
	R 3103 178 13750	Lift Flap			✔								
	R 3103 178 13810	Lift Flap				✔							
	R 3103 178 13450	Lift Flap					✔						✔
	R 3103 178 13790	Lift Flap						✔				✔	
	R 3103 178 16870	Lift Flap							✔	✔			
20/6	R 3103 111 02450	Spring	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
22	R 3103 141 22750	Cover Lacquered	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
23	R 3112 400 40220	Screw 3,5 x 10	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
47	R 3112 400 40060	Screw 3,15 x 8	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
150/1	R 3103 140 24320	Mains Cord	✔	✔	✔		✔	✔		✔		✔	✔
	R 4622 001 55540	Mains Cord				✔			✔		✔		
150/2	R 3103 140 25020	Connecting Cable Pal	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
150/9	R 3103 140 25400	Scart Cable	✔		✔							✔	
151	R 8622 661 63301	Remote RT163/301		✔		✔	✔	✔	✔	✔	✔		✔
	R 8622 661 63304	Remote RT163/304	✔		✔							✔	
152	R 3103 166 16550	Direction for use	✔										
	R 3103 166 16460	Direction for use		✔									
	R 3103 166 16370	Direction for use			✔								
	R 3103 166 16160	Direction for use				✔							
	R 3103 166 16290	Direction for use					✔						
	R 3103 166 16570	Direction for use						✔					
	R 3103 166 16280	Direction for use							✔				
	R 3103 166 16560	Direction for use								✔			
	R 3103 166 16580	Direction for use									✔		
	R 3103 166 16490	Direction for use										✔	
	R 3103 166 16500	Direction for use											✔
168	R 3103 110 01280	Wordmark Hitachi	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
8001	R 3103 140 25720	Cable FFC TD1-1961	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
8002	R 3103 140 25700	Cable FFC TD2-1962	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
8003	R 3103 140 25730	Cable FFC TD3-1944	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
8004	R 3103 140 25710	Cable FFC TD4-1930	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
8020	R 3103 140 25760	Cable FFC 1921-1941	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

PSM1, PSM2, PSM2A

MISCELLANEOUS

0010⚠	R4822 256 30514	FUSE HOLDER
0011⚠	R4822 256 30514	FUSE HOLDER
1010⚠	R4822 070 31252	FUSE T 1.25 A

CONNECTORS

0008⚠	R4822 267 31064	MAINS Connector
1509	R4822 265 10484	Connector 18P

CAPACITORS

2012	R4822 121 10524	910	pF	100V	
2014	R4822 124 11559	2.2	µF	50V	
2016	R4822 121 42687	3,3	nF	63V	
2018	R4822 121 51299	1	nF	50V	
2026	R4822 121 51299	1	nF	50V	
2030	R5322 121 42386	100	nF	63V	
2032	R5322 121 42386	100	nF	63V	
2036	R4822 124 80874	47	µF	50V	
2042	R4822 121 70481	47	nF	400V	
2050⚠	R4822 121 70674	68	nF	250V	
2052⚠	R4822 121 70674	68	nF	250V	
2054⚠	R4822 126 13859	470	pF	250V	
2056⚠	R4822 126 13859	470	pF	250V	
2059⚠	R4822 126 13859	470	pF	250V	
2060	R4822 121 10525	330	nF	100V	
2062	R4822 124 80875	220	µF	25V	
2064	R5322 121 42661	330	nF	63V	
2068	R4822 124 80874	47	µF	50V	
2069	R4822 122 31175	1	nF	500V	
2070⚠	R4822 124 11561	47	µF	400V	
2074	R5322 121 42386	100	nF	63V	
2076	R4822 124 80874	47	µF	50V	
2079	R5322 121 42661	330	nF	50V	
2080	R5322 121 42578	100	nF	250V	
2081	R4822 124 80874	47	µF	50V	
2081	R4822 124 41751	470	µF	50V	for PSM2
2084	R4822 124 41747	680	µF	35V	
2085	R4822 124 80874	47	µF	50V	
2088	R4822 124 80875	220	µF	25V	
2090	R4822 124 80875	220	µF	25V	
2092	R5322 121 42386	100	nF	63V	
2096	R4822 122 31116	2	nF	400V	
2098	R4822 124 41747	680	µF	35V	
2099	R4822 124 41747	680	µF	35V	

RESISTORS

3010	R4822 116 83864	10	k	0,5W	
3012	R4822 050 11002	1	k	0,4W	
3014	R4822 050 13902	3,9	k	0,4W	
3016	R4822 116 52244	15	k	0,5W	
3018	R4822 116 52257	22	k	0,5W	
3020	R4822 116 52251	18	k	1/6W	
3022	R4822 050 11003	10	k	0,4W	
3026	R4822 116 52228	680	R	0,5W	
3028	R4822 116 52304	82	k	0,5W	
3030	R4822 116 52303	8,2	k	0,5W	
3032	R4822 116 52186	22	R	0,5W	
3034	R4822 116 52202	82	R	0,5W	
3040	R4822 116 52283	4,7	k	0,5W	
3041	R4822 050 23309	33	R	0,6W	
3042	R4822 050 21003	10	k	0,6W	
3043	R4822 050 21003	10	k	0,6W	
3044	R4822 050 21003	10	k	0,6W	
3046	R4822 050 21808	1,8	R	0,6W	
3048	R4822 050 21508	1,5	R	0,6W	
3048	R4822 050 21808	1,8	R	0,6W	for PSM1
3050	R4822 116 83882	39	k	0,5W	
3052	R4822 116 83882	39	k	0,5W	
3054	R4822 050 21005	1	M	0,6W	
3055	R4822 050 21005	1	M	0,6W	
3056	R4822 050 21005	1	M	0,6W	
3057	R4822 050 21005	1	M	0,6W	
3058⚠	R4822 053 21395	3,9	M	0,5W	
3059⚠	R4822 053 21395	3,9	M	0,5W	
3060	R4822 116 83872	220	R	0,5W	
3062	R4822 116 83864	10	k	0,5W	
3063	R4822 116 83872	220	R	0,5W	
3064	R4822 116 52283	4,7	k	0,5W	
3067	R4822 116 83872	220	R	0,5W	
3068	R4822 116 52186	22	R	0,5W	
3069	R4822 050 24708	4,7	R	1/8W	
3070	R4822 116 83872	220	R	0,5W	
3071	R4822 116 52199	68	R	1/6W	
3072	R4822 050 11002	1	k	0,4W	
3073	R4822 116 52234	100	k	1/6W	
3074	R4822 116 52289	5,6	k	0,5W	
3075	R4822 116 52291	56	k	1/6W	
3076	R4822 116 52263	2,7	k	1/6W	
3077	R4822 116 52259	2,4	k	1/6W	
3078	R4822 100 12163	470	R		
3079	R4822 116 52234	100	k	1/6W	
3080	R4822 052 10479	47	R		
3081	R4822 116 52226	560	R	1/6W	
3082	R4822 116 52283	4,7	k	1/6W	
3083	R4822 116 52226	560	R	1/6W	
3084	R4822 116 52283	4,7	k	1/6W	
3085	R4822 116 52226	560	R	1/6W	
3086	R4822 116 52234	100	k	1/6W	
3087	R4822 050 15603	56	k		
3088	R4822 116 52291	56	k	1/6W	
3089	R4822 050 15603	56	k		
3090	R4822 050 23902	3,9	k	0,6W	
3092	R4822 050 11002	1	k	0,4W	
3094	R4822 116 52245	150	k	0,5W	
3096	R4822 116 52234	100	k	0,5W	
3098	R4822 116 52291	56	k	0,5W	
3099	R4822 116 52283	4,7	k	1/6W	

COILS

5010⚠	R4822 157 10454	Coil
5050⚠	R4822 146 10445	TRANSF. B 324C2
5050⚠	R4822 146 10463	TRANSF. A 324C2 for PSM1
5069	R4822 157 60147	2,2UH
5080	R4822 157 71461	22UH 10%
5081	R4822 157 52285	6,8 µH
5088	R4822 157 71461	22UH 10%
5090	R4822 157 71461	22UH 10%
5098	R4822 157 71461	22UH 10%

DIODES

6032	R4822 130 31631	BYV10-20
6036	R4822 130 30842	BAV21
6042	R4822 130 10439	BY268 A
6046⚠	R4822 130 31438	1N4001G
6048⚠	R4822 130 31438	1N4001G
6050	R5322 209 12018	DF08M
6076	R4822 130 82885	BYT52M
6080	R4822 130 83909	BYW98-200RL
6081	R4822 130 82885	BYT52M
6082	R4822 130 82885	BYT52M
6084	R4822 130 34142	BZX79-B33
6088	R4822 130 83909	BYW98-200RL
6092	R4822 130 83909	BYW98-200RL
6098	R4822 130 83934	MBR360

TRANSISTORS & IC's

7020⚠	R4822 209 90025	MC44603P
7040	R4822 130 63794	STP3NA60
7050	R4822 130 44503	BC547C
7056	R4822 130 44503	BC547C
7058	R4822 130 41344	BC337-40
7060	R4822 130 41327	BC327-40
7070⚠	R4822 209 32126	SOC1012T
7074	R4822 209 81397	TL431CLPST
7084	R4822 130 44503	BC547C
7085	R4822 209 81397	TL431CLPRE
7088	R4822 209 72742	L7812ACV
7090	R4822 130 10237	MTD3055V1
7096	R4822 130 44503	BC547C

⚠ ... Safety component, use only this type

MOBO PAL - BG - I

MISCELLANEOUS

0007	R4822 256 10195	HOLDER	Layout .3
0008	R4822 256 10196	HOLDER	Layout .3
0020	R4822 256 10197	HOLDER	
0021	R4822 256 10197	HOLDER	
0022	R4822 256 10197	HOLDER	
0030	R4822 256 10198	HOLDER	
0031	R4822 256 10198	HOLDER	
0040	R4822 256 10196	HOLDER	Layout .4
0041	R4822 256 10195	HOLDER	Layout .4
1000	R4822 242 81067	Crystal 4.433 619 MC	
1400	R4822 242 82059	Crystal 10MC	
1402⚠	R4822 071 55001	Fuse 500mA	
1403⚠	R4822 071 58009	Fuse 80mA	
1404⚠	R4822 071 51002	Fuse T 1.0 A	
1405⚠	R4822 071 56301	Fuse 630mA	for < 6W version
1460	R4822 277 11521	Switch	
1461	R4822 277 11521	Switch	
1701	R4822 210 10697	TUMOD TP916	(PAL-G)
1701	R4822 210 10701	TUMOD TP944	(PAL-I)
1721	R4822 242 81261	OFWG1966M	(PAL-G)
1721	R4822 242 70936	OFWJ1952M	(PAL-I)
1740	R4822 242 72586	TPS5,5MB-TF20	(PAL-G)
1740	R4822 242 81572	TPS6,0MB-TF21F	(PAL-I)
1745	R4822 242 81811	SFE5,5MB-TF21	(PAL-G)
1745	R4822 242 70279	SFE6,0MB-TF21	(PAL-I)

CONNECTORS

1915	R4822 267 10364	Conn. 9P
1916	R4822 267 41199	Conn. 5P
1917	R4822 265 10485	SCART SOCKET ORANGE 21P
1917	R4822 267 31513	SCART SOCKET ORANGE
1930	R4822 267 41062	Conn. 6P
1941	R4822 267 10365	Conn. 20P
1944	R4822 265 30989	Conn. 3P SS>CBL0,3-1,25
1946	R4822 267 10366	Conn. 8P
1961	R4822 267 31512	Conn. 2 P
1962	R4822 267 40696	Conn. 3 P

