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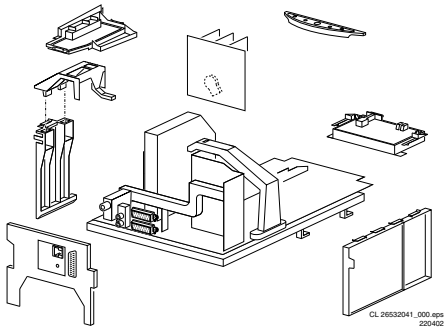

Service Manual

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PHILIPS

1. Technical Specifications, Connections and Chassis Overview

1.1 Technical Specifications

1.1.1 Vision

Display type	:	CRT, Real Flat WS
Screen size	:	28” (70 cm)
	:	32" (82 cm)
	:	36” (92 cm)
Tuning system	:	PLL
Colour systems	:	PAL: B/G, D/K, I
	:	SECAM: B/G, D/K, L/L’
	:	NTSC: playback only
Channel selections	:	100 presets
	:	UVSH
Aerial input	:	75 Ω, IEC-type

1.1.2 Sound

Sound systems	:	FM-mono, AM-mono
	:	FM-stereo: B/G, Czech
	:	NICAM: B/G, D/K, I, L
Maximum power	:	4 x 15 W_{rms} (int.)

1.1.3 Miscellaneous

Mains voltage	:	220 - 240 V
Mains frequency	:	50 / 60 Hz
Ambient temperature	:	+5 to +45 deg. C
Maximum humidity	:	90 % R.H.
Power consumption	:	
Normal operation	:	≈ 130 W
Standby	:	< 1 W

1.2 Connections

1.2.1 Front View / Side Connections

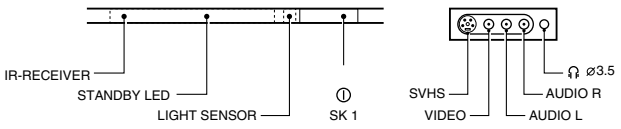


Figure 1-1 Front View and Side I/O

Hosiden: SVHS - In

1 - Y	Ground	
2 - C	Ground	
3 - Y	1 V_{pp} / 75 Ω	
4 - C	0.3 V_{pp} / 75 Ω	

Cinch: In

1 - CVBS	1 V_{pp} / 75 Ω	
2 - Audio - L	0.5 V_{rms} / 10 kΩ	
3 - Audio - R	0.5 V_{rms} / 10 kΩ	

Mini Jack: Headphone - Out

- Headphone	32 - 600 Ω / 10 mW	

1.2.2 Rear Connections

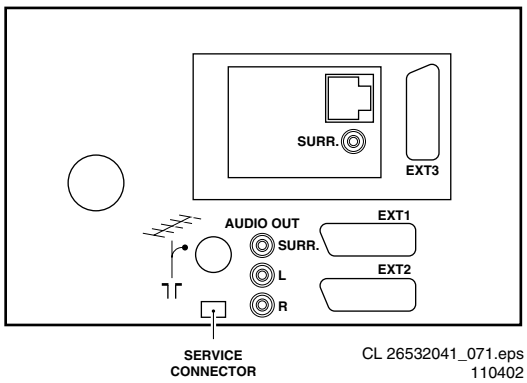


Figure 1-2 Rear View

Aerial - In

- IEC-type	Coax, 75 Ω	

Cinch: Audio - Out

- Audio - R	0.5 V_{rms} / 1 kΩ	
- Audio - L	0.5 V_{rms} / 1 kΩ	

External 1: RGB/YUV and CVBS - In/Out

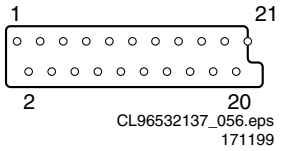


Figure 1-3 SCART connector

1 - Audio - R	0.5 V_{rms} / 1 kΩ	
2 - Audio - R	0.5 V_{rms} / 10 kΩ	
3 - Audio - L	0.5 V_{rms} / 1 kΩ	
4 - Audio	Ground	
5 - Audio	Ground	
6 - Audio - L	0.5 V_{rms} / 10 kΩ	
7 - Blue / U	0.7 V_{pp} / 75 Ω	
8 - CVBS-status	0 - 1.3 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	
9 - Video	Ground	
10 -		
11 - Green / Y	0.7 V_{pp} / 75 Ω	
12 -		
13 - Video	Ground	
14 - Video	Ground	
15 - Red / V	0.7 V_{pp} / 75 Ω	
16 - Status / FBL	0 - 0.4 V: INT 1 - 3 V: EXT / 75 Ω	
17 - Video	Ground	
18 - Video	Ground	
19 - CVBS-out	1 V_{pp} / 75 Ω	
20 - CVBS-in	1 V_{pp} / 75 Ω	
21 - Shielding	Ground	

External 2: CVBS and SVHS - In (for VCR)

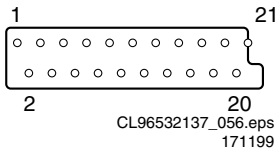


Figure 1-4 SCART connector

1 - Audio - R	0.5 V_{rms} / 1 kΩ	
2 - Audio - R	0.5 V_{rms} / 10 kΩ	
3 - Audio - L	0.5 V_{rms} / 1 kΩ	
4 - Audio	Ground	
5 - Audio	Ground	
6 - Audio - L	0.5 V_{rms} / 10 kΩ	
7 - C-out	0.7 V_{pp} / 75 Ω	
8 - CVBS-Status	0 - 1.3 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	
9 - Video	Ground	
10 - Easy Link	(P50)	
11 -		
12 -		
13 - Video	Ground	
14 - Video	Ground	
15 - C-in	0.7 V_{pp} / 75 Ω	
16 -		
17 - Video	Ground	
18 - Video	Ground	
19 - CVBS-out	1 V_{pp} / 75 Ω	
20 - Y / CVBS-in	1 V_{pp} / 75 Ω	
21 - Shielding	Ground	

External 3: RGB and CVBS - In

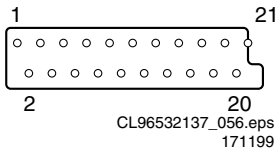


Figure 1-5 SCART connector

1 - Audio - R	0.5 V_{rms} / 1 kΩ	
2 - Audio - R	0.5 V_{rms} / 10 kΩ	
3 - Audio - L	0.5 V_{rms} / 1 kΩ	
4 - Audio	Ground	
5 - Audio	Ground	
6 - Audio - L	0.5 V_{rms} / 10 kΩ	
7 - Blue-in	0.7 V_{pp} / 75 Ω	
8 - CVBS-status	0 - 1.3 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	
9 - Video	Ground	
10 -		
11 - Green-in	0.7 V_{pp} / 75 Ω	
12 -		
13 - Video	Ground	
14 - Video	Ground	
15 - Red-in	0.7 V_{pp} / 75 Ω	
16 - Status / FBL	0 - 0.4 V: INT 1 - 3 V: EXT / 75 Ω	
17 - Video	Ground	
18 - Video	Ground	
19 -		
20 - CVBS-in	1 V_{pp} / 75 Ω	
21 - Shielding	Ground	

RJ45: Wireless Surround Transmitter - Out

1 - SDA2_TM	Signal	
2 - SCL2_TM	Signal	
3 - GND	Ground	
4 - I^2C_MUTE	Signal	
5 - 15V	Supply	
6 - AUDIO_SL_S_TM	Signal	
7 - GND_AUD	Ground	
8 - PILOT_MUTE	Signal	

Jack: Surround - Out

1 - Audio	0.2 - 2 V_{rms} / 10 kΩ	

1.3 Chassis Overview

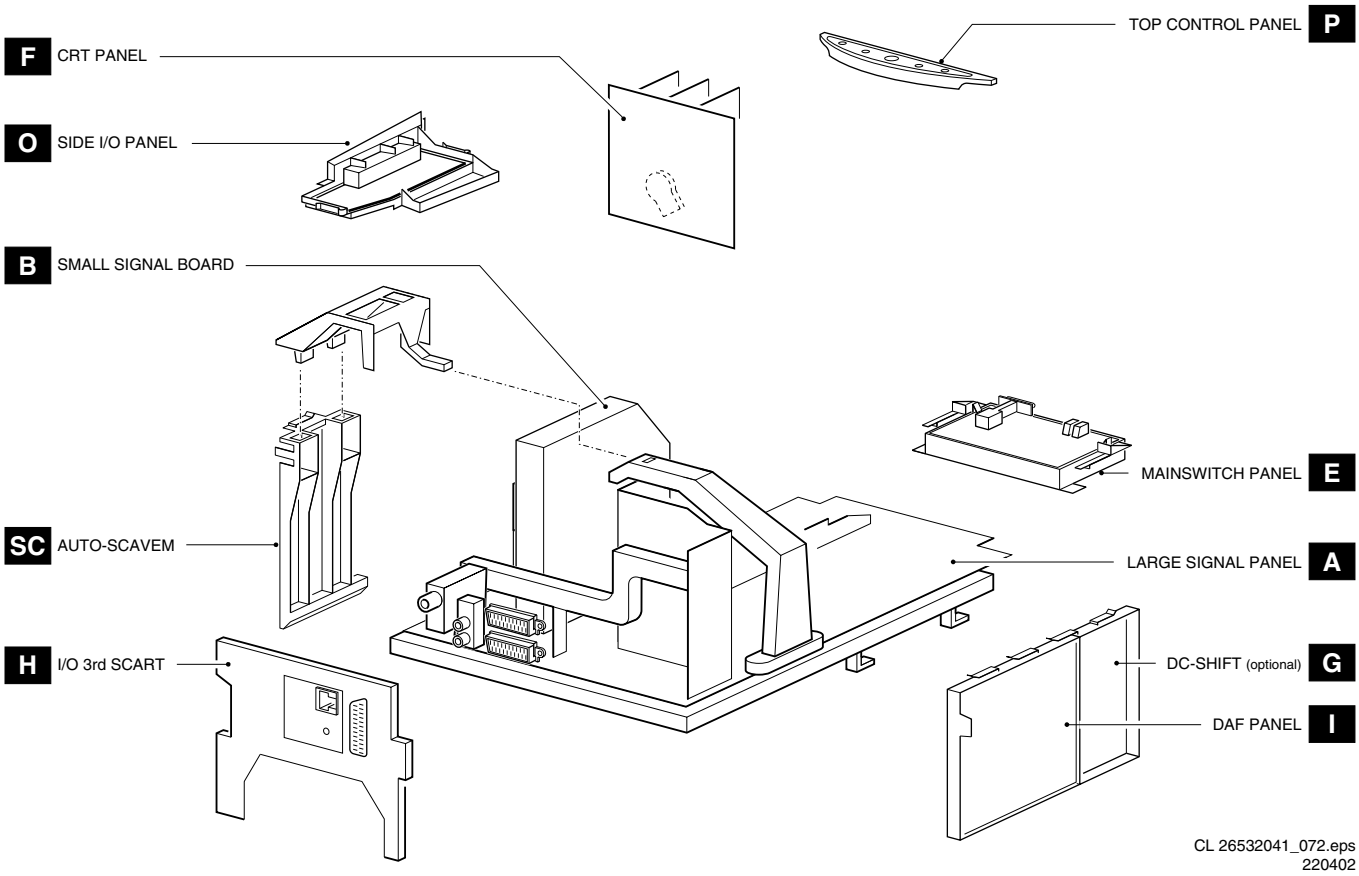


Figure 1-6 PWB location

2. Safety and Maintenance Instructions, Warnings, and Notes

2.1 Safety Instructions

Safety regulations require that **during** a repair:

- Due to the chassis concept, a very large part of the circuitry (incl. deflection) is 'hot'. Therefore, connect the set to the mains via an isolation transformer.
- Replace safety components, indicated by the symbol ▲, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.
- Wear safety goggles when you replace the CRT.

Safety regulations require that **after** a repair, you must return the set in its original condition. Pay, in particular, attention to the following points:

- General repair instruction: as a strict precaution, we advise you to re-solder the solder connections through which the horizontal deflection current is flowing. In particular this is valid for the:
  1. Pins of the line output transformer (LOT).
  2. Fly-back capacitor(s).
  3. S-correction capacitor(s).
  4. Line output transistor.
  5. Pins of the connector with wires to the deflection coil.
  6. Other components through which the deflection current flows.

Note: This re-soldering is advised to prevent bad connections due to metal fatigue in solder connections, and is therefore only necessary for television sets more than two years old.

- Route the wire trees and EHT cable correctly and secure them with the mounted cable clamps.
- Check the insulation of the mains cord for external damage.
- Check the strain relief of the mains cord for proper function, to prevent the cord from touching the CRT, hot components, or heat sinks.
- Check the electrical DC resistance between the mains plug and the secondary side (only for sets that have an isolated power supply). Do this as follows:
  1. Unplug the mains cord and connect a wire between the two pins of the mains plug.
  2. Turn on the main power switch (keep the mains cord unplugged!).
  3. Measure the resistance value between the pins of the mains plug and the metal shielding of the tuner or the aerial connection of the set. The reading should be between 4.5 MΩ and 12 MΩ.
  4. Switch the TV 'off' and remove the wire between the two pins of the mains plug.
- Check the cabinet for defects, to prevent the possibility of the customer touching any internal parts.

2.2 Maintenance Instructions

We recommend a maintenance inspection carried out by qualified service personnel. The interval depends on the usage conditions:

- When a customer uses the set under normal circumstances, for example in a living room, the recommended interval is three to five years.
- When a customer uses the set in an environment with higher dust, grease, or moisture levels, for example in a kitchen, the recommended interval is one year.
- The maintenance inspection includes the following actions:
  1. Perform the 'general repair instruction' noted above.
  2. Clean the power supply and deflection circuitry on the chassis.
  3. Clean the picture tube panel and the neck of the picture tube.

2.3 Warnings

- In order to prevent damage to ICs and transistors, avoid all high voltage flashovers. In order to prevent damage to the picture tube, use the method shown in Fig. 2-1, to discharge the picture tube. Use a high voltage probe and a multi-meter (position VDC). Discharge until the meter reading is 0 V (after approx. 30 s).

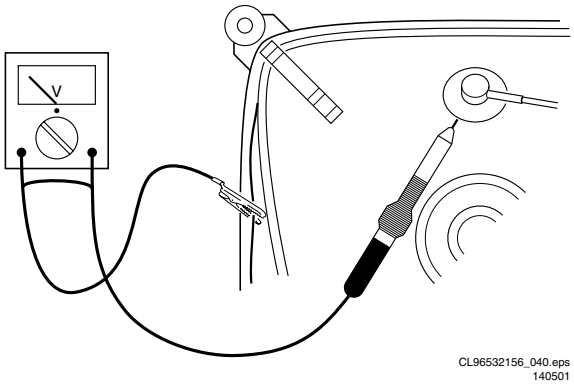


Figure 2-1 Discharge picture tube

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD, symbol w). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this potential. Available ESD protection equipment:
  – Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and ground cable) 4822 310 10671.
  – Wristband tester 4822 344 13999.
- Together with the deflection unit and any multi-pole unit, flat square picture tubes form an integrated unit. The deflection and the multi-pole units are set optimally at the factory. We do not recommend adjusting this unit during repair.
- Be careful during measurements in the high voltage section and on the picture tube.
- Never replace modules or other components while the unit is 'on'.
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

2.4 Notes

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⏚), or hot ground (⏚), depending on the tested area of circuitry.
- The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a colour bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz (PAL) or 61.25 MHz (NTSC, channel 3).
- Where necessary, measure the waveforms and voltages with (⊓) and without (⊼) aerial signal. Measure the voltages in the power supply section both in normal operation (⏻) and in standby (⏻). These values are indicated by means of the appropriate symbols.
- The picture tube panel has printed spark gaps. Each spark gap is connected between an electrode of the picture tube and the Aquadag coating.

- The semiconductors indicated in the circuit diagram and in the parts lists, are interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.
- Manufactured under license from Dolby Laboratories. 'Dolby', 'Pro Logic' and the 'double-D symbol', are trademarks of Dolby Laboratories.

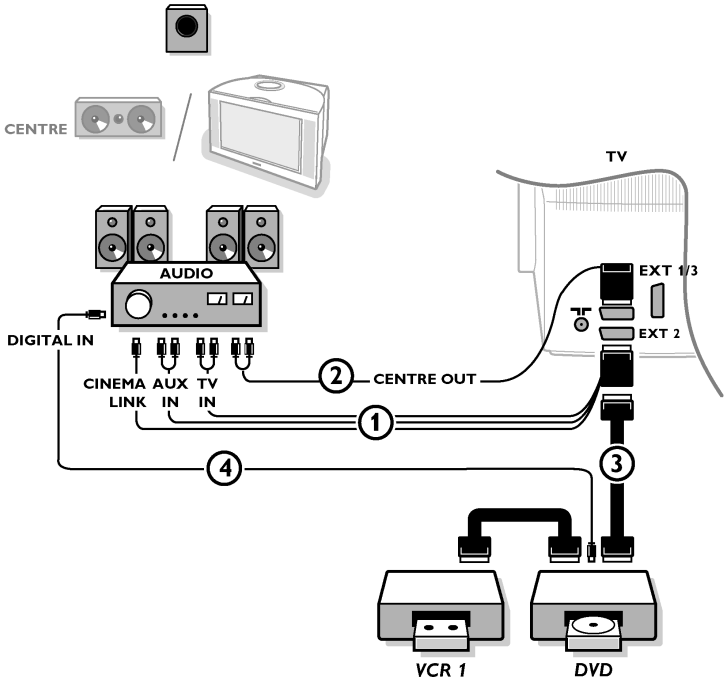
Figure 2-2 Dolby PL Symbol

Cinema Link

Note: The Cinema Link functionality is only available with devices of the Cinema Link (P50.3) generation ! (Digital A/V-Receiver FR996; Video recorder VR820; DVD-player DVD952 and their successors.)

Cinema Link is a new Philips feature in which the TV, the audio receiver and other video peripherals like DVD player and video recorder communicate with each other (on condition they all are equipped with the Cinema Link functionality and are connected via a eurocable). They automatically offer the highest quality combination of picture and multi channel surround sound to create your own Home Cinema.

With one key on the remote control, with which you can control all Cinema Link products, your total Cinema Link system will be started and the DVD or video recorder will start to play and the audio receiver will provide the sound (on the condition Cinema link is enabled) on behalf of the TV.
The TV can function as the centre speaker of your system, making a separate centre speaker unnecessary.
By pressing the standby key ⏻ on the remote control for at least 3 seconds, the complete Cinema Link system will be switched to standby.



Configuration of the Cinema Link peripherals

The connection diagram in the inside cover shows you how to connect the Cinema Link peripherals with each other.
Notes:
- *Besides to the TV at least one peripheral should be provided with the Cinema Link functionality to take profit from this feature.*
- *To take advantage of the highest quality of multi channel Surround sound it is advisable you have a Cinema Link audio receiver connected.*
- *The peripherals connected don't need to see the TV remote control in the Cinema Link system. The commands given to the TV are automatically passed to the other peripherals. This allows you to put the peripherals behind the doors of a cabinet or to place them in another room.*
- *To enjoy Digital Surround playback, the digital device (e.g. DVD) should be connected to the digital input of the audio receiver ④ with a separate cinch audio cable.*
- *The optional wireless speakers of the TV cannot be used.*

Preparation and Operation

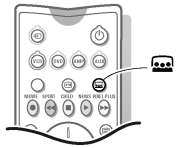
1. Cinema Link is switched on as soon as the audio receiver and the TV are switched on. If necessary, Cinema Link may be switched off or on again only on the audio receiver. See the instructions for use of your audio receiver.
   Important: When Cinema Link is switched on all audio commands control the audio receiver instead of the TV.
2. The message **CINEMALINK ON** is displayed on the audio receiver and on the TV. Now the CinemaLink system is activated.
   Note: it is recommended to disable CinemaLink when the receiver is used to record a CD e.g. or when using a headphone when others are watching TV.

Now you can adjust the initial TV settings for optimal surround sound and install the audio channels before starting up one of the CinemaLink devices. The system information about country choice, menu language and picture format you set up during the installation of the TV is transferred to the audio receiver automatically.

TV as centre speaker

See the Instructions for Use of the TV, Setup, Source menu, Centre input, p. 19.
Use the test tone functin in the Speakers menu to have a reference of the loudness of the separate speakers.
Note: If you want the loudspeakers of your TV to act as centre speaker, also connect a cinch to scart cable (not supplied) ②.

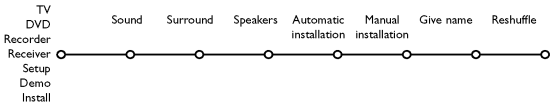
Activating CinemaLink



Press the Cinema Go -key on the remote control.

1. The TV sends a play command to the Cinema Link DVD player, if present.
2. The DVD player will start playing and the audio receiver automatically switches to the best Cinema Link sound.
3. If no DVD player is connected or if the DVD player has no disc loaded, the command can not be executed.
4. The TV will then send a play command to the Cinema Link video recorder, if present.
5. The video recorder will start playing and the audio receiver select the best Cinema Link sound.
6. If no video recorder source is connected or tape is loaded, the TV will select the last watched TV channel.

Receiver menu



Note: When Cinema Link is enabled, certain items of the Sound menu (see TV menu) are steered by the audio receiver instead of by the TV.

1. Press the **MENU** key on the remote control.
2. Press the cursor down to select **Receiver**.
3. Press the cursor right to enter the Receiver menu items.
4. Press the cursor up/down to select the submenu items.
   Note: the audio receiver submenu items may only be selected if provided by the audio receiver (dependent on the configuration setup and the sound signals transmitted).

Sound menu

Dependent on the audio receiver speakers configuration, you may not be able to select certain menu items.

Smart Sound, Treble, Bass

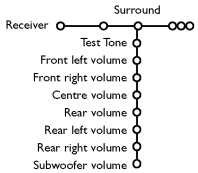
See the Instructions for Use for the TV.

Loudness

When **Loudness On** is selected and when listening at low volume, the low and high frequencies are amplified so that the natural balance is restored.

3D effect

3D effect enables you to experience the effect of Dolby Surround Pro Logic without the need of having rear speakers connected or activated.
elect the level of 3D effect with the cursor left/right.



Night mode *(only functional with Dolby Digital sound broadcasting input)*
The loud parts of the sound are lowered and the soft passages are raised. You can enjoy surround sound without disturbing sleeping children or neighbours.

Audio only
This control enables you to blank the TV picture if the TV is used as centre speaker in the Cinema Link system and if the audio receiver is reproducing sound unrelated to a TV picture.
Switch **Audio only On** to only hear the sound and to switch off the picture.
The message **Audio only** appears on screen.

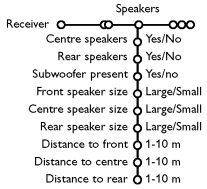
Surround menu

Dependent on the audio receiver speakers configuration, you may not be able to select certain menu items.

Adjustment of the volume level of the loudspeakers

Note: the test tone function is automatically cancelled by the audio receiver when leaving the Surround menu.

1. Select **Test Tone On**.
   A steady noise tone is switched sequentially through the available loudspeakers, except for the subwoofer, for 2 seconds each. This enables you to have a reference of the loudness of each loudspeaker and to adjust the level of each until they all sound equally loud.
   The loudspeakers activated light up in the screen graphic.
2. Select the Surround menu items with the cursor up/down one after another and alter the selected adjustments with the cursor left/right.
   The best result is achieved when all speakers have equal volume in your usual listening position.
3. Select **Test tone Off** when you have finished the adjustment of the speaker levels.



Speakers menu

Dependent on the audio receiver speakers configuration, you may not be able to select certain menu items.
Once the number and position of the loudspeakers has been fixed, selecting Centre speaker, Rear Speakers and Subwoofer Yes or No, you can adjust the initial receiver settings, size and distance, for optimal surround sound.
Note: after changing the configuration, the menu will disappear temporarily and re-appear again after the new stettings will be updated.

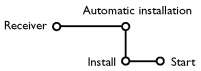
Size of the speakers

Select **Small** if your speaker is able to reproduce low notes down to at least 80-100 Hz. Select **Large** if your speaker is able to reproduce low notes down to at least 50 Hz.
Note:
- *As a rule of thumb, a large speaker has a cone diameter of at least 12 cms (5 inches). See the specification sheet of your loudspeakers.*
- *If Subwoofer present is set to **No**, Front speaker size can only be set to Large. If Front speaker size is set to **Small**, Centre speaker size can only be set to Small and consequently a subwoofer must be connected.*

Distance to the speakers

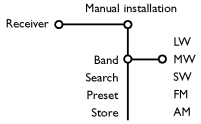
Select the distance from your usual listening position to the available speakers each; front, centre and rear speakers. This defines the delay time for the surround sound.

Automatic installation



In the Automatic installation menu select Start to activate the automatic searching of all radio stations which can be received.
The programme list is automatically filled with all the numbers and names of the radio stations transmitted.

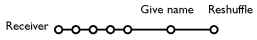
Manual installation



You can also search for a known radio station by keying in the frequency.

1. Firs select **Band** to switch to the desired waveband: **LW**, **MW**, **SW**, **FM** or **AM**.
2. Select **Search** and press the cursor right.
   The frequency increases until a radio station is found.
   If you know the 3-digit frequency, enter it directly with the digit keys 0 to 9.
   Select **Preset** to enter the preset number using a three digit entry with the digit keys.
3. To store your radio station, select **Store** and press the **OK** key.
4. Repeat steps 1 to 3 to store another radio station.

Give name - Reshuffle

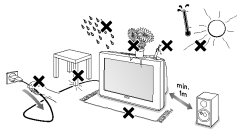


To assign or change a name to a radio station or to change the order of the stored radio stations according to your preference, act in the same way as with giving a name or reshuffling the programme list of TV stations.
See the Instructions for Use of the TV.

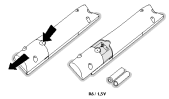
*Exceptions: The menu language is always English (the selected menu language with the TV has no influence) and the selection item **SPECIAL** on the keyboard is not available.*

Preparation

1. **Place the TV on a solid surface.**
   ! 28PW9527: 41 kg; 32PW9527: 59 kg; 36PW9527: 79 kg !



   For ventilation, leave at least 5 cm free all around the TV.
   Do not place the TV on a carpet.
   To prevent any unsafe situations, do not place any objects on top of the TV. Avoid heat, direct sunlight and exposure to rain or water. Keep mobile telephones at a safe distance to avoid disturbances in picture and sound.
2. Insert the aerial plug firmly into the aerial socket at the back of the TV. For best picture quality use the suppressor-aerial cable supplied.
3. Remote control: Remove the cover of the battery compartment.
   Insert the 2 batteries supplied (Type R6-1,5V).



The batteries supplied do not contain the heavy metals mercury and cadmium. Nevertheless in many countries exhausted batteries may not be disposed of with your household waste. Please check on how to dispose of exhausted batteries according to local regulations.

Note: this remote control functions with TVs and other equipment which use the RC6 signalling standard.

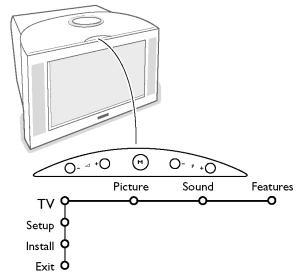
4. **Insert the mains plug of the TV** in the wall socket having a mains voltage of 220V-240V.
   To prevent damaging the mains (AC) cord which could cause a fire or electric shock, do not place the TV on the cord.
5. **Switch the TV on** : Press the power switch ⏻ on the front of your TV.
   A green indicator on the front of the TV lights up and the screen comes on.
   If the indicator is red, press the **-P+** keys on the remote control.

The green lamp blinks every time you press a key on the remote control.
*When you switch on your set for the first time, the menu **LANGUAGE** automatically appears on the screen. The explanation appears in different languages one at a time. Choose your own language and press the OK key on the remote control.*

Optional wireless transmitter module

Your TV has been prepared and equipped to connect a wireless transmitter module with an integrated cable and wireless surround sound loudspeakers. Such a kit may be purchased at your TV retailer. (Type no: AD902W).
Select the correct type of transmitter in the Setup menu, Speakers, Wireless transmitter, p. 9 Default 864 MHz has been selected at the factory.
How to connect and to operate, see the appendix to this manual, p. 23.