CAPACITORS

2001	R5322 122 32654	22	nF	63V	
2002	R4822 124 23053	1	µF	63V	
2003	R4822 122 33797	47	nF	50V	
2004	R4822 122 33797	47	nF	50V	
2005	R4822 124 41969	1	µF	50V	
2006	R4822 126 13838	100	nF		
2007	R4822 122 33177	10	nF	50V	
2008	R4822 124 41969	1	µF	50V	
2009	R4822 126 13838	100	nF		
2010	R4822 124 80231	47	µF	16V	
2011	R4822 122 33177	10	nF	50V	
2012	R4822 122 33177	10	nF	50V	
2013	R4822 122 33177	10	nF	50V	
2014	R5322 122 31863	330	pF	50V	
2015	R4822 124 23053	1	µF	63V	
2016	R4822 124 23053	1	µF	63V	
2017	R4822 124 22826	10	µF	16V	
2018	R4822 124 22826	10	µF	16V	
2019	R4822 122 33177	10	nF	50V	
2020	R4822 126 13838	100	nF		
2021	R4822 124 22826	10	µF	16V	
2022	R4822 122 33177	10	nF	50V	
2023	R4822 126 13123	68	pF	63V	
2024	R5322 122 32448	10	pF	50V	
2025	R5322 122 32452	47	pF	63V	
2026	R4822 126 13222	390	pF	63V	
2027	R4822 124 23179	10	µF	16V	
2028	R4822 124 23179	10	µF	16V	
2029	R4822 126 13475	200	pF		
2030	R4822 126 13838	100	nF		
2031	R5322 122 32448	10	pF	50V	
2032	R5322 122 32452	47	pF	63V	
2033	R4822 124 80231	47	µF	16V	
2034	R4822 124 40196	220	µF	16V	
2035	R4822 122 33514	68	pF	50V	for 4/0
2035	R4822 122 33515	82	pF	63V	
2036	R5322 122 32659	33	pF	50V	
2037	R5322 122 34123	1	nF	50V	
2038	R4822 126 13838	100	nF		
2039	R4822 122 33514	68	pF	50V	
2040	R4822 122 33514	68	pF	50V	
2041	R5322 122 31946	27	pF	63V	
2042	R5322 122 32452	47	pF	63V	
2043	R4822 122 33177	10	nF	50V	
2044	R4822 122 33514	68	pF	50V	
2045	R4822 126 10326	180	pF	63V	
2046	R4822 122 33575	220	pF	50V	
2047	R4822 126 13689	18	pF	63V	
2048	R4822 122 33514	68	pF	50V	
2049	R5322 122 32658	22	pF	50V	
2050	R4822 126 13838	100	nF		
2051	R5322 122 32531	100	pF	50V	
2053	R5322 122 32659	33	pF	50V	
2054	R5322 122 31946	27	pF	63V	
2055	R5322 116 80853	560	pF	63V	
2056	R4822 126 13061	220	nF	25V	
2057	R4822 122 33177	10	nF	50V	
2058	R4822 126 10326	180	pF	63V	
2060	R4822 122 33177	10	nF	50V	
2061	R4822 124 23053	1	µF	63V	
2064	R4822 126 13061	220	nF	25V	
2065	R4822 124 80231	47	µF	16V	
2066	R4822 122 33177	10	nF	50V	
2067	R5322 122 34123	1	nF	50V	
2068	R4822 122 33177	10	nF	50V	
2069	R4822 122 33177	10	nF	50V	
2075	R4822 126 13689	18	pF	63V	
2081	R5322 122 32452	47	pF	63V	
2083	R5322 122 32448	10	pF	50V	
2085	R4822 124 22826	10	µF	16V	
2086	R4822 124 80729	22	µF	16V	
2087	R4822 122 33177	10	nF	50V	
2088	R4822 124 80875	220	µF	25V	
2090	R4822 124 80875	220	µF	25V	
2092	R5322 121 42386	100	nF	63V	
2094	R5322 122 32452	47	pF	63V	
2099	R4822 124 41747	680	µF	35V	
2150	R4822 122 33177	10	nF	50V	
2151	R5322 122 32654	22	nF	63V	
2152	R4822 126 13061	220	nF	25V	
2153	R4822 122 33177	10	nF	50V	
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	R5322 122 32531	100	pF	50V	
2162	R4822 122 33177	10	nF	50V	
2163	R4822 122 33177	10	nF	50V	
2164	R4822 124 40433	47	µF	25V	
2300	R4822 124 80705	1	µF	50V	
2301	R4822 124 80705	1	µF	50V	
2302	R4822 124 80705	1	µF	50V	
2307	R5322 122 32654	22	nF	50V	
2308	R5322 122 32531	100	pF	50V	
2309	R4822 126 10002	100	nF	50V	
2310	R4822 126 13838	100	nF		
2311	R4822 122 33177	10	nF	50V	
2313	R4822 122 33575	220	pF	50V	
2314	R4822 126 13838	100	nF		
2315	R4822 122 33177	10	nF	50V	
2316	R4822 122 33797	47	nF	50V	
2317	R5322 122 32654	22	nF	63V	
2318	R4822 124 41576	2,2	µF	50V	
2319	R5322 122 32654	22	nF	63V	
2400	R4822 126 13838	100	nF		
2401	R4822 124 80729	22	µF	16V	
2402	R4822 126 13838	100	nF		
2403	R5322 122 32658	22	pF	50V	
2404	R5322 122 32658	22	pF	50V	
2416	R4822 126 13838	100	nF		
2417	R4822 124 23178	47	µF	16V	
2420	R4822 122 33175	2,2	nF	50V	
2440	R5322 124 21189	100	µF	40V	

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2441	R4822 126 13838	100	nF	
2442	R4822 122 33177	10	nF	50V
2455	R5322 126 10223	4,7	nF	63V
2459	R4822 124 22263	220	µF	25V
2461	R5322 126 10223	4,7	nF	63V
2462	R4822 124 11537	47	µF	25V
2463	R4822 124 80231	47	µF	16V
2464	R5322 126 10223	4,7	nF	63V
2465	R5322 122 34123	1	nF	50V
2466	R4822 124 80231	47	µF	16V
2467	R4822 122 33342	33	nF	63V
2468	R4822 126 13838	100	nF	
2470	R4822 122 33177	10	nF	50V
2471	R4822 122 33177	10	nF	50V
2472	R5322 116 80853	560	pF	63V
2473	R5322 116 80853	560	pF	63V
2480	R4822 122 33342	33	nF	63V
2510	R4822 124 22826	10	µF	16V
2512	R4822 124 80231	47	µF	16V
2513	R4822 126 10002	100	nF	25V
2514	R4822 126 10002	100	nF	25V
2515	R4822 126 10002	100	nF	25V
2516	R4822 126 10002	100	nF	25V
2517	R4822 126 10002	100	nF	25V
2519	R4822 126 13838	100	nF	
2540	R4822 126 10002	100	nF	25V
2541	R4822 122 33175	2,2	nF	50V
2542	R4822 126 10002	100	nF	25V
2542	R4822 122 33342	33	nF	50V
2543	R4822 126 10002	100	nF	25V
2545	R4822 126 10002	100	nF	25V
2570	R5322 122 32268	470	pF	50V
2571	R5322 122 32268	470	pF	50V
2572	R5322 122 32268	470	pF	50V
2573	R4822 122 33177	10	nF	50V
2574	R5322 122 32268	470	pF	50V
2590	R4822 122 33177	10	nF	50V
2591	R4822 124 80879	100	µF	16V
2592	R4822 126 13838	100	nF	
2600	R5322 122 34123	1	nF	50V
2601	R5322 122 31865	1,5	nF	50V
2602	R4822 126 10002	100	nF	5V
2604	R4822 122 33177	10	nF	50V
2605	R4822 124 80879	100	µF	16V
2606	R4822 126 13838	100	nF	
2607	R4822 126 13838	100	nF	
2608	R5322 122 32268	470	pF	50V
2609	R4822 124 80231	47	µF	16V
2610	R4822 122 33175	2,2	nF	50V
2611	R4822 124 80231	47	µF	16V
2612	R4822 122 33342	33	nF	50V
2613	R4822 126 12104	12	nF	63V
2614	R4822 124 23053	1	µF	63V
2615	R4822 124 80231	47	µF	16V
2616	R4822 124 80231	47	µF	16V
2617	R4822 124 23178	47	µF	16V
2618	R5322 122 31863	330	pF	50V
2619	R4822 124 80231	47	µF	16V
2620	R4822 121 51655	47	nF	50V
2621	R5322 122 34123	1	nF	50V
2622	R4822 121 43873	27	nF	50V
2631	R4822 124 23053	1	µF	63V
2650	R4822 122 33177	10	nF	50V
2652	R5322 122 34123	1	nF	50V
2700	R4822 126 13838	100	nF	
2702	R4822 126 13838	100	nF	
2703	R4822 124 22826	10	µF	16V
2704	R4822 124 41579	10	µF	50V
2705	R4822 126 13838	100	nF	
2706	R5322 122 34123	1	nF	50V
2709	R4822 126 10002	100	nF	50V
2726	R4822 122 33177	10	nF	50V
2727	R4822 124 80729	22	µF	16V
2735	R5322 122 32452	47	pF	63V
2740	R4822 124 41576	2,2	µF	50V
2742	R4822 124 80729	22	µF	16V
2743	R4822 126 13838	100	nF	
2746	R4822 126 10002	100	nF	25V
2747	R4822 126 13838	100	nF	
2748	R4822 126 12945	8,2	pF	
2751	R4822 124 80228	4,7	µF	25V
2752	R4822 126 13061	220	nF	25V
2753	R4822 126 13838	100	nF	
2800	R4822 126 13689	18	pF	63V
2801	R5322 122 32659	33	pF	50V
2802	R4822 126 13838	100	nF	
2803	R4822 126 13838	100	nF	
2804	R4822 124 23053	1	µF	50V
2810	R5322 122 33861	120	pF	50V
2820	R4822 125 50412	TRI	µF	
2822	R5322 122 32659	33	pF	50V
2830	R5322 122 32661	56	pF	50V
2831	R4822 122 33177	10	nF	50V
2832	R4822 126 13838	100	nF	
2840	R4822 126 13838	100	nF	
2850	R4822 124 22826	10	µF	16V
2851	R4822 124 22826	10	µF	16V
2852	R5322 126 10223	4,7	nF	63V
2853	R5322 116 80853	560	pF	63V
2854	R5322 126 10223	4,7	nF	63V
2855	R5322 116 80853	560	pF	63V
2858	R4822 124 22826	10	µF	16V
2860	R4822 126 10002	100	nF	25V
2890	R4822 126 13061	220	nF	25V

RESISTORS

3000	R4822 051 10102	1	k	0,25W	
3001	R4822 051 20822	8,2	k	0,1W	
3002	R4822 051 20182	1,8	k	0,1W	
3003	R4822 051 20223	22	k	0,1W	
3004	R4822 051 20223	22	k	0,1W	
3006	R4822 051 20223	22	k	0,1W	
3007	R4822 051 10102	1	k	0,25W	
3008	R4822 051 20272	2,7	k	0,1W	
3010	R4822 051 20473	47	k	0,1W	
3011	R4822 051 20104	100	k	0,1W	
3012	R4822 051 20221	220	R	0,1W	
3013	R4822 117 11139	1,5	k	0,1W	
3014	R4822 051 20272	2,7	k	0,1W	
3015	R4822 051 20561	560	R	0,1W	for SPC
3015	R4822 051 20681	680	R	0,1W	
3016	R4822 051 20472	4,7	k	0,1W	
3017	R4822 051 20103	10	k	0,1W	
3018	R4822 117 11449	2,2	k	0,1W	
3019	R4822 116 52231	820	R	0,5W	
3020	R4822 116 83903	4,7	k	0.1W	
3021	R4822 117 11721	1,3	k	0.1W	
3022	R4822 051 10102	1	k	0,25W	
3023	R4822 117 11449	2,2	k	0,1W	
3024	R4822 117 11449	2,2	k	0,1W	
3025	R4822 051 20122	1,2	k	0,1W	
3026	R4822 051 20331	330	R	0,1W	
3027	R4822 051 20681	680	R	0,1W	
3028	R4822 051 20271	270	R	0,1W	
3029	R4822 051 10102	1	k	0,25W	
3030	R4822 051 20471	470	R	0,1W	
3031	R4822 051 20561	560	R	0,1W	
3034	R4822 051 20331	330	R	0,1W	for 2/0
3034	R4822 051 20471	470	R	0,1W	
3035	R4822 051 20392	3,9	k	0,1W	
3036	R4822 051 20122	1,2	k	0,1W	
3037	R4822 051 20392	3,9	k	0,1W	
3038	R4822 100 12157	10	k		
3039	R4822 051 20272	2,7	k	0,1W	
3040	R4822 051 10102	1	k	0,25W	
3041	R4822 051 20471	470	R	0,1W	
3044	R4822 117 11139	1,5	k	0,1W	
3045	R4822 051 10102	1	k	0,25W	
3046	R4822 051 20472	4,7	k	0,1W	
3047	R4822 051 20471	470	R	0,1W	
3048	R4822 051 20681	680	R	0,1W	
3049	R4822 051 10102	1	k	0,25W	
3050	R4822 051 10102	1	k	0,25W	
3051	R4822 051 20561	560	R	0,1W	
3052	R4822 051 20391	390	R	0,1W	
3055	R4822 051 20472	4,7	k	0,1W	
3056	R4822 051 20104	100	k	0,1W	
3057	R4822 100 12157	10	k		
3068	R4822 051 10102	1	k	0,25W	
3069	R4822 117 11149	82	k	0,1W	

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MOBO PAL - BG - I

3073	R4822 051 20183	18	k	0,1W	
3074	R4822 051 20183	18	k	0,1W	
3075	R4822 051 20473	47	k	0,1W	
3076	R4822 051 20223	22	k	0,1W	
3079	R4822 051 20333	33	k	0,1W	
3080	R4822 051 20103	10	k	0,1W	
3081	R4822 051 20223	22	k	0,1W	
3085	R4822 051 20471	470	R	0,1W	
3090	R4822 050 23902	3,9	k	0,6W	
3092	R4822 050 11002	1	k	0,4W	
3094	R4822 116 52245	150	k	0,5W	
3096	R4822 116 52234	100	k	0,5W	
3098	R4822 116 52291	56	k	0,5W	
3114	R4822 116 83864	10	k	0,5W	
3129	R4822 050 11002	1	k	0,4W	
3150	R4822 051 20331	330	R	0,1W	
3150	R4822 051 20561	560	R	0,1W	for 2/0
3151	R4822 051 20472	4,7	k	0,1W	
3152	R4822 116 52234	100	k	0,5W	
3153	R4822 051 20008	0	R	0,1W	
3154	R4822 051 20008	0	R	0,1W	
3155	R4822 051 20008	0	R	0,1W	
3157	R4822 051 20008	0	R	0,1W	
3158	R4822 051 20393	39	k	0,1W	
3159	R4822 117 11449	2,2	k	0,1W	
3160	R4822 051 20331	330	R	0,1W	
3161	R4822 117 12141	14, 1	k	0,1W	
3161	R4822 117 12142	15	k	0,1W	for 4/0
3162	R4822 051 20103	10	k	0,1W	
3300	R4822 051 20101	100	R	0,1W	
3301	R4822 051 20101	100	R	0,1W	
3302	R4822 051 20101	100	R	0,1W	
3303	R4822 116 52224	470	R	0,5W	
3304	R4822 050 11002	1	k	0,4W	
3305	R4822 051 20472	4,7	k	0,1W	
3306	R4822 050 21809	18	R	0,1W	
3312	R4822 116 52249	1,8	k	0,5W	
3313	R4822 116 52284	47	k	0,5W	
3315	R4822 051 20008	0	R	0,1W	
3316	R4822 051 20472	4,7	k	0,1W	
3351	R4822 051 20332	3,3	k	0,1W	
3352	R4822 051 20472	4,7	k	0,1W	
3353	R4822 051 20103	10	k	0,1W	
3370	R4822 051 20472	4,7	k	0,1W	
3371	R4822 051 20472	4,7	k	0,1W	
3372	R4822 051 20472	4,7	k	0,1W	
3373	R4822 051 20221	220	R	0,1W	
3374	R4822 051 20472	4,7	k	0,1W	
3375	R4822 051 20472	4,7	k	0,1W	
3377	R4822 051 20472	4,7	k	0,1W	
3378	R4822 051 20224	220	k	0,1W	
3383	R4822 117 11449	2,2	k	0,1W	
3384	R4822 116 52303	8,2	k	0,5W	
3390	R4822 051 10008	0	R	0,25W	
3391	R4822 051 20221	220	R	0,1W	
3392	R4822 051 20008	0	R	0,1W	
3393	R4822 051 20008	0	R	0,1W	
3394	R4822 051 20008	0	R	0,1W	
3395	R4822 051 20008	0	R	0,1W	
3396	R4822 051 20008	0	R	0,1W	
3397	R4822 051 20008	0	R	0,1W	
3398	R4822 051 20221	220	R	0,1W	
3399	R4822 051 20008	0	R	0,1W	
3400	R4822 116 83864	10	k	0,5W	
3401	R4822 051 20103	10	k	0,1W	
3402	R4822 050 11002	1	k	0,4W	
3403	R4822 051 20472	4,7	k	0,1W	
3404	R4822 051 20103	10	k	0,1W	
3405	R4822 051 20103	10	k	0,1W	
3406	R4822 051 20103	10	k	0,1W	
3407	R4822 051 20472	4,7	k	0,1W	
3408	R4822 116 52224	470	R	0,5W	
3409	R4822 116 52283	4,7	k	0,5W	
3410	R4822 116 83864	10	k	0,5W	
3411	R4822 116 83864	10	k	0,5W	
3412	R4822 116 52249	1,8	k	0,5W	
3413	R4822 051 20472	4,7	k	0,1W	
3414	R4822 051 20472	4,7	k	0,1W	
3415	R4822 051 10102	1	k	0,1W	
3416	R4822 116 83864	10	k	0,5W	
3417	R4822 116 52283	4,7	k	0,5W	
3421	R4822 051 20103	10	k	0,1W	
3422	R4822 051 20221	220	R	0,1W	
3423	R4822 116 83872	220	R	0,5W	
3424	R4822 116 52256	2,2	k	0,5W	
3425	R4822 051 20472	4,7	k	0,1W	
3426	R4822 116 83864	10	k	0,5W	
3427	R4822 050 11002	1	k	0,4W	
3428	R4822 051 20472	4,7	k	0,1W	
3429	R4822 050 11002	1	k	0,4W	
3430	R4822 051 20182	1,8	k	0,1W	
3431	R4822 051 20392	3,9	k	0,1W	
3432	R4822 116 52263	2,7	k	0,5W	
3434	R4822 116 52296	6,8	k	0,5W	
3435	R4822 051 20103	10	k	0,1W	
3436	R4822 116 52271	33	k	0,5W	
3437	R4822 051 20472	4,7	k	0,1W	
3438	R4822 051 20472	4,7	k	0,1W	
3439	R4822 051 10102	1	k	0,25W	
3440⚠	R4822 052 10228	2,2	R	0,33W	
3441	R4822 051 20158	1,5	R	0,1W	
3442	R4822 117 11149	82	k	0,1W	
3443	R4822 051 20223	22	k	0,1W	
3444	R4822 051 20392	3,9	k	0,1W	
3445	R4822 051 20103	10	k	0,1W	
3446	R4822 051 20223	22	k	0,1W	
3447	R4822 116 52257	22	k	0,5W	
3448	R4822 116 83864	10	k	0,5W	
3449	R4822 116 83864	10	k	0,5W	
3450	R4822 116 52256	2,2	k	0,5W	
3451	R4822 116 52257	22	k	0,5W	
3452	R4822 051 20821	820	R	0,1W	
3453	R4822 051 20821	820	R	0,1W	
3454	R4822 051 20682	6,8	k	0,1W	
3455	R4822 051 20103	10	k	0,1W	
3456	R4822 051 20103	10	k	0,1W	
3457	R4822 051 20472	4,7	k	0,1W	
3458	R4822 051 20103	10	k	0,1W	
3459	R4822 116 83872	220	R	0,5W	
3460	R4822 051 20473	47	k	0,1W	
3461	R4822 051 20472	4,7	k	0,1W	
3462	R4822 051 20683	68	k	0,1W	
3463	R4822 117 11383	12	k	0,1W	
3464	R4822 117 11449	2,2	k	0,1W	
3465	R4822 051 20472	4,7	k	0,1W	
3466	R4822 116 52217	270	R	0,5W	
3467	R4822 116 83872	220	R	0,5W	
3468	R4822 116 83872	220	R	0,5W	
3469	R4822 116 83872	220	R	0,5W	
3470	R4822 116 52264	27	k	0,5W	
3471	R4822 116 52222	390	R	0,5W	
3472	R4822 116 52264	27	k	0,5W	
3473	R4822 116 52222	390	R	0,5W	
3474	R4822 051 20103	10	k	0,1W	
3475	R4822 116 52289	5,6	k	0,5W	
3476	R4822 116 52222	390	R	0,5W	
3477	R4822 051 20472	4,7	k	0,1W	
3478	R4822 051 20104	100	k	0,1W	
3479	R4822 051 20472	4,7	k	0,1W	
3480	R4822 051 20473	47	k	0,1W	
3481	R4822 117 11449	2,2	k	0,1W	
3482	R4822 051 20223	22	k	0,1W	
3483	R4822 051 20103	10	k	0,1W	
3484	R4822 051 20103	10	k	0,1W	
3485	R4822 051 20104	100	k	0,1W	
3486	R4822 116 83864	10	k	0,5W	
3487	R4822 051 20224	220	k	0,25W	
3488	R4822 051 20471	470	R	0,1W	
3489	R4822 051 20472	4,7	k	0,1W	
3490	R4822 051 20221	220	R	0,1W	
3491	R4822 051 20473	47	k	0,1W	
3492	R4822 051 20104	100	k	0,1W	
3493	R4822 051 20225	2,2	M	0,1W	
3494	R4822 051 20104	100	k	0,1W	
3495	R4822 051 20104	100	k	0,1W	
3496	R4822 051 20472	4,7	k	0,1W	
3497	R4822 051 20472	4,7	k	0,1W	
3498	R4822 051 20472	4,7	k	0,1W	
3499	R4822 116 52283	4,7	k	0,5W	
3500	R4822 051 10102	1	k	0,25W	
3501	R4822 051 10102	1	k	0,25W	
3502	R4822 051 10102	1	k	0,25W	

⚠ ... Safety component, use only this type

MOBO PAL - BG - I

3503	R4822 051 10008	0	R	0,25W	
3505	R4822 051 20104	100	k	0,1W	
3506	R4822 051 20104	100	k	0,1W	
3509	R4822 051 20104	100	k	0,1W	
3510	R4822 051 20472	4,7	k	0,1W	
3511	R4822 051 20104	100	k	0,1W	
3512	R4822 051 10102	1	k	0,25W	
3513	R4822 051 20472	4,7	k	0,1W	
3515	R4822 051 20759	75	R	0,1W	
3515	R4822 051 20689	068	R	0.1W	
3516	R4822 051 20759	75	R	0,1W	
3517	R4822 051 20101	100	R	0,1W	
3518	R4822 051 20101	100	R	0,1W	
3519	R4822 051 20394	390	k	0,1W	
3520	R4822 051 20101	100	R	0,1W	
3521	R4822 051 20125	1,2	M	0,1W	
3522	R4822 051 20104	100	k	0,1W	
3523	R4822 051 20125	1,2	M	0,1W	
3524	R4822 051 20104	100	k	0,1W	
3525	R4822 051 20008	0	R	0,1W	
3526	R4822 051 20008	0	R	0,1W	
3530	R4822 051 20472	4,7	k	0.1W	
3531	R4822 051 20008	0	R	0,1W	
3532	R4822 051 20008	0	R	0,1W	
3534	R4822 051 20008	0	R	0,1W	
3535	R4822 051 20008	0	R	0,1W	
3540	R4822 116 52175	100	R	0,5W	
3541	R4822 116 52175	100	R	0,5W	
3542	R4822 051 20682	6,8	k	0,1W	
3543	R4822 051 20105	1	M	0,1W	
3544	R4822 051 20105	1	M	0,1W	
3545	R4822 051 20105	1	M	0,1W	
3545	R4822 051 20474	470	k	0,1W	
3546	R4822 051 20332	3,3	k	0,1W	
3547	R4822 051 20332	3,3	k	0,1W	
3548	R4822 051 20562	5,6	k	0,1W	for VPS
3548	R4822 051 20682	6,8	k	0,1W	for PDC
3549	R4822 051 20101	100	R	0,1W	
3550	R4822 051 20104	100	k	0,1W	
3551	R4822 051 20105	1	M	0,1W	
3552	R4822 051 20008	0	R	0,1W	
3553	R4822 051 20008	0	R	0,1W	
3560	R4822 051 20101	100	R	0.1W	
3561	R4822 051 20472	4,7	k	0.1W	
3570	R4822 051 20759	75	R	0,1W	
3571	R4822 051 20682	6,8	k	0,1W	
3572	R4822 051 20224	220	k	0,1W	
3573	R4822 051 20473	47	k	0,1W	
3574	R4822 051 20008	0	R	0,1W	
3576	R4822 051 20332	3,3	k	0,1W	
3577	R4822 051 10102	1	k	0,25W	
3580	R4822 051 20471	470	R	0,1W	
3581	R4822 051 20682	6,8	k	0,1W	
3590	R4822 116 52269	3,3	k	0,5W	
3591	R4822 116 52256	2,2	k	0,5W	
3592	R4822 051 20008	0	R	0,1W	
3600	R4822 116 52195	47	R	0,5W	
3601	R4822 051 20104	100	k	0,1W	
3602	R4822 051 20331	330	R	0,1W	
3603	R4822 117 11383	12	k	0,1W	
3604	R4822 051 20394	390	k	0,1W	
3605	R4822 051 20101	100	R	0,1W	
3606	R4822 100 12157	10	k		
3607	R4822 116 52235	1	M	0,5W	
3610	R4822 051 20103	10	k	0,1W	
3611	R4822 116 52271	33	k	0,5W	
3612	R4822 051 20103	10	k	0,1W	
3613	R4822 117 11449	2,2	k	0,1W	
3614	R4822 051 20103	10	k	0,1W	
3615	R4822 051 20391	390	R	0,1W	
3616	R4822 051 20221	220	R	0,1W	
3617	R4822 051 20223	22	k	0,1W	
3618	R4822 100 12159	100	k		
3619	R4822 051 20158	1,5	R	0,1W	
3620	R4822 051 20473	47	k	0,1W	
3621	R4822 051 20104	100	k	0,1W	
3623	R4822 051 20103	10	k	0,1W	
3624	R4822 051 20332	3,3	k	0,1W	
3625	R4822 051 20339	33	R	0,1W	
3626	R4822 051 20104	100	k	0,1W	
3638	R4822 051 20109	10	R	0,1W	
3650	R4822 116 52224	470	R	0,5W	
3655	R4822 051 20008	0	R	0,1W	
3656	R4822 051 20008	0	R	0,1W	
3658	R4822 051 20008	0	R	0,1W	
3700	R4822 051 20008	0	R	0,1W	
3701	R4822 051 10102	1	k	0,25W	
3702	R4822 051 20101	100	R	0,1W	
3703	R4822 051 20101	100	R	0,1W	
3705	R4822 051 20223	22	k	0,1W	
3706	R4822 051 20681	680	R	0,1W	
3709	R4822 051 20008	0	R	0,1W	
3716	R4822 051 20008	0	R	0,1W	
3718	R4822 051 20008	0	R	0,1W	
3720	R4822 051 20008	0	R	0,1W	
3721	R4822 051 20008	0	R	0,1W	
3722	R4822 051 20008	0	R	0,1W	
3723	R4822 051 20684	680	k	0,1W	
3725	R4822 051 20822	8,2	k	0,1W	
3726	R4822 051 20273	27	k	0,1W	
3727	R4822 051 20008	0	R	0,1W	
3728	R4822 051 20008	0	R	0,1W	
3729	R4822 051 10102	1	k	0,25W	
3730	R4822 051 20183	18	k	0,1W	
3731	R4822 051 20183	18	k	0,1W	
3732	R4822 051 20391	390	R	0,1W	
3737	R4822 051 20472	4,7	k	0,1W	
3739	R4822 051 20272	2,7	k	0,1W	
3740	R4822 100 12156	4,7	k		
3742	R4822 100 12158	22	k		
3744	R4822 051 20154	150	k	0,1W	
3747	R4822 051 20331	330	R	0,1W	
3747	R4822 051 20271	270	R	0,1W	for /07
3760	R4822 051 10102	1	k	0,25W	
3760	R4822 051 20821	820	R	0,1W	for PAL I
3761	R4822 051 10102	1	k	0,25W	
3762	R4822 051 10102	1	k	0,25W	
3805	R4822 051 20479	47	R	0,1W	
3806	R4822 051 10102	1	k	0,25W	
3807	R4822 051 20221	220	R	0,1W	
3808	R4822 051 20223	22	k	0,1W	
3809	R4822 051 20103	10	k	0,1W	
3810	R4822 051 20104	100	k	0,1W	
3811	R4822 051 10102	1	k	0,25W	
3812	R4822 051 20472	4,7	k	0,1W	
3813	R4822 051 20472	4,7	k	0,1W	
3814	R4822 051 20101	100	R	0.1W	
3820	R4822 051 20008	0	R	0,1W	
3830	R4822 051 20332	3,3	k	0,1W	
3831	R4822 051 20181	180	R	0,1W	
3832	R4822 051 20008	0	R	0,1W	
3837	R4822 051 10102	1	k	0,25W	
3838	R4822 051 20101	100	R	0,1W	
3850	R4822 051 20153	15	k	0,1W	
3851	R4822 051 20103	10	k	0,1W	
3852	R4822 051 20103	10	k	0,1W	
3853	R4822 051 20103	10	k	0,1W	
3854	R4822 051 20153	15	k	0,1W	
3855	R4822 051 20103	10	k	0,1W	
3856	R4822 117 11449	2,2	k	0,1W	
3857	R4822 051 20472	4,7	k	0,1W	
3858	R4822 117 11449	2,2	k	0,1W	
3860	R4822 051 20472	4,7	k	0,1W	
3861	R4822 051 20223	22	k	0,1W	
3862	R4822 051 20153	15	k	0,1W	
3863	R4822 051 20104	100	k	0,1W	
3864	R4822 051 20472	4,7	k	0,1W	
3865	R4822 051 20472	4,7	k	0,1W	
3866	R4822 051 20475	4,7	M	0,1W	
3867	R4822 051 20475	4,7	M	0,1W	
3870	R4822 051 20103	10	k	0,1W	
3871	R4822 051 20103	10	k	0,1W	
3872	R4822 051 20103	10	k	0,1W	
3873	R4822 116 52175	100	R	0,5W	
3890	R4822 051 20101	100	R	0,1W	
3891	R4822 051 20101	100	R	0,1W	
3892	R4822 051 20103	10	k	0,1W	