Keys on top of the TV



Should your remote be lost or broken you can still change some of the basic settings with the keys on top of your TV.

- Press the ◿ - or + key to adjust the volume.
- Press the **P** - and + key to browse through the TV channels or sources stored and to select them.
- Press the **M** key to summon the main menu.
  Use the ◿ - and + keys to select the menu items in the horizontal axis.
  Use the **P** - and + keys to select submenu items in the vertical axis.
  Use the **M** key to confirm your selection.

Note:
*- Sometimes not all the menu items are visible on the screen; Press the **P +** key to reveal all items.*
*- **Exit** lets you dismiss the menu. Select **Exit** and press the **M** key.*

Use of the remote control

Use the on-screen info for more information about the different keys. See p. 5

Select peripherals
Press this key to select **EXT1**, **EXT2**, **EXT3** or **SIDE**, according to where you connected the peripherals (p. 21).

VCR DVD AMP AUX (see p. 21)
Press one of these keys to use the remote control directly in the video recorder, DVD, amplifier or other auxiliary mode (CD, SAT).
A green indicator lights up.
Press the key again to return to TV mode.

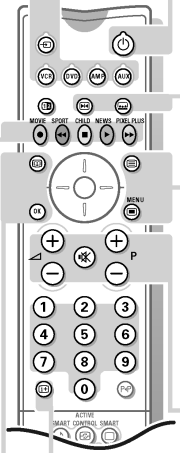
● ◀◀ ■ ▶ ▶▶ Video recorder see p. 21

Select TV channels by theme
If NEXTVIEW with defined themes is broadcast, it is possible to quickly select TV programmes with the coloured keys.
1. Press the red, green, yellow or blue key to select one of the four predefined theme categories **MOVIES**, **SPORTS**, **CHILDREN**, **NEWS**.
   The TV switches to the first TV channel broadcasting a programme of the selected theme. At the same time a list of all the TV channels currently transmitting a programme of the selected theme appears on the screen.
2. Use the cursor up/down to select a programme.
3. Press the same colour key again to remove the list. (After 10 seconds the list is removed automatically.)

Switching Pixel Plus demo on/off
1. Press the **PIXEL PLUS** key.
   The TV screen is divided into 2 parts:
   - in the left part Pixel Plus and Digital Natural Motion switched off;
   - in the right part Pixel Plus and Digital Natural Motion switched on.
2. Press the **PIXEL PLUS** key again to switch the Pixel Plus demo off.

NEXTVIEW see p. 15
Press this key to activate NEXTVIEW/Teletext Guide. Press again to select Picture/NEXTVIEW or Teletext Guide in dual screen format. Press once again to display a full screen picture.

OK Press this key to activate your choice, when in the menus.



Standby
Press to switch the TV on or off.
When switched off, a red indicator (orange when acquiring NEXTVIEW information) lights up. When acquiring NEXTVIEW the TV is switched to full standby after a period of max. 1 hour and the red indicator lights up.
If your EasyLink video recorder has the system standby function and you press the standby key for 3 seconds, both the TV and video recorder are switched to standby.

Freeze
To activate/de-activate the frozen picture and to hold a teletext page.

Cinema Go
See separate Cinema Link instruction manual supplied.

Teletext see p. 17
Press this key to activate Teletext.
Press again to select Picture/NEXTVIEW or Teletext Guide in dual screen format. Press once again to display a full screen picture.

Main menu on/off see p. 6

Press + or - to adjust the volume.

Interrupt the sound or restore it.

P Programme selection
To browse through the TV channels and sources stored.
Only those channels which are in the favourite list can be selected with the **-P+** keys.

0/9 Digit keys
To select a TV channel.
For a two digit programme number, enter the second digit within 2 seconds.
To switch immediately to a selected one digit TV channel, keep the digit key pressed a bit longer.

Screen information
Press to display information about the selected TV channel and programme.

Menu information
When the menu is on screen, press to display info on the selected menu item. While the menu info is displayed, press any key to display remote control info.

Dual screen
1. Press the key to switch on Dual screen.
   The TV screen is divided into 2 parts: the left side for the normal main picture, the right side for teletext broadcast by the selected TV channel or for NEXTVIEW.
   To operate NEXTVIEW, see p. 15.
   To operate teletext, see p. 17.
2. Press the key under the door of the remote control to select a vertical squeezed or a non vertical squeezed picture size.
3. Move the puck to the blue ball in the left screen. Press **+ P -** to select another TV channel.
4. Press the key or the key to switch off dual screen.

Surround mode
Press this key repeatedly to select another available surround mode: Stereo, Dolby 3 Stereo, 3D Surround, Hall or Dolby Pro Logic.

● Instant record
If your video recorder has the EasyLink function, the **INSTANT** ● key for record can be operated in the TV mode.

Picture format
Press this key to summon a list of **available** picture formats.
Press this key repeatedly or press the cursor up/down to select another picture format:
Auto format, Super zoom, 4:3, Movie Expand 14:9, Movie Expand 16:9, Subtitle zoom, Wide screen.
Auto format makes the picture fill the screen as much as possible.
In case of subtitles in the bottom black bar, Auto format makes the subtitles visible. In case of a broadcaster logo in the corner of the top black bar, the logo disappears from the screen.
Super zoom removes the black bars on the sides of 4:3 programs with minimal distortion.
When in Movie Expand 14:9, 16:9 or Super zoom picture format, you can make subtitles visible with the cursor up/down.

no function

P+P Smart surf
With this feature you can easily switch between up to 9 different TV channels/ sources.
In the menu system, you can set Smart surf to 2- or 9-programme.
(See General, Smart surf, p. 10.)
Press this key to select the previously viewed TV channel or source in case of a 2 programme surf.
In case of a 9 programme surf, a list appears at the right side of the screen. On top, the most recent programme is displayed. The puck is on the channel number currently viewed.
Press the P+P key to turn to the next channel in the list or press cursor up/down to immediately select the desired TV channel of the list.

To add a new channel or source: tune to the channel or source you wish to add.
Press the P+P key. Press the cursor right to add.
If there are already nine channels/sources in the list, the one at the bottom of the list will be removed.

To remove a channel or source: select the channel number you want to remove.
Press the P+P key. Press the cursor right to remove.
Press the **OK** key or wait for the time out to dismiss the Smart surf display.

Time display: The time is displayed on the screen.

no function

ZOOM on/off
Press the **ZOOM** key to activate/ deactivate the zoom function.
Press the **OK** key repeatedly to select one of the zoom magnifications (x1, x4, x9, x16). Use the cursor up/down, left/right to shift the selected zoom window over the screen with the cursor.
The zoom window is reset after: selecting another TV channel, another picture format or when another picture format is selected automatically.

Active control

Active control is a pro-active and automatic system. The TV continuously measures and corrects all incoming signals in order to provide the best picture possible. Thanks to the Ambient Light Sensor which measures the light conditions of the room, the contrast, dynamic contrast, brightness and colour picture settings are adjusted automatically. The light sensor is active when the Active control function is switched to Medium or Maximum. Press the key repeatedly to select the Active Control values Off, Minimum, Medium or Maximum (recommended).

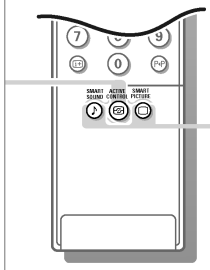
Off Sharpness and Dynamic Contrast are controlled automatically

Minimum Sharpness, Dynamic Contrast and Noise Reduction are controlled automatically.

Medium Dynamic Contrast, Colour, Sharpness and Noise reduction are controlled automatically.

Maximum Contrast, Dynamic Contrast, Colour, Sharpness and Noise reduction are controlled automatically.

Press the cursor right to select **INFO+**.
The Active Control demo menu appears.
The picture settings are being adapted continuously and automatically.
The menu items cannot be selected.
The sliders will be moving, showing how the TV is tweaking the current picture. None of the sliders is user controllable.
Press the **OK** key to switch off the Demo.



Smart Keys

To select predefined picture and sound settings.

Smart Sound

Each time it is pressed, a different sound setting is selected, corresponding with specific factory settings of treble and bass.

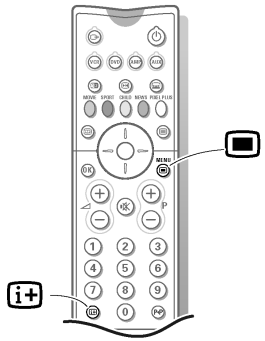
Smart Picture

Each time it is pressed, a different picture setting is selected, corresponding with specific factory settings of Contrast, Colour, Sharpness, Dynamic Contrast and Colour enhancement.

Personal refers to the personal preference settings of picture and sound selected in the picture and sound menu.

Remark: the moment you are in a predefined smart sound or picture setting and you modify a setting in the picture or sound menu, all values of the menu will overwrite the previously made Personal settings. The predefined factory settings remain unchanged.

Menu Info / Remote Control Info



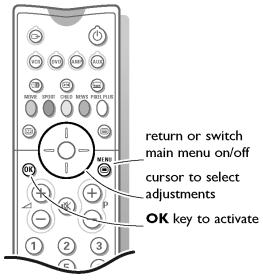
Menu Info

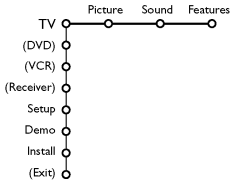
1. Press the **MENU** key and select a menu item or submenu item.
2. Press the i+ key on the remote control to get information about the selected menu item.
3. Press the i+ key again to exit.

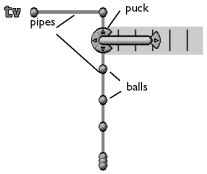
Remote Control Info

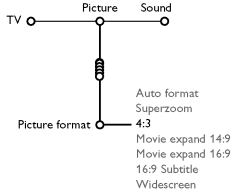
1. Press the **MENU** key.
2. Press the i+ key.
3. Press any key on the remote control (except the cursor keys, the OK, the **MENU**, the digit, the i+ and the ⏻ keys) and you get information about the pressed key.
   The normal function of the key is not executed.
   The moment one of the remote control keys which do not invoke remote control info, is pressed, remote info is cancelled.
4. Press the i+ key to display the menu that was on screen before a remote control key for info was pressed.

To use the menus and the menu system









Attention: point the remote control to the indicator of the TV.

1. Press the **MENU** key on the remote control to summon the main menu. Which items appear in the main menu depends on the peripherals connected. In case of an Cinema Link VCR or DVD, the menu items **VCR** and **DVD** are present, see p. 21.
   In case of a Cinema Link audio receiver or DVD, the menu item **Receiver** or **DVD** is present. See the separate Cinema Link booklet supplied.
   *Note: The Main menu only contains the item **Exit** to dismiss the menu, when you switch on your TV for the first time, or when the Main menu is summoned with the **M** key on top of the TV.*
2. Use the cursor in the up/down direction to select the **TV**, **(DVD)**, **(VCR)**, **(Receiver)**, **Setup, Demo** or **Install** menu.
   Note: Sometimes not all the menu items are visible on the screen. Press the cursor down to reveal all items.
3. Use the cursor in the left/right direction to select the menu item.
4. Use the cursor up/down again to select the control you want to select or to adjust.
5. Press the **MENU** key again to turn off the main menu.

The menu system

Pipes, balls and a puck

The hierarchy of menus and controls is represented by an animated visual mechanism of pipes, balls and a puck. The animated mechanism constantly shows the current whereabouts and continually expands the view of the immediate neighbourhood.

The puck surrounds the ball indicating the user's current position in the menu hierarchy.
The puck is always present when the menu system is displayed.
The puck is divided into 4 parts. They correspond to the directional controls (up/down, left/right) on the remote control. The arrows on the cursor indicate which directions to choose.
In this way users can navigate through the menu hierarchy to the control they wish to adjust.

When items are more numerous than can fit comfortably on the TV display, only a portion are shown. Those omitted are indicated by a cluster of balls which indicates that there are 'more' items.

Direct selection and control

Menu items are controlled as soon as they are selected by the puck. Only a few items require confirmation with the **OK** key.

List controls

A list control is used to select one or more items from a list of options.
For instance, the Picture format option list with 4:3, Movie Expand 14:9, etc.
Press the right key to move the puck into the list. At least one item is the current value and is highlighted.
Moving the puck up or down with the up/down key causes the list to move down or up.

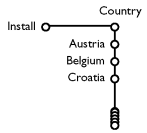
Select the menu language

1. Press the **MENU** key on the remote control.

*When you switch on your TV for the first time and no channels are stored so far, the menu Language automatically appears on the screen. This menu also has an additional item **exit** with which the menu can be dismissed. The explanation appears in different languages, one at a time. Choose your preferred language and press the **OK** key on the remote control. Proceed with the Install menu.*

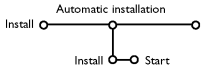
2. Use the cursor down to select **Install**.
3. Use the cursor right to select **Language**.
   Follow the instructions on screen.
4. Use the cursor up/down to select your preferred language and press the **OK** key to confirm your selection.
5. Proceed with the **Install** menu.

Select the country



1. Use the cursor right to select **Country**.
2. Select the country where you are now located and press the **OK** key.
   Select **Other** when none of the countries applies.
3. Proceed with the **Install** menu.

Store TV channels



You can now search for and store the TV channels in two different ways: using Automatic Installation or Manual Installation (tuning-in channel by channel).
Select your choice with the cursor right.

After the new or extra TV channels have been stored, the TV automatically transfers those TV channels to the video recorder if it is equipped with the EasyLink function. The message EasyLink: downloading ..... appears on the screen. The programme list of the video recorder is now the same as the one of the TV.

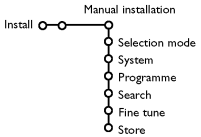
Automatic installation

1. Select **Automatic installation** in the Install menu.
   Note: All channels must be unlocked in order to autoprogram. If requested, enter your PIN to unlock all channels. (See TV, Features menu, Childlock, p. 14.)
2. Press the cursor down.
   The autoprogramming option label **Start** appears.
3. Press the cursor right.
4. The message **Searching** appears and the progress of autoprogramming is displayed.
   When the Automatic installation is complete, the puck navigates to Install again.

If a cable system or a TV channel which broadcasts ACI (Automatic Channel Installation) is detected, the search is stopped and the programme list appears.
Without ACI broadcast, the channels are numbered according your language and country selection. You can use Reshuffle to renumber them. See p. 8

*It is possible that the cable company or the TV channel displays a broadcast selection menu. Layout and items are defined by the cable company or the TV channel. Make your choice with the cursor and press the **OK** key.*

Manual installation



Manual installation

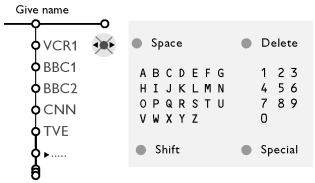
Searching for and storing TV channels is done channel by channel. You **must go through every step** of the Manual Installation menu.

1. Select **Manual installation** in the Install menu.
2. Press the cursor down.
   Follow the instructions on screen.

Note: Search or direct selection of a TV channel
If you know the frequency, the C- or S-channel number, enter the 3 digits of the frequency directly with the digit keys 0 to 9 (e.g. 048). Press the cursor down to proceed.

Repeat to search for another TV channel.

Give name



It is possible to change the name stored in the memory or to assign a name to a TV channel for which a name has not yet been entered. A name with up to 5 letters or numbers can be given to the programme numbers 0 to 99. For example SUPER, BBC1,... Before programme number 0 you can also enter a name for the peripherals that are connected to a euroconnector.

1. Select **Give Name** in the Install menu and press the cursor down.
2. Select the programme number.
   Note: keep the cursor up/down pressed to scroll through the programme list and to avoid that the TV tunes to each channel passed by.
3. Press the cursor right.
   A keyboard appears on the screen.
   Press the cursor right to enter the keyboard.
   Press the cursor up/down, left/right to select the first character and press **OK**. Repeat for every character you want to enter.
   Select **Space** to enter a space; **Delete** to erase the highlighted character in the name entered; **Shift** to display upper- or undercast characters on the keyboard; **Special** to display special characters on the keyboard. Press **OK** to confirm.
4. Press the cursor left repeatedly when you have finished the name giving of the selected channel or peripheral.
5. Select another programme number and repeat steps 3 to 5.

Reshuffle the programme list

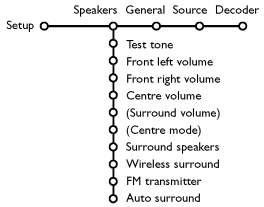
According to your preference you **can** change the order of the stored TV channels.

1. Select **Reshuffle** in the **INSTALLATION** menu and press the **OK** key.
2. Follow the instructions on screen.

Select Favourite TV channels

1. Select **Favourite programmes** in the **Install** menu.
2. Select your programme number with the cursor up/down.
3. Select **Yes** or **No** with the cursor right.
4. Repeat 2 and 3 for every TV channel or external you want to make a favourite or a non-favourite TV channel or external.

Install TV Setup

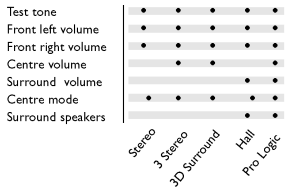


The Setup menu contains items that control the settings of the TV's functions, features, services and peripherals you may have connected.

The **Speakers** menu reflects the speaker-related controls.
The **General** menu allows you to change settings that will typically be accessed only occasionally.
The **Source** menu allows you to select a source and/or to name each input source.

Speakers

Availability of Speaker menu items



In order to receive the full reproduction capability of true Dolby Surround Sound you should include the proper use and arrangement of the speakers:
- via the TV and its internal Front right, Centre and Left speakers and two amplified rear surround speakers connected to the back of the TV;
- or via the Variable Line Out connectors and an external Dolby amplifier. See External speakers/Amplifier, p. 20.

Select the various Speakers menu controls to setup the configuration of the TV's speakers system for Dolby audio playback.
Each volume control can be adjusted to match test tone levels.
Depending on the output and Surround mode (see Main menu, TV, Surround, Sound mode, p. 13) selected, some menu items may be greyed out and are not selectable.

Test tone and Volume controls

The menu item **Test tone** enables you to adjust the volume level of each until they are balanced.
The speakers activated light up in the screen graphic.

1. Select **Test tone**.
2. Press the cursor right.
3. Select **On** or **Off** with the cursor up/down.
   Once turned on, the Test Tone will circulate through the Left, Centre, Right and both Rear surround speakers (if present).
4. Press the cursor left.
5. Press the cursor up/down to select the desired speaker for individual volume level adjustment.
6. Press the cursor left/right to adjust the volume level.
7. Continue and select the other speakers for adjustment as desired.
8. Press the cursor up to return to the **Test Tone** menu item when speaker adjustments are complete and turn the control **Off**.

Centre Mode

See Connect Peripheral Equipment, External Speakers, Amplifier, p. 20.

If no External Front Speakers are connected, do not change the predefined factory settings which is **Centre mode No**. If an external amplifier with Front Speakers is connected, select **Centre mode Yes**.
In this setting, the centre channel in surround mode is directed to all three internal TV speakers (left, centre and right).

Surround Speakers

See Connect Peripheral Equipment, External Speakers, p. 19. If no Surround Speakers are connected do not change the predefined factory settings which is **No**.
If Surround Speakers are connected select **Yes**.
(Dolby Pro Logic and Hall are not available if **No** is selected.)

Wireless Surround

Only operational when you connected a special wireless transmitter module and wireless surround sound loudspeakers. (Kit with type no. AD902W).
See: Optional Wireless Surround speaker system, p. 23.

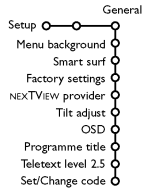
FM transmitter

Select the correct type of transmitter, when connected at the rear of the TV. See Optional Wireless surround speaker system, p. 23.

Auto Surround

Sometimes the broadcaster transmits special signals for Surround Sound encoded programmes.
The TV automatically switches to the best surround sound mode when **Auto Surround** is switched **On**.
However it is possible to overwrite this setting.

General



Menu background

1. Select **Menu background**.
2. Press the cursor right.
3. Select **Yes** or **No** to turn the Menu background on or off.

Smart surf

1. Select **Smart surf**.
2. Select **2 programmes** or **9 programmes** with the cursor left/right.
   Select **2 programmes** if you want the P•P key to toggle between the current and the previously selected channel.
   Select **9 programmes** if you want the P•P key to summon a list of up to 9 channels which can be selected. (See Use of the Remote Control, p. 3.)

Factory settings

This function allows you to reset most of the picture and sound settings to their predefined factory values.

1. Select **Factory settings**.
2. Press **OK** to erase settings and reset them to their default values.

NEXTVIEW provider

Most broadcasters in Europe are offering teletext pages containing the day's programme schedule. These pages can be requested by switching the TV to Teletext Guide.
Some broadcasters are offering an extended programme guide service called NEXTVIEW.
NEXTVIEW is a new way of presenting programme schedules and offers more features than basic teletext. With NEXTVIEW it is possible to show for instance all the movies or children programmes for today or the following days.

If you select **None** as NEXTVIEW provider, the TV will capture data from the available TV channels if they broadcast NEXTVIEW. Broadcaster defined menus will not be available.
If you select a programme number of a TV channel broadcasting NEXTVIEW, the selected TV channel will provide NEXTVIEW data and additional information of its own broadcasts as well as from other (non selected) TV channels.
Normally you will select the NEXTVIEW provider that transmits most information in your language. You can make the best selection via information from TV announcements or from the newspapers.

Important:
In order for NEXTVIEW to function properly, the first TV channel from the favourite list should also broadcast the correct local date and time via teletext. Please check at startup if the time and date are correct in the NEXTVIEW screen.

Remark:
Only some TV broadcasters support NEXTVIEW.
How to make use of NEXTVIEW, see p. 15.

Tilt adjust

Select **Tilt adjust**.
Keep the cursor left/right pressed to adjust the rotation of the picture.

OSD (On Screen Display)

1. Select **OSD**.
2. Press the cursor right to select **Normal** or **Minimum**.
   Normal to activate the continuous display of the programme number and extended display of TV channel and programme information on screen. **Minimum** to activate the display of reduced channel information.
   See Use of the Remote Control, p. 3, i+ On screen information.
   Note: When Subtitles is switched on, see Features, p. 15, continuous display of the programme number is not possible.

Programme title

1. Select **Programme title**.
2. Press the cursor right to select **Programme title Yes** or **No**.
   When selected **Yes**, after the selection of a TV programme or after pressing the i+ key on the remote control, a TV channel which broadcasts teletext may transmit the name of the TV channel or the programme title. When selected **No**, the programme title will only appear after pressing the i+ key, and not after the selection of a TV channel.

Teletext level 2.5

Some broadcasters offer the opportunity to see more colours, other background colours and nicer pictures in the teletext pages.

1. Select **Teletext level 2.5**.
2. Press the cursor right to select **Teletext level 2.5 On** to take advantage of this feature.
3. Press the cursor right again to select **Teletext level 2.5 Off** if you like the more neutral teletext layout.
   The selection made is valid for all channels which broadcast teletext.
   Note: It may take a few seconds before teletext broadcast switches over to Teletext level 2.5.

Set/Change code

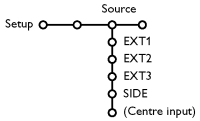
The Child lock feature (see TV, Features, p. 14) allows you to lock channels to prevent children from watching certain programmes. To watch locked channels, you need to enter an access code.
The **Set/Change code** menu item allows you to create or change a Personal Identification Number (PIN).

1. Select **Set/Change code**.
2. If no code exists yet, the menu item is set to **Set code**.
   If a code has previously been entered, the menu item is set to **Change code**. Follow the instructions on screen.
   All number combinations from 0000 to 9999 are valid numbers.
3. The **General** menu reappears with a message confirming that the code has been created.

Important: You have forgotten your code !

1. Select **Set/Change code** in the General menu.
2. Press **OK**.
3. Press the cursor right.
4. Enter the overriding code 8-8-8-8.
5. Press the cursor again and enter a new personal 4-digit code. The previous code is erased and the new code is stored.

Source



This menu allows you to select the peripheral you connected to one of the external inputs.

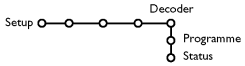
1. Select **Source**.
2. Press the cursor down to select one of the external inputs.
3. Press the cursor right to enter the list of names of peripherals attached to the selected input.
4. Select the peripheral device with the cursor up/down.

Once you have selected the source, e.g. VCR, this source will automatically be selected when your remote control is in VCR mode, see p. 3, and when you press the -⊡ key on the remote control.

Centre input

When you have connected a Cinema Link surround receiver to the TV (See separate Cinema Link instruction manual supplied) and you have selected one of the external inputs as centre input, the loudspeakers of the TV will act as centre speaker, making a separate centre speaker unnecessary.

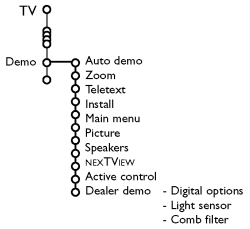
Decoder



If a decoder or a descrambler is connected, see p. 19, you can define one or more programme numbers as decoder programme numbers.

1. Select **Decoder** with the cursor right.
2. Select **Programme**.
3. Select the programme number under which you have stored the programme coming from your decoder.
4. Select **Status**.
   - Select the input used to connect your decoder: **None**, **EXT1** or **EXT2**.
   - Select **None** if you do not want the selected programme number being activated as a decoder programme number.

Demo



The Demo menu allows to demonstrate the TV features separately or in a continuous loop.

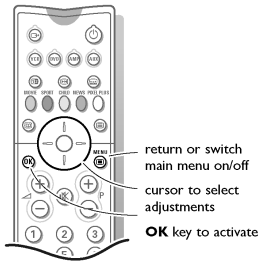
1. Select **Demo** in the Main menu.
2. Select **Auto demo** or one of the features with the cursor right and press the **OK** key on the remote control.

   If **Auto demo** has been selected the demo will automatically present all the features sequentially in a loop. Press one of the cursor keys to stop the Auto demo.
   If one of the features has been selected, this particular feature demo will run only once, and the Demo menu will disappear.

Select Digital options, Light sensor and Comb filter On or Off

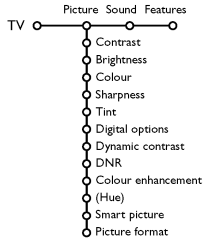
Select one of the Digital options, Lightsensor and Comb filter On or Off to really see the difference in picture quality.
In Dealer demo mode it is possible to change channels with **-P+** and to adjust the volume.
Note: The Dealer demo is not part of the automatic sequence and can only be activated separately.

TV menu



Press the **MENU** ▣ key on the remote control to summon the main menu.
Use the on-screen Menu-Info, see p. 5, for more information about the menu items.

Note: When the main menu is accessed from the keypad on top of the TV, it has an additional Exit item, which lets you dismiss the menu.



Picture menu

Press the cursor right to select **Picture**.
Select the menu items in the Picture menu with the cursor up/down. Adjust the settings with the cursor left/right or enter the list of submenu items with the cursor right. Select a submenu item with the cursor up/down.
Note: To remove the menu background before adjusting the picture settings, see Select TV setup, General, p. 10.

Digital options

Although Pixel Plus is the most ideal setting, it may be preferable, dependent on your own preference, to select Double lines, or 100 Hz Digital Scan.

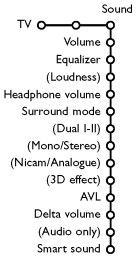
- **100 Hz Dig. Scan** = 100 Hz + Dig. Scan (Field and line flicker reduction) without motion compensation.
- **Pixel Plus** = creates near High Definition performance inside the TV on the basis of a regular input signal.
  The number of lines are increased and the number of pixels on a line are doubled in combination with Digital Natural Motion. As such Pixel Plus enhances both regular broadcast signals and DVD or Digital TV input towards unparalleled sharpness and depth, near High Definition and natural detail.
- **Double Lines** = provides for a doubling of vertical and horizontal resolution which adds astonishing sharpness and a total absence of visible picture lines. Motion compensation reduces jitter and offers smooth, yet sharp motion reproduction.
  Advised for NTSC (60 Hz) pictures.