⚠ ... Safety component, use only this type

MOBO PAL - BG - I

JUMPER

4000	R4822 051 20008	0R00 JUMP. (0805)
4001	R4822 051 10008	0R00 5% 0,25W
4002	R4822 051 10008	0R00 5% 0,25W
4003	R4822 051 20008	0R00 JUMP. (0805)
4004	R4822 051 10008	0R00 5% 0,25W
4005	R4822 051 20008	0R00 JUMP. (0805)
4006	R4822 051 10008	0R00 5% 0,25W
4007	R4822 051 20008	0R00 JUMP. (0805)
4008	R4822 051 20008	0R00 JUMP. (0805)
4009	R4822 051 20008	0R00 JUMP. (0805)
4010	R4822 051 20008	0R00 JUMP. (0805)
4012	R4822 051 20008	0R00 JUMP. (0805)
4014	R4822 051 10008	0R00 5% 0,25W
4015	R4822 051 10008	0R00 5% 0,25W
4016	R4822 051 10008	0R00 5% 0,25W
4017	R4822 051 10008	0R00 5% 0,25W
4020	R4822 051 20008	0R00 JUMP. (0805)
4021	R4822 051 10008	0R00 5% 0,25W
4022	R4822 051 10008	0R00 5% 0,25W
4023	R4822 051 10008	0R00 5% 0,25W
4024	R4822 051 10008	0R00 5% 0,25W
4026	R4822 051 10008	0R00 5% 0,25W
4027	R4822 051 10008	0R00 5% 0,25W
4028	R4822 051 10008	0R00 5% 0,25W
4031	R4822 051 20008	0R00 JUMP. (0805)
4032	R4822 051 10008	0R00 5% 0,25W
4033	R4822 051 10008	0R00 5% 0,25W
4034	R4822 051 10008	0R00 5% 0,25W
4035	R4822 051 10008	0R00 5% 0,25W
4049	R4822 051 20008	0R00 JUMP. (0805)
4050	R4822 051 10008	0R00 5% 0,25W
4051	R4822 051 20008	0R00 JUMP. (0805)
4052	R4822 051 10008	0R00 5% 0,25W
4053	R4822 051 10008	0R00 5% 0,25W
4101	R4822 051 10008	0R00 5% 0,25W
4102	R4822 051 10008	0R00 JUMP. (1206)
4103	R4822 051 20008	0R00 JUMP. (0805)
4104	R4822 051 20008	0R00 JUMP. (0805)
4105	R4822 051 10008	0R00 5% 0,25W
4106	R4822 051 10008	0R00 5% 0,25W
4107	R4822 051 20008	0R00 JUMP. (0805)
4108	R4822 051 10008	0R00 JUMP (1206)
4109	R4822 051 20008	0R00 JUMP. (0805)
4110	R4822 051 20008	0R00 JUMP. (0805)
4147	R4822 051 20008	0R00 JUMP. (0805)
4150	R4822 051 20008	0R00 JUMP. (0805)
4301	R4822 051 20008	0R00 JUMP. (0805)
4350	R4822 051 10008	0R00 JUMP (1206)
4401	R4822 051 20008	0R00 JUMP. (0805)
4402	R4822 051 10008	0R00 5% 0,25W
4403	R4822 051 20008	0R00 JUMP. (0805)
4404	R4822 051 10008	0R00 5% 0,25W
4407	R4822 051 10008	0R00 5% 0,25W
4408	R4822 051 10008	0R00 5% 0,25W
4410	R4822 051 10008	0R00 5% 0,25W
4411	R4822 051 20008	0R00 JUMP. (0805)
4112	R4822 051 10008	0R00 5% 0,25W
4412	R4822 051 10008	0R00 5% 0,25W
4413	R4822 051 10008	0R00 5% 0,25W
4420	R4822 051 20008	0R00 JUMP. (0805)
4421	R4822 051 20008	0R00 JUMP. (0805)
4500	R4822 051 10008	0R00 5% 0,25W
4501	R4822 051 10008	0R00 5% 0,25W
4502	R4822 051 20008	0R00 JUMP. (0805)
4503	R4822 051 20008	0R00 JUMP. (0805)
4504	R4822 051 20008	0R00 JUMP. (0805)
4505	R4822 051 20008	0R00 JUMP. (0805)
4506	R4822 051 20008	0R00 (0805) JUMP
4507	R4822 051 10008	0R00 JUMP (1206)
4511	R4822 051 10008	0R00 5% 0,25W
4512	R4822 051 20008	0R00 JUMP. (0805)
4513	R4822 051 10008	0R00 5% 0,25W
4515	R4822 051 10008	0R00 5% 0,25W
4516	R4822 051 10008	0R00 5% 0,25W
4517	R4822 051 10008	0R00 5% 0,25W
4518	R4822 051 10008	0R00 5% 0,25W
4519	R4822 051 10008	0R00 5% 0,25W
4520	R4822 051 10008	0R00 5% 0,25W
4522	R4822 051 10008	0R00 JUMP (1206)
4523	R4822 051 10008	0R00 5% 0,25W
4524	R4822 051 10008	0R00 5% 0,25W
4525	R4822 051 10008	0R00 5% 0,25W
4527	R4822 051 10008	0R00 5% 0,25W
4530	R4822 051 10008	0R00 5% 0,25W
4531	R4822 051 10008	0R00 5% 0,25W
4532	R4822 051 10008	0R00 5% 0,25W
4533	R4822 051 10008	0R00 5% 0,25W
4534	R4822 051 10008	0R00 5% 0,25W
4535	R4822 051 10008	0R00 5% 0,25W
4537	R4822 051 10008	0R00 5% 0,25W
4538	R4822 051 10008	0R00 5% 0,25W
4539	R4822 051 10008	0R00 5% 0,25W
4540	R4822 051 20008	0R00 JUMP. (0805)
4541	R4822 051 10008	0R00 5% 0,25W
4542	R4822 051 10008	0R00 5% 0,25W
4543	R4822 051 10008	0R00 5% 0,25W
4544	R4822 051 10008	0R00 5% 0,25W
4545	R4822 051 20008	0R00 JUMP. (0805)
4546	R4822 051 10008	0R00 5% 0,25W
4547	R4822 051 10008	0R00 5% 0,25W
4548	R4822 051 10008	0R00 5% 0,25W
4550	R4822 051 10008	0R00 5% 0,25W
4551	R4822 051 10008	0R00 5% 0,25W
4552	R4822 051 10008	0R00 5% 0,25W
4553	R4822 051 20008	0R00 JUMP. (0805)
4554	R4822 051 10008	0R00 5% 0,25W
4555	R4822 051 10008	0R00 5% 0,25W
4601	R4822 051 10008	0R00 5% 0,25W
4701	R4822 051 20008	0R00 JUMP. (0805)
4702	R4822 051 10008	0R00 5% 0,25W
4703	R4822 051 20008	0R00 JUMP. (0805)
4800	R4822 051 20008	0R00 JUMP. (0805)
4802	R4822 051 10008	0R00 5% 0,25W
4805	R4822 051 10008	0R00 5% 0,25W
4806	R4822 051 10008	0R00 5% 0,25W
4807	R4822 051 20008	0R00 JUMP. (0805)

COILS

5000	R4822 157 63717	6,8 µH
5001	R4822 157 52842	15 µH
5002	R4822 157 63717	6,8 µH
5003	R4822 157 53265	100 µH
5004	R4822 157 53265	100 µH
5005	R4822 157 52842	15 µH
5006	R4822 157 52842	15 µH
5007	R4822 157 53253	27 µH
5008	R4822 157 53251	8,2 µH
5009	R4822 157 53253	27 µH
5010	R4822 157 52842	15 µH
5011	R4822 157 53265	100 µH
5012	R4822 157 70015	220 µH
5013	R4822 157 52842	15 µH
5050	R4822 146 10445	
5060	R4822 156 21719	1,5 µH 10%
5069	R4822 157 60147	2,2µH
5088	R4822 157 71461	22µH 10%
5150	R4822 157 10449	47µH 10%
5300	R4822 157 53005	
5400	R4822 157 70746	22µH
5401	R4822 157 62681	1µH
5402	R4822 157 52265	100 µH
5403	R4822 157 71243	100µH 10%
5404	R4822 157 52333	100µH
5405	R4822 157 53005	0,33 µH
5406	R4822 157 53252	22µH
5510	R4822 157 63717	6,8µH
5601	R4822 157 70038	
5602	R4822 157 71246	330µH 10%
5603	R4822 157 53531	
5702	R4822 157 60123	6,8µH
5703	R4822 157 52285	6,8 µH
5704	R4822 157 71206	(100MHz,600R)
5705	R4822 157 52285	6,8 µH
5720	R4822 157 62681	
5725	R4822 157 70877	77,8MHZ
5727	R4822 157 52285	6,8 µH
5740	R4822 157 52842	15 µH
5800	R4822 157 70402	33 µH
5801	R4822 157 52285	6,8 µH

⚠ ... Safety component, use only this type

5802	R4822 157 52285	6,8 µH
5810	R4822 152 20677	10 µH
5830	R4822 157 70746	22 µH
5831	R4822 157 10451	30 µH 5%

DIODES

6000	R4822 130 30621	1N4148
6088	R4822 130 83909	BYW98-200RL
6092	R4822 130 83909	BYW98-200RL
6098	R4822 130 83934	MBR360
6402	R4822 130 80622	BAT54
6460	R4822 130 10231	V298PB
6550	R4822 130 30621	1N4148
6553	R4822 130 30621	1N4148
6570	R4822 130 34197	BZX79-B12
6572	R4822 130 34197	BZX79-B12
6573	R5322 130 80212	BZX84-C18
6574	R4822 130 33699	BZX84-C12
6575	R4822 130 33699	BZX84-C12
6576	R4822 130 34197	BZX79-B12
6590	R4822 130 34278	BZX79-B6V8
6830	R5322 130 34331	BAV70

TRANSISTORS & IC's

7000	R4822 130 61495	DTA124EK
7001	R5322 130 41982	BC848B
7004	R4822 130 42513	BC858C
7006	R5322 130 41983	BC858B
7007	R5322 130 41982	BC848B
7009	R4822 130 60729	DTC124EK
7010	R5322 130 41982	BC848B
7013	R5322 130 41982	BC848B
7014	R4822 130 42353	BSF19-F2
7015	R4822 130 61495	DTA124EK
7016	R4822 130 61495	DTA124EK
7018	R4822 130 42353	BSF19-F2
7019	R5322 130 41982	BC848B
7020	R4822 130 42353	BSF19-F2
7021	R4822 130 60383	BF824
7035	R4822 209 60177	LM339D
7036	R4822 130 60729	DTC124EK
7038	R4822 130 60729	DTC124EK
7039	R4822 130 60729	DTC124EK
7040	R4822 130 60729	DTC124EK
7051	R4822 209 90538	LA7437A
7060	R4822 209 90005	LC89973M-TLM
7090	R4822 130 10237	MTD3055V1
7096	R4822 130 44503	BC547C
7150	R4822 209 90422	STV5744DT
7152	R4822 209 13121	STV5742
7160	R4822 130 42353	BFS19
7300	R4822 209 13126	TDA5241
7350	R5322 130 41983	BC858B
7400	R4822 209 13147	TMP91C642AF PTDP1-xU
7400	R4822 209 13122	TMP91C642AF PTDP3-xU
7401	R5322 209 11306	HEF4094BT
7402	R4822 130 61495	DTA124EK
7406	R4822 130 61495	DTA124EK
7407	R4822 130 60729	DTC124EK
7408	R4822 130 60729	DTC124EK
7409	R5322 130 41982	BC848B
7440	R4822 209 30146	L2722
7455	R4822 130 61495	DTA124EK
7456	R5322 130 41982	BC848B
7457	R5322 130 41982	BC848B
7458	R5322 130 41982	BC848B
7460	R4822 209 30836	SAA1310P/N2
7461	R4822 130 10232	S298P
7462	R4822 130 10232	S298P
7463	R4822 130 41344	BC337-40
7464	R4822 130 10233	TCRT5000L
7465	R4822 130 10233	TCRT5000L
7466	R4822 130 10234	TCST1030L
7467	R5322 130 42136	BC848C
7468	R5322 130 42136	BC848C
7469	R5322 130 41982	BC848B
7470	R4822 130 10214	STD17N06
7471	R4822 130 60729	DTC124EK
7472	R4822 130 10214	STD17N06
7500	R5322 130 41982	BC848B
7501	R5322 130 41982	BC848B
7502	R5322 130 41982	BC848B
7510	R5322 130 42136	BC848C
7512	R5322 130 42136	BC848C
7540	R4822 209 32728	SDA5642 for VPS
7540	R4822 209 33756	SDA5648 for PDC
7540	R4822 209 12674	SDA5649 for PDC time download
7550	R5322 209 14481	HEF4053BT
7551	R4822 209 10263	HEF4052BD
7552	R4822 209 90016	STV6400
7560	R4822 130 40937	BC548B
7601	R4822 209 31548	LA7282
7604	R4822 130 41715	BC328-40
7606	R5322 130 41982	BC848B
7609	R4822 130 42615	BC817-40
7720	R4822 209 90288	TDA9800T/V3
7723	R5322 130 41982	BC848B
7724	R5322 130 42136	BC848C
7725	R5322 130 41983	BC858B
7800	R4822 209 13119	LC74781
7801	R5322 130 41982	BC848B
7802	R5322 130 41983	BC858B
7810	R5322 130 41982	BC848B
7811	R5322 130 41982	BC848B
7821	R5322 130 41982	BC848B
7830	R5322 130 41983	BC858B
7850	R4822 209 60177	LM339D
7851	R5322 130 41982	BC848B
7852	R5322 130 41982	BC848B
7890	R4822 209 32709	ST24C04C
7890	R4822 209 32283	ST24C08CB1 for Gamestar

JUMPER

9045	R4822 051 10008	0R00 5% 0,25W
9046	R4822 051 10008	0R00 5% 0,25W
9048	R4822 051 20008	0E00 JUMP (0805)
9049	R4822 051 10008	0R00 5% 0,25W
9050	R4822 051 10008	0R00 5% 0,25W