Note:

- *Pixel Plus is not active when Teletext (Except when Subtitling is activated), NEXTVIEW or Teletext Dual screen is selected.*
- *When having selected Pixel Plus, the size of the menus on screen is reduced. This is a normal behaviour.*
- *Interference, caused by fluorescent lights just above the TV, may occur when having selected Pixel Plus.*

The modified adjustments for Contrast, Brightness, Colour, Sharpness, Colour enhancement, Tint, Digital options and Dynamic Contrast are automatically stored. Select Factory settings in the Setup menu, General, to restore the predefined factory settings, see p. 10.

Sound menu



Press the cursor right to select **Sound**.
Select the menu items in the Sound menu with the cursor up/down and adjust the settings with the cursor left/right.
Remember, control settings are at normal mid-range levels when the bar scale is centred.

Note:
- *Some menu items are only available in case of a Cinema Link configuration and when the Cinema Link is activated. Others are steered by the audio receiver instead of by the TV. See the separate Cinema Link booklet supplied.*
- *Dual I-II is only available with dual sound transmission.*
- *Mono/Stereo is only selectable in case of analogue stereo transmission.*
- *Nicam/Analogue is only selectable in case of Nicam transmission.*
- *Surround modes can not be modified when a headphone has been connected and the mode is always stereo.*

Surround Modes

Dependent on the sound signal broadcasted, select one of the Surround modes.

Stereo

This mode reproduces only the left and right front sound signals.
You only hear a stereo sound if the broadcast which you are receiving is transmitted in stereo or nicam stereo.

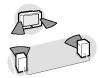
Dolby 3 Stereo *(optimal with Dolby Surround broadcasting)*

The sound signal is now distributed over the front left, the front right and the centre TV loudspeakers.
The rear loudspeakers do not produce any signal.

3D Surround *(optimal with Dolby Surround broadcasting)*

3D Surround enables you to experience the effect of Dolby Surround Pro Logic * without the need of having rear speakers connected or activated.
The graphical representation of the rear loudspeakers is replaced by the symbol))) (((.
Select the level of **3D effect** with the cursor left/right.

Hall



The special sound signal is distributed over the rear loudspeakers which creates a hall effect from the rear.
The centre loudspeaker does not reproduce any signal.
This mode is recommended when you wish to add surround sound to a broadcast which is not encoded Dolby Surround or to a mono signal.

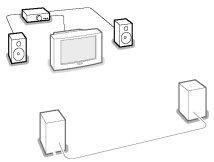
Pro Logic *(with Dolby Surround broadcasting)*

In addition to the left and right internal speakers, the centre and the rear surround loudspeakers reproduce the Dolby Surround Pro Logic sounds.
This sound is always present in the movie or programme marked with DD Dolby Surround. This mode is especially recommended for such programmes or movies.
Dolby Pro Logic signals are also present on some DVD tracks.
Note: Normal stereo broadcast is not always encoded to produce a rear surround sound.

Note: In case of a Cinema Link configuration connected, the surround modes of the receiver can be selected.

Pro Logic and Hall can only be reproduced if Surround speakers is set to Yes in the Setup, Speakers menu, p. 9, and rear speakers are connected.

With two extra front loudspeakers connected



To enhance the sound reproduction of your TV you may connect two extra front loudspeakers via an external amplifier. See Connect Peripheral Equipment, Extra loudspeakers/Amplifier, p. 20.
In the Surround modes **+ ext. amp** is added to indicate that you should switch on your amplifier as in these modes the internal TV speakers produce only centre sound. The subwoofer speaker is muted.

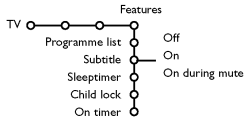
Note: If extra front speakers are connected and selected, all internal TV speakers produce centre sound in the surround modes Pro Logic, Dolby 3 Stereo and 3D Surround.

* DOLBY SURROUND PRO • LOGIC

'Dolby' 'Pro Logic' and the double-D symbol DD are trademarks of Dolby Laboratories Licensing Corporation. Manufactured under license from Dolby Laboratories Licensing Corporation.

Features menu

Press the cursor right to select **Features**.



Select the menu items in the Features menu with the cursor up/down and adjust the settings with the cursor left/right.
Use the on-screen Menu-Info i+ for more information about the menu items.

Programme list

Press the **OK** key to switch over to the selected TV channel or external.

Select subtitles

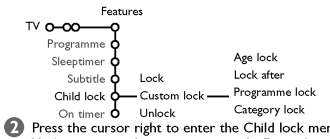
Switch on teletext and select the proper subtitle page from the index.
Switch off teletext.
Now the subtitle page is stored for the selected TV channel.

Once subtitles have been stored and **Subtitle On** has been selected they will automatically be displayed on the selected TV channels if subtitles are in the transmission.
A symbol will indicate that the mode is on.

Select **On during mute** when you want to have the subtitles automatically displayed when the sound has been muted with the 🔇 key on the remote control.

Child lock

1. Select **Child lock**.



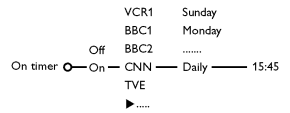
2. Press the cursor right to enter the Child lock menu.
You're summoned to enter your code. Enter the access code.
Note: You have to re-enter your code each time you enter the child lock menu.

Important: You have forgotten your code ! See p. 11.

3. Select one of the menu items of the child lock menu.
   - Select **Lock** if you want to lock all channels and externals.
   - Select **Custom lock** and press the cursor right.
   The items Age lock and Category lock are available when NEXTVIEW broadcast is available.
   - Select **Age lock** if you want to lock programmes related to a certain age: off, 2, 4 ... 18.
   - Select **Programme lock** if you want to lock the programmes from a certain TV channel or external.
   - Select **Category lock** if you want to lock programmes related to a certain theme: Movies, Sports, Shows.... See NEXTVIEW, p. 15.
   - Select **Lock after** if you want to lock all programmes from a certain time onwards.
   Press the cursor right and enter the time with the cursor up/down and right. Press the **OK** key to validate.
   Note: The entered time will remain valid for every day, until you have selected Unlock.
   - Select **Unlock** to unlock all locked channels and externals at once.

On timer

1. Select **On timer**.



2. Select **On** with the cursor right.
3. Press the cursor right again to enter the programme list.
4. Select the TV channel or external you want your TV to switch to on a selected time and day.
5. Press the cursor right again to select a day of the week or to select **Daily**.
6. Press the cursor right once again to enter the time.
7. Enter the time with the digit keys or with the cursor up/down.
8. Press the **OK** key to activate.
9. Press the **MENU** ▣ key to turn off the menu.

Note: To check your timer settings, press the i+ key.

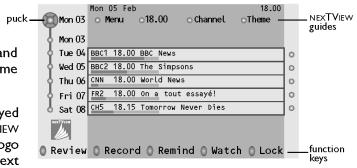
NEXTVIEW / Teletext guide

NEXTVIEW is an electronic guide that allows you to look up programmes as you would in a newspaper or a TV magazine. You can sort the programmes by subject (films, sport...), obtain detailed information and programme your video recorder if it comes with the NEXTVIEWLink function.

Important note: ***The NEXTVIEW service is only available on certain programmes and in certain countries.***
When no NEXTVIEW information is broadcast, the teletext programme guide appears in its place. this is based on teletext programme information (if available) and offers most functions of NEXTVIEW.
Note: The broadcaster is responsible for the content of the information. The TV is responsible for the capture of that information and for the presentation to the user.

Display of a NEXTVIEW page

The information is set by the channel that transmits the NEXTVIEW service.
For example:



Programme name and broadcast time

This logo is only displayed during a NEXTVIEW transmission. No logo indicates it is a teletext programme guide

NEXTVIEW guides:
- choice of the day
- channel choice
- sort by subject
- programme preview

NEXTVIEW functions:
Use the coloured keys on the remote control to activate them.
The text appears in grey when the function is not available.

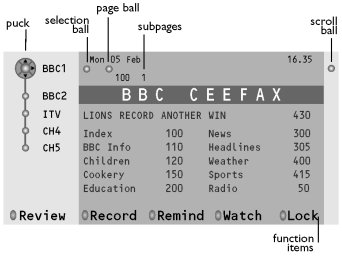
Using NEXTVIEW / Teletext guide

Call Teletext/NEXTVIEW guide

Press the key on the remote control to call the Teletext/NEXTVIEW guide. A menu appears with the message **One moment please**. After a while you obtain:
- a NEXTVIEW page, if the selected channel broadcasts this service (the NEXTVIEW logo is displayed. See also Setup menu, General, NEXTVIEW provider, p. 10),
- a teletext page, if the selected channel does not broadcast NEXTVIEW,
- **No information available** is displayed if neither NEXTVIEW nor teletext are transmitted. In this case, select another channel.

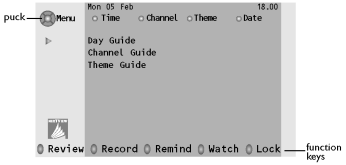
Note: Press the key twice to exit NEXTVIEW/Teletext Guide.

Teletext Guide



1. When in Teletext Guide mode, select a TV channel with the cursor up/down and press **OK**.
2. Move the cursor up to the top of the channel list where the name of the selected TV channel reappears.
3. In the Teletext index page, look for the programme guide page of the day or the following day.
4. Enter with the digit keys, the programme guide page number.
5. Press the cursor right to move the puck over the selection ball.
6. Use the cursor up/down to scroll through the different programmes.
   - If the selected programme contains a page number with an optional subcode referring to a page with more info about the programme, press the **OK** key to display the information. Press the **OK** key again to return to the programme guide page.
   - If the selected programme guide page satisfies the VPT requirements,
   - it will be possible to record, remind, watch or lock programmes:
   - the TV will remember the last selected teletext page number of that channel that contains programme guide information and indicates which programme starts at what time.
   Every time you press the key, the teletext programme guide page of the selected TV channel will be available.

NEXTVIEW



If in the Setup menu, General, see p. 10, you have selected a TV channel as NEXTVIEW provider and the selected channel broadcasts this service, the NEXTVIEW menu appears when NEXTVIEW is switched on. In other cases, NEXTVIEW starts up with the **Time Guide**.

1. Use the cursor key left/right to select **Time**, **Channel**, **Theme**, the date (or the menu).
   The **Time guide** provides an overview of all programme titles active in the selected time block.
   The **Channel guide** provides an overview of all programmes that are broadcast by a single channel during one day.
   With the **Date guide** you can choose a specific date.
   The **Theme guide** displays a list of all programmes at the selected date, that matches with the selected category.

Going through the menu guide, the TV is collecting the sorting criteria to finally display a list of programme events.

2. Press the **OK** key to select the guide type.
3. Move the puck down and to the right to select the programmes.
   If available a summary or commentary on the programme is displayed at the bottom of the screen.
4. Use the cursor up/down to scroll through the programmes.
5. Press one of the colour keys to select one of the basic functions (if available): **review**, **record**, **remind**, **watch**, **lock**..

Basic functions

Press one of the grey, red, green, yellow or blue keys to activate a Teletext Guide, **NEXTVIEW** function.
The keys appear in grey if the function is not available.

Review *(not available in Teletext Guide)*: this menu provides a list of programmes that are marked as reminders, those that have to be recorded and those that are locked. This menu can be used to change a reminder of programmes to be recorded.
Record: to programme the recording of the video recorder (if it has a NEXTVIEWLink function and is connected to **EXTERNAL 2**).
Remind: automatically switch on the TV if it is in standby or stops a programme from being broadcast by displaying a message if the TV is on.
Lock: to lock certain programmes to prevent recording or watching.

For the functions Record, Remind or Lock, a small menu pops up in which you can choose the interval: **once**, **daily** or **weekly**, or clear an earlier made record, remind or lock setting. The default interval is sit to **Once**. to confirm the frequency, press the **OK** key.

Note: For certain broadcasts, the Series option is suggested. With this option, the system will independently search for when the next episode in the series is being broadcast.

Watch: to watch the selected and currently broadcast programme. *(Not available in Teletext guide).*

Select Picture/NEXTVIEW Guide

Press the key twice.
The screen is divided into two parts: the left side for the normal main picture, the right side for NEXTVIEW/Teletext Guide/
Press the or key to return to a full picture screen.
Note:
- *in half screen mode the basic functions of the NEXTVIEW/ Teletext Guide are limited to Record, Remind and Watch.*
- *when using the key the TV will display the last used of teletext or NEXTVIEW.*

Acquisition and updating of NEXTVIEW information

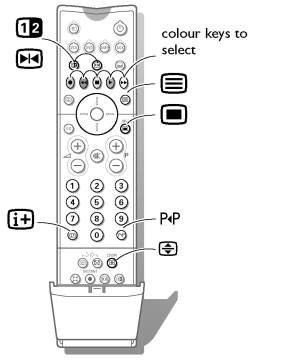
Acquisition and updating of NEXTVIEW is done when you are watching the TV channel of the selected NEXTVIEW provider, see Setup menu, p. 10, or when the TV is switched to standby;
The indicator on the front of the TV remains orange during standby. After all needed acquisition or updating is complete, it turns red.
Acquisition of fresh date will happen once during the night.
Note: it may be necessary to put the TV in standby mode when all NEXTVIEW information is outdated, e.g. returning from holiday.

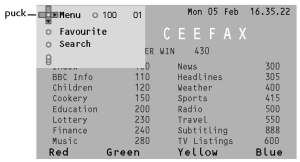
Teletext

Most TV channels broadcast information via teletext. This TV has a 1200 pages memory that will store most broadcasted pages and subpages to reduce waiting time. After each programme change, the memory is refreshed. It may take some time for all pages to load.
Depending on the TV channel, teletext is transmitted in different systems. The colours used in the bottom line of the teletext page correspond with the colour keys of your remote control.

Switch Teletext on and off

Press ☰ to switch the teletext on.
Press again to display a picture/teletext screen.
Press once again to return to a full screen picture.





The main index page appears on the screen together with an information line at the top, an option line at the bottom and a puck in the top left corner of the screen.

Select a Teletext page

With the digit keys

Enter the desired page number with the digit keys.
The page counter seeks the page or the page appears immediately when the page number has been stored in the memory.
A message appears when you have entered a non existent or incorrect page number. Page numbers beginning with 0 or 9 do not exist. Choose another number.

With the option line

Select with the colour keys, corresponding to the coloured options at the bottom of the screen, the desired subject.

Select Picture/Teletext

Select a TV channel which broadcasts teletext.
Press the 12 or the ☰ key twice.
The screen is divided into two parts: the left side for the normal main picture, the right side for teletext broadcast by the selected TV channel.
Press the ☰ or 12 key to return to a full screen picture.
Note: when using the 12 key, the TV will display the last use of teletext or NEXTVIEW.

Quickly run through the teletext pages

Press the cursor up/down or the **- P +** key to run through the previous or the following pages.

Select the previously selected teletext page

Press the P∢P key.
Note: Only possible when teletext pages are active, not when the Teletext menu is displayed.

Select the index teletext page

Press the grey colour key ▶▶ to display the main index (usually p.100).

Only for T.O.P teletext broadcasts :

T.O.P orders the pages in categories and adds other possibilities of enhancing ease of use.
Press i+. A T.O.P. overview of the teletext subjects available is displayed.
Not all TV channels broadcast T.O.P. teletext. When the teletext system is not T.O.P. teletext, a message appears at the bottom of the screen.
Select with the cursor up/down, left/right the desired subject and press the **OK** key.

Select subpages

When a selected teletext page consists of different subpages, one of the subpages appears on the screen.
Press the cursor right to highlight the subpagenumber.
Press the cursor up/down to select the next or previous subpage or enter the subpagenumber with the digit keys.

Special teletext functions

Hold

Press ⏮ to stop the automatically rotating of the subpages or to stop the page counter from seeking when you have entered a wrong page number or when the page is not available. Enter another page number.

Enlarge

Press ⇳ repeatedly to display the upper part, the lower part and then to return to the normal page size. When the upper part is displayed, you can scroll the text, line by line using the cursor up/down.

Hypertext

With hypertext you can select and search for pages containing any word or number on the current teletext page.

1. Make sure you are not in the teletext menu and that the puck is in the upper left corner of the screen.
2. Press the cursor key down to highlight the first word or a number on the page.
3. Use the cursor up/down, left/right to select the word or number you want to search for.
4. Press the **OK** key to confirm.
   A message appears at the bottom of the screen to indicate that the searching is going on or that the word or page is not found.

Teletext menu *(only available in full screen teletext mode)*

1. Press the ☰ menu key to activate the menu.
2. Press the cursor up/down to select the menu items.

Favourite

This list contains up to eight favourite teletext pages.
Only the pages of the current channel can be selected.

1. Press the cursor right to add the current page or to select one of the favourite pages to the list.
2. Press the **OK** key or the cursor right again to add.
3. Press the cursor left to return to the Teletext menu.

Search

On the keyboard on screen you can type in a word you want to search for in the teletext pages. Whether upper- or lowercase is used has no influence. Searching for numbers is not possible.

1. Press the cursor left/right, up/down to select the characters, words or functions.
2. Press the **OK** key to confirm each character selected.
3. Select **Cancel** to cancel the word or character selected. Select **Space** to enter a space; **Delete** to delete the last character selected; **Shift** to switch between undercast or capital characters; **Special** to display special characters on the keyboard.
4. Press the cursor left repeatedly to return to the Teletext menu again.

Searching a word

1. Type in the word on screen or select a word from the history list on the right and press **OK**.
2. Select **Accept** and press **OK** again.
   The message **Searching** appears. When the word is found, it is highlighted in the teletext page.
3. To continue the search, press the **OK** key twice.
   When a word is not found, a message appears.
4. To search for a new word, select **Keyboard** and press **OK**.
5. Select the new word.

Reveal

Reveals/conceals hidden information on a page, such as solutions to riddles and puzzles. Press the **OK** key to activate.
Press **OK** again to return to the Teletext menu.

Cycle subpages

Makes the subpages cycle automatically. Press the **OK** key to activate and to de-activate again.

Timed page

To display a specific page at a certain time.
1. Press the cursor right to select **Yes** or **No.**
2. Enter the time and pagenumber with the cursor keys or the digit keys.
   Note: Teletext does not have to remain switched on. It is not possible to display a timed page when the TV is switched to standby.

Language

If the displayed characters on screen do not correspond with the characters used by the teletext broadcaster, you can change the language group here.
Select **Group 1** or **Group 2** with the cursor keys left/right.

Press the **MENU** ☰ key to leave the Teletext menu.

Select Continuous Subtitles

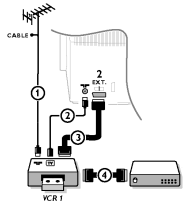
TV channels with teletext often transmit programmes with subtitling. For each TV channel you can store a subtitle page.

Switch on teletext and select the proper subtitle page from the index.
Switch off teletext.
Now the subtitle page is stored for the selected TV channel.

Connect Peripheral Equipment

There is a wide range of audio and video equipment that can be connected to your TV.
The following connection diagrams show you how to connect them.

Recorder



Connect the aerial cables ①, ② and, to obtain the optimum picture quality, eurocable ③ as shown.
If your recorder is provided with the EasyLink function, the eurocable supplied with it should be connected to EXTERNAL 2 to benefit from the EasyLink functionality.

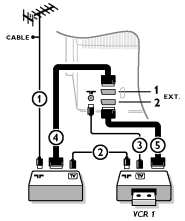
If the eurocable ③ is not used the following steps are required:

Search for and store the test signal of the recorder

1. Unplug the aerial cable ① from the aerial socket of your recorder.
2. Switch on your TV and put the recorder on the test signal. (See the handbook for your recorder.)
3. Search for the test signal of your recorder in the same way as you searched for and stored the TV signals. See Installation, Store TV channels, Manual Installation, p. 8.
4. Store the test signal under programme number 0 or between 90 and 99.
5. Replace the aerial cable in the aerial socket of your recorder after you have stored the test signal.

Decoder and Recorder
Connect a eurocable ④ to your decoder and to the special euroconnector of your recorder. See also the recorder handbook. See Decoder, p.11.
You can also connect your decoder directly to **EXTERNAL 1** or **2** with a eurocable.

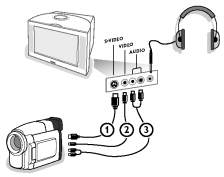
Other equipment (except Digital Sources)



1. Connect the aerial cables ①, ② and ③ as shown. Better picture quality can be obtained if you also connect eurocable ⑤ to **EXTERNAL 2** and a eurocable ④ to **EXTERNAL 1** or **3**.
2. Look for the test signal of your peripheral in the same way as you do for a Recorder.
*When a recorder is connected to **EXTERNAL 1** you can only record a programme from your TV. Only when a recorder is connected to **EXTERNAL 2** it is possible to record a programme from your TV as well as from other connected equipment. See Record with your recorder, p. 22.*

*Note: **EXTERNAL 1** can handle CVBS and RGB, **EXTERNAL 2** CVBS and Y/C, **EXTERNAL 3** CVBS and RGB. It is preferred to connect peripherals with RGB output to **EXTERNAL 1** or **3** as RGB provides a better picture quality.*

Side connections



Camera or Camcorder

1. Connect your camera or camcorder to sockets at the right side of your TV.
2. Connect the equipment to **VIDEO** ② and **AUDIO L** ③ for mono equipment.
3. For stereo equipment also connect **AUDIO R** ③.

S-VHS quality with an S-VHS camcorder is obtained by connecting the S-VHS cables with the **S-VIDEO** input ① and **AUDIO** inputs ③.

Do not connect cable ① and ② at the same time. This may cause picture distortion !

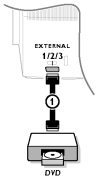
Headphone

1. Insert the plug into the headphone socket at the right side of the TV.
2. Press on the remote control to switch off the internal loudspeakers of the TV.
The headphone impedance must be between 8 and 4000 Ohm. The headphone socket has a 3.5 mm jack.

In the **SOUND** menu select **Headphone volume** to adjust the headphone volume.

Note: The surround mode is always stereo when the headphone is connected.

Digital equipment

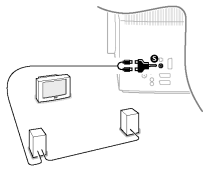


Connect your digital equipment with a eurocable ① to one of the euroconnectors (**EXT1**, **EXT2** or **EXT3**), or with a cinch cable to the **VIDEO** input at the right side of the TV.

Note: the low quality of some digital picture material may be the cause of digital image distortion. In this case select Eco under the smart picture key on the remote control as this setting is intended to improve distorted picture quality.

Connect extra loudspeakers/amplifier

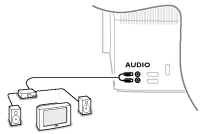
REAR multimedia loudspeakers



You can enjoy Dolby Pro Logic Surround sound by connecting two rear loudspeakers to be connected to the Dolby Surround output **S** at the back of your TV.

1. Connect two rear loudspeakers with built in amplifiers or an audio amplifier with rear loudspeakers.
Connect the audio cables to the rear loudspeakers and to the Dolby surround output **S** at the back of your TV as shown above. There is only one output for both speakers.
Note: Switch off the TV and the rear loudspeakers before connecting them.
*The surround output **S** has a 3,5 mm jack.*
2. Select **Surround speakers Yes** in the Setup menu. See p. 9.
See Surround sound modes in the Sound menu, p. 13 for the available Surround modes.
Rear Surround Sound loudspeakers should always be located behind or to either side of the listener at about 1 m above the listener.
3. Adjust the volume of the rear loudspeakers.
Use the Test tone function in the Speakers menu, see p. 9, to have a reference of the loudness of the separate loudspeakers.
Note: Once you have adjusted the volume of the rear loudspeakers, do not change it while watching TV as the whole configuration operates with the volume adjustment of your TV.

Stereo amplifier and two extra FRONT speakers



To enhance the sound reproduction of your TV you can connect two extra front loudspeakers via an external amplifier.

1. Connect the audio cables to the audio input of your amplifier and to **AUDIO L** and **R** at the back of your TV.
The output level is controlled by the volume control of your TV.
Note: Switch off the TV and your audio amplifier before connecting them. Set the audio amplifier's volume to minimum.
2. Select **Centre mode On** in the Setup, Speakers menu. See p. 9. See Surround mode in the Sound menu, p. 13 for the available Surround modes.
3. Adjust the volume of the audio amplifier.
Use the Test tone function in the Setup, Speakers menu, see p. 9 to have a reference of the loudness of the separate loudspeakers.
Note: Once you have adjusted the volume of the amplifier, do not change it while watching TV as the whole configuration operates with the volume adjustment of your TV.

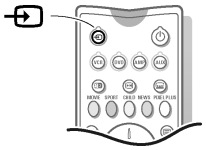
If extra front speakers are connected and selected, all internal TV speakers produce centre sound in the surround modes Dolby Pro Logic and Dolby 3 Stereo.

Cinema Link Surround receiver

1. Connect the Dolby Pro Logic Surround amplifier to the **AUDIO L** and **R** at the back of your TV.
2. If you want the loudspeakers of your TV to act as centre speaker, also connect a cinch to scart cable (not supplied) to the multichannel Surround receiver and to **EXT1** or **EXT3** at the back of your TV.
3. Select **Centre mode On** in the Setup, Speakers menu, p. 9.
The loudspeakers of the TV will now produce centre sound, the loudspeakers connected to the audio receiver will produce Surround sound.
4. Switch off the volume of the TV with the mute key .
All volume settings, tone control and speaker connections have to be done via the external Dolby Pro Logic amplifier.
Attention: the sound info on screen will not correspond with the actual sound reproduction.
No sound will be heard when a TV channel or external source is blocked via the Child lock menu, see p. 14.

If you want to connect more equipment to your TV, consult your dealer.

To select connected equipment



Equipment connected with an aerial cable only :
Select the programme number under which you have stored the test signal with the digit keys.

Equipment connected to a euroconnector or to the right side of the TV

1. Press the key repeatedly to select **EXT1, EXT2, EXT3** or **SIDE** according to where you connected your equipment at the back or the right side of your TV.
   Remark : Most equipment (decoder, Recorder) carries out the switching itself.
2. Press the cursor up/down and press **OK**.

If you want to change to TV channels?
Enter the programme number of the TV channel which you want to watch with the digit keys.

Recorder or DVD with EasyLink

The recorder or DVD can be operated via the **VCR** or **DVD** menu on screen.

1. Press the **MENU** key on the remote control.
2. Select the Recorder or DVD menu with the cursor up/down.

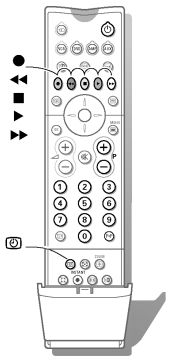
REC ◄◄ Rwd ◄ Play ■ Stop ► Play ►► Ffw ● Rec ▲ Eject

DVD ◄◄ Prev. ◄ Play ■ Stop ► Play ►► Next ▲ Eject

3. Press the cursor left/right, up/down to select one of the Recorder or DVD functions.

The key **INSTANT** ● *for recording, under the door of the remote control, can be operated in the TV mode.*
If your EasyLink Recorder has the system standby function, when you press the key for 3 seconds, both TV and the Recorder are switched to standby.

Audio- and video equipment keys



Most of the audio and video equipment from our range of products can be operated with the remote control of your TV.

Press one of the keys after you pressed the **VCR**, **DVD**, **AMP** or **AUX** key according to the equipment you want to operate with this remote control. See Use of the remote control, p. 3.

- to switch to standby (**VCR**)
- for pause (**DVD, CD**)
- for record,
- for rewind (**VCR, CD**); search down (**DVD, AMP**)
- for stop,
- for play,
- for fast forward (**VCR, CD**); search up (**DVD/AMP**)
- to select your choice of subtitle language (**DVD**); RDS news/TA (**AMP**); to shuffle play (**CD**)
- to select a **DVD** title; RDS display (**AMP**); info on screen (**CD**)
- display information
- to switch the menu on or off
- **- P +** for chapter, channel, track selection
- 0 to 9 digit entry,
- P∢P tape index (**VCR**), select a DVD chapter, select a frequency (**AMP**)
- VCR timer
- surround on/off (**AMP, CD**)
- cursor up/down to select the next or the previous disc (**CD**)
- cursor left/right to select the previous or following track (**CD**)

Note: If no action has been taken within 30 seconds, the remote control goes back to the TV mode.

AUX keys
The **AUX** mode can be customised according to the equipment you want to operate: a CD player, a satellite receiver with RC5 signalling standard or a satellite receiver with RC6 or RC5 signalling standard.

Press the **OK** key together
with the digit key 1 to select the CD system,
with the digit key 2 to select the **SAT RC-5** system,
with the digit key 3 to select the **SAT RC-6** system.

Record with your Recorder without EasyLink

To record S-VHS quality, connect an S-VHS peripheral directly to the recorder.

Record a TV programme

1. Select the programme number on your Recorder.
2. Set your Recorder to record.
   See the handbook for your Recorder.

Switching programme numbers on your TV does not disturb recording !

Record a programme on your Recorder connected to EXTERNAL 2 from Audio/Video equipment connected to EXTERNAL 1, EXTERNAL 3 or to sockets on the right side of the TV

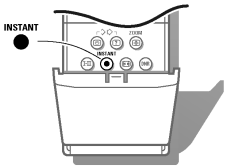
1. Switch on the equipment.
2. Select the correct external on your recorder.
3. Set your Recorder to record.
   You record what you are watching on the screen.

Do not switch programme numbers or do not switch off your TV when you are recording !

Record with your Recorder with EasyLink

If you have connected an S-VHS Recorder provided with the EasyLink function, you can record S-VHS quality from an S-VHS peripheral connected to the right side of the TV. (E.g. from an S-VHS camcorder.)

In TV mode, it is possible to start a direct recording of the programme which is being displayed on the TV screen.
Press the **INSTANT** ● *record key, under the door of the remote control.*



The Recorder switches on from standby and a message of what is being recorded appears on the screen.
The Recorder starts recording the programme you are watching.
Switching programme numbers on your TV does not disturb recording !

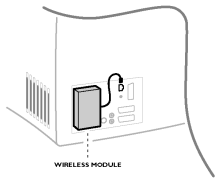
When recording a programme from a peripheral connected to EXTERNAL 1, 3 or SIDE, you can not select another TV programme on the screen.
To watch TV programmes again, press the programme number you want to select twice.
Attention: the recording is stopped and your Recorder switches to standby.

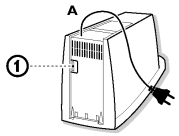
If you switch to standby during recording of a programme from a peripheral connected to EXTERNAL 1, 3 or SIDE, the blinking lamp on the front of your TV indicates that you are still recording. The blinking stops after the recording is finished.

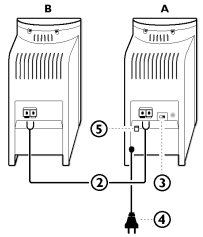
Record with your Recorder with NEXTVIEWLink

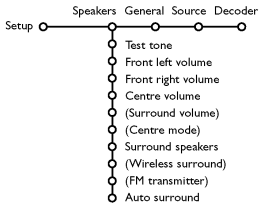
If your Recorder is equipped with NEXTVIEWLink, and you tagged one or more programmes to be recorded automatically in the NEXTVIEW mode, it is not necessary for the TV to be in the standby mode or switched on for the recording to start.

Appendix: Optional Wireless Surround speaker system - Kit type no: AD902W









Wireless transmitter module

- Switch the TV off with the power switch.
- Attach the wireless module to the back of the TV as shown.
- Connect the attached cable to the wireless module connector.
- Switch the TV on.

Surround loudspeakers

There are two surround loudspeakers supplied. One is the active loudspeaker A. The other loudspeaker B is a passive one which has to be connected with the active loudspeaker.

- The slide channel switch ① at the bottom of the active loudspeaker has been set default to channel 1 in the factory.
- Connect the active to the passive loudspeaker with the supplied speaker cable ②. Insert the marked wire into the openings of the same coloured connector clips on both speakers. Do not insert the wires too far.
- The Surround sound loudspeakers can be located behind or to either side of the listener. The front of the loudspeakers do not have to face the listener. The distance between the TV and the surround speakers should not exceed 15 m.
  Note: In rare occasions people moving around close to the TV may interfere with the sound transmission.
- Set the position switch ③ to the right if the active loudspeaker is positioned to the right side of the listener, to the left if it is positioned to the left side of the listener (seen from the point of view of watching the TV).
- Connect the active loudspeaker to the mains with the mains cable ④.
- Switch on the active loudspeaker with the **POWER** switch ⑤.
  The red indicator at the front of the active surround speaker shows that the speaker is in standby. During sound transmission the indicator turns to green. 10-15 min. after the sound transmission of the TV has stopped, the indicator turns back to red to indicate the low power standby.
  To switch the active speaker off, use the **POWER** switch.

Setup - Speakers menu

- Press the **MENU** key on the remote control.
- Use the cursor down to select **Setup**.
- Use the cursor right to select **Speakers**.
- Use the cursor down to select **Wireless surround**.

  The system has already been configured in the factory to work properly. In rare circumstances, interference from external RF (wireless) equipments such as RF headphones, mobile phones or remote controls for lights, may occur. Then it may be necessary to shift to another wireless channel.
  Important: Always be sure that the active surround speaker (A) and the Wireless surround setting are switched to the same transmitting channel. Otherwise no sound or only a distorted sound will be heard on the surround speakers.
- Select **FM transmitter** and select the correct type of transmitter, 864 MHz or 433 MHz, valid for the country where you are now located.
  When the TV is tuned to a channel in the neighbourhood of 864 MHz (alternatively 433 MHz), the transmitter is switched off because no RF surround sound is possible. this is necessary to avoid interfered picture.

In rare cases, when no RF surround sound is possible or when there is too much interference, use the wired back up solution with a 3.5 mm stereo jack. In this case select Off in the Wireless surround menu item. See Connect Peripheral Equipment, p. 20.

Tips

Care of the screen
Clean the TV with a slightly damp soft cloth. Do not use abrasive solvent as it can damage the TV screen.

Mobile telephone warning !
To avoid disturbances in picture and sound, malfunctioning of your TV or even damage to the TV, keep away your mobile telephone from the TV.

Poor Picture

- Have you selected the correct TV system?
- Is your TV or house aerial located too close to loudspeakers, non-earthed audio equipment or neon lights, etc.?
- Mountains or high buildings can cause double pictures or ghost images. Sometimes you can improve the picture quality by changing the direction of the aerial.
- Is the picture or teletext unrecognisable? Check if you have entered the correct frequency. See Installation, p. 8.
- Are brightness, sharpness and contrast out of adjustment? Select Factory settings in the Setup menu, p. 10.
- Sometimes poor picture quality is possible when having activated an S-VHS camera or camcorder connected to the right side of your TV and another peripheral is connected to **EXT1**, **EXT2** or **EXT3** at the same time. In this case switch off one of the other peripherals.

No picture

- Is the aerial connected properly?
- Are the plugs tightly connected in the aerial socket?
- Is the aerial cable in good condition and does it have suitable plugs?
- Are the connection facilities to a possible second TV in good condition? If in doubt, consult your dealer.

No sound

- No sound on any channel? Check the volume isn't at minimum.
- Is the sound interrupted with the mute key ? Check if your speaker configuration corresponds with the selections made in the Setup menu, Speakers, p. 9. E.g. is your amplifier switched on when you have 2 extra front speakers connected?
- No sound from the rear speakers or the centre speakers? Select an appropriate surround mode, according to the broadcasted sound signal or adjust the volume or check if the wireless transmitter is properly connected. See Surround Modes, p. 13.

No Surround sound

- Check if the headphone is not plugged in.
- Check if the channel is broadcasting good quality surround.

Remote control

- If your TV no longer responds to the remote control, the batteries may be dead or the wrong mode (TV or other peripheral, see p. 3) is selected.
- You can still use the **M** key and the -/+ keys at the top of your TV.

Menu
Have you selected the wrong menu? Press the **MENU** key again to exit from the menu.

NEXTVIEW - No information
See Acquisition and updating of NEXTVIEW information, p. 16.

NEXTVIEW - Displayed time is wrong
The broadcaster on programme number one does not transmit the correct local date and time. Use **Reshuffle** in the **INSTALLATION** menu to place another broadcaster on programme number one.

Wireless Surround speaker system

- Are the active surround speaker and the Surround Sound setting in the Setup menu switched to the same transmitting channel?
- External RF equipment, mobile telephones or people moving around close to the TV may disturb the sound transmission.
- When no RF surround sound is possible, or when there is too much interference, try to switch to another wireless channel or use the wired back up solution. See Install Sound Setup, p. 9.
- When you switch to another wireless channel, take care to select the same transmitting channel as well in the setup menu as on the speaker box.
- For wireless transmitter modules with a built in antenna: direct the antenna to achieve the best reception.

No solution
Switch your TV off and then on again once.
Never attempt to repair a defective TV yourself.
Check with your dealer or call a TV technician.

End of life directives
Philips is paying a lot of attention to producing environmentally-friendly in green focal areas. Your new TV contains materials which can be recycled and reused. At the end of its life specialised companies can dismantle the discarded TV to concentrate the reusable materials and to minimise the amount of materials to be disposed of.
Please ensure you dispose of your old TV according to local regulations.

How to dispose of dead batteries?
The batteries supplied do not contain the heavy metals mercury and cadmium. Nevertheless in many countries dead batteries may not be disposed of with your household waste. Please ensure you dispose of dead batteries according to local regulations.

4. Mechanical Instructions

Index of this chapter:

Note: Figures below can deviate slightly from the actual situation, due to the different set executions.

4.1 Service Connector (for ComPair)

For service diagnostics with ComPair, it is not necessary to disassemble the set. You only have to connect the ComPair interface box, via the appropriate cable, to the service connector (on the rear of the set, see figure below), and start the program (see also chapter 5).

4.2 Set Disassembly

Follow the disassemble instructions in described order.

4.2.1 Wireless Surround Transmitter Removal (if attached)

1. Remove the cable of the Wireless Surround Transmitter box (at the right side of this RJ45 plug you can find the release-hook of the lock-mechanism).
2. Pull the Wireless Surround Transmitter box backwards. It is clicked to the rear cover via three clamps.

4.2.2 Rear Cover Removal

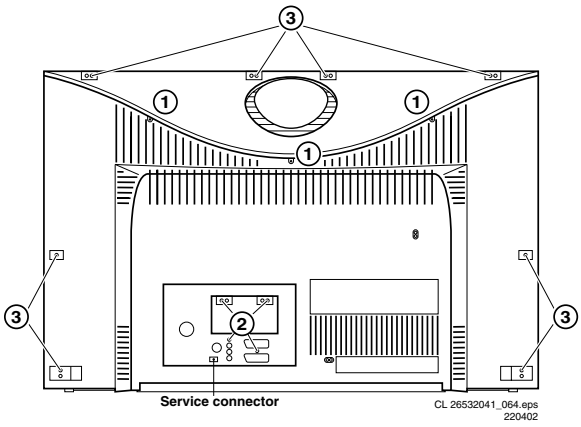


Figure 4-1 Rear view

Warning: disconnect the mains power cord before you remove the rear cover.

First, remove the top cover (= plate with 'saucer'):
1. Remove the three fixation screws [1] that hold the cover plate.
2. Pull the cover (horizontally) backwards.

To be able to access the electronics of the set, you must remove the rear cover:
1. Remove the fixation screws [2] of the rear I/O cover plate.
2. Remove the remaining fixation screws [3] at the two sides, and the top of the rear cover.
3. Now remove the rear cover. Make sure that wires and cables are not damaged during cover removal.

4.2.3 Sub-woofer Removal

Caution: Do not disconnect the loudspeaker cable from the subwoofer box when the set is operative, because the class-D amplifier cannot handle a change in load during operation. It is no problem when the subwoofer is disconnected **before operation**, but a change from connected to disconnected **during operation** can damage the amplifier.

1. Disconnect the loudspeaker cable at the top of the sub-woofer box.
2. The subwoofer is fixed in the bottom plate with two 'rubber feet'.
3. Pull the sub-woofer box upwards, and remove it.

4.3 Service Positions

This chassis has several predefined service positions, for better accessibility. They are explained below in more detail.

4.3.1 Solder Side '3rd SCART' panel

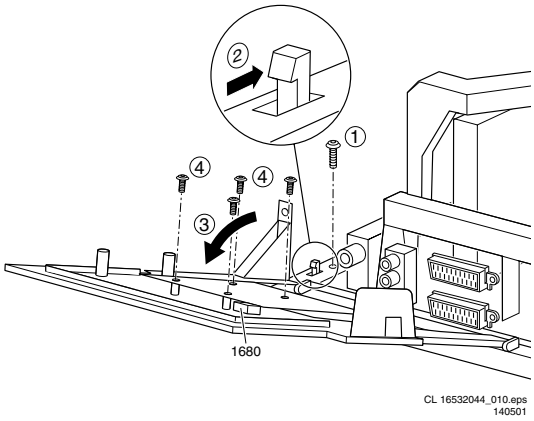


Figure 4-2 Service position 1

To remove or access the '3rd SCART' panel, do the following:
1. Remove fixation screw [1].
2. To release the fixation peg, push it towards the CRT [2].
3. At the same time, pull the complete module away from the LSP [3]. It hinges in the LSP-bracket.
4. To remove the panel, disconnect the flat-cable from connector 1680 and remove the four panel screws [4].

4.3.2 Component Side LSP

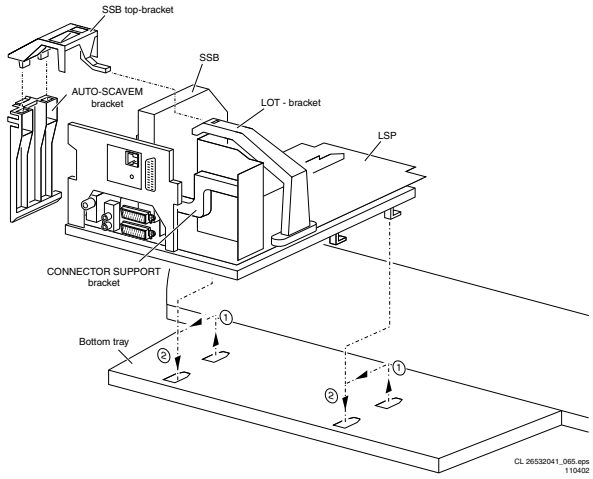


Figure 4-3 Service position 2

For better accessibility of the LSP, do the following (see figure above):

1. Remove the LSP-bracket from the bottom tray by pulling it backwards.
2. Hook the bracket in the first row of fixation holes of the bottom tray. In other words, reposition the bracket from [1] to [2].

4.3.3 Solder Side LSP

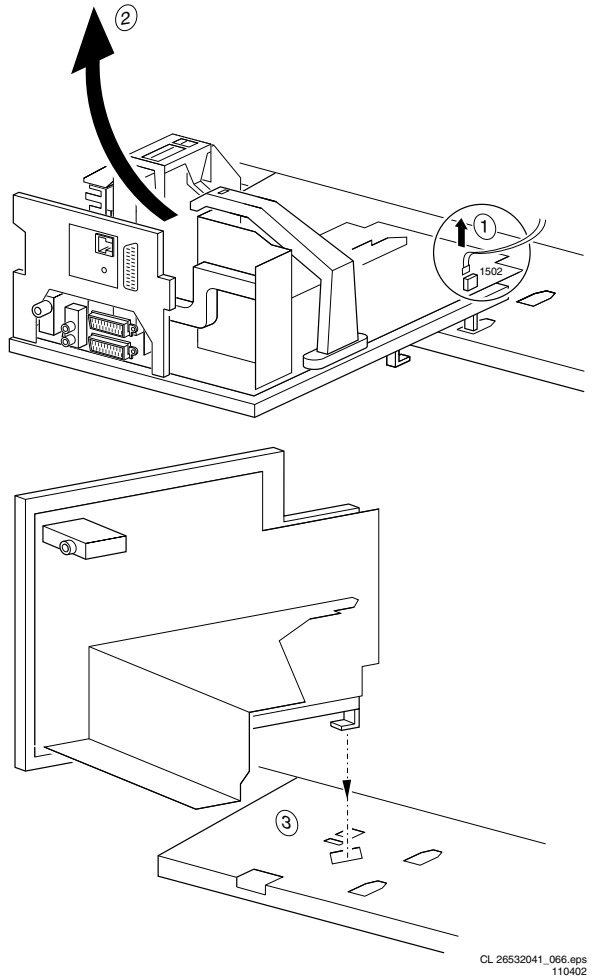


Figure 4-4 Service position 3

To get access to the bottom side (solder side) of the LSP, do the following (see figure above):

1. Remove the DAF-module (see paragraph 'DAF Assy/ panel' below
2. To disconnect the degaussing coil from the LSP, remove the cable from connector 1502 [1].
3. Release the wiring from their fixation clamps, in order to get room for repositioning the LSP.
4. Flip the LSP 90 degrees clockwise [2], and place it in the fixation hole at the left side of the bottom tray [3].

4.3.4 Small Signal Board (SSB)

In fact, there is no predefined service position for the SSB. Most test points are located on the A-side (side that is facing the tuner). If you have to replace ICs, you must take the complete SSB module out of the SIMM-connector.
Note: For good access to the A-side, it is necessary to remove the Auto-Scavem assy (at the left side of the SSB). See description in paragraph 'Auto-Scavem Assy/Panel' below.

To get access to the SSB test points, do the following:

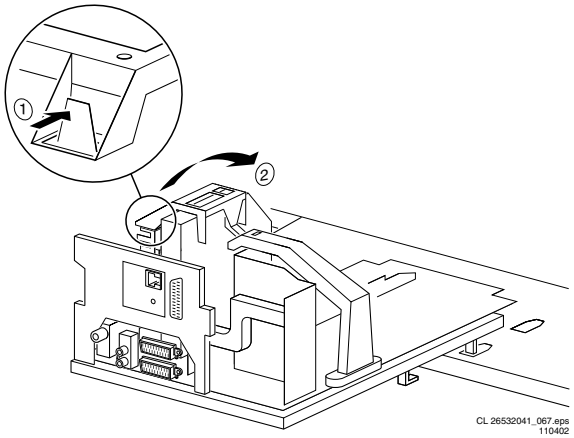


Figure 4-5 SSB removal (part 1)

1. Put the LSP in service position 2 (as described above).
2. Release the two clamps at the top of the SSB bracket [2] and pull the bracket upward (it hinges in the bracket at the LOT side).
3. Now you can remove the complete SSB bracket.

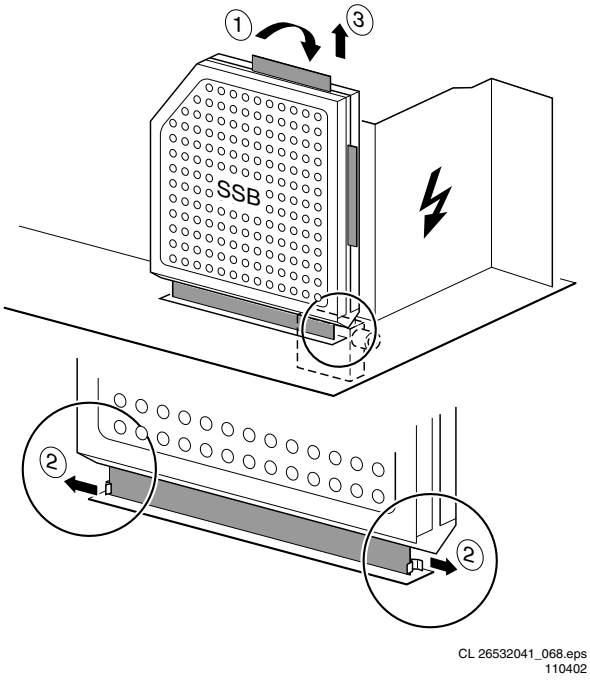


Figure 4-6 SSB removal (part 2)

1. Push the top of the SSB towards the LOT [1].
2. Due to the pressure, the two metal clamps at both sides of the SIMM-connector will release [2].
3. Take the complete SSB out [3].

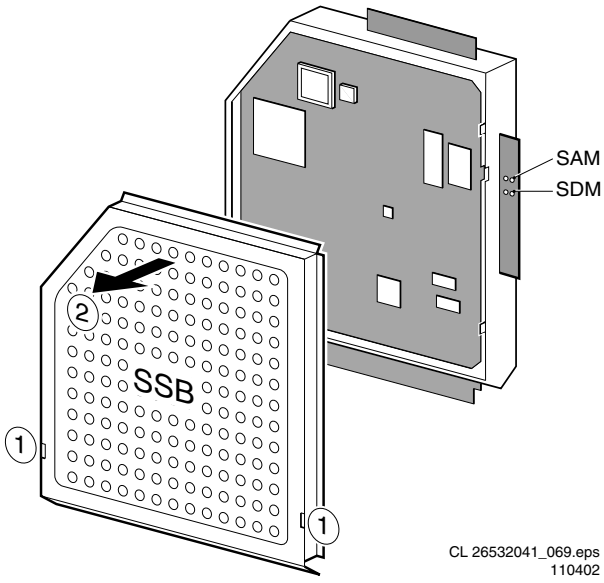


Figure 4-7 SSB removal (part 3)

1. Once you have taken out the SSB, remove the shieldings [2]. Sometimes it is necessary to unsolder some solder-tags first [1].
2. Now re-place the SSB module in the SIMM-connector in reverse order.

Notes:

- For better access to the SSB, it is possible to order an 'extension board' under number **9965 000 05769**.
- If necessary for the measurement, you can put the LSP in 'service position 2' (as described above).

4.4 Assy / Board Removal

Sometimes, it can be necessary to swap a complete assy or Printed Wiring Board (PWB). How that can be done is explained below.

4.4.1 Top Control Assy/Panel

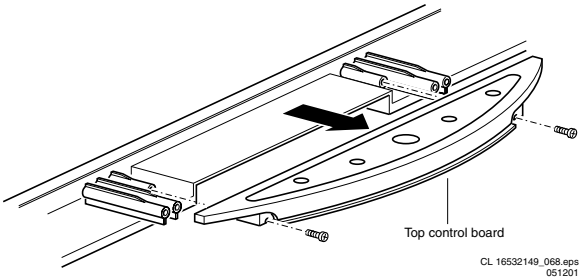


Figure 4-8 Top control assy

1. Release both fixation screws about 5 full turns.
2. Pull the complete assy back- and upwards (it hinges in the cabinet front).
3. Flip the assy, and you can access the board by releasing (carefully) the four fixation clamps.

4.4.2 Side-I/O Assy and Panel

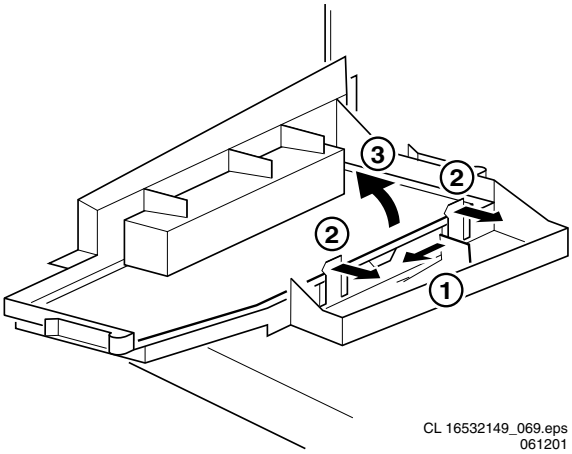


Figure 4-9 Side I/O assy

1. Release the snap-hook [1] with your finger.
2. At the same time, pull the assy backwards [2].
3. Release the two fixation clamps on the right side of the bracket (the board hinges at the left side).
4. Remove the board from the bracket.

4.4.3 Mains Switch Assy/Panel

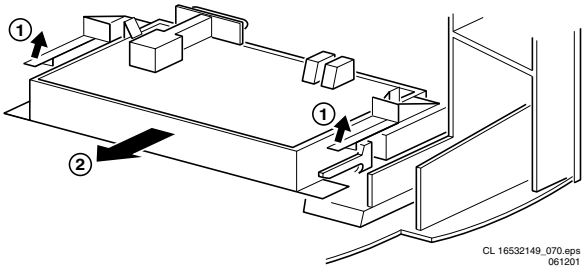


Figure 4-10 Mains Switch Assy

1. Release the two fixation clamps (rather difficult to reach), by pushing them upwards [1]. At the same time, pull the complete assy backwards [2].
   Note: be aware that the degaussing coil can hamper this.
2. Release the two fixation clamps on the two sides of the bracket (the board hinges at the connector side).
3. Remove the board from the bracket.
4. When the light guide (sitting in the cabinet, in front of the LEDs) is defective, you can replace it by pushing it forwards at the left side (it hinges at the right side, seen from the rear).

4.4.4 DAF Assy/Panel

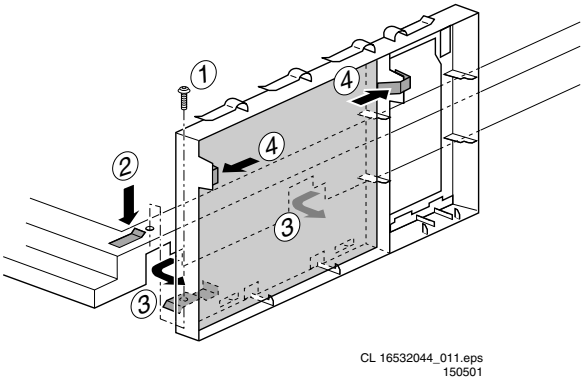


Figure 4-11 DAF-module

1. Remove the fixation screw [1] (if present).
2. Push down the fixation clamp [2], and pull the complete bracket at the same time away from the CRT [3]. The module is now free from the LSP-bracket.
3. Release the fixation clamps [4], in order to remove the print from its bracket.

4.4.5 Auto-SCAVEM Assy/Panel

This panel is placed on the left side of the SSB (See figure 'Service position 2'). Because most of its components are placed on the bottom side, you must lift the panel from its bracket before you can measure it.

1. Therefore, release the two fixation clamps at the top.
2. Lift the panel from the bracket (it hinges at the bottom).

To remove the bracket:

1. First, remove the panel from the bracket, as described above.
2. Then, remove the two fixation screws at the bottom.
3. Lift the Auto-Scavem bracket slightly up, and at the same time bend the top a little away from the tuner.
4. Now, push the bracket into the direction of the CRT, and lift it out of the LSP-bracket.

4.4.6 Small Signal Board (SSB)

See paragraph 'Small Signal Board (SSB)' above.

4.4.7 Large Signal Panel (LSP)

1. Remove the SSB (see paragraph 'Small Signal Board (SSB)' above).
2. Remove the Auto-Scavem assy (see paragraph 'Auto Scavem Assy/Panel' above).
3. Disconnect the necessary cables.
4. Release the fixation clamps on the left of the LSP-bracket (the board hinges at the right side).
5. Remove the board from the bracket.

4.5 Set Reassembly

To reassemble the whole set, do all processes in reverse order.

Be sure that, before the rear cover is mounted:

- The mains cord is mounted correctly in its guiding brackets.
- All wires/cables are returned in their original positions. This is very important due to the large 'hot' area of the set

5. Service Modes, Error Codes and Fault Finding

Index of this chapter:

5.1 Test Points

The chassis is equipped with test points printed on the circuit board assemblies. They refer to the diagram letters. The numbering is in a logical sequence for diagnostics. Always start diagnosing (within a functional block), in the sequence of the relevant test points for that block.

Perform measurements under the following conditions:
- Service Default Mode.
- Video: colour bar signal.
- Audio: 3 kHz left, 1 kHz right.

5.2 Service Modes

Service Default Mode (SDM) and Service Alignment Mode (SAM) offer several features for the service technician, while the Customer Service Mode (CSM) is used for communication between a Philips Customer Care Centre (P3C) and a customer.

There is also the option of using ComPair, a hardware interface between a computer (see requirements below) and the TV chassis. It offers the ability of structured troubleshooting, test pattern generation, error code reading, software version readout, and software upgrading.
Minimum requirements: a Pentium processor, Windows 95/ 98, and a CD-ROM drive (see also paragraph 5.4).

5.2.1 Service Default Mode (SDM)

Purpose
- To create a pre-defined setting, to get the same measurement results as given in this manual.
- To override SW protections.
- To start the blinking LED procedure.