⚠ ... Safety component, use only this type

MISCELLANEOUS

0007	R4822 256 10195	HOLDER	for Layout .3
0008	R4822 256 10196	HOLDER	for Layout .3
0020	R4822 256 10197	HOLDER	
0021	R4822 256 10197	HOLDER	
0022	R4822 256 10197	HOLDER	
0030	R4822 256 10198	HOLDER	
0031	R4822 256 10198	HOLDER	
0040	R4822 256 10196	HOLDER	for Layout .4
0041	R4822 256 10195	HOLDER	for Layout .4
1000	R4822 242 81067	Crystal 4.433 619 MC	
1400	R4822 242 82059	Crystal 10MC	
1402⚠	R4822 071 55001	Fuse 500mA	
1403⚠	R4822 071 58009	Fuse 80mA	
1404⚠	R4822 071 51002	Fuse T 1.0 A	
1460	R4822 277 11521	Switch	
1461	R4822 277 11521	Switch	
1701	R4822 210 10698	TUMOD TP926	
1719	R4822 242 81423	B39389-L9453-M100	
1720	R4822 242 81737	B39389-G1965-M100	
1740	R4822 242 72586	TPS 5,5MB-TF20	
1745	R4822 242 81811	SFE 5,5MB-TF21	
1746	R4822 242 70279	SFE 6,0MB-TF21	

CONNECTORS

1915	R4822 267 10364	CONN. 9P
1916	R4822 267 41199	CONN. 5P
1917	R4822 267 31513	SCART ORANGE
1930	R4822 267 41062	CONN. 6P
1941	R4822 267 10365	CONN. 20P
1944	R4822 265 30989	BMT 3P CBL0,3-1,25
1945	R4822 265 30989	BM V 3P F 1.25
1946	R4822 267 10366	CONN. 8P
1951	R4822 265 31205	CONN. 5P VERT
1961	R4822 267 31512	CONN. 2P
1962	R4822 267 40696	CONN. 3P

CAPACITORS

2001	R5322 122 32654	22	nF	63V	
2002	R4822 124 23053	1	µF	63V	
2003	R4822 122 33797	47	nF	50V	
2004	R4822 122 33797	47	nF	50V	
2005	R4822 124 41969	1	µF	50V	
2006	R4822 126 13838	100	nF		
2007	R4822 122 33177	10	nF	50V	
2008	R4822 124 41969	1	µF	50V	
2009	R4822 126 13838	100	nF		
2010	R4822 124 80231	47	µF	16V	
2011	R4822 122 33177	10	nF	50V	
2012	R4822 122 33177	10	nF	50V	
2013	R4822 122 33177	10	nF	50V	
2014	R5322 122 31863	330	pF	50V	
2015	R4822 124 23053	1	µF	63V	
2016	R4822 124 23053	1	µF	63V	
2017	R4822 124 22826	10	µF	16V	
2018	R4822 124 22826	10	µF	16V	
2019	R4822 122 33177	10	nF	50V	
2020	R4822 126 13838	100	nF		
2021	R4822 124 22826	10	µF	16V	
2022	R4822 122 33177	10	nF	50V	
2023	R4822 126 13123	68	pF	63V	
2024	R5322 122 32448	10	pF	50V	
2025	R5322 122 32452	47	pF	63V	
2026	R4822 126 13222	390	pF	63V	
2027	R4822 124 23179	10	µF	16V	
2028	R4822 124 23179	10	µF	16V	
2029	R4822 126 13475	200	pF		
2030	R4822 126 13838	100	nF		
2031	R5322 122 32448	10	pF	50V	
2032	R5322 122 32452	47	pF	63V	
2033	R4822 124 80231	47	µF	16V	
2034	R4822 124 40196	220	µF	16V	
2035	R4822 122 33514	68	pF	50V	for 4/0
2035	R4822 122 33515	82	pF	50V	
2036	R5322 122 32659	33	pF	50V	
2037	R5322 122 34123	1	nF	50V	
2038	R4822 126 13838	100	nF		
2039	R4822 122 33514	68	pF	50V	
2040	R4822 122 33514	68	pF	50V	
2041	R5322 122 31946	27	pF	63V	
2042	R5322 122 32452	47	pF	63V	
2043	R4822 122 33177	10	nF	50V	
2044	R4822 122 33514	68	pF	50V	
2045	R4822 126 10326	180	pF	63V	
2046	R4822 122 33575	220	pF	50V	
2047	R4822 126 13689	18	pF	63V	
2048	R4822 122 33514	68	pF	50V	
2049	R5322 122 32658	22	pF	50V	
2050	R4822 126 13838	100	nF		
2051	R5322 122 32531	100	pF	50V	
2052	R5322 122 33861	120	pF	50V	
2053	R5322 122 32659	33	pF	50V	
2054	R5322 122 31946	27	pF	63V	
2055	R5322 122 31863	330	pF	50V	
2056	R4822 126 13061	220	nF	25V	
2057	R4822 122 33177	10	nF	50V	
2058	R4822 126 10326	180	pF	63V	
2060	R4822 122 33177	10	nF	50V	
2061	R4822 124 23053	1	µF	63V	
2064	R4822 126 13061	220	nF	25V	
2065	R4822 124 80231	47	µF	16V	
2066	R4822 122 33177	10	nF	50V	
2067	R5322 122 34123	1	nF	50V	
2068	R4822 122 33177	10	nF	50V	
2069	R4822 122 33177	10	nF	50V	
2075	R5322 122 32659	33	pF	50V	
2075	R5322 126 13689	18	pF	50V	for SPC
2081	R5322 122 32452	47	pF	63V	
2083	R5322 122 32448	10	pF	50V	
2085	R4822 124 22826	10	µF	16V	
2086	R4822 124 80729	22	µF	16V	
2087	R4822 122 33177	10	nF	50V	
2088	R4822 124 80875	220	µF	25V	
2090	R4822 124 80875	220	µF	25V	
2092	R5322 121 42386	100	nF	63V	
2094	R5322 122 32452	47	pF	63V	
2099	R4822 124 41747	680	µF	35V	
2100	R4822 122 33177	10	nF	50V	
2101	R5322 122 32531	100	pF	50V	
2102	R5322 122 32658	22	pF	50V	
2103	R5322 122 34123	1	nF	50V	
2104	R4822 122 33177	10	nF	50V	
2105	R4822 122 33177	10	nF	50V	
2106	R4822 122 33177	10	nF	50V	
2107	R4822 122 33177	10	nF	50V	
2108	R5322 122 33538	150	pF	63V	
2109	R5322 122 32481	15	pF	50V	
2110	R4822 126 10002	100	nF	25V	
2111	R4822 122 33514	68	pF	50V	
2112	R4822 122 33177	10	nF	50V	
2113	R4822 126 10002	100	nF	25V	
2114	R5322 122 32654	22	nF	63V	
2115	R4822 122 33575	220	pF	50V	
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	R5322 122 32448	10	pF	50V	
2126	R5322 122 32658	22	pF	50V	
2127	R4822 126 10326	180	pF	63V	
2128	R4822 122 32139	12	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	R4822 122 33514	68	pF	50V	
2150	R4822 122 33177	10	nF	50V	
2151	R5322 122 32654	22	nF	63V	
2152	R4822 126 13061	220	nF	25V	
2153	R4822 122 33177	10	nF	50V	
2154	R4822 122 33177	10	nF	50V	

⚠ ... Safety component, use only this type

MOBO PAL - SECAM L - L`

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	R5322 122 32531	100	pF	50V
2162	R4822 122 33177	10	nF	50V
2163	R4822 122 33177	10	nF	50V
2164	R4822 124 40433	47	µF	25V
2300	R4822 124 80705	1	µF	50V
2301	R4822 124 80705	1	µF	50V
2302	R4822 124 80705	1	µF	50V
2308	R5322 122 32531	100	pF	50V
2307	R5322 122 32654	22	nF	50V
2309	R4822 126 10002	100	nF	50V
2310	R4822 126 13838	100	nF	
2311	R4822 122 33177	10	nF	50V
2313	R4822 122 33575	220	pF	50V
2314	R4822 126 13838	100	nF	
2315	R4822 122 33177	10	nF	50V
2316	R4822 122 33797	47	nF	50V
2317	R5322 122 32654	22	nF	63V
2318	R4822 124 41576	2,2	µF	50V
2319	R5322 122 32654	22	nF	63V
2400	R4822 126 13838	100	nF	
2401	R4822 124 80729	22	µF	16V
2402	R4822 126 13838	100	nF	
2403	R5322 122 32658	22	pF	50V
2404	R5322 122 32658	22	pF	50V
2416	R4822 126 13838	100	nF	
2417	R4822 124 23178	47	µF	16V
2420	R4822 122 33175	2,2	nF	50V
2440	R5322 124 21189	100	µF	40V
2441	R4822 126 13838	100	nF	
2442	R4822 122 33177	10	nF	50V
2455	R5322 126 10223	4,7	nF	63V
2459	R4822 124 22263	220	µF	25V
2461	R5322 126 10223	4,7	nF	63V
2462	R4822 124 11537	47	µF	25V
2463	R4822 124 80231	47	µF	16V
2464	R5322 126 10223	4,7	nF	63V
2465	R5322 122 34123	1	nF	50V
2466	R4822 124 80231	47	µF	16V
2467	R4822 122 33342	33	nF	63V
2468	R4822 126 13838	100	nF	
2470	R4822 122 33177	10	nF	50V
2471	R4822 122 33177	10	nF	50V
2472	R5322 116 80853	560	pF	63V
2473	R5322 116 80853	560	pF	63V
2510	R4822 124 22826	10	µF	16V
2512	R4822 124 80231	47	µF	16V
2513	R4822 126 10002	100	nF	25V
2514	R4822 126 10002	100	nF	25V
2515	R4822 126 10002	100	nF	25V
2516	R4822 126 10002	100	nF	25V
2517	R4822 126 10002	100	nF	25V
2518	R4822 126 10002	100	nF	50V
2519	R4822 126 13838	100	nF	
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 10002	100	nF	25V
2545	R4822 126 10002	100	nF	25V
2570	R5322 122 32268	470	pF	50V
2571	R5322 122 32268	470	pF	50V
2572	R5322 122 32268	470	pF	50V
2590	R4822 122 33177	10	nF	50V
2591	R4822 124 80879	100	µF	16V
2592	R4822 126 13838	100	nF	
2600	R5322 122 34123	1	nF	50V
2601	R5322 122 31865	1,5	nF	63V
2602	R4822 126 13838	100	nF	
2604	R4822 122 33177	10	nF	50V
2605	R4822 124 80879	100	µF	16V
2606	R4822 126 13838	100	nF	
2607	R4822 126 13838	100	nF	
2608	R5322 122 32268	470	pF	50V
2609	R4822 124 80231	47	µF	16V
2610	R4822 122 33175	2,2	nF	50V
2611	R4822 124 80231	47	µF	16V
2612	R4822 122 33342	33	nF	63V
2613	R4822 126 12104	12	nF	63V
2614	R4822 124 23053	1	µF	63V
2615	R4822 124 80231	47	µF	16V
2616	R4822 124 80231	47	µF	16V
2617	R4822 124 23178	47	µF	16V
2618	R5322 122 31863	330	pF	50V
2619	R4822 124 80231	47	µF	16V
2620	R4822 121 51655	47	nF	50V
2621	R5322 122 34123	1	nF	50V
2622	R4822 121 43873	27	nF	50V
2623	R4822 121 51574	12	nF	50V
2624	R5322 122 34123	1	nF	50V
2625	R4822 121 43996	33	nF	50V
2626	R4822 121 43873	27	nF	50V
2627	R4822 121 41857	10	nF	50V
2628	R4822 124 80231	47	µF	16V
2629	R4822 124 80231	47	µF	16V
2631	R4822 124 23053	1	µF	63V
2633	R4822 124 80729	22	µF	16V
2650	R4822 122 33177	10	nF	50V
2652	R5322 122 34123	1	nF	50V
2700	R4822 126 13838	100	nF	
2702	R4822 126 13838	100	nF	
2704	R4822 124 41579	10	µF	50V
2705	R4822 126 13838	100	nF	
2706	R4822 122 33575	220	pF	50V
2707	R5322 122 33861	120	pF	50V
2708	R4822 124 80729	22	µF	16V
2709	R4822 126 10002	100	nF	50V
2710	R4822 126 10002	100	nF	50V
2722	R5322 122 34123	1	nF	50V
2727	R4822 124 80729	22	µF	16V
2728	R4822 122 33177	10	nF	50V
2735	R5322 122 32452	47	pF	63V
2736	R5322 122 32452	47	pF	63V
2740	R4822 124 41576	2,2	µF	50V
2741	R4822 126 10002	100	nF	25V
2742	R4822 124 80729	22	µF	16V
2743	R4822 126 13838	100	nF	
2744	R4822 124 80227	2,2	µF	35V
2745	R4822 122 33575	220	pF	50V
2747	R4822 126 13838	100	nF	
2748	R4822 126 12945	8,2	pF	
2749	R4822 126 13061	220	nF	25V
2750	R4822 124 80227	2,2	µF	35V
2751	R4822 124 80228	4,7	µF	25V
2753	R4822 126 13838	100	nF	
2800	R4822 126 13689	18	pF	63V
2801	R5322 122 32659	33	pF	50V
2802	R4822 126 13838	100	nF	
2803	R4822 126 13838	100	nF	
2804	R4822 124 40242	1	µF	63V
2810	R5322 122 33861	120	pF	50V
2820	R4822 125 50412	TRI	µF	
2822	R5322 122 32659	33	pF	50V
2830	R5322 122 32661	56	pF	50V
2831	R4822 122 33177	10	nF	50V
2832	R4822 126 13838	100	nF	
2840	R4822 126 13838	100	nF	
2850	R4822 124 22826	10	µF	16V
2851	R4822 124 22826	10	µF	16V
2852	R5322 126 10223	4,7	nF	63V
2853	R5322 116 80853	560	pF	63V
2854	R5322 126 10223	4,7	nF	63V
2855	R5322 116 80853	560	pF	63V
2858	R4822 124 22826	10	µF	16V
2860	R4822 126 10002	100	nF	25V
2890	R4822 126 13061	220	nF	25V