Specifications
- Tuning frequency: 475.25 MHz for PAL/SECAM.
- Colour system: SECAM L for France or PAL B/G for the rest of Europe.
- All picture settings at 50 % (brightness, colour, contrast).
- All sound settings at 50 %, except volume at 25 %.
- All service-unfriendly modes (if present) are disabled, like:
  - (Sleep) timer.
  - Child/parental lock.
  - Blue mute.
  - Automatic volume limiter (AVL).
  - Auto switch-off (when no video signal was received for 10 minutes).
  - Skip/blank of non-favourite pre-sets.
  - Smart modes.
  - Auto store of personal presets.
  - Auto user menu time-out.

How to enter SDM
Use one of the following methods:
- Use the standard RC-transmitter and key in the code '062596', directly followed by the 'MENU' button.

  Note: It is possible that, together with the SDM, the main menu will appear. To switch it off, push the 'MENU' button again.
- When you shorten for a moment the two solder pads on the 'external part' of the SSB print, with the indication SDM. Activation can be performed in all modes, except when the set has a problem with the main-processor. **Caution**: If the SDM is entered via the pins, all the software-controlled protections are de-activated.
- Use the DST-emulation feature of ComPair.
- Use the 'DEFAULT' button on the Dealer Service Tool (RC7150).

After entering this mode, 'SDM' will appear in the upper right corner of the screen.

How to navigate
When you press the 'MENU' button on the RC transmitter, the set will toggle between the SDM and the normal user menu (with the SDM mode still active in the background).

How to exit SDM
Use one of the following methods:
- Switch the set to STANDBY via the RC-transmitter.
- Press the 'EXIT' button on the DST.
- Via a standard customer RC-transmitter: key in '00'-sequence.

5.2.2 Service Alignment Mode (SAM)

Purpose
- To perform (software) alignments.
- To change option settings.
- To easily identify the used software version.
- To view operational hours.
- To display (or clear) the error code buffer.

Specifications
- Operation hours counter.
- Software version.
- Option settings.
- Error buffer reading and erasing.
- Software alignments.

How to enter SAM
Use one of the following methods:
- Via a standard RC transmitter: key in the code '062596' directly followed by the 'OSD [i+]' button
- Short for a moment the two solder pads on the 'external part' of the SSB print, with the indication SAM.
- Use the DST-emulation feature of ComPair.
- Press the ALIGN button on the DST while the set is in the normal operation

After entering this mode, 'SAM' will appear in the upper right corner of the screen.

Contents of SAM:
- **Rom Version.** Displays the date of the software and the software version of the ROM (**example**: EM5EU1-1.0_01234= AAABBC-X.Y_NNNNN).
  - AAA= the chassis name (EM5).
  - BB= the region: EU= Europe, AP= Asia Pacific PAL/ Multi, AN= Asia Pacific NTSC, US= USA, LT= LATAM.
  - C= the language cluster number.
  - X.Y= the software version, where X is the main version number (different numbers are not compatible with one another) and Y is the sub version number (a higher number is always compatible with a lower number).
  - NNNNN= last five digits of 12nc code software.

- **Operation Hours.** Displays the accumulated total of operation hours (not the standby hours).
- **Errors** (followed by maximal 10 errors). The most recent error is displayed at the upper left (for an error explanation see paragraph 5.5).
- **Defect. Module.** Here the module that generates the error is displayed. If there are multiple errors in the buffer, which are not all generated by a single module, there is probably another defect. It will then display the message 'Unknown' here.
- **Reset Error Buffer.** When you press the 'OK' button, the error buffer is reset.
- **Alignments.** This will activate the 'Alignments' sub-menu.
- **Dealer Options.** Extra features for the dealers.
- **Service Options.** Extra features for Service.
- **Initialise NVM.** When an NVM was corrupted (or replaced) in the former EM3 chassis, the microprocessor replaces the content with default data (to assure that the set can operate). However, all pre-sets and alignment values are gone now, and option numbers are also not correct. So, this was a very drastic way.
  In the EM5 chassis, the procedure is implemented in another way: The moment the processor recognises a corrupted NVM, an extra line will be added to the SAM menu: '**Initialise NVM**'.
  Now, you can do two things (dependent of the service instructions at that moment):
  – Save the content of the NVM via ComPair for development analysis, **before** initialising. This will give the Philips Service department an extra possibility for diagnosis (e.g. when Development asks for this).
  – Initialise the NVM (same as in the past, however now it happens conscious).
- **Store Options.** All options are stored when pressing the 'OK'-button
- **Functional Test.** All devices are tested via the 'OK' button. Eventual errors are displayed in the error buffer. The error buffer is not erased, the content returns when this test is terminated.
- **Broadcast Info.** The purpose of this menu is to debug the broadcast, NOT the TV. The menu gives an overview of what is received on the current preset related to Time extraction, CNI codes, and NexTView transmission.
  Following items are displayed:
  – **Preset.** Shows the preset number.
  – **Local.** Local date and time from the selected preset.
  – **UTC** (Coordinated Universal Time). Extracted from the selected preset.
  – **LTO** (Local Time Offset). Extracted from the selected preset.
  – **CNI** (Country and Network Identification). Extracted from the current preset (displayed as a four digit hexadecimal number. The CNI number identifies the broadcaster.
  – **NexTView service** (optional). This item gives information about the type of NexTView service that is available for the current preset. The possible strings are:
    1. NexTView provider.
    2. NexTView data available from preset xx (where xx is the preset number).
    3. No NexTView data available.
  – **CNI Linking** (optional). 'Link' refers to the connection between the broadcasted NexTView programme information and the preset number. The possible strings are:
    1. Data available for preset xx xx xx (where xx xx xx is a list off all presets for which a CNI link is available).
    2. 'Automatic link' or ' Manual link', depending on what is read from the broadcast and from the CNI table in the NVM. 'Automatic' means that the link has been made based on broadcasted information, without user-interaction. 'Manual' means that the user has established this link by selecting a preset in the pop-up menu that you get after setting a reminder/recording/lock/watch in EPG. Erase a wrong 'Manual link' by entering the Manual Installation menu and (without changing anything) activate 'Store'.
    3. Nothing is shown.

How to navigate

- In SAM, you can select the menu items with the CURSOR UP/DOWN key on the RC-transmitter. The selected item will be highlighted. When not all menu items fit on the screen, move the CURSOR UP/DOWN key to display the next/previous menu items.
- With the CURSOR LEFT/RIGHT keys, it is possible to:
  – (De) activate the selected menu item.
  – Change the value of the selected menu item.
  – Activate the selected submenu.

How to exit SAM

Use one of the following methods:

- Press the 'MENU' button on the RC-transmitter, or
- Switch the set to STANDBY (⏻) via the RC-transmitter, or
- Press the 'EXIT' button on the DST.

5.2.3 Customer Service Mode (CSM)

Purpose

When a customer is having problems with his TV-set, he can call his dealer. The service technician can than ask the customer to activate the CSM, in order to identify the status of the set. Now, the service technician can judge the severity of the complaint. In many cases, he can advise the customer how to solve the problem, or he can decide if it is necessary to visit the customer.
The CSM is a read only mode; therefore, modifications in this mode are not possible.

How to enter CSM

Use one of the following methods:

- Press the 'MUTE' button on the RC-transmitter **simultaneously** with the 'MENU' button on the TV (top control) for (at least) 4 seconds.
- Key in the code '123654' via the standard RC transmitter.

Note: Activation of the CSM is only possible if there is no (user) menu on the screen!

How to navigate

By means of the 'CURSOR-DOWN/UP' knob on the RC-transmitter you can navigate through the five menus.

Contents of CSM

Customer Service Menu 1

- **Software version (example: EM5EU1-1.0_01234).** Displays the build in software version. In case of field problems related to software, software flash-RAM pos.7006 must be changed by a new one. Do this via soldering. You will find details of the software versions in the chapter 'Software Survey' of the 'Product Survey - Colour Television' publication. This publication is generated four times a year.
- **Feature Box.** The 12NC-number of the build in Feature Box software
- **Set Type.** This information is very helpful for a helpdesk/ workshop as reference for further diagnosis. In this way, it is not necessary for the customer to look at the rear of the TV-set.
- **Code 1.** Gives the last 5 errors of the error buffer. As soon as the built-in diagnose software has detected an error the buffer is adapted. The last occurred error is displayed on the leftmost position. Each error code is displayed as a 3-digit number. When less than 10 errors occur, the rest of

the buffer is empty ('000'). See also paragraph 5.5 for a description.

- **Code 2.** Gives the first 5 errors of the error buffer. See also paragraph 5.5 for a description.
- **Volume.** Gives the last status of the volume as set by the customer. The value can vary from 0 (volume is minimum) to 100 (volume is maximum). Volume values can be changed via the volume key on the RC-transmitter.
- **Brightness.** Gives the last status of the brightness as set by the customer. The value can vary from 0 (brightness is minimum) to 100 (brightness is maximum). Brightness values can be changed via the 'CURSOR LEFT' and 'CURSOR RIGHT' keys on the RC-transmitter after pressing the 'MENU' button and selecting 'PICTURE' and 'BRIGHTNESS'.
- **Contrast.** Gives the last status of the contrast as set by the customer. The value can vary from 0 (contrast is minimum) to 100 (contrast is maximum). Contrast values can be changed via 'CURSOR LEFT' and 'CURSOR RIGHT' keys on the RC-transmitter after pressing the 'MENU' button and selecting 'PICTURE' and 'CONTRAST'.
- **Colour.** Gives the last status of the colour saturation, as set by the customer. The value can vary from 0 (colour is minimum) to 100 (colour is maximum). Colour values can be changed via 'CURSOR LEFT' and 'CURSOR RIGHT' keys on the RC-transmitter after pressing the 'MENU' button and selecting 'PICTURE' and 'COLOUR'.
- **Hue.** Only relevant for NTSC-signals (e.g. some NTSC-DVD-discs).

Customer Service Menu 2

- **Sharpness.** Gives the sharpness value. The value can vary from 0 (sharpness is minimum) to 7 (sharpness is maximum). In case of bad antenna signals, a too high value of the sharpness can result in a noisy picture. Sharpness values can be changed via the 'CURSOR LEFT' and 'CURSOR RIGHT' keys on the RC-transmitter after pressing the 'MENU' button and selecting 'PICTURE' and 'SHARPNESS'.
- **Headphone volume.** Gives the last status of the headphone volume, as set by the customer. The value can vary from 0 (volume is minimum) to 100 (volume is maximum). Headphone volume values can be changed via the 'CURSOR LEFT' and 'CURSOR RIGHT' keys on the RC-transmitter after pressing the 'MENU' button and selecting 'SOUND' and 'HEADPHONE VOLUME'.
- **Dolby.** Indicates whether the received transmitter transmits Dolby sound ('ON') or not ('OFF'). Attention: The presence of Dolby can only be tested by the software on the Dolby Signalling bit. If a Dolby transmission is received without a Dolby Signalling bit, this indicator will show 'OFF' even though a Dolby transmission is received.
- **Surround Mode.** Indicates the by the customer selected surround mode (or automatically chosen mode). In case the set is a Non-Dolby set there will be displayed '0'. If it is a Dolby-set then is displayed: 'Stereo', '3 Stereo', '3D Surround', 'Dolby Pro Logic', 'Dolby Digital', 'Hall' or 'MPEG Multi-channel'. These settings can be influenced after pressing the 'MENU' button and selecting 'SOUND' and 'SOUND MODE'. It can also have been selected automatically by signalling bits (internal software).
- **Tuner Frequency.** Indicates the frequency the selected transmitter is tuned to. The tuner frequency can be changed via the 'CURSOR LEFT' and 'CURSOR RIGHT' keys for fine tune after opening the installation menu and selecting 'INSTALL' and 'MANUAL INSTALL'.
- **Front L Trim.** Indicates the difference between main volume and volume of front left speaker. Change via: 'MENU', 'SETUP', 'SPEAKERS', and 'FRONT LEFT VOLUME'. The value can vary from '-10' to '+10'
- **Front R Trim.** Indicates the difference between main volume and volume of front right speaker. Change via: 'MENU', 'SETUP', 'SPEAKERS', and 'FRONT RIGHT VOLUME'. The value can vary from '-10' to '+10'
- **Digital Option.** Gives the selected digital mode, '100 HZ', 'Digital Scan', 'Natural Motion', 'Double Lines', or 'Pixel Plus'. Change via 'MENU', 'PICTURE', 'DIGITAL OPTIONS'.
- **Centre Trim.** Indicates the difference between main volume and volume of centre speaker. Change via: 'MENU', 'SETUP', 'SPEAKERS', and 'CENTRE VOLUME' (not available when 'Surround Mode' is set to 'STEREO' or 'HALL'). The value can vary from '-10' to '+10'
- **TV System.** Gives information about the video system of the selected transmitter.
  - BG: PAL BG signal received.
  - DK: PAL DK signal received.
  - I: PAL I signal received.
  - L: SECAM L signals received.
  - M38.9: NTSC M signal received with video carrier on 38.9 MHz.

Customer Service Menu 3

- **Balance.** Indicates the balance settings, between '-50' and '+50'. Change via 'MENU', 'SOUND', and 'BALANCE'. Not applicable for Dolby Pro Logic sets.
- **Centre mode.** Indicates if centre mode is set 'ON' or 'OFF'. When centre mode is on, all TV speakers are used as one centre speaker. Change Centre mode via 'MENU', 'SETUP', 'SPEAKERS', and 'CENTRE MODE'.
- **DNR.** Gives the selected DNR setting (Dynamic Noise Reduction), 'OFF', 'MINIMUM', 'MEDIUM', or 'MAXIMUM'. Change via 'MENU', 'PICTURE', 'DNR'
- **Noise figure.** Gives the noise ratio for the selected transmitter. This value can vary from 0 (good signal) to 127 (average signal) and to 255 (bad signal).
- **Source.** Indicates which source is used and the signal quality of the selected source. Source: 'TUNER', 'EXT1', 'EXT2', 'EXT3', 'EXT4', or 'SIDE'. Signal Quality: 'VIDEO/STEREO', 'VIDEO/NICAM', 'VIDEO/SPDIF', 'S-VIDEO/STEREO', 'S-VIDEO/NICAM', 'S-VIDEO/SPDIF', 'RGB/STEREO', 'RGB/SPDIF', '480P/STEREO', '576P/STEREO' or '1080i/STEREO'.
- **Audio System.** Gives information about the audio system of the selected transmitter: 'Analogue Mono', 'Analogue Stereo', 'PCM 2/0', 'DD 1/0', 'DD 2/0 LtRt', 'DD 2/0 L0R0', 'DD 2/1', 'DD 2/2', 'DD 3/0', 'DD 3/1', 'DD 3/2', 'DD 1+1', 'MPEG 1/0', 'MPEG 2/0', 'MPEG 2/0 LtRt', 'MPEG 2/1', 'MPEG 2/2', 'MPEG 3/0', 'MPEG 3/1', 'MPEG 3/2', 'MPEG 1+1' or 'MPEG 2+2'.
- **Tuned bit.** Gives information about the tuning method of the stored pre-set. If a channel is found via 'automatic installation', you will see the value 'Off'. When you change this (automatically found) frequency via 'fine tune' adjustment (installation menu - manual installation), the displayed value will change to 'On'. Therefore, when you see the value 'On' in this line, it is an indication that the received channel is a non-standard signal (e.g. of a VCR).
- **Surround Speakers.** Indicates if the surround speakers are set 'ON' or 'OFF'. Change via 'MENU', 'SETUP', 'SPEAKERS', and 'SURROUND SPEAKERS'.
- **On Timer.** Indicates if the 'On Timer' is set 'ON' or 'OFF' and if the timer is 'ON' also displays start time, start day and program number. Change via 'MENU', 'TV', 'FEATURES', and 'ON TIMER'.
- **Preset Lock.** Indicates if the selected preset has a child lock: 'LOCKED' or 'UNLOCKED'. Change via 'MENU', 'TV', 'FEATURES', 'CHILD LOCK', and 'CUSTOM LOCK'.

Customer Service Menu 4

- **Child Lock.** Indicates the last status of the general child lock: 'UNLOCK', 'LOCK', or 'CUSTOM LOCK'. Change via 'MENU', 'TV', 'FEATURES', 'CHILD LOCK', and 'LOCK'.
- **Age Lock.** Indicates the last status of the EPG rating for child lock: 'OFF', '4 years', '6 years', '8 years', '10 years', '12 years', '14 years' or '16 years'. This is only displayed if child lock is set to 'CUSTOM LOCK'

- **Lock After.** Indicates at what time the child lock is set: 'OFF' or e.g. '18:45' (lock time). This is only displayed if child lock is set to 'CUSTOM LOCK'
- **Category Lock.** Indicates the last status of the EPG theme childlock: 'MOVIES', 'NEWS', 'SHOWS', 'SPORTS', 'CHILDREN', 'MUSIC', 'CULTURE', or 'SERIES'. This is only displayed if child lock is set to 'CUSTOM LOCK'. It is possible that more than one value is shown.
- **Program Category.** Indicates the theme of the selected transmitter: 'MOVIES', 'NEWS', 'SHOWS', 'SPORTS', 'CHILDREN', 'MUSIC', 'CULTURE', or 'SERIES'.
- **SW Code 1.** Not applicable.
- **SW Code 2.** Not applicable.
- **TV Ratings Lock.** Only applicable for US.
- **Movie Ratings Lock.** Only applicable for US.
- **V-chip TV Status.** Only applicable for US.

Customer Service Menu 5
- **V-chip Movie Status.** Only applicable for US.
- **Options 1.** Gives the option codes of option group 1 as set in SAM (Service Alignment Mode).
- **Options 2.** Gives the option codes of option group 2 as set in SAM (Service Alignment Mode).

SW Event-log
This item contains 'software event logging' information that can be delivered to the development centre on special request.

How to exit CSM
Use one of the following methods:
- After you press a key on the RC-transmitter (with exception of the 'CHANNEL', 'VOLUME' and digit (0-9) keys), or
- After you switch the TV-set 'OFF' with the mains switch.

5.3 Problems and Solving Tips (related to CSM)

Note: Below described problems are all related to the TV settings. The procedures to change the value (or status) of the different settings are described above. New value(s) are automatically stored.

5.3.1 Picture Problems

Snowy/noisy picture
1. Check line 24 'Noise Figure'. In case the value is 127 or higher, and the value is also high on other programs, check the aerial cable/aerial system.
2. Check lines 11 'Sharpness' and 24 'Noise Figure'. In case the value of line 11 is 3 or 4 and the value of line 24 is high (127 or higher), decrease the 'Sharpness' value.

Picture too dark
1. Press 'Smart Picture' button on the RC-transmitter. In case the picture improves, increase the 'Brightness' or the 'Contrast' value. The new value(s) are automatically stored (in 'personal' pre-set) for all TV channels.
2. Check line 7 'Brightness' and 8 'Contrast'. If the value of line 7 is low (< 10) or the value of line 8 is low (< 10), increase the 'Brightness' or the 'Contrast' value.

Picture too bright
1. Press 'Smart Picture' button on the RC-transmitter. In case the picture improves, decrease the 'Brightness' or the 'Contrast' value. The new value(s) are automatically stored (in 'personal' pre-set) for all TV channels.
2. Check lines 7 'Brightness' and 6 'Contrast'. If the value of line 7 is high (> 40) or the value of line 8 is high (> 50). Decrease the 'Brightness' value or increase the 'Contrast' value.

White line around picture elements and text
1. Press 'Smart Picture' button on the Remote Control. In case the picture improves, decrease the 'Sharpness' value. The new value is automatically stored (in 'personal' pre-set) for all TV channels.
2. Check line 11 'Sharpness'. Decrease the 'Sharpness' value. The new value is automatically stored for all TV channels.

No picture
Check line 27 'Tuned bit'. In case the value is 'On', install the required program again. Open the installation menu and perform manual installation.

Blue picture
1. No proper signal is received. Check the aerial cable/aerial system.

Blue picture and/or unstable picture
1. A scrambled or decoded signal is received.

Black and white picture
Check line 9 'Colour'. In case the value is low (< 10), increase the 'Colour' value. The new value is automatically stored for all TV channels.

No colours/colour lines around picture elements or colours not correct or unstable picture
1. Check line 20 'TV System'. If a 'strange' system pop's up, something has gone wrong during installation. Re-install the channel.
2. In case line 20 is 'L', the installed system for this pre-set is 'France', while 'West Europe' is required. Install the required program again: open the installation menu and perform manual installation. Select system 'West Europe'.

Menu text not sharp enough
1. Press 'Smart Picture' button on the RC-transmitter. In case picture improves, decrease the contrast value. The new value(s) are automatically stored for all TV channels.
2. Check line 8 'Contrast'. The value of line 8 is high (> 50). Decrease the contrast value.

5.3.2 Sound Problems

No sound from left and right speaker
Check line 6 'Volume'. The value is low. Increase the value of 'Volume'. The new value(s) are automatically stored (in 'personal' pre-set) for all TV channels.

Sound too loud for left and right speaker
Check line 6 'Volume'. The value is high. Decrease the value of 'LS Volume'. The new value(s) are automatically stored (in 'personal' pre-set) for all TV channels.

5.4 ComPair

5.4.1 Introduction

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the European DST (service remote control), which allows faster and more accurate diagnostics. ComPair has three big advantages:
- ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.
- ComPair allows very detailed diagnostics (on I^2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I^2C commands yourself because ComPair takes care of this.

- ComPair speeds up the repair time since it can automatically communicate with the chassis (when the microprocessor is working) and all repair information is directly available. When ComPair is installed together with the SearchMan electronic manual of the defective chassis, schematics and PWBs are only a mouse click away.

5.4.2 Specifications

ComPair consists of a Windows based faultfinding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial or RS232 cable.
In case of the EM5E chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector.

The ComPair faultfinding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in two ways:

- **Automatic** (by communication with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on I^2C level. ComPair can access the I^2C bus of the television. ComPair can send and receive I^2C commands to the micro controller of the television. In this way, it is possible for ComPair to communicate (read and write) to devices on the I^2C busses of the TV-set.
- **Manually** (by asking questions to you): Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extends. When this is not the case, ComPair will guide you through the faultfinding tree by asking you questions (e.g. *Does the screen give a picture? Click on the correct answer: YES / NO*) and showing you examples (e.g. *Measure test-point I7 and click on the correct oscillogram you see on the oscilloscope*). You can answer by clicking on a link (e.g. text or a waveform picture) that will bring you to the next step in the faultfinding process.

By a combination of automatic diagnostics and an interactive question / answer procedure, ComPair will enable you to find most problems in a fast and effective way.

Beside fault finding, ComPair provides some **additional features** like:

- Up- or downloading of pre-sets.
- Managing of pre-set lists.
- Emulation of the Dealer Service Tool (DST).
- If both ComPair and SearchMan (Electronic Service Manual) are installed, all the schematics and the PWBs of the set are available by clicking on the appropriate hyperlink. **Example**: *Measure the DC-voltage on capacitor C2568 (Schematic/Panel) at the Mono-carrier*.
  - Click on the 'Panel' hyperlink to automatically show the PWB with a highlighted capacitor C2568.
  - Click on the 'Schematic' hyperlink to automatically show the position of the highlighted capacitor.

5.4.3 Stepwise Start-up / Shut-down

Under normal circumstances, a fault in the power supply, or an error during start-up, will switch the television to protection mode. ComPair can take over the initialisation of the television. In this way it is possible to distinguish which part of the start-up routine (hence which circuitry) is causing the problem.

Stepwise start- up explanation
This is realised via ComPair and is very helpful when a **protection** is activated (see also chapter 5.7).

Table 5-1 Stepwise start-up table

State	Description mode	Display LED (Red)	Enabled protection
0	Low power stdby: 5V2/3V3 present, uP in stdby-mode	On	None
1	High power Stdby: TV-set in stdby-mode	Wait 1s, flash 1 x	None
2	SSB is powered by std-by-supply (5V/8V). Degaussing (12 s) has been activated.	Wait 1s, flash 2 x	1, 4, 5, 6 & 18
3	Semi stdby-mode: HIP, HOP, MSP and Tuner initialized leading to semi stdby-mode.	Wait 1s, flash 3 x	
4	All ICs are initialized, HOP activates the main supply, EHT-generation starts, black current stabilization is on	Wait 1s, flash 4 x	Plus 2 & 16
5	TV On: TV-set operates, unblanked picture.	Wait 1s, flash 5 x	

Stepwise shut-down explanation
In the stepwise shutdown mode, state 2 and 4 are skipped.

Table 5-2 Stepwise shut-down table

State	Description mode	Display LED (Red) (*)	Disabled protections
5	TV On: TV-set operates, unblanked picture	Wait 1s, flash 5 x	-
3	Semi stdby-mode: SSB is powered by the stdby-supply	Wait 1s, flash 3 x	2 & 16
1	High power stdby: TV-set in stdby-mode	Wait 1s, flash 1 x	1, 4, 5, 6 & 18
0	Low power stdby: 5V2/3V3 present, uP in stdbymode	On	

Note (*): When the set is in stepwise mode and, due to stepping-up, a protection is activated, the set will really go into protection (blinking LED). The set will not leave the stepwise-mode however. By stepping up, the set can be activated again, until state X where the protection was activated. At state (X-1) diagnostic measurements can be performed.

5.4.4 How To Connect

1. First, install the ComPair Browser software (see the Quick Reference Card for installation instructions).
2. Connect the RS232 interface cable between a free serial (COM) port of your PC and the PC connector (marked with 'PC') of the ComPair interface.
3. Connect the mains adapter to the supply connector (marked with 'POWER 9V DC') of the ComPair interface.
4. Switch the ComPair interface 'OFF'.
5. Switch the television set 'OFF' with the mains switch.
6. Connect the ComPair interface cable between the connector on the rear side of the ComPair interface (marked with 'I^2C') and the ComPair connector at the rear side of the TV (situated just below the tuner input, see also chapter 4).

7. Plug the mains adapter in a mains outlet, and switch the interface 'ON'. The green and red LEDs light up together. The red LED extinguishes after approx. 1 second while the green LED remains lit.
8. Start the ComPair program and read the 'Introduction' chapter.

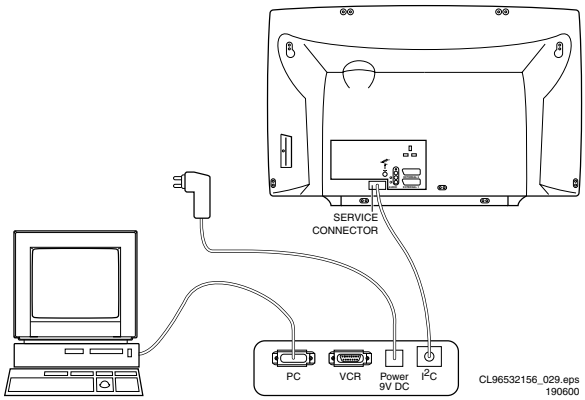


Figure 5-1 ComPair Interface connection

5.4.5 How To Order

ComPair order codes:
- Starter kit ComPair32/SearchMan32 software and ComPair interface (excl. transformer): 3122 785 90450.
- ComPair interface (excluding transformer): 4822 727 21631.
- Starter kit ComPair32 software (registration version): 3122 785 60040.
- Starter kit SearchMan32 software: 3122 785 60050.
- ComPair32 CD (update): 3122 785 60070.
- SearchMan32 CD (update): 3122 785 60080.
- ComPair interface cable: 3122 785 90004.

5.5 Error Codes

5.5.1 Introduction

The error code buffer contains all detected errors since the last time the buffer was erased. The buffer is written from left to right, new errors are logged at the left side, and all other errors shift one position to the right.
When an error has occurred, the error is added to the list of errors, provided the list is not full or the error is a protection error.
When an error occurs and the error buffer is full, then the new error is not added, and the error buffer stays intact (history is maintained), except when the error is a protection error.
To prevent that an occasional error stays in the list forever, the error is removed from the list after 50+ operation hours.
When multiple errors occur (errors occurred within a short time span), there is a high probability that there is some relation between them.

5.5.2 How to read the Error Buffer

Use one of the following methods:
- On screen via the SAM (only if you have a picture). Examples:
  - **0 0 0 0 0**: No errors detected
  - **6 0 0 0 0**: Error code 6 is the last and only detected error
  - **9 6 0 0 0**: Error code 6 was first detected and error code 9 is the last detected error
- Via the blinking LED procedure (when you have no picture). See next paragraph.
- Via ComPair.