⚠ ... Safety component, use only this type

MOBO PAL - SECAM L - L`

RESISTORS

3000	R4822 051 10102	1	k	0,25W	
3001	R4822 051 20822	8,2	k	0,1W	
3001	R4822 117 11383	12	k	0,1W	
3002	R4822 051 20182	1,8	k	0,1W	
3003	R4822 051 20223	22	k	0,1W	
3004	R4822 051 20223	22	k	0,1W	
3006	R4822 051 20223	22	k	0,1W	
3007	R4822 051 10102	1	k	0,25W	
3008	R4822 051 20272	2,7	k	0,1W	
3009	R4822 051 20473	47	k	0,1W	
3010	R4822 051 20473	47	k	0,1W	
3011	R4822 051 20104	100	k	0,1W	
3012	R4822 051 20221	220	R	0,1W	
3013	R4822 117 11139	1,5	k	0,1W	
3014	R4822 051 20272	2,7	k	0,1W	
3015	R4822 051 20561	560	R	0,1W	for SPC
3015	R4822 051 20681	680	R	0,1W	
3016	R4822 051 20472	4,7	k	0,1W	
3017	R4822 051 20103	10	k	0,1W	
3018	R4822 117 11449	2,2	k	0,1W	
3019	R4822 116 52231	820	R	0,5W	
3020	R4822 116 83903	4,7	k	0.1W	
3021	R4822 117 11721	1,3	k	0.1W	
3022	R4822 051 10102	1	k	0,25W	
3023	R4822 117 11449	2,2	k	0,1W	
3024	R4822 117 11449	2,2	k	0,1W	
3025	R4822 051 20122	1,2	k	0,1W	
3026	R4822 051 20331	330	R	0,1W	
3027	R4822 051 20681	680	R	0,1W	
3028	R4822 051 20271	270	R	0,1W	
3029	R4822 051 10102	1	k	0,25W	
3030	R4822 051 20471	470	R	0,1W	
3031	R4822 051 20561	560	R	0,1W	
3034	R4822 051 20331	330	R	0,1W	for 2/0
3034	R4822 051 20471	470	R	0,1W	
3035	R4822 051 20392	3,9	k	0,1W	
3036	R4822 051 20122	1,2	k	0,1W	
3037	R4822 051 20392	3,9	k	0,1W	
3038	R4822 100 12157	10	k		
3039	R4822 051 20272	2,7	k	0,1W	
3040	R4822 051 10102	1	k	0,25W	
3041	R4822 051 20471	470	R	0,1W	
3042	R4822 100 12157	10	k		
3043	R4822 051 20822	8,2	k	0,1W	
3044	R4822 117 11139	1,5	k	0,1W	
3045	R4822 051 10102	1	k	0,25W	
3046	R4822 051 20472	4,7	k	0,1W	
3047	R4822 051 20471	470	R	0,1W	
3048	R4822 051 20681	680	R	0,1W	
3049	R4822 051 10102	1	k	0,25W	
3050	R4822 051 10102	1	k	0,25W	
3051	R4822 051 20561	560	R	0,1W	
3052	R4822 051 20391	390	R	0,1W	
3055	R4822 051 20472	4,7	k	0,1W	
3056	R4822 051 20104	100	k	0,1W	
3057	R4822 100 12157	10	k		
3068	R4822 051 10102	1	k	0,25W	
3069	R4822 117 11149	82	k	0,1W	
3070	R4822 051 20273	27	k	0,1W	
3072	R4822 051 20472	4,7	k	0,1W	
3073	R4822 051 20183	18	k	0,1W	
3074	R4822 051 20183	18	k	0,1W	
3075	R4822 051 20473	47	k	0,1W	
3076	R4822 051 20223	22	k	0,1W	
3079	R4822 051 20333	33	k	0,1W	
3080	R4822 051 20103	10	k	0,1W	
3081	R4822 051 20223	22	k	0,1W	
3085	R4822 051 20471	470	R	0,1W	
3090	R4822 050 23902	3,9	k	0,6W	
3092	R4822 050 11002	1	k	0,4W	
3094	R4822 116 52245	150	k	0,5W	
3096	R4822 116 52234	100	k	0,5W	
3098	R4822 116 52291	56	k	0,5W	
3100	R4822 051 20331	330	R	0,1W	
3101	R4822 051 20332	3,3	k	0,1W	
3102	R4822 051 20821	820	R	0,1W	
3103	R4822 051 20681	680	R	0,1W	
3104	R4822 051 10102	1	k	0,25W	
3105	R4822 051 20391	390	R	0,1W	
3106	R4822 051 20821	820	R	0,1W	
3107	R4822 051 10102	1	k	0,25W	
3108	R4822 051 20473	47	k	0,1W	
3109	R4822 051 20473	47	k	0,1W	
3110	R4822 051 20122	1,2	k	0,1W	
3111	R4822 117 11449	2,2	k	0,1W	
3112	R4822 051 10102	1	k	0,25W	
3113	R4822 051 20561	560	R	0,1W	
3114	R4822 116 83864	10	k	0,5W	
3115	R4822 051 20183	18	k	0,1W	
3116	R4822 051 10102	1	k	0,25W	
3118	R4822 051 20472	4,7	k	0,1W	
3119	R4822 051 20333	33	k	0,1W	
3121	R4822 051 20182	1,8	k	0,1W	
3122	R4822 051 10102	1	k	0,25W	
3123	R4822 051 20103	10	k	0,1W	
3124	R4822 117 11139	1,5	k	0,1W	
3125	R4822 117 11449	2,2	k	0,1W	
3126	R4822 051 10102	1	k	0,25W	
3127	R4822 117 11449	2,2	k	0,1W	
3128	R4822 117 11449	2,2	k	0,1W	
3129	R4822 050 11002	1	k	0,4W	
3150	R4822 051 20331	330	R	0,1W	
3150	R4822 051 20561	560	R	0,1W	for 2/0
3151	R4822 051 20472	4,7	k	0,1W	
3152	R4822 116 52234	100	k	0,5W	
3153	R4822 051 20008	0	R	0,1W	
3154	R4822 051 20008	0	R	0,1W	
3155	R4822 051 20008	0	R	0,1W	
3157	R4822 051 20008	0	R	0,1W	
3158	R4822 051 20393	39	k	0,1W	
3159	R4822 117 11449	2,2	k	0,1W	
3160	R4822 051 20331	330	R	0,1W	
3161	R4822 117 12142	15, 1k		0,1W	for 4/0
3161	R4822 117 12141	14	k	0,1W	
3162	R4822 051 20103	10	k	0,1W	
3300	R4822 051 20101	100	R	0,1W	
3301	R4822 051 20101	100	R	0,1W	
3302	R4822 051 20101	100	R	0,1W	
3303	R4822 116 52224	470	R	0,5W	
3304	R4822 050 11002	1	k	0,4W	
3305	R4822 051 20472	4,7	k	0,1W	
3306	R4822 050 21809	18	R	0,1W	
3312	R4822 116 52249	1,8	k	0,5W	
3313	R4822 116 52284	47	k	0,5W	
3315	R4822 051 20008	0	R	0,1W	
3316	R4822 051 20472	4,7	k	0,1W	
3370	R4822 051 20472	4,7	k	0,1W	
3371	R4822 051 20472	4,7	k	0,1W	
3372	R4822 051 20472	4,7	k	0,1W	
3373	R4822 051 20221	220	R	0,1W	
3374	R4822 051 20472	4,7	k	0,1W	
3375	R4822 051 20472	4,7	k	0,1W	
3377	R4822 051 20472	4,7	k	0,1W	
3378	R4822 051 20224	220	k	0,1W	
3383	R4822 117 11449	2,2	k	0,1W	
3384	R4822 116 52303	8,2	k	0,5W	
3390	R4822 051 10008	0	R	0,25W	
3391	R4822 051 20221	220	R	0,1W	
3392	R4822 051 20008	0	R	0,1W	
3393	R4822 051 20008	0	R	0,1W	
3394	R4822 051 20008	0	R	0,1W	
3395	R4822 051 20008	0	R	0,1W	
3396	R4822 051 20008	0	R	0,1W	
3397	R4822 051 20008	0	R	0,1W	
3398	R4822 051 20221	220	R	0,1W	
3399	R4822 051 20008	0	R	0,1W	
3400	R4822 116 83864	10	k	0,5W	
3401	R4822 051 20103	10	k	0,1W	
3402	R4822 050 11002	1	k	0,4W	
3403	R4822 051 20472	4,7	k	0,1W	
3404	R4822 051 20103	10	k	0,1W	
3405	R4822 051 20103	10	k	0,1W	
3406	R4822 051 20103	10	k	0,1W	
3407	R4822 051 20472	4,7	k	0,1W	
3408	R4822 116 52224	470	R	0,5W	
3409	R4822 116 52283	4,7	k	0,5W	
3410	R4822 116 83864	10	k	0,5W	
3411	R4822 116 83864	10	k	0,5W	
3412	R4822 116 52249	1,8	k	0,5W	

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3413	R4822 051 20472	4,7	k	0,1W
3414	R4822 051 20472	4,7	k	0,1W
3415	R4822 051 10102	1	k	0,25W
3416	R4822 116 83864	10	k	0,5W
3417	R4822 116 52283	4,7	k	0,5W
3418	R4822 051 20103	10	k	0,1W
3419	R4822 051 20104	100	k	0,1W
3420	R4822 051 20472	4,7	k	0,1W
3421	R4822 051 20103	10	k	0,1W
3422	R4822 051 20221	220	R	0,1W
3423	R4822 116 83872	220	R	0,5W
3424	R4822 116 52256	2,2	k	0,5W
3425	R4822 051 20472	4,7	k	0,1W
3426	R4822 116 83864	10	k	0,5W
3427	R4822 050 11002	1	k	0,4W
3428	R4822 051 20472	4,7	k	0,1W
3429	R4822 050 11002	1	k	0,4W
3430	R4822 051 20182	1,8	k	0,1W
3431	R4822 051 20392	3,9	k	0,1W
3432	R4822 116 52263	2,7	k	0,5W
3434	R4822 116 52296	6,8	k	0,1W
3435	R4822 051 20103	10	k	0,1W
3436	R4822 116 52271	33	k	0,5W
3437	R4822 051 20472	4,7	k	0,1W
3438	R4822 051 20472	4,7	k	0,1W
3439	R4822 051 10102	1	k	0,25W
3440⚠	R4822 052 10228	2,2	R	0,33W
3441	R4822 051 20158	1,5	R	0,1W
3442	R4822 117 11149	82	k	0,1W
3443	R4822 051 20223	22	k	0,1W
3444	R4822 051 20392	3,9	k	0,1W
3445	R4822 051 20103	10	k	0,1W
3446	R4822 051 20223	22	k	0,1W
3447	R4822 116 52257	22	k	0,5W
3448	R4822 116 83864	10	k	0,5W
3449	R4822 116 83864	10	k	0,5W
3450	R4822 116 52256	2,2	k	0,5W
3451	R4822 116 52257	22	k	0,5W
3452	R4822 051 20821	820	R	0,1W
3453	R4822 051 20821	820	R	0,1W
3454	R4822 051 20682	6,8	k	0,1W
3455	R4822 051 20103	10	k	0,1W
3456	R4822 051 20103	10	k	0,1W
3457	R4822 051 20472	4,7	k	0,1W
3458	R4822 051 20103	10	k	0,1W
3459	R4822 116 83872	220	R	0,5W
3460	R4822 051 20473	47	k	0,1W
3461	R4822 051 20472	4,7	k	0,1W
3462	R4822 051 20683	68	k	0,1W
3463	R4822 117 11383	12	k	0,1W
3464	R4822 117 11449	2,2	k	0,1W
3465	R4822 051 20472	4,7	k	0,1W
3466	R4822 116 52217	270	R	0,5W
3467	R4822 116 83872	220	R	0,5W
3468	R4822 116 83872	220	R	0,5W
3469	R4822 116 83872	220	R	0,5W
3470	R4822 116 52264	27	k	0,5W
3471	R4822 116 52222	390	R	0,5W
3472	R4822 116 52264	27	k	0,5W
3473	R4822 116 52222	390	R	0,5W
3474	R4822 051 20103	10	k	0,1W
3475	R4822 116 52289	5,6	k	0,5W
3476	R4822 116 52222	390	R	0,5W
3477	R4822 051 20472	4,7	k	0,1W
3478	R4822 051 20104	100	k	0,1W
3479	R4822 051 20472	4,7	k	0,1W
3480	R4822 051 20473	47	k	0,1W
3481	R4822 117 11449	2,2	k	0,1W
3482	R4822 051 20223	22	k	0,1W
3483	R4822 051 20103	10	k	0,1W
3484	R4822 051 20103	10	k	0,1W
3486	R4822 116 83864	10	k	0,5W
3488	R4822 051 20471	470	R	0,1W
3489	R4822 051 20472	4,7	k	0,1W
3490	R4822 051 20221	220	R	0,1W
3491	R4822 051 20473	47	k	0,1W
3492	R4822 051 20104	100	k	0,1W
3493	R4822 051 20225	2,2	M	0,1W
3494	R4822 051 20104	100	k	0,1W
3495	R4822 051 20104	100	k	0,1W
3496	R4822 051 20472	4,7	k	0,1W
3497	R4822 051 20472	4,7	k	0,1W
3498	R4822 051 20472	4,7	k	0,1W
3499	R4822 116 52283	4,7	k	0,5W
3505	R4822 051 20104	100	k	0,1W
3506	R4822 051 20104	100	k	0,1W
3509	R4822 051 20104	100	k	0,1W
3510	R4822 051 20472	4,7	k	0,1W
3511	R4822 051 20104	100	k	0,1W
3512	R4822 051 10102	1	k	0,1W
3513	R4822 051 20472	4,7	k	0,1W
3515	R4822 051 20759	75	R	0,1W
3516	R4822 051 20759	75	R	0,1W
3517	R4822 051 20101	100	R	0,1W
3518	R4822 051 20101	100	R	0,1W
3525	R4822 051 20008	0	R	0,1W
3531	R4822 051 20008	0	R	0,1W
3534	R4822 051 20008	0	R	0,1W
3535	R4822 051 20008	0	R	0,1W
3540	R4822 116 52175	100	R	0,5W
3541	R4822 116 52175	100	R	0,5W
3542	R4822 051 20682	6,8	k	0,1W
3543	R4822 051 20105	1	M	0,1W
3544	R4822 051 20105	1	M	0,1W
3545	R4822 051 20474	470	k	0,1W
3546	R4822 051 20332	3,3	k	0,1W
3547	R4822 051 20332	3,3	k	0,1W
3548	R4822 051 20682	6,8	k	0,1W
3549	R4822 051 20101	100	R	0,1W
3550	R4822 051 20104	100	k	0,1W
3553	R4822 051 20008	0	R	0,1W
3570	R4822 051 20759	75	R	0,1W
3571	R4822 051 20682	6,8	k	0,1W
3572	R4822 051 20224	220	k	0,1W
3573	R4822 051 20473	47	k	0,1W
3574	R4822 051 20008	0	R	0,1W
3576	R4822 051 20332	3,3	k	0,1W
3577	R4822 051 10102	1	k	0,25W
3580	R4822 051 20471	470	R	0,1W
3581	R4822 051 20682	6,8	k	0,1W
3590	R4822 116 52269	3,3	k	0,5W
3591	R4822 116 52256	2,2	k	0,5W
3600	R4822 116 52195	47	R	0,5W
3601	R4822 051 20104	100	k	0,1W
3602	R4822 051 20331	330	R	0,1W
3603	R4822 117 11383	12	k	0,1W
3604	R4822 051 20394	390	k	0,1W
3605	R4822 051 20101	100	R	0,1W
3606	R4822 100 12157	10	k	
3607	R4822 116 52235	1	M	0,5W
3610	R4822 051 20103	10	k	0,1W
3611	R4822 116 52271	33	k	0,5W
3612	R4822 051 20103	10	k	0,1W
3613	R4822 117 11449	2,2	k	0,1W
3614	R4822 051 20103	10	k	0,1W
3615	R4822 051 20391	390	R	0,1W
3616	R4822 051 20221	220	R	0,1W
3617	R4822 051 20223	22	k	0,1W
3618	R4822 100 12159	100	k	
3619	R4822 051 20158	1,5	R	0,1W
3620	R4822 051 20473	47	k	0,1W
3621	R4822 051 20104	100	k	0,1W
3623	R4822 051 20103	10	k	0,1W
3624	R4822 051 20332	3,3	k	0,1W
3625	R4822 051 20339	33	R	0,1W
3626	R4822 051 20104	100	k	0,1W
3630	R4822 051 20333	33	k	0,1W
3631	R4822 051 20158	1,5	R	
3632	R4822 051 20331	330	R	0,1W
3633	R4822 051 20331	330	R	0,1W
3634	R4822 051 20183	18	k	0,1W
3635	R4822 051 20472	4,7	k	0,1W
3636	R4822 051 20104	100	k	0,1W
3637	R4822 051 20109	10	R	0,1W
3638	R4822 051 20109	10	R	0,1W
3650	R4822 116 52224	470	R	0,5W
3655	R4822 051 20008	0	R	0,1W
3656	R4822 051 20008	0	R	0,1W
3657	R4822 051 20008	0	R	0,1W
3658	R4822 051 20008	0	R	0,1W
3659	R4822 051 20008	0	R	0,1W
3660	R4822 051 20104	100	k	0,1W