5.5.3 How to clear the Error Buffer

Use one of the following methods:
- By activation of the 'RESET ERROR BUFFER' command in the SAM menu.
- With a normal RC, key in sequence 'MUTE', followed by '062599' and 'OK'.
- When you transmit the commands 'DIAGNOSE' - '99' - 'OK' with ComPair (or with a DST).
- If the content of the error buffer has not changed for 50+ hours, it resets automatically.

5.5.4 Error Codes

In case of non-intermittent faults, clear the error buffer before you begin the repair. This to ensure that old error codes are no longer present. Before clearing the buffer, write down the content, as this history can give you significant information.
If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error code and not the actual cause (e.g., a fault in the protection detection circuitry can also lead to a protection).
There are various errors:
- I^2C device errors.
- I^2C bus errors.
- Protection errors.
- Errors not related to I^2C device, but of importance:
  - Black Current Loop Error (error 28): detection of a continuous fail of the black current stabilisation loop of the HOP.
  - FALCONIC Error (error 26): at start-up, after initialisation of the PICNIC, the presence of the FALCONIC can be checked.
  - Eagle Error (error 27): at start-up, after initialisation of the PICNIC, the presence of the Eagle can be checked.

Table 5-3 Error Table

Error	Device	Description	Def. item	Defect. module indication	Diagram
1	M24C32	NVM, spontaneous blinking 1-1-1..	7011	NVM	B5
2	Hfail Protection	Horizontal Flyback protection	7301	HFB protection	B4
3	SAA4978	PICNIC	7713	PICNIC	B3a
4	Supply 5V	5V2 protection		5V Protection	B5
5	Supply 8V	8V6 protection		8V Protection	B5
6	Slow I^2C bus blocked				B5
7	TDA9330/HOP	High-end Output Processor	7301	HOP video control/geometry	B4
8	TDA9320/HIP	High-end Input Processor	7323	HIP I/O-video processing	B2
9	PCF8574	Wireless Expander	7501	Wireless Expander	H
11	Reserved				
12	TDA9178		7302	TOPIC (LTP Peaking)	B4
13	UV1316/ TEDE9		1200	Tuner Protection	A8
14	MSP3411/3412/3452		7651	ITT sound processor	B6
15	Reserved				
16	FBX			Feature Box Protection	B3
17	Reserved				
18	Fast I^2C bus blocked				B5
19	TDA8444		7500	Auto Scavem DAC	SC1
26	SAA4992	FALCONIC	7718	Falconic	B3b
27	T8F24EF	Eagle	7724	Eagle device	B3c
28	Black current loop			Black current loop	
30	PCF8574T/PCF8584T	only for DVD models	7150	DVD Interface	
31	--	only for DVD models		DVD Engine	
32	M29W400BT	Flash Ram (EPG)	7012	Flash Ram (EPG)	B5

Note: Error codes 1, 6 or 18 are protection codes and in this case, supplies of some circuits will be switched off. Also, in protection, the LED will blink the number of times equivalent to the most recent error code.

5.6 The Blinking LED Procedure

5.6.1 Introduction

Via this procedure, you can make the contents of the error buffer visible via the front LED. This is especially useful for fault finding, when there is no picture.

When the SDM is entered, the front LED will show (blink) the contents of the error-buffer. Error-codes = 10 are shown as follows:
- A long blink of 750 ms (which is an indication of the decimal digit),
- A pause of 1.5 s,
- 'n' short blinks (where 'n' = 1 - 9),
- When all the error-codes are displayed, the sequence finishes with a LED blink of 3 s,
- The sequence starts again.

Example: Error 12 9 6 0 0.
After activation of the SDM, the red front LED will show:
- 1 long blink of 750 ms (which is an indication of the decimal digit) followed by a pause of 1.5 s,
- 2 short blinks followed by a pause of 3 s,
- 9 short blinks followed by a pause of 3 s,
- 6 short blinks followed by a pause of 3 s,
- 1 long blink of 3 s to finish the sequence,
- The sequence starts again.

Note: If errors 1, 6 or 18 occur, the LED always gives the last occurred error even if the set is NOT in service mode.

5.6.2 How to Enter

Use one of the following methods:
- Enter the SDM (only via soldering pads marked 'SDM' on SSB). The blinking red front LED will show the entire contents of the error buffer (this works in 'normal operation' mode and in 'protection' mode).
- Transmit the commands 'MUTE' - '062500' - 'OK' with a normal RC. The complete error buffer is shown. This works only in 'protection' mode.
- Transmit the commands 'MUTE' - '06250x' - 'OK' with a normal RC (where 'x' is a number between 1 and 5). When x= 1 the last detected error is shown, x= 2 the second last error, etc.... This works only in 'protection' mode.

5.7 Protections

5.7.1 Introduction

The EM5E has only one microprocessor (OTC), which remains active during Standby. This because power of the microprocessor and the attached memory chip set is coming from the 3V3 supply, which is derived from the 5V Standby-circuitry. So, in both Power-on as in Standby mode, the microprocessor is connected to this power supply.
If a fault situation is detected, an error code will be generated and if necessary, the set is put in protection mode. The protection mode is indicated by the blinking of the red front LED at a frequency of 3 Hz (or by a coded blinking in special cases). In some error cases however, the microprocessor does not put the set in the protection mode (this is the case with the - hardware - loudspeaker protection of the audio amplifier).
The content of the error buffer can be read via the service menu (SAM), the blinking LED procedure or via DST/ComPair. The DST/ComPair 'diagnose' functionality will force the set into the 'Service Standby', which is alike the usual Standby, however the microprocessor remains completely in normal operation.
To get a quick diagnosis, the EM5E has three service-modes implemented:
- The **Customer Service Mode** (CSM).
- The **Service Default Mode** (SDM). Start-up of the set in a predefined way.

- The **Service Alignment Mode** (SAM). In this mode, items of the set can be adjusted via a menu and with the help of test patterns.

You can enter both SDM and SAM modes via the 'service pads' on the SSB, via an RC-transmitter (DST or standard RC), or via ComPair. It is not possible to enter the SAM in 'standby'; the TV has to be in 'normal operation' mode.
The EM5E 'Protection Diagram' shows the structure of the protection system. See diagram below.

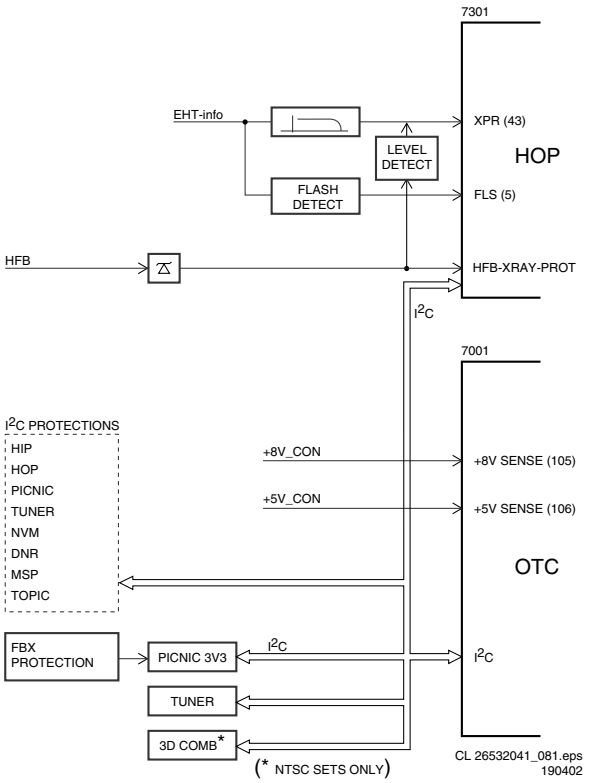


Figure 5-2 Protection diagram

There are several types of protections:
- I^2C related protections.
- OTC related protections (via polling on I/O pins or via algorithms).
- HOP related protections (mainly for deflection items).
- Hardware errors that are not sensed by the OTC (e.g. vertical flyback protection, bridge coil protection, E/W protection, arcing protection).

All protections are explained below.

5.7.2 I^2C Related Protections

In normal operation, some registers of the I^2C controlled ICs are refreshed every 200 ms. During this sequence, the I^2C busses and the I^2C ICs are checked.
An I^2C protection will take place if the SDA and SCL lines are short-circuited to ground, or to each other. An I^2C error will also occur, if the power supply of the IC is missing (e.g. FBX_PROT (error 16)).

5.7.3 OTC Related Protections

If a protection is detected at an OTC input, the OTC will start to scan all protection inputs every 200 ms for 5 times. If the protection on one of the inputs is still active after 1 s, the P will put the set in the protection mode. Before the scanning is started, a so-called 'ESD refresh' is carried out. This is done, because the interrupt on one of the inputs is possibly caused either by a flash or by ESD. As a flash or ESD can influence IC settings, the HOP, HIP, MSP, PICNIC, NVM, and Tuner are initialised again, to ensure the normal picture and sound conditions of the set.

8 V and 5 V protection: The µP senses the presence of the 8 V and 5 V (via the '+5V_CON' and '+8V_CON' lines). If one (or both) of these voltages is (are) not present, an error code is stored in the error buffer of the NVM, and the set is put in the protection mode.

5.7.4 HOP Related Protections

Every 200 ms, the status register of the HOP is read by the OTC (via the I^2C bus). If a protection signal is detected on one of the inputs of the HOP, the relevant error bit in the HOP register is set to 'high'. If this error bit is still 'high' after 1 s, the OTC will store the error code in the error buffer of the NVM and, depending on the relevancy of the error bit, the set will either go into the protection mode or not.

The following protections are implemented:
- **HFB (Horizontal Flyback):** If the horizontal flyback is not present, this is detected via the HOP (HFB_X-RAY_PROT). One status bit is set to 'high'. The error code is stored in the error buffer and the set will go into the protection mode.
- **XPR (X-ray protection):** If the HFB pulses are too low (level detection), the HOP will detect this via the XPR-bit. The error will be logged in the error buffer and the set will go into protection mode.

Note: Both errors will be logged as HFB-failure.

5.7.5 Hardware Related Protections

Due to the architecture ('hot' deflection), some protections cannot be sensed by the microprocessor. Three of these protections will lead to a protection on set level (Standby mode and blinking LED), while another will only lead to a circuit protection.

TV-set Protection
The following fault conditions will lead to a 'complete' set protection:
- **BRIDGECOIL protection:** This is sensed via the 'EW' signal going to the base of TS7652 (via R3495 and D6499). In a normal situation, the voltage on C2498 (diagram A4) is high and TS7652 is conducting. When bridge coil 5422 (diagram A3) is short circuited, the voltage on C2498 changes to low, which will block TS7652. In this case, also TS7641 will block and the voltage on 2642 will rise until TS7443 is forced in conduction. The 'SUP-ENABLE' signal (in normal operating condition -20 V) is shorted now to ground level, which will force the Main Power Supply to Standby mode.
- **ARC protection:** If there are 'open' connections (e.g. bad solder joints) in the high-energy deflection circuitry, this can lead to damaging effects (read: fire). For that reason, the E/W current is sensed (via 3479//3480). If this current becomes too high, the 'thyristor' circuit (TS7653 and TS7654) is triggered. TS7442 is switched 'on' and TS7443 is forced into conduction. . The 'SUP-ENABLE' signal is shorted now to ground level, which will force the Main Power Supply to Standby mode.
- **NON_VFB (No vertical Flyback) protection:** If the frame stage generates no pulses, TS7641 will block. TS7443 is now switched 'on', which will lead to Standby mode. So, in normal operation condition, TS7641 and TS7652 are conducting, while TS7443 is blocked.

Circuit Protection
The following fault condition will lead to a 'partly' set protection:
- **PROT1 (DC) protection:** When a DC-voltage (positive or negative) is sensed on one of the loudspeaker outputs, the protection circuit (TS7704, 7705, 7706 and 7707 in

diagram A6) will put the IC7700 in Standby mode (via tri-state input pin 6). For more details, see chapter 9.

5.8 Repair tips

5.8.1 Miscellaneous

The relay you hear when you switch the set 'on' (from Standby or via the mains switch), is from the degaussing circuitry. It is not used for switching the Power Supply (as done in the MG-chassis).

Take care not to touch the 'hot' heatsink while disconnecting the SSB, despite the fact that the mains cord is out of the mains socket. There can still be an annoying rest-voltage on the heatsink for a short while. This, because the discharge resistors 3502 and 3503 (on the LSP between hot and cold part) are not stuffed for Europe. Instead, discharge resistors 3066 and 3057 on the Mains Switch panel are used, but because they are located before the Mains switch, they only discharge when this switch is 'on'.
Advice: when you remove the SSB, disconnect the Mains cord, but keep the Mains Switch 'on'.

Do not try to measure on the SSB side, which is facing the 'hot' heatsink. This is dangerous. Most service test points are guided to the 'tuner' side and are indicated by the 'service' printing. Where the circuitry was too 'crowded' for this printing, you can find the correct location on the 'test point overviews' in this manual (chapter 6).

A very large part of the LSP is **'hot'**, such as:
- The primary part of the Standby Supply.
- The whole Main supply (except for the secondary Audio supply).
- And the complete deflection circuitry (so notice that the deflection coil is hot!!).

5.8.2 Start-up Sequence

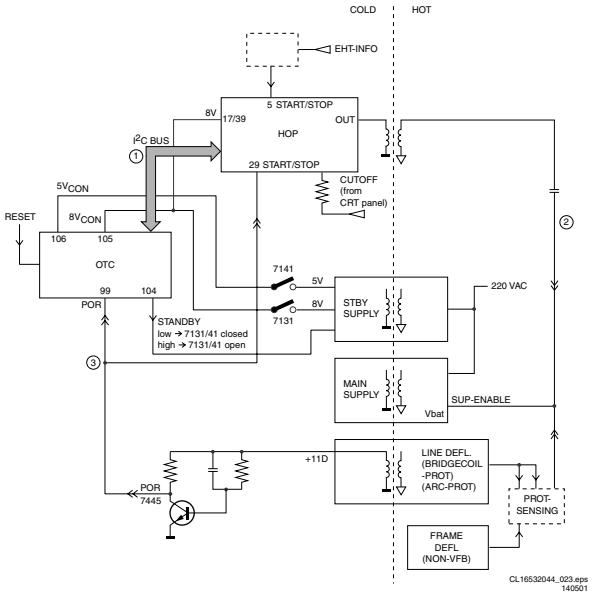


Figure 5-3 Start-up circuitry

The start up sequence differs from other sets (e.g. MG-sets or EM2E-sets, but is same as in EM3E-set):
1. When the set is switched 'on', the 5 and 8 V lines ('+5V_CON' and '+8V_CON') of the standby power supply are activated.
2. After the OTC senses them, the µP will address the HOP via the I²C-bus, to start the drive [1].
3. Via the 'SUP-ENABLE' signal, the Main Supply is switched 'on' and will deliver the V_{BAT} to the Line deflection stage [2].
4. EHT generation is now started.
5. The OTC will un-blank the picture.
6. When you switch 'off' the set, this is done in a controlled way via the POR signal [3].

Note: Standby is not directly achieved via the Standby line of the microprocessor, but indirectly via the HOP circuitry.

5.8.3 ComPair

This chassis does not have an IR transmitting LED (as in MG-sets). Therefore, a 'Service' (ComPair) connector is implemented at the rear side of the set, which is directly accessible (as in A10-, EM2E- and EM3E-sets). In addition to this, there is also a blinking LED procedure to show the contents of the error buffer.

When you use ComPair, you have the possibility to activate a 'stepwise start-up' mode. With this mode, you can initiate the start-up sequence step by step. This also means that in certain steps, some protections are not activated. This is sometimes very convenient during repair (see also paragraph 5.4.3).

5.8.4 Protections

There are 'service pads' implemented on the SSB (items 9005 and 9006, outside the shielding), to force the set in SAM or SDM (see also figure: 'SSB removal (part 3)' in Chapter 4). This will overrule the processor-controlled protections, but not the hardware protections. This means, that the A/D-input protections (5 and 8 V) and the I²C 'not-acknowledging' info of the feature box (FBX) and of the Tuner are overruled.
Caution: When doing this, the service technician must know what he is doing, as it could lead to damaging the set.

The 'ARC'- and/or 'BRIDGECOIL' protection are hardly ever triggered, however:
When you suspect the 'ARC' protection, look for bad solder joints and smell. By interrupting resistor 3497, this protection is disabled (special attention needed!).
When you suspect the 'BRIDGECOIL' protection, which can also be due to a too wide picture amplitude, shorten G and S of the E/W MOSFET 7480. This will disable the protection. You will now have minimal horizontal amplitude. Re-align the horizontal amplitude in the SAM menu and remove the G/S short of TS7480.

5.8.5 Main Supply

The simplest way is, to replace the components of the Main Supply with repair kit (3122 785 90310)

More detailed way:
1. Replace FET 7504 and zener 6505.
2. Remove the SSB panel.
3. Short B and E of TS7529, in order to put the Main Supply in 'on'-mode (TS7529 is blocking then). Caution: To prevent that R3403 and TS7443 will be damaged, first disable the HW-protection of the deflection circuit. Therefore short circuit C2642 on the LSP (diagram A4).
4. Attach a load of 500 Ω to V_{BAT} capacitor C2515 (the supply can not work without a minimum load).
5. Use a variac, and slowly increase the VMAINS. Measure over sensing resistors R3514//15 if a nice sawtooth voltage becomes available.
6. Also measure the V_{BAT}. This may never exceed +141 V. If it does, there is something wrong in the feedback circuitry (e.g. regulator 7506).

Note: Be careful when measuring on the gate of FET TS7504. This circuitry is very high ohmic and can easily be damaged

(first connect ground to measuring equipment, than measure the gate).

5.8.6 Standby Supply

The simplest way is to replace the components of the Standby Supply with repair kit 3122 785 90460.

5.8.7 Line Deflection

The simplest way is to replace the components of the Line Deflection circuitry with repair kit 3122 785 90330.

5.8.8 Frame Deflection

Caution: When the Frame Deflection circuitry is suspected, one must be careful. Because there is a DC-voltage on the frame deflection, the beam current could damage the CRT neck, leading to a defective CRT.

- Best thing to do is:
- Interrupt the resistors 3403 and 3404 on the CRT panel (diagram F1), in order to remove the 'filament' voltage from the tube (no beam current, so no chance of destroying the CRT).
- Interrupt resistor 3403 on the LSP (diagram A4) to disable the 'SUP-ENABLE' line.
- Measure with a multi-meter, or better with a oscilloscope, the functionality of the Frame stage.
- After you have found the cause, exchange the defective component (e.g. TDA8177), and re-solder the interrupted resistors.

Table 5-4 Repair tips

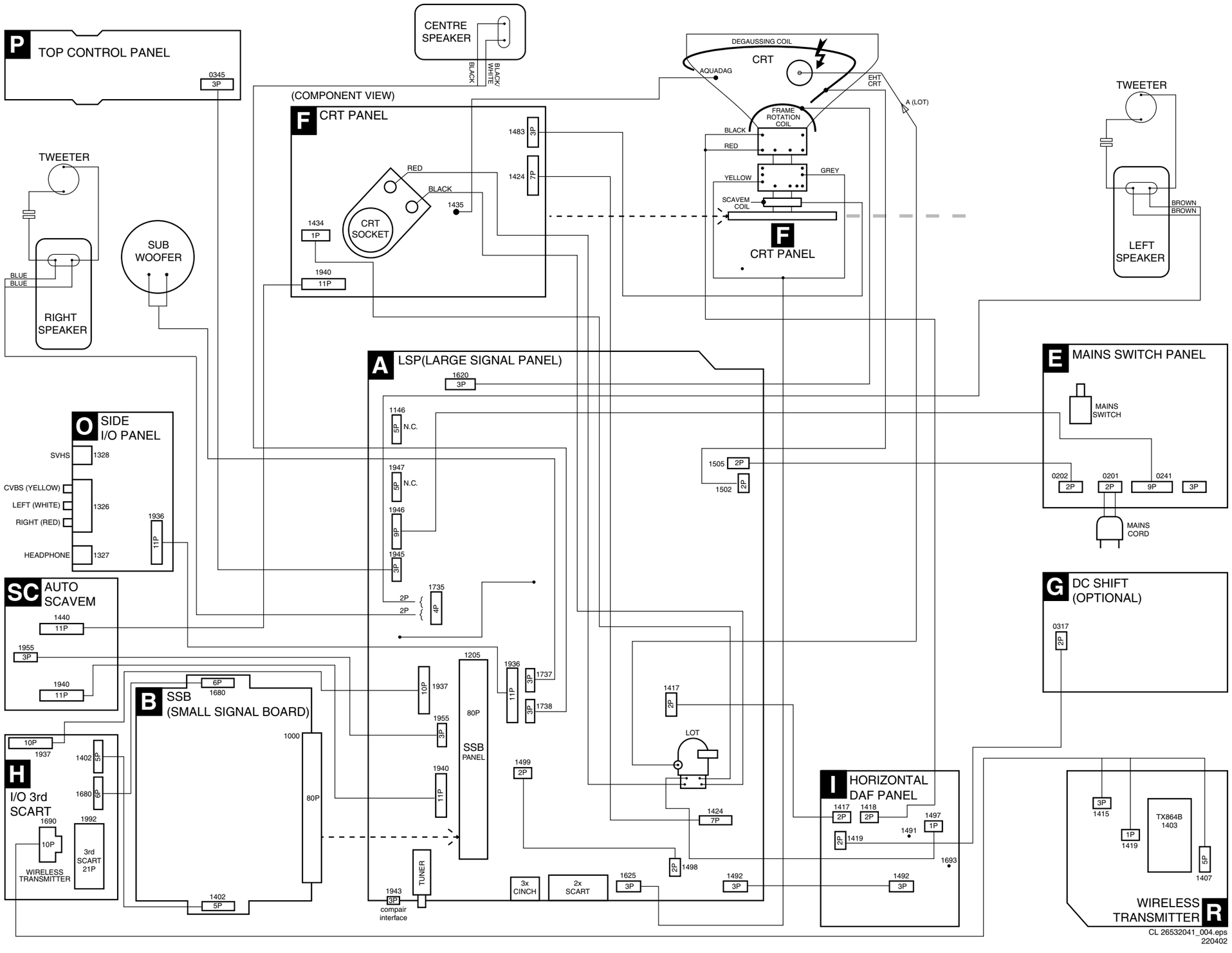
Phenomenon	Possible Cause	Repair tip
No picture, no LED.	Standby Supply defective.	Measure circuitry (see diagram A2). Start at test-point A19.When the Mains switch is 'on', this voltage must always be available
No picture, no LED.	Bad connection of SSB in SIMM-connector.	In case of a bad connection, it can happen that there is no picture, and that the Standby LED is not controllable. Re-place the SSB.
No picture, red LED blinking at 3 Hz.	Set is in protection due to various causes. For error codes see error-code list.	You have no picture, so: Read the error buffer via ComPair (error buffer is accessible when set is in protection, compare-file will guide you to this) Read the blinking LED information via standard remote command <mute>06250X<ok> Or you read the error code sequence via standard remote command <mute>062500<ok>. When you have found the error, check the circuitry related to the supply voltage and I^2C-communication or the circuitry that triggers the protection.
No picture, red LED blinking with code 6-6-6 or 18-18-18.	No communication on slow I^2C- or fast I^2C-bus.	As processor cannot communicate with one of the 2 busses it the standby-led spontaneously starts blinking 6-6-6 . . . or 18-18-18 . . .. If in the error buffer somewhere is an error 6 or 18, these will have the highest priority starting the mentioned blinking. Measure dependent of the error on the I^2C-bus which device is loading the bus. (Use I^2C -overview)
No picture, red LED blinking with code 1-1-1.	No communication on NVM-I^2C bus to the µP.	As the µP cannot communicate with the NVM I^2C bus, it spontaneously starts blinking 1-1-1. Note: when there is no access to the NVM, a lot of picture setting can go wrong.
No picture, no sound. Set is making audible squeaking sound	Supply is possibly in hiccup-mode, which is audible via a squeaking supply transformer.	Possible causes: V_{BAT} is shorted (caused by short circuited line transistor 7421), or Sound winding is shorted (amplifier is shortening the power supply lines), or D6514 is shorted (due to a too high V_{BAT}). Remove excessive load, to see what causes the failure, or check feedback circuit. See repair tip 'Main Power Supply' (supply needs a minimal load).
No picture, no sound. Green LED works fine	Supply does not work correctly.	If e.g. V_{BAT} is only about 90 V, it is possible that the regulator IC (7506) is defective.
No RC-reception. Red LED does not echo RC-commands.	µP circuitry or RC-receiver is defective.	In case the set does react on a local keyboard operation, you must check the RC-receiver circuitry (diagram E).
Relay (degaussing) is not audible, when set is switched from 'off' or 'standby' to 'on'.	µP is not working correctly.When pin 115 is low, the degaussing must be activated.	Check RESET-circuitry on diagram B5. Check the level on pin 115 when you switch the set 'on'. Signal must be low initially and go to high after approx. 12 µs.
No sound, only picture.	Measure A7/A8 on diagram A1. Possibly the audio amplifier is defect (but not shorted), or the 'sound enable' line is high (diagram A5). Further, measure the audio signal path (HIP-MSP-Switch ICs-Amplifier).	In ComPair, a beep test can determine where the signal stops (use loudspeakers or headphone).Possible cause is also the 'PROT1' protection (see diagram. A6). This is a loudspeaker DC protection, which the µP cannot sense. Via circuitry 7701/7707, this signal can put audio amplifiers 7700 and 7702 in standby mode (tri-state input). Warning: Find out, which amplifier is causing the problem, because it is possible, that the other one is OK.

Phenomenon	Possible Cause	Repair tip
No sound at headphone output.	HP amplifier (7681) on diagram B10, or the supply to it, malfunctions.	Measure on pin 3 input left and pin 1 output left, repeat this for pin 3 (input right) and pin 7 (output right), and the supply line (+8V_AUD) on diagram B10.
Picture is rotated.	Rotation circuitry on diagram A5, or related supply to it, malfunctions.	Measure test points A52 and A53 on diagram A5.
Picture is continuously switching 'off' and 'on', showing heavy 'switch' spots (set does not go into protection).	200 V is missing on CRT panel.	Probably a bad connection from LSP connector 1424 to CRT connector 1224 (diagram F1), or an interruption of the 200 V supplies line (e.g. R3341 on circuit F1 is interrupted).
Picture is not sharp.	Focus is possibly mis-aligned or SCAVEM-circuitry does not work correctly.	Re-align the 'focus' potmeter on the Line Output Transformer, or check the SCAVEM circuitry on the CRT-panel (diagram F2). It is also possible that the DAF circuitry is defective (see diagram I). Check the Vdc values.
Picture is not synchronised.	The sync is derived in the HIP from xtal 1305 and/or 1308.	Maybe the crystals 1305 and/or 1308 are making a bad contact.
Picture is distorted.	Check video-path in Service Default Mode.	Investigate whether there is an error code present in the error buffer. In case there is one, check the I^2C-bus and/or supply lines (see overview supply lines).Measure and check signal path Tuner-HIP-PICNIC-HOP-RGB amplifier.In case it is a geometry issue, check on diagram A4 opto-coupler 7482, OpAmps 7440/7450 and the Frame circuitry alignments or a possible corrupted NVM (7011) on diagram B5.
Picture with horizontal stripes.	Pixel Plus processing is malfunctioning	Check functionality on circuitry (B3a, B3b, and B3c) of PICNIC (7713), FALCONIC (7718, EAGLE (7724) and/or field memories (7714, 7717, 7719, 7722 and 7723.Tip the whole Pixel Plus chipset (3 ICs + 5 Field Memories can be diagnosed very good via ComPair.
No menu, no OSD.	Probably a defective µP.	Measure test points B61to B64 on diagram B5.
No NextView (EPG).	IC7012 defective or not powered.	Check circuitry around IC7012.
No Teletext.	IC7007 defective or not powered.	Check circuitry around IC7007. Check also B61to B64 around µP on diagram B5.
Strange switch 'off' behaviour	TS7445 possibly defective.	Check, with a multi-meter, whether transistor TS7445 is well functioning. (diagram A3).
Various symptoms, due to missing local supply voltage.	An interrupted fuse, NFR-resistor or connection.	When no symptom or error code leads you to a specific circuitry, use the supply lines overview (see chapter 6), for a quick scan of all supply lines.

Personal Notes:

6. Wiring Diagram, Block Diagrams and Overviews

Wiring Diagram



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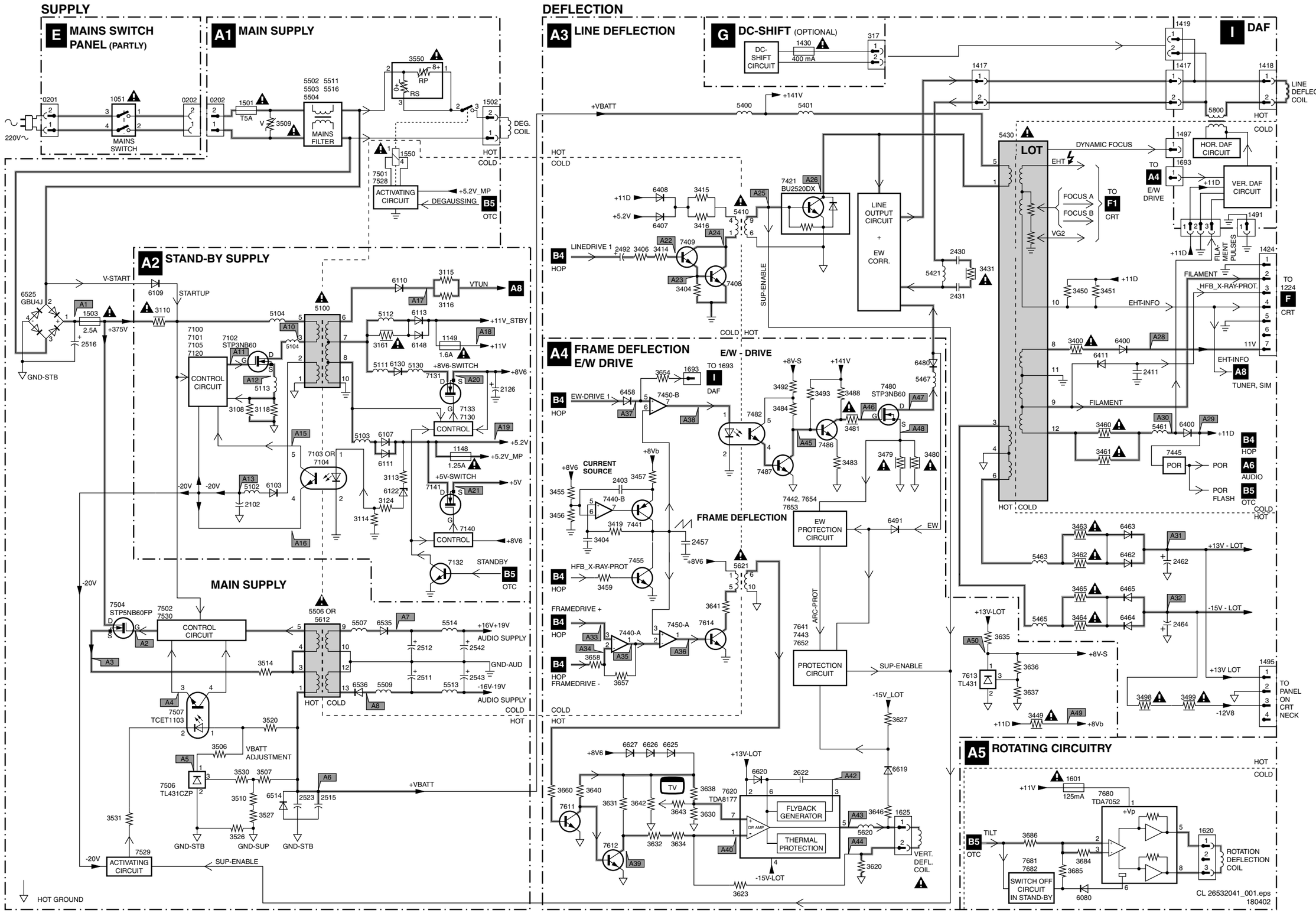
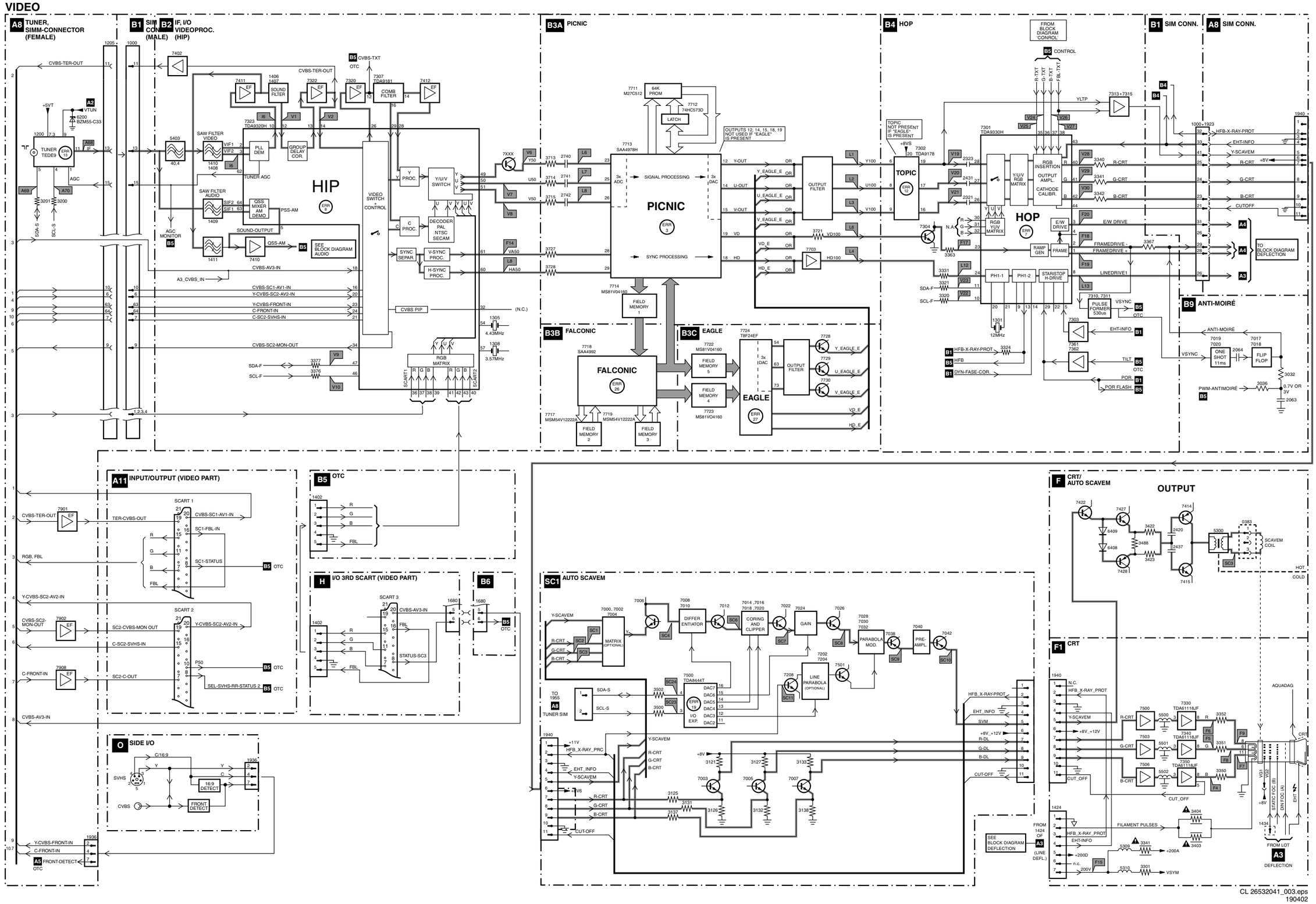
Block Diagram Supply and Deflection



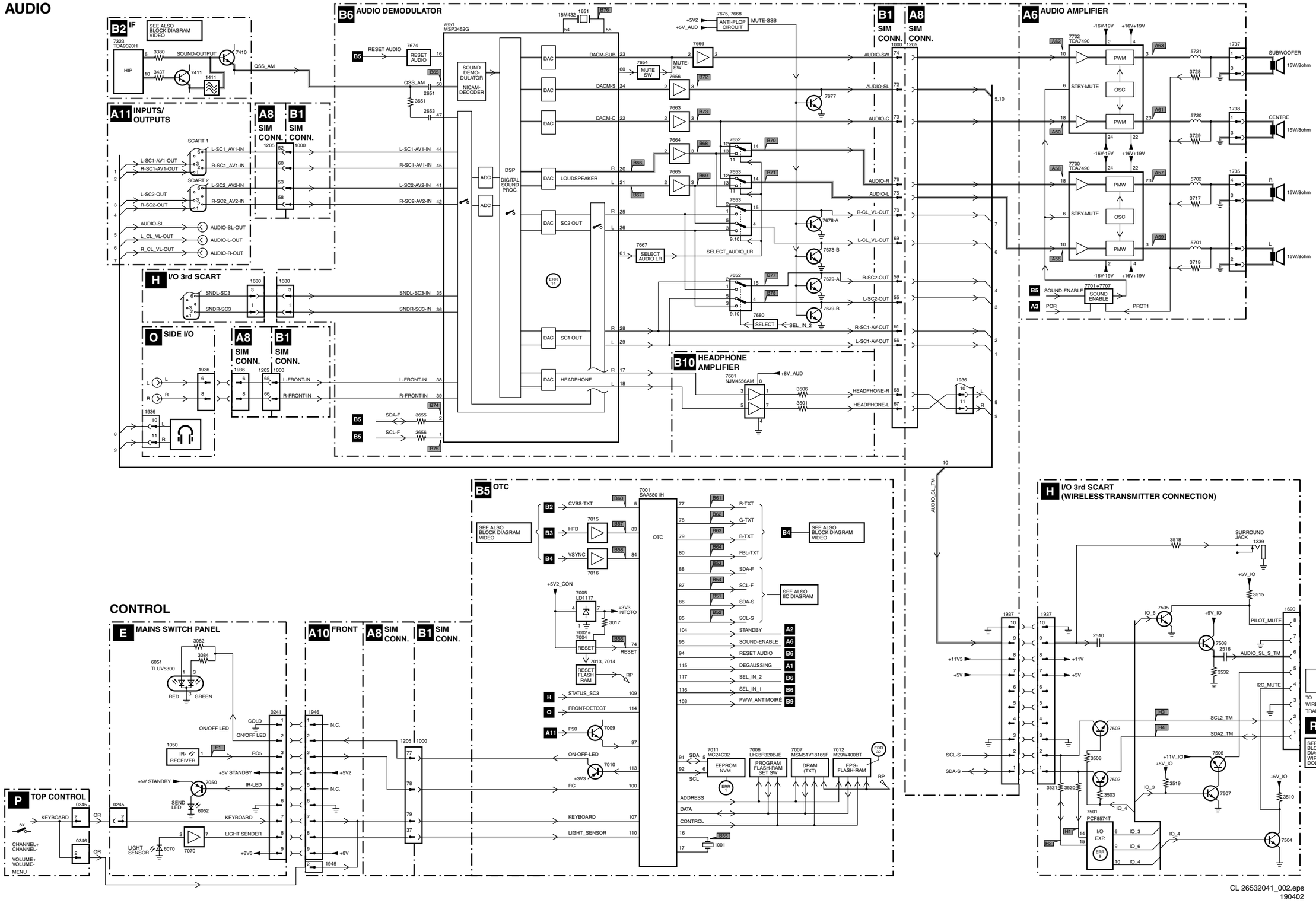
Block Diagram Video

VIDEO



Block Diagram Audio 1 (Exclusive Wireless Audio Details)

AUDIO



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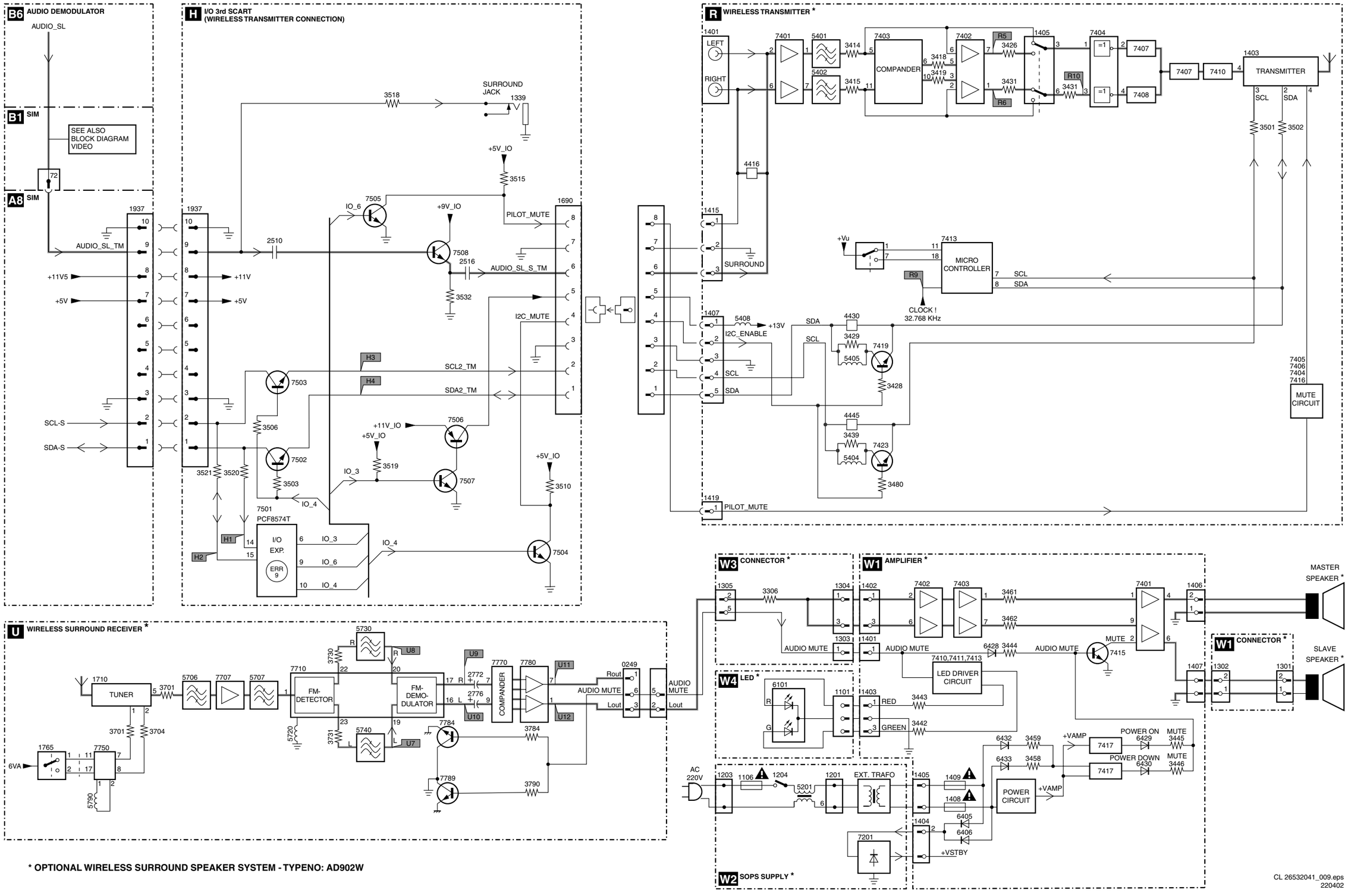
Block Diagram Audio 2 (Wireless Audio Details)

WIRELESS DOLBY



*** OPTIONAL WIRELESS SURROUND SPEAKER SYSTEM - TYPENO: AD902W**

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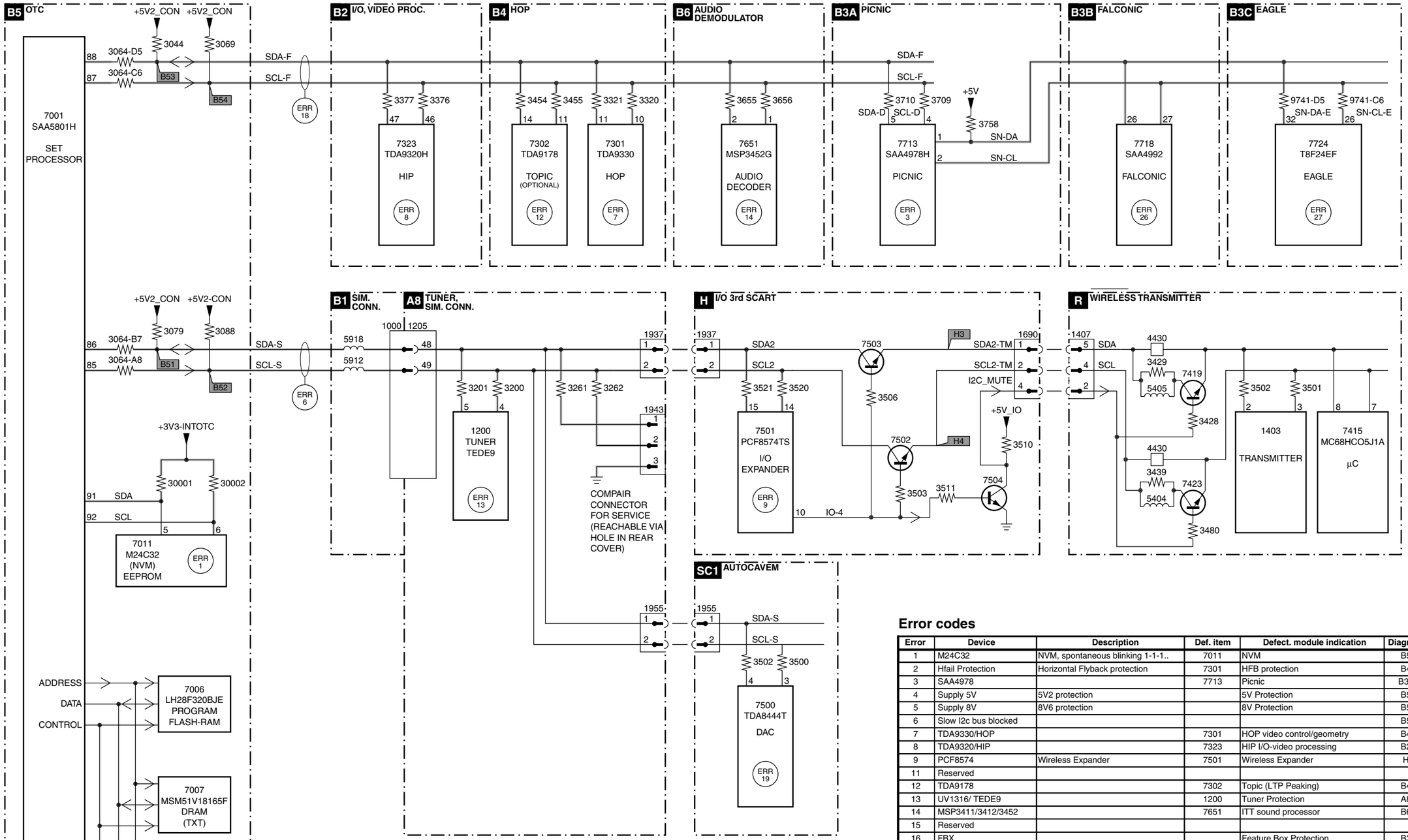
I2C IC's overview

IIC



Error codes

Error	Device	Description	Def. item	Defect. module indication	Diagram
1	M24C32	NVM, spontaneous blinking 1-1-1..	7011	NVM	B5
2	Hfail Protection	Horizontal Flyback protection	7301	HFB protection	B4
3	SAA4978		7713	Picnic	B3a
4	Supply 5V	5V2 protection		5V Protection	B5
5	Supply 8V	8V6 protection		8V Protection	B5
6	Slow I2c bus blocked				B5
7	TDA9330/HOP		7301	HOP video control/geometry	B4
8	TDA9320/HIP		7323	HIP I/O-video processing	B2
9	PCF8574	Wireless Expander	7501	Wireless Expander	H
11	Reserved				
12	TDA9178		7302	Topic (LTP Peaking)	B4
13	UV1316/ TEDE9		1200	Tuner Protection	A8
14	MSP3411/3412/3452		7651	ITT sound processor	B6
15	Reserved				
16	FBX			Feature Box Protection	B3
17	Reserved				
18	Fast I2c bus blocked				B5
19	TDA8444		7500	Auto Scavem DAC	SC1
26	SAA4992	Falconic	7718	Falconic	B3b
27	T8F24EF	Eagle	7724	Eagle device	B3c
28	Black current loop			Black current loop	
30	PCF8574T/PCF8584T	only for DVD models	7150	DVD Interface	
31	--	only for DVD models		DVD Engine	
32	M29W400BT	Flash Ram (EPG)	7012	Flash Ram (EPG)	B5

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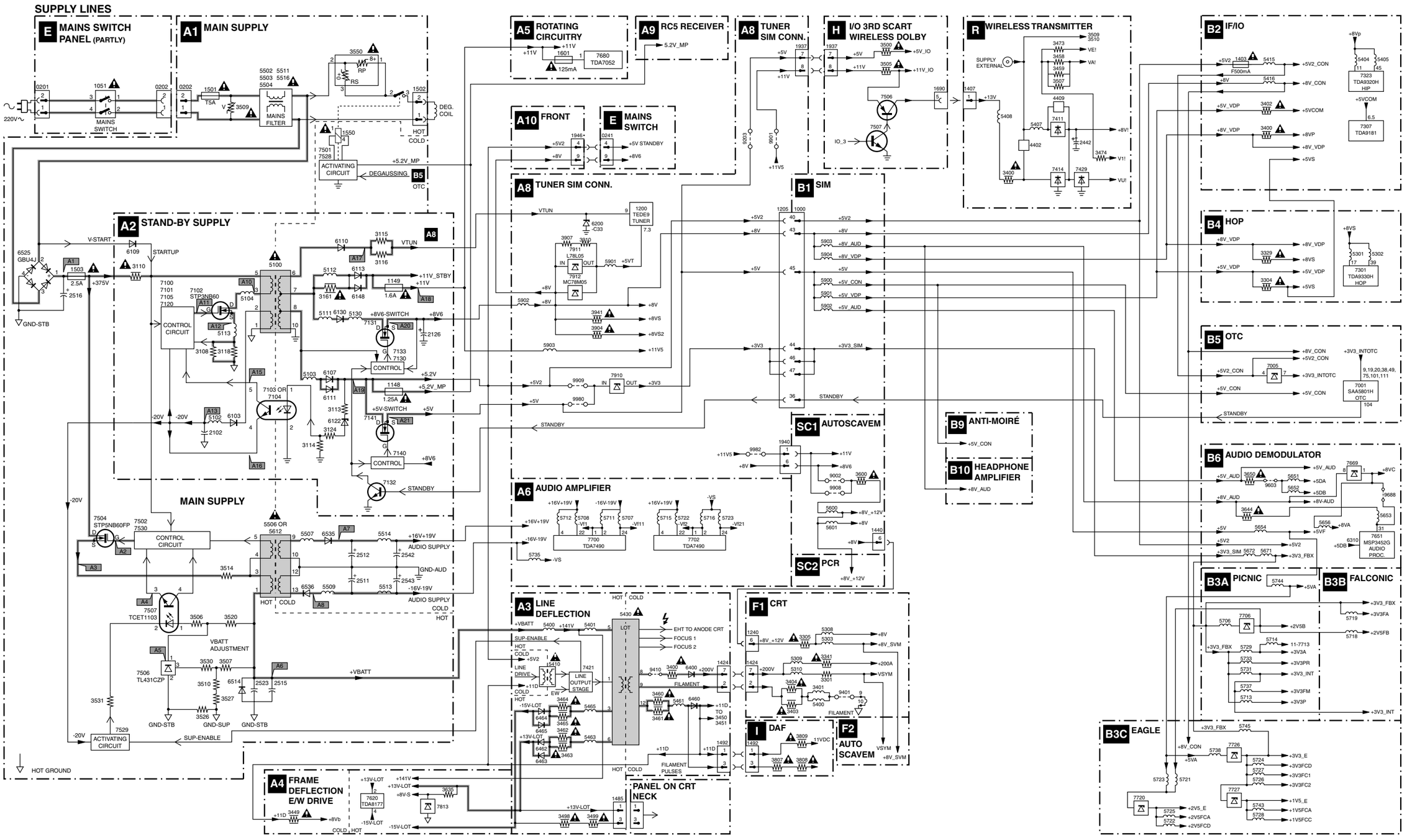
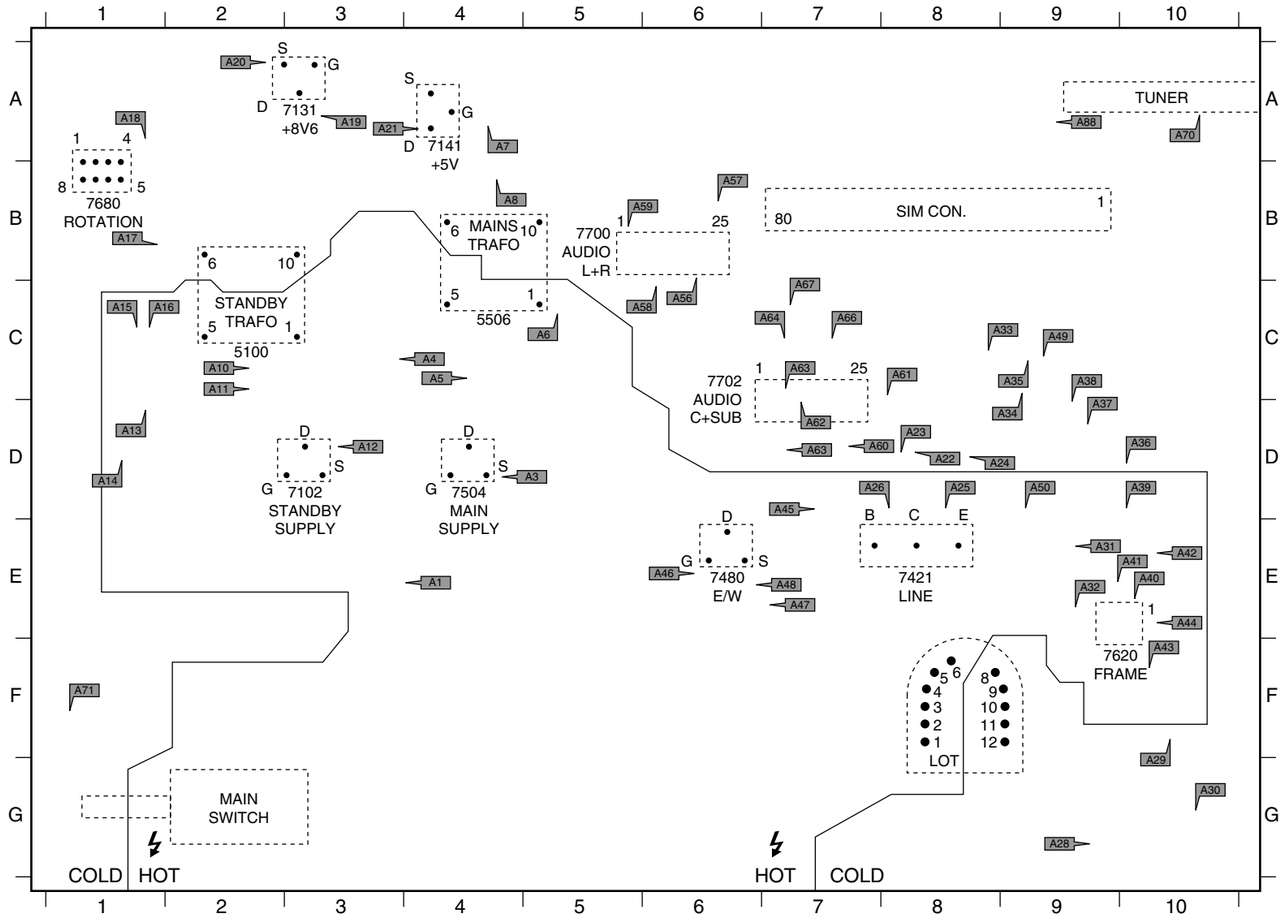
Supply Lines Overview