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MOBO PAL - SECAM L - L`

3701	R4822 051 10102	1	k	0,25W
3702	R4822 051 20101	100	R	0,1W
3703	R4822 051 20101	100	R	0,1W
3704	R4822 051 20681	680	R	0,1W
3705	R4822 051 20223	22	k	0,1W
3709	R4822 051 20101	100	R	0,1W
3714	R4822 051 20008	0	R	0,1W
3717	R4822 051 20008	0	R	0,1W
3719	R4822 051 20008	0	R	0,1W
3724	R4822 051 20008	0	R	0,1W
3725	R4822 051 20822	8,2	k	0,1W
3726	R4822 051 20273	27	k	0,1W
3730	R4822 051 20183	18	k	0,1W
3731	R4822 051 20183	18	k	0,1W
3733	R4822 051 20008	0	R	0,1W
3734	R4822 051 20008	0	R	0,1W
3735	R4822 051 20181	180	R	0,1W
3736	R4822 051 20562	5,6	k	0,1W
3742	R4822 100 12158	22	k	
3744	R4822 051 20154	150	k	0,1W
3747	R4822 051 20391	390	R	0,1W
3748	R4822 100 12158	22	k	
3749	R4822 051 20681	680	R	0,1W
3750	R4822 051 20331	330	R	0,1W
3761	R4822 051 10102	1	k	0,25W
3762	R4822 051 10102	1	k	0,25W
3764	R4822 051 10102	1	k	0,25W
3766	R4822 051 20473	47	k	0,1W
3767	R4822 051 20472	4,7	k	0,1W
3768	R4822 051 20104	100	k	0,1W
3769	R4822 051 20472	4,7	k	0,1W
3770	R4822 051 20104	100	k	0,1W
3771	R4822 051 20472	4,7	k	0,1W
3805	R4822 051 20479	47	R	0,1W
3806	R4822 051 10102	1	k	0,25W
3807	R4822 051 20221	220	R	0,1W
3808	R4822 051 20223	22	k	0,1W
3809	R4822 051 20103	10	k	0,1W
3810	R4822 051 20104	100	k	0,1W
3811	R4822 051 10102	1	k	0,25W
3812	R4822 051 20472	4,7	k	0,1W
3813	R4822 051 20472	4,7	k	0,1W
3814	R4822 051 20101	100	R	0,1W
3820	R4822 051 20008	0	R	0,1W
3830	R4822 051 20332	3,3	k	0,1W
3831	R4822 051 20181	180	R	0,1W
3832	R4822 051 20008	0	R	0,1W
3837	R4822 051 10102	1	k	0,25W
3838	R4822 051 20101	100	R	0,1W
3850	R4822 051 20153	15	k	0,1W
3851	R4822 051 20103	10	k	0,1W
3852	R4822 051 20103	10	k	0,1W
3853	R4822 051 20103	10	k	0,1W
3854	R4822 051 20153	15	k	0,1W
3855	R4822 051 20103	10	k	0,1W
3856	R4822 117 11449	2,2	k	0,1W
3857	R4822 051 20472	4,7	k	0,1W
3858	R4822 117 11449	2,2	k	0,1W
3860	R4822 051 20472	4,7	k	0,1W
3861	R4822 051 20223	22	k	0,1W
3862	R4822 051 20153	15	k	0,1W
3863	R4822 051 20104	100	k	0,1W
3864	R4822 051 20472	4,7	k	0,1W
3865	R4822 051 20472	4,7	k	0,1W
3866	R4822 051 20475	4,7	M	0,1W
3867	R4822 051 20475	4,7	M	0,1W
3870	R4822 051 20103	10	k	0,1W
3871	R4822 051 20103	10	k	0,1W
3872	R4822 051 20103	10	k	0,1W
3873	R4822 116 52175	100	R	0,5W
3890	R4822 051 20101	100	R	0,1W
3891	R4822 051 20101	100	R	0,1W
3892	R4822 051 20103	10	k	0,1W

JUMPER

4000	R4822 051 20008	0R00			JUMP. (0805)
4001	R4822 051 10008	0R00	5%	0,25W	
4002	R4822 051 10008	0R00	5%	0,25W	
4003	R4822 051 20008	0R00			JUMP. (0805)
4004	R4822 051 10008	0R00	5%	0,25W	
4005	R4822 051 20008	0R00			JUMP. (0805)
4006	R4822 051 10008	0R00	5%	0,25W	
4007	R4822 051 20008	0R00			JUMP. (0805)
4009	R4822 051 20008	0R00			JUMP. (0805)
4010	R4822 051 20008	0R00			JUMP. (0805)
4012	R4822 051 20008	0R00			JUMP. (0805)
4014	R4822 051 10008	0R00	5%	0,25W	
4015	R4822 051 10008	0R00	5%	0,25W	
4016	R4822 051 10008	0R00	5%	0,25W	
4017	R4822 051 10008	0R00	5%	0,25W	
4020	R4822 051 20008	0R00			JUMP. (0805)
4021	R4822 051 10008	0R00	5%	0,25W	
4023	R4822 051 10008	0R00	5%	0,25W	
4024	R4822 051 10008	0R00	5%	0,25W	
4026	R4822 051 10008	0R00	5%	0,25W	
4027	R4822 051 10008	0R00	5%	0,25W	
4028	R4822 051 10008	0R00	5%	0,25W	
4029	R4822 051 10008	0R00	5%	0,25W	
4030	R4822 051 10008	0R00	5%	0,25W	
4031	R4822 051 20008	0R00			JUMP. (0805)
4032	R4822 051 10008	0R00	5%	0,25W	
4033	R4822 051 10008	0R00	5%	0,25W	
4034	R4822 051 10008	0R00	5%	0,25W	
4035	R4822 051 10008	0R00	5%	0,25W	
4036	R4822 051 10008	0R00	5%	0,25W	
4049	R4822 051 20008	0R00			JUMP. (0805)
4051	R4822 051 20008	0R00			JUMP. (0805)
4053	R4822 051 10008	0R00	5%	0,25W	
4101	R4822 051 10008	0R00	5%	0,25W	
4102	R4822 051 10008	0R00	5%	0,25W	
4103	R4822 051 20008	0R00			JUMP. (0805)
4104	R4822 051 20008	0R00			JUMP. (0805)
4105	R4822 051 10008	0R00	5%	0,25W	
4106	R4822 051 10008	0R00	5%	0,25W	
4107	R4822 051 20008	0R00			JUMP. (0805)
4108	R4822 051 10008	0R00			JUMP. (1206)
4109	R4822 051 20008	0R00			JUMP. (0805)
4110	R4822 051 20008	0R00			JUMP. (0805)
4112	R4822 051 10008	0R00	5%	0,25W	
4147	R4822 051 20008	0R00			JUMP. (0805)
4150	R4822 051 20008	0R00			JUMP. (0805)
4301	R4822 051 20008	0R00			JUMP. (0805)
4401	R4822 051 20008	0R00			JUMP. (0805)
4402	R4822 051 10008	0R00	5%	0,25W	
4403	R4822 051 20008	0R00			JUMP. (0805)
4404	R4822 051 10008	0R00	5%	0,25W	
4407	R4822 051 10008	0R00	5%	0,25W	
4408	R4822 051 10008	0R00	5%	0,25W	
4410	R4822 051 10008	0R00	5%	0,25W	
4411	R4822 051 20008	0R00			JUMP. (0805)
4412	R4822 051 10008	0R00	5%	0,25W	
4413	R4822 051 10008	0R00	5%	0,25W	
4420	R4822 051 20008	0R00			JUMP. (0805)
4421	R4822 051 20008	0R00			JUMP. (0805)
4500	R4822 051 10008	0R00	5%	0,25W	
4501	R4822 051 10008	0R00	5%	0,25W	
4502	R4822 051 20008	0R00			JUMP. (0805)
4503	R4822 051 20008	0R00			JUMP. (0805)
4504	R4822 051 20008	0R00			JUMP. (0805)
4505	R4822 051 20008	0R00			JUMP. (0805)
4511	R4822 051 10008	0R00	5%	0,25W	
4512	R4822 051 20008	0R00			JUMP. (0805)
4513	R4822 051 10008	0R00	5%	0,25W	
4515	R4822 051 10008	0R00	5%	0,25W	
4516	R4822 051 10008	0R00	5%	0,25W	
4517	R4822 051 10008	0R00	5%	0,25W	
4518	R4822 051 10008	0R00	5%	0,25W	
4519	R4822 051 10008	0R00	5%	0,25W	
4520	R4822 051 10008	0R00	5%	0,25W	
4522	R4822 051 10008	0R00			JUMP. (1206)
4523	R4822 051 10008	0R00	5%	0,25W	
4524	R4822 051 10008	0R00	5%	0,25W	
4525	R4822 051 10008	0R00	5%	0,25W	
4526	R4822 051 10008	0R00			JUMP. (1206)

⚠ ... Safety component, use only this type

4527	R4822 051 10008	0R00 5% 0,25W
4528	R4822 051 10008	0R00 JUMP. (1206)
4530	R4822 051 10008	0R00 5% 0,25W
4531	R4822 051 10008	0R00 5% 0,25W
4532	R4822 051 10008	0R00 5% 0,25W
4533	R4822 051 10008	0R00 5% 0,25W
4534	R4822 051 10008	0R00 5% 0,25W
4535	R4822 051 10008	0R00 5% 0,25W
4537	R4822 051 10008	0R00 5% 0,25W
4538	R4822 051 10008	0R00 5% 0,25W
4539	R4822 051 10008	0R00 5% 0,25W
4540	R4822 051 20008	0R00 JUMP. (0805)
4541	R4822 051 10008	0R00 5% 0,25W
4542	R4822 051 10008	0R00 5% 0,25W
4543	R4822 051 10008	0R00 5% 0,25W
4544	R4822 051 10008	0R00 5% 0,25W
4545	R4822 051 20008	0R00 JUMP. (0805)
4546	R4822 051 10008	0R00 5% 0,25W
4547	R4822 051 10008	0R00 5% 0,25W
4548	R4822 051 10008	0R00 5% 0,25W
4550	R4822 051 10008	0R00 5% 0,25W
4551	R4822 051 10008	0R00 5% 0,25W
4552	R4822 051 10008	0R00 5% 0,25W
4553	R4822 051 20008	0R00 JUMP. (0805)
4554	R4822 051 10008	0R00 5% 0,25W
4555	R4822 051 10008	0R00 5% 0,25W
4601	R4822 051 10008	0R00 5% 0,25W
4701	R4822 051 20008	0R00 JUMP. (0805)
4702	R4822 051 10008	0R00 5% 0,25W
4703	R4822 051 20008	0R00 JUMP. (0805)
4800	R4822 051 20008	0R00 JUMP. (0805)
4804	R4822 051 10008	0R00 5% 0,25W
4805	R4822 051 10008	0R00 5% 0,25W
4806	R4822 051 10008	0R00 5% 0,25W
4807	R4822 051 20008	0R00 JUMP. (0805)

COILS

5000	R4822 157 63717	6,8MUH
5001	R4822 157 52842	15 µH
5002	R4822 157 63717	6,8MUH
5003	R4822 157 53265	100 µH
5004	R4822 157 53265	100 µH
5005	R4822 157 52842	15 µH
5006	R4822 157 52842	15 µH
5007	R4822 157 53253	27 µH
5008	R4822 157 53251	8,2 µH
5009	R4822 157 53253	27 µH
5010	R4822 157 52842	15 µH
5011	R4822 157 53265	100 µH
5012	R4822 157 70015	220 µH
5013	R4822 157 52842	15 µH
5014	R4822 157 63678	560MUH
5050	R4822 146 10445	
5060	R4822 156 21719	
5069	R4822 157 60147	2,2UH
5088	R4822 157 71461	22UH 10%
5100	R4822 157 63661	FIL LC VAR 4M286 5VS
5101	R4822 157 52842	15 µH
5102	R4822 157 63676	56MUH
5103	R4822 157 63661	FIL LC VAR 4M286 5VS
5104	R4822 157 71456	150UH 5%
5105	R4822 157 71456	150UH 5%
5106	R4822 157 63675	330MUH
5107	R4822 157 53265	100 µH
5108	R4822 157 63659	FIL LC VAR 1G072 5V2
5110	R4822 157 53251	8,2 µH
5111	R4822 157 71287	82UH 5%
5112	R4822 157 71287	82UH 5%
5113	R4822 157 71456	150UH 5%
5114	R4822 157 52842	15 µH
5150	R4822 157 10449	47UH 10%
5300	R4822 157 53005	
5400	R4822 157 70746	22UH
5401	R4822 157 62681	
5402	R4822 157 52265	100 µH
5403	R4822 157 71243	100UH 10%
5404	R4822 157 52333	100UH
5405	R4822 157 53005	0MU33
5406	R4822 157 53252	22 µH
5510	R4822 157 63717	6,8MUH
5601	R4822 157 70038	
5602	R4822 157 71246	330UH 10%
5603	R4822 157 53531	
5604	R4822 157 53531	SOUND DUB. COIL
5702	R4822 157 60123	6,8UH
5703	R4822 157 52285	6,8 µH
5704	R4822 157 71206	(100MHz,600R)
5705	R4822 157 52285	6,8 µH
5720	R4822 157 62681	
5721	R4822 157 70877	77,8MHZ
5725	R4822 157 70877	77,8MHZ
5727	R4822 157 52285	6,8 µH
5740	R4822 157 70037	12MUH
5800	R4822 157 70402	33UH
5801	R4822 157 52285	6,8 µH
5802	R4822 157 52285	6,8 µH
5810	R4822 152 20677	10MUH
5830	R4822 157 70746	22UH
5831	R4822 157 10451	30UH 5%

DIODES

6000	R4822 130 30621	1N4148
6088	R4822 130 83909	BYW98-200RL
6092	R4822 130 83909	BYW98-200RL
6098	R4822 130 83934	MBR360
6460	R4822 130 10231	V298PB
6470	R4822 130 33699	BZX84-C12
6471	R4822 130 33699	BZX84-C12
6550	R4822 130 30621	1N4148
6553	R4822 130 30621	1N4148
6570	R4822 130 34197	BZX79-B12
6572	R4822 130 34197	BZX79-B12
6573	R5322 130 80212	BZX84-C18
6574	R4822 130 33699	BZX84-C12
6575	R4822 130 33699	BZX84-C12
6576	R4822 130 34197	BZX79-B12
6590	R4822 130 34278	BZX79-B6V8
6760	R4822 130 83703	BA582
6761	R4822 130 83703	BA582
6830	R5322 130 34331	BAV70

TRANSISTORS & IC's

7000	R4822 130 61495	DTA124EK
7001	R5322 130 41982	BC848B
7002	R4822 130 61495	DTA124EK
7003	R4822 130 61495	DTA124EK
7004	R4822 130 42513	BC858C
7005	R5322 130 41982	BC848B
7006	R5322 130 41983	BC858B
7007	R5322 130 41982	BC848B
7009	R4822 130 60729	DTC124EK
7010	R5322 130 41982	BC848B
7013	R5322 130 41982	BC848B
7014	R4822 130 42353	BSF19-F2
7015	R4822 130 61495	DTA124EK
7016	R4822 130 61495	DTA124EK
7018	R4822 130 42353	BSF19-F2
7019	R5322 130 41982	BC848B
7020	R4822 130 42353	BSF19-F2
7021	R4822 130 60383	BF824
7030	R5322 130 41982	BC848B
7032	R4822 130 61495	DTA124EK
7035	R4822 209 60177	LM339D
7036	R4822 130 60729	DTC124EK
7038	R4822 130 60729	DTC124EK
7039	R4822 130 60729	DTC124EK
7040	R4822 130 60729	DTC124EK
7051	R4822 209 90538	LA7437A
7060	R4822 209 90005	LC89973M-TLM
7090	R4822 130 10237	MTD3055V1
7096	R4822 130 44503	BC547C
7100	R5322 130 41982	BC848B
7101	R5322 130 41982	BC848B
7102	R4822 209 73852	PMBT2369
7103	R5322 130 41982	BC848B
7104	R4822 130 60729	DTC124EK
7105	R5322 130 41982	BC848B
7106	R5322 130 41982	BC848B

⚠ ... Safety component, use only this type

MOBO PAL - SECAM L - L`

7110	R4822 209 90189	TDA4722/V2
7150	R4822 209 90422	STV5744
7152	R4822 209 13121	STV5742DT
7160	R4822 130 42353	BSF19-F2
7300	R4822 209 13126	TDA5241
7400	R4822 209 13147	TMP91C642AF PTDP1-xU
7400	R4822 209 13122	TMP91C642AF PTDP3-xU
7401	R5322 209 11306	HEF4094BT PHIN
7402	R4822 130 61495	DTA124EK
7406	R4822 130 61495	DTA124EK
7407	R4822 130 60729	DTC124EK
7408	R4822 130 60729	DTC124EK
7409	R5322 130 41982	BC848B
7440	R4822 209 30146	L2722
7455	R4822 130 61495	DTA124EK
7456	R5322 130 41982	BC848B
7457	R5322 130 41982	BC848B
7458	R5322 130 41982	BC848B
7460	R4822 209 30836	SAA1310P/N2
7461	R4822 130 10232	S298P
7462	R4822 130 10232	S298P
7463	R4822 130 41344	BC337-40
7464	R4822 130 10233	TCRT5000L
7465	R4822 130 10233	TCRT5000L
7466	R4822 130 10234	TCST1030L
7467	R5322 130 42136	BC848C
7768	R5322 130 42136	BC848C
7469	R5322 130 41982	BC848B
7472	R4822 130 10214	STD17N06
7510	R5322 130 42136	BC848C
7512	R5322 130 42136	BC848C
7540	R4822 209 33756	SDA5648 for PDC
7540	R4822 209 12674	SDA5649 for PDC time down load
7550	R5322 209 14481	HEF4053BT
7551	R4822 209 10263	HEF4052BD
7552	R4822 209 90016	STV6400
7601	R4822 209 31548	LA7282
7604	R4822 130 41715	BC328-40
7606	R5322 130 41982	BC848B
7608	R5322 130 41983	BC858B
7609	R4822 130 42615	BC817-40
7610	R5322 130 41982	BC848B
7612	R4822 130 42615	BC817-40
7721	R4822 209 90018	TDA9812T
7722	R5322 209 14481	HEF4053BT
7724	R5322 130 42136	BC848C
7725	R5322 130 41983	BC858B
7726	R4822 130 60729	DTC124EK
7729	R5322 130 41982	BC848B
7730	R5322 130 41982	BC848B
7800	R4822 209 13119	LC74781
7801	R5322 130 41982	BC848B
7802	R5322 130 41983	BC858B
7810	R5322 130 41982	BC848B
7811	R5322 130 41982	BC848B
7821	R5322 130 41982	BC848B
7830	R5322 130 41983	BC858B
7850	R4822 209 60177	LM339D
7851	R5322 130 41982	BC848B
7852	R5322 130 41982	BC848B
7890	R4822 209 32709	24C04
7890	R4822 209 32283	ST24C08CB1 for Gamestar

JUMPER

9045	R4822 051 10008	0R00 5% 0,25W
9046	R4822 051 10008	0R00 5% 0,25W
9048	R4822 051 20008	0R00 JUMP. (0805)
9049	R4822 051 10008	0R00 5% 0,25W
9050	R4822 051 10008	0R00 5% 0,25W

PDCH1

MISCELLANEOUS

0005	R4822 256 92072	IR - HOLDER
0006	R4822 403 53863	DISPLAY HOLDER
1235	R4822 276 11349	TIP-SWITCH
1242	R4822 276 11349	TIP-SWITCH
1251	R4822 276 11349	TIP-SWITCH
1257	R4822 276 11349	TIP-SWITCH
1258	R4822 276 11349	TIP-SWITCH
1266	R4822 276 11349	TIP-SWITCH
1267	R4822 276 11349	TIP-SWITCH
1272	R4822 276 11349	TIP-SWITCH
1273	R4822 276 11349	TIP-SWITCH
1287	R4822 276 11349	TIP-SWITCH
1288	R4822 276 11349	TIP-SWITCH
1297	R5322 242 73682	CRYSTAL 32,768KHZ
1298	R4822 242 82114	CRYSTAL 8 MHZ
1299	R4822 276 13732	TIP-SWITCH

CONNECTORS

1921	R4822 267 10365	20P VERT HLEM

CAPACITORS

2203	R5322 122 32481	15	pF	50V
2204	R5322 122 32481	15	pF	50V
2210	R4822 122 33177	10	nF	50V
2211	R4822 124 81045	220	µF	6,3V
2220	R4822 124 80729	22	µF	16V
2230	R4822 122 33177	10	nF	50V
2231	R4822 126 13061	220	nF	25V
2237	R4822 122 33177	10	nF	50V
2239	R4822 122 33177	10	nF	50V
2251	R4822 122 31947	100	nF	
2252	R4822 122 31947	100	nF	63V
2297	R4822 124 11603	47	µF	5,5V

RESISTORS

3228	R4822 051 20221	220	R	0,1W
3229	R4822 051 20103	10	k	0,1W
3233	R4822 117 11449	2,2	k	1/8W
3235	R4822 051 10103	10	k	1/8W
3236	R4822 051 20103	10	k	0,1W
3237	R4822 116 52257	22	k	1/6W
3238	R4822 116 52269	3,3	k	0,5W
3239	R4822 116 52234	100	k	1/6W
3240	R4822 051 10103	10	k	1/8W
3250	R4822 051 10332	3,3	k	1/8W
3251	R4822 116 52175	100	R	1/6W
3252	R4822 116 52175	100	R	0,5W
3253	R4822 116 52182	15	R	0,5W
3900	R4822 051 10008	0	R	0,25W
3901	R4822 051 10008	0	R	0,25W
3902	R4822 051 10008	0	R	0,25W
3903	R4822 051 10008	0	R	0,25W
3904	R4822 051 10008	0	R	0,25W
3905	R4822 051 20008	0	R	0,1W
3907	R4822 051 20008	0	R	0,1W
3908	R4822 051 10008	0	R	0,25W
3910	R4822 051 10008	0	R	0,25W
3911	R4822 051 10008	0	R	0,25W
3913	R4822 051 10008	0	R	0,25W
3914	R4822 051 10008	0	R	0,25W
3915	R4822 051 20008	0	R	0,1W
3918	R4822 051 10008	0	R	0,25W
3919	R4822 051 10008	0	R	0,25W
3920	R4822 051 10008	0	R	0,25W
3921	R4822 051 10008	0	R	0,25W
3922	R4822 051 10008	0	R	0,25W
3923	R4822 051 20008	0	R	0,1W
3929	R4822 051 10008	0	R	0,25W
3930	R4822 051 10008	0	R	0,25W
3932	R4822 051 10008	0	R	0,25W
3934	R4822 051 10008	0	R	0,25W
3935	R4822 051 10008	0	R	0,25W
3936	R4822 051 10008	0	R	0,25W
3995	R4822 051 20008	0	R	0,1W
3998	R4822 051 10008	0	R	0,25W
3999	R4822 051 20008	0	R	0,1W

COILS

5200	R4822 157 52286	22 µH

DIODES

6231	R5322 130 41982	BC848B
6250	R4822 130 34197	BZX79-B12
6286	R4822 130 30621	1N4148
6287	R4822 130 30621	1N4148
6290	R4822 130 30621	1N4148
6295	R5322 130 41982	BC848B
6296	R5322 130 41982	BC848B
6299	R4822 130 31983	BAT85

TRANSISTORS & IC's

7201	R4822 209 13236	TMP87CP71F PDCE1-xP
7201	R4822 209 13235	TMP87CS71F PDCE2-xU
7202	R4822 130 91485	Display 15-MT-65GK
7203	R4822 212 30842	TFMS5360
7231	R4822 130 60729	DTC124EK

⚠ ... Safety component, use only this type

PIO

MISCELLANEOUS

1951	R4822 265 10478	Conn 15P
1954	R4822 265 10479	SCART SOCKET

CAPACITORS

2570	R5322 122 32268	470	pF	50V
2571	R5322 122 32268	470	pF	50V
2580	R5322 122 32268	470	pF	50V
2581	R4822 124 22826	10	µF	16V

RESISTORS

3540	R4822 051 20682	6,8	k	0,1W
3550	R4822 051 20759	75	R	0,1W
3570	R4822 116 52296	6,8	k	0,5W
3571	R4822 051 20682	6,8	k	0,1W
3572	R4822 051 20104	100	k	1/6W
3580	R4822 051 20472	4,7	k	0,1W
3581	R4822 051 20104	100	k	0,1W
3583	R4822 051 20471	470	R	0,1W
3590	R4822 051 20822	8,2	k	0,1W
3591	R4822 117 11449	2,2	k	0,1W
3900	R4822 051 20008	0	R	0,1W

DIODES

6531	R4822 130 34278	BZX79-B6V8
6540	R4822 130 34197	BZX79-C12
6550	R4822 130 34197	BZX79-B12
6560	R4822 130 34197	BZX79-B12
6561	R4822 130 34197	BZX79-B12
6562	R4822 130 34197	BZX79-B12
6563	R4822 130 34197	BZX79-B12
6570	R4822 130 34197	BZX79-B12
6571	R4822 130 34197	BZX79-B12
6590	R4822 130 31024	BZX79-B18
6800	R4822 130 31983	BAT85

TRANSISTORS & IC's

7540	R4822 130 42616	BC818-40

⚠ ... Safety component, use only this type

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