Testpoint Overview LSP and CRT Panel

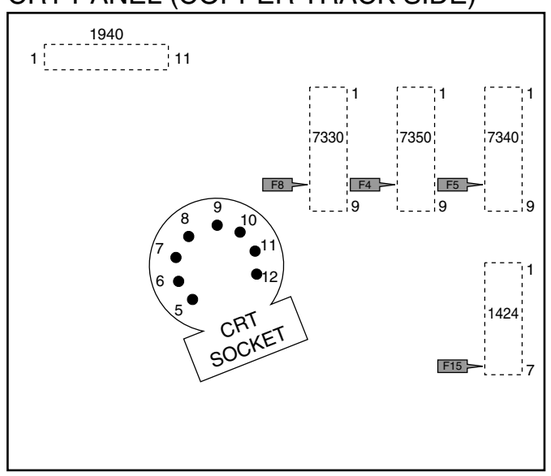
LSP COPPER TRACK SIDE



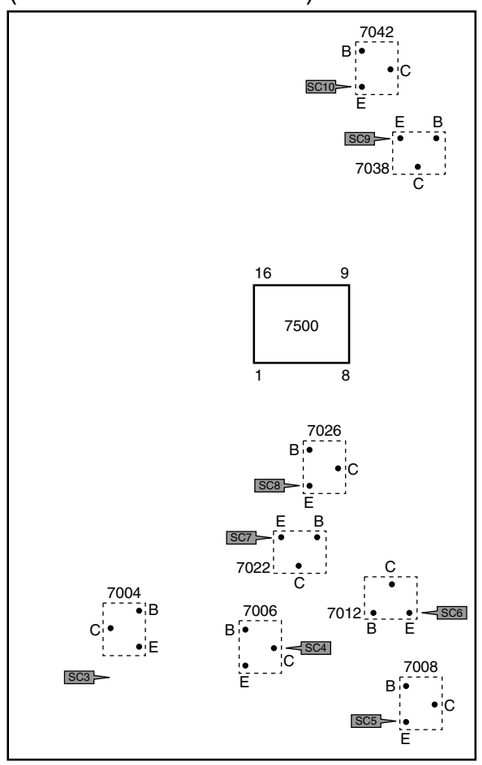
A1	E4	A58	C6
A3	D4	A59	B5
A4	C4	A60	D7
A5	C4	A61	C8
A6	C5	A62	D7
A7	A4	A63	D7
A8	B4	A64	C7
A10	C2	A66	C7
A11	C2	A67	C7
A12	D3	A70	A10
A13	D1	A71	F1
A14	D1	A88	A9
A15	C1		
A16	C1		
A17	B1		
A18	A1		
A19	A3		
A20	A2		
A21	A3		
A22	D8		
A23	D8		
A24	D8		
A25	D8		
A26	D7		
A28	G9		
A29	G10		
A30	G10		
A31	E9		
A32	E9		
A33	C8		
A34	D9		
A35	C9		
A36	D10		
A37	D9		
A38	C9		
A39	D10		
A40	E10		
A41	E10		
A42	E10		
A43	F10		
A44	E10		
A45	D7		
A46	E6		
A47	E7		
A48	E7		
A49	C9		
A50	D9		
A56	C6		
A57	B6		

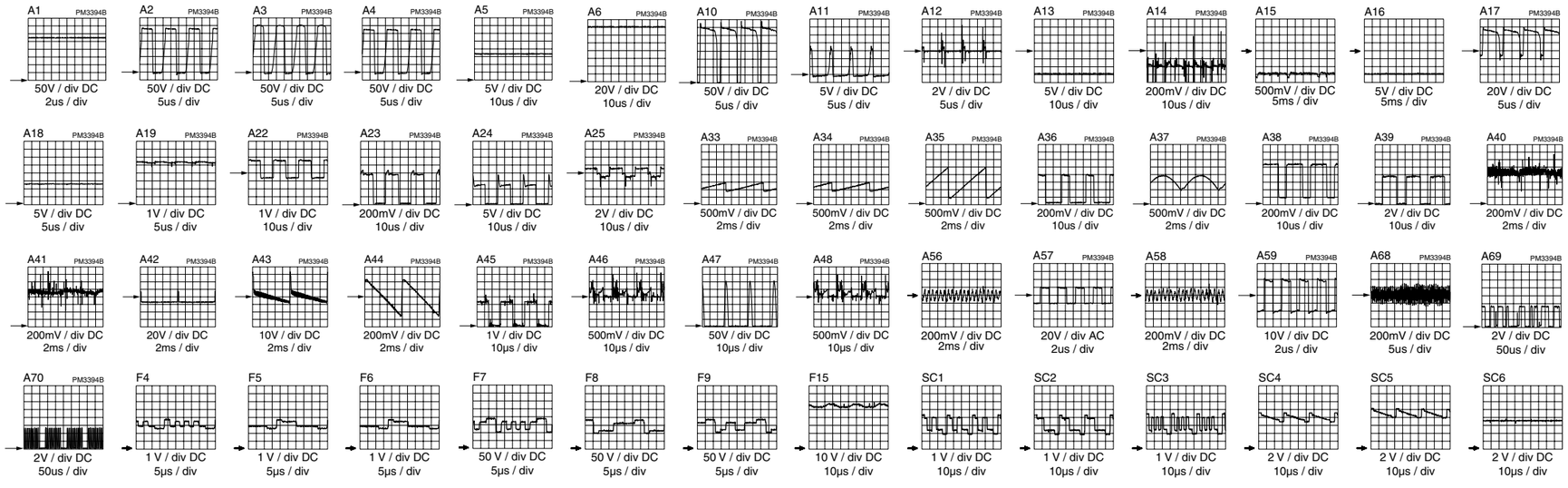
SC7 2 V / div DC 10µs / div
SC8 2 V / div DC 10µs / div
SC9 2 V / div DC 10µs / div
SC10 1 V / div DC 10µs / div
SC11 200mV / div DC 10µs / div
SC12 1 V / div DC 10µs / div
SC13 50mV / div DC 10µs / div
SC22 2 V / div DC 10µs / div
SC23 2 V / div DC 100µs / div
SC24 2 V / div DC 100µs / div

CRT PANEL (COPPER TRACK SIDE)



AUTO SCAVEM PANEL (COPPER TRACK SIDE)





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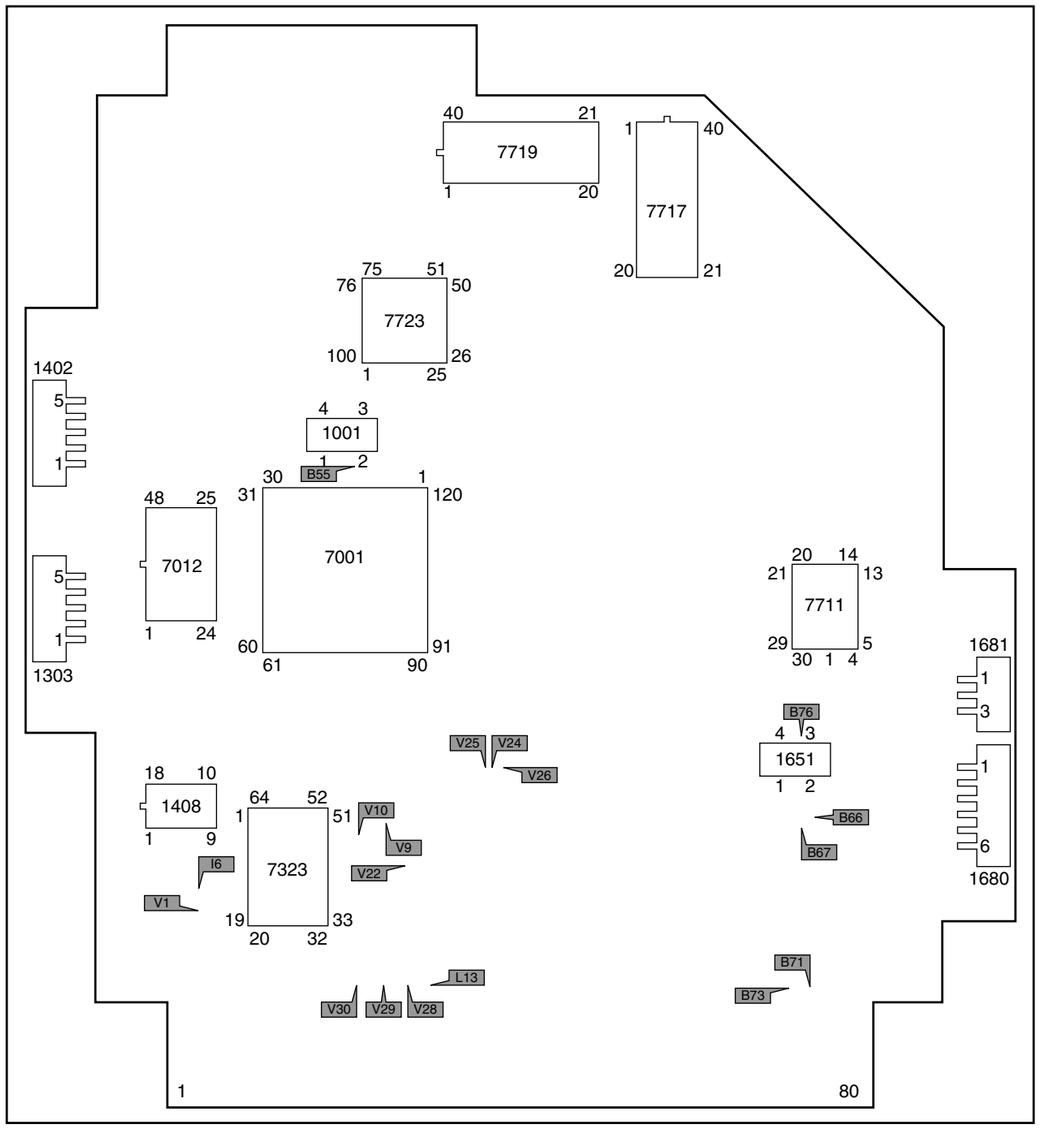
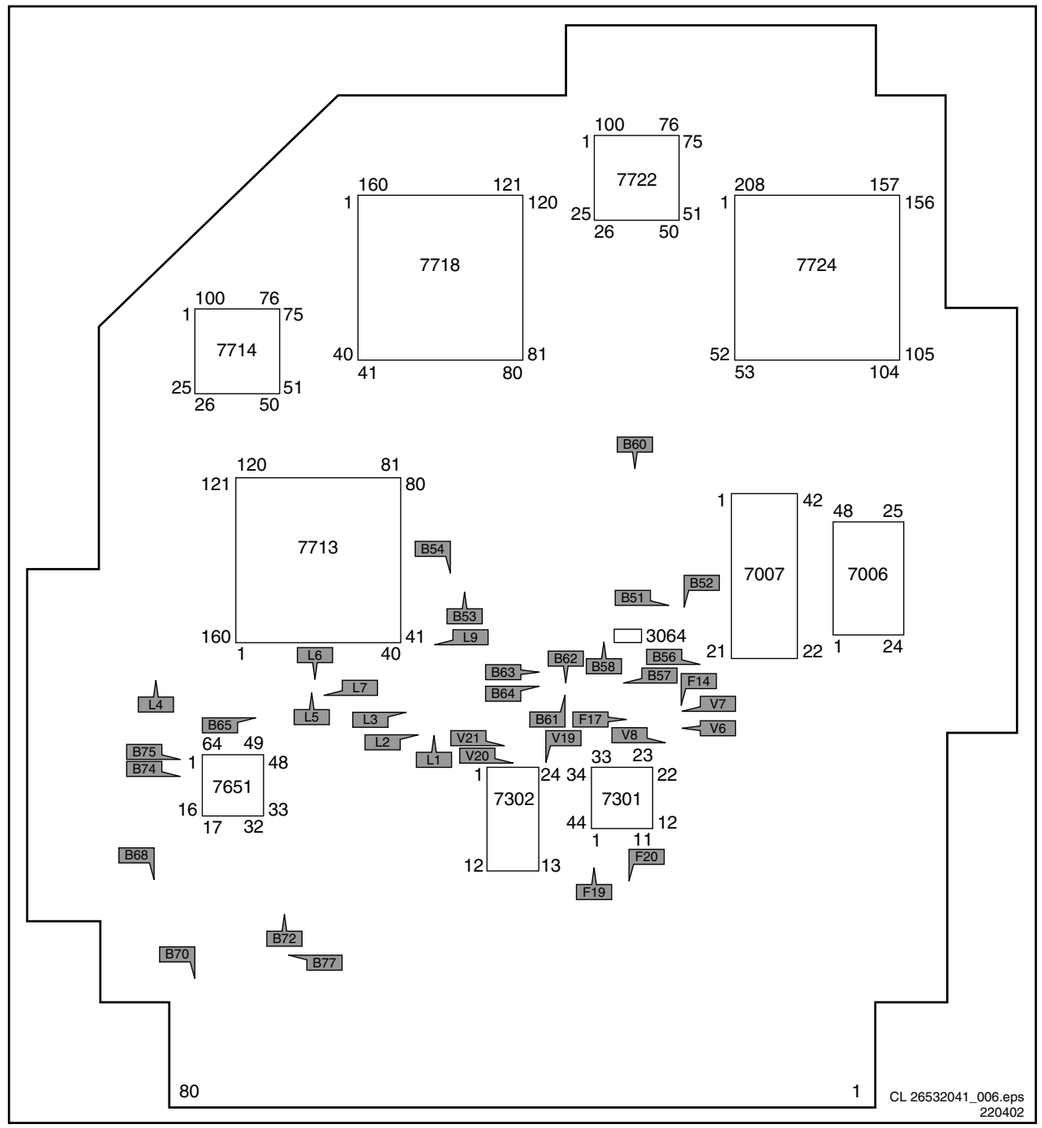
Testpoint Overview Small Signal Board

SSB SIDE A



SSB SIDE Z



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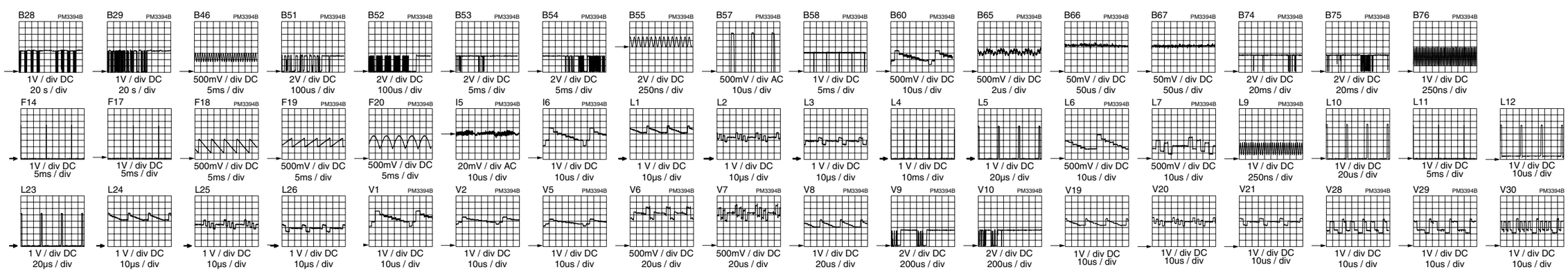
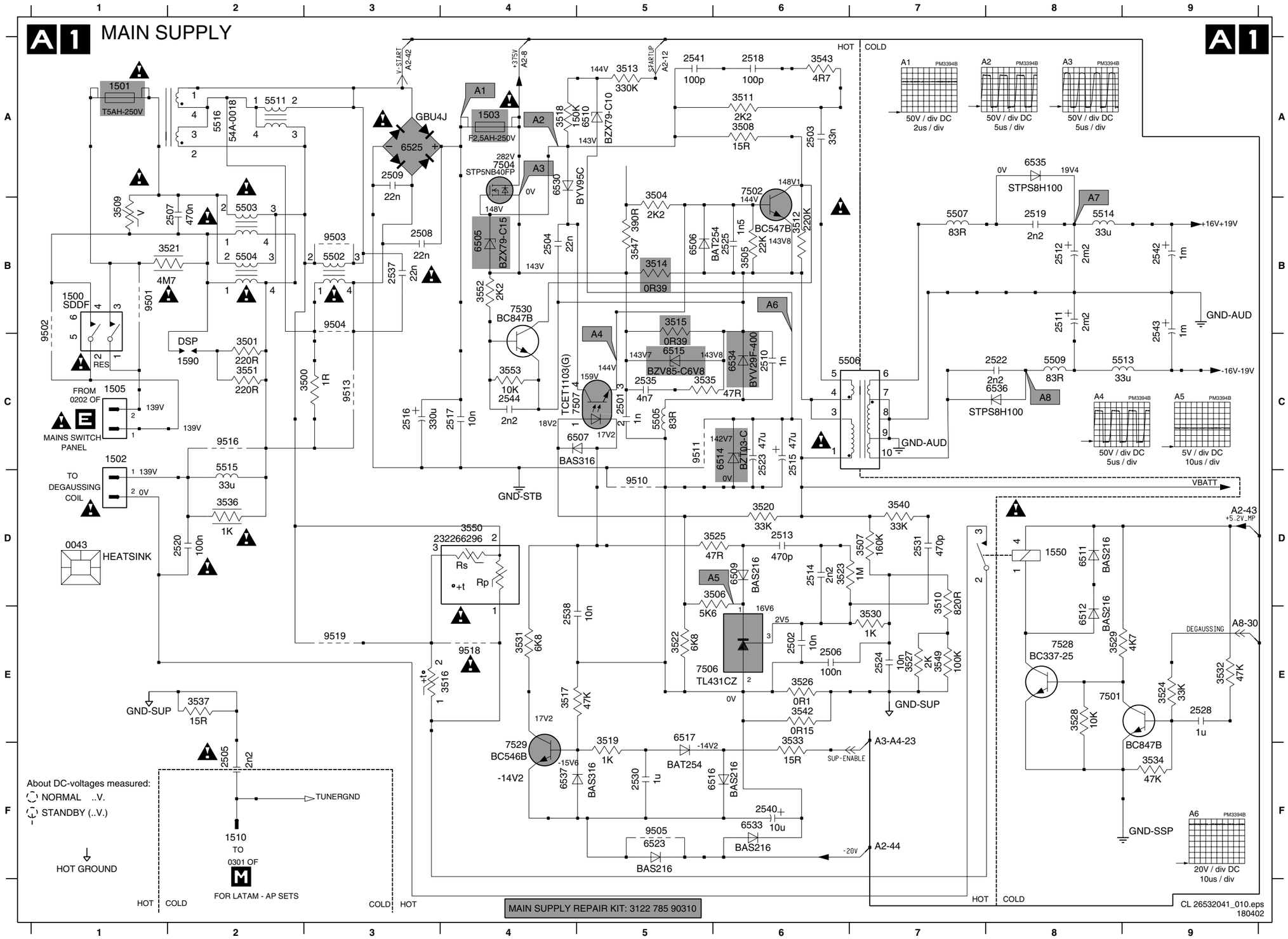


7. Circuit Diagrams and PWB Layouts

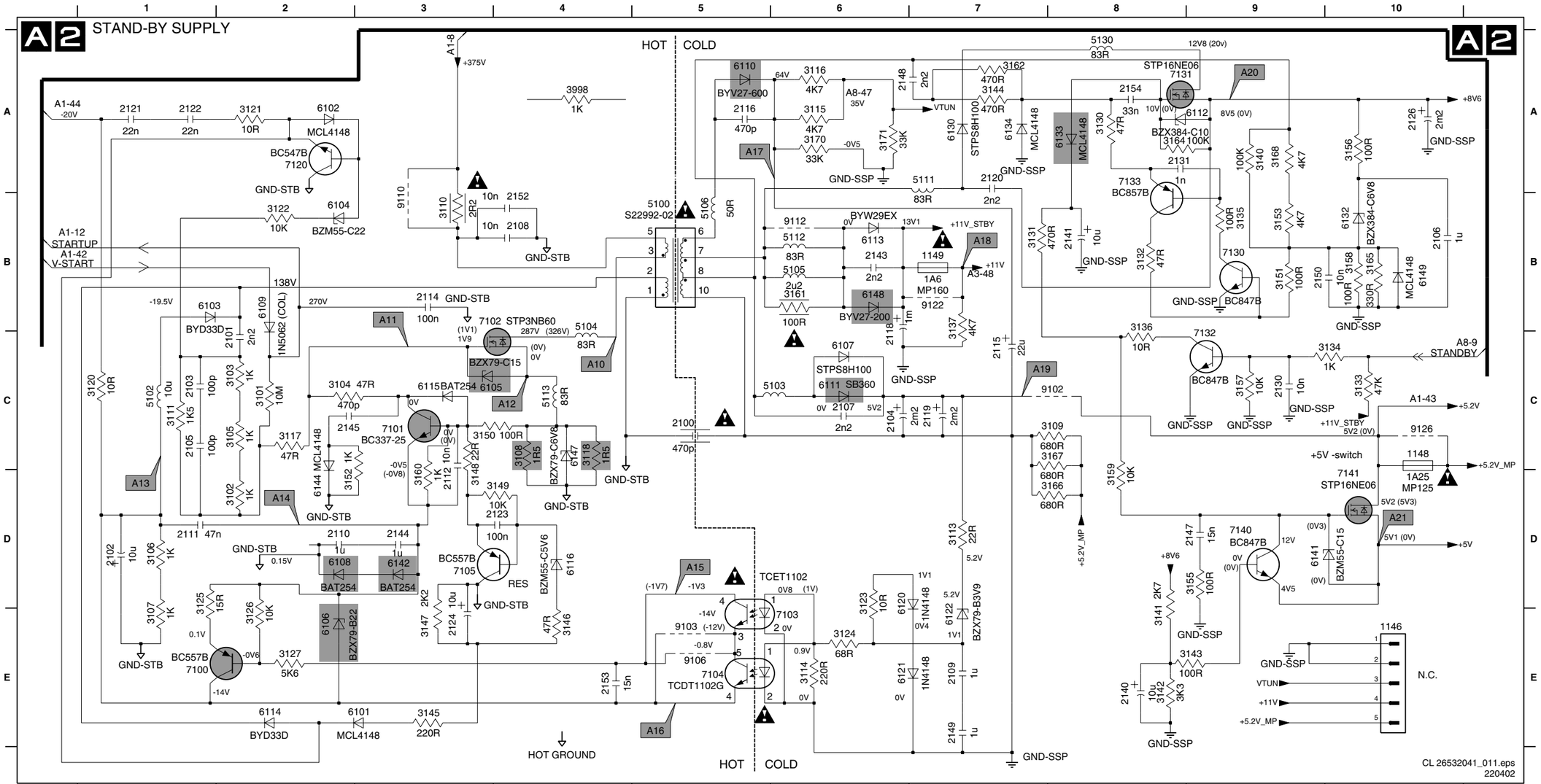
Large Signal Panel: Main Supply



0043 D1 1500 B1 1501 A1 1502 C1 1503 A4 1505 C1 1510 F2 1550 D8 1590 C2 2501 C5 2502 E6 2503 A6 2504 B4 2505 F2 2506 E6 2507 B2 2508 B3 2509 A3 2510 C6 2511 B8 2512 B8 2513 D6 2514 D6 2515 C6 2516 C3 2517 C4 2518 A6 2519 B8 2520 D2 2522 C8 2523 C6 2524 E7 2525 B6 2528 E9 2530 F5 2531 D7 2535 C5 2537 B3 2538 E4 2540 F6 2541 A5 2542 B9 2543 B9 2544 C4 3500 C3 3501 C2 3504 B5 3505 B6 3506 D6 3507 D7 3508 A6 3509 B1 3510 D7 3511 A6 3512 B6 3513 A5 3514 B5 3515 B5 3516 E4 3517 E4 3518 A4 3519 F5 3520 D6 3521 B2 3522 E5 3523 D6 3524 E9 3525 D6 3526 E6 3527 E7 3528 E8 3529 E8 3530 E7 3531 E4 3532 E9 3533 F6 3534 F4 3535 C5 3536 E8 3537 F9 3540 D7 3542 E6 3543 A6 3547 B5 3549 E7 3550 D4 3551 C2 3552 B4 3553 C4 5502 B3 5503 B2 5504 B2 5505 C5 5506 C6 5507 B7 5509 C8 5511 A2 5513 C9 5514 B8 5515 D2 5516 A2 6505 B4 6506 B5 6507 C5 6509 D6 6510 A5 6511 D8 6512 E8 6514 C6 6515 C5 6516 F6 6517 E5 6523 F5 6525 A3 6530 A4 6533 F6 6534 C6 6535 A8 6536 C8 6537 F4 7501 E8 7502 A6 7504 A4 7506 E5 7507 C5 7528 E8 7529 F4 7530 B4 9501 B1 9502 B1 9503 B3 9504 B3 9505 F5 9510 D5 9511 C5 9513 C3 9516 C2 9518 E4 9519 E3

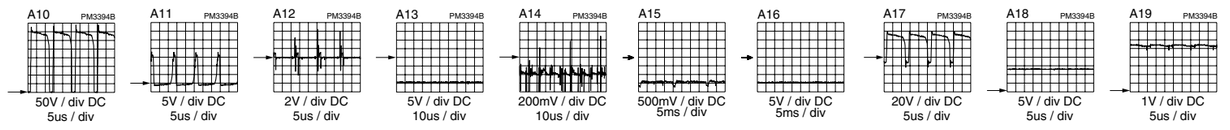
Large Signal Panel: Stand-by Supp;y

1146 E10	2109 E7	2123 D4	2149 E7	3108 C4	3122 B2	3136 B8	3150 C3	3164 A8	5105 B6	6107 C6	6122 E7	7101 C3	9102 C8
1148 C10	2110 D2	2124 E3	2150 B9	3109 C8	3123 D6	3137 B7	3151 B9	3165 B10	5106 B5	6108 D2	6130 A7	7102 B3	9103 E5
1149 B7	2111 D1	2126 A10	2152 A4	3110 B3	3124 E6	3140 A9	3152 D2	3166 D8	5111 A7	6109 B2	6132 B10	7103 E6	9106 E5
2100 C5	2112 D3	2130 C9	2153 E4	3111 C1	3125 D1	3141 E8	3153 B9	3167 C8	5112 B6	6110 A5	6133 A8	7104 E5	9110 B3
2101 C2	2114 B3	2131 A8	2154 A8	3113 D7	3126 E2	3142 E8	3155 D9	3168 A9	5113 C4	6111 C6	6134 A7	7105 D3	9112 B6
2102 D1	2115 C7	2140 E8	3101 C2	3114 E6	3127 E2	3143 E9	3156 A10	3170 A6	5130 A8	6112 A9	6141 D9	7120 A2	9122 B7
2103 C1	2116 A5	2141 B8	3102 D2	3115 A6	3130 A8	3144 A7	3157 C9	3171 A6	6101 E3	6113 B6	6142 D3	7130 B9	9126 C10
2104 C6	2118 C6	2143 B6	3103 C2	3116 A6	3131 B7	3145 E3	3158 B10	3998 A4	6102 A2	6114 E2	6144 D2	7131 A8	
2105 C1	2119 C7	2144 D3	3104 C2	3117 C2	3132 B8	3146 E4	3159 D8	5100 B5	6103 B1	6115 C3	6147 C4	7132 C9	
2106 B10	2120 A7	2145 C2	3105 C2	3118 C4	3133 C10	3147 E3	3160 D3	5102 C1	6104 B2	6116 D4	6148 B6	7133 A8	
2107 C6	2121 A1	2147 D9	3106 D1	3120 C1	3134 C10	3148 D3	3161 B6	5103 C6	6105 C3	6120 D6	6149 B10	7140 D9	
2108 B4	2122 A1	2148 A6	3107 E1	3121 A2	3135 B9	3149 D4	3162 A7	5104 B4	6106 E2	6121 E6	7100 E1	7141 D10	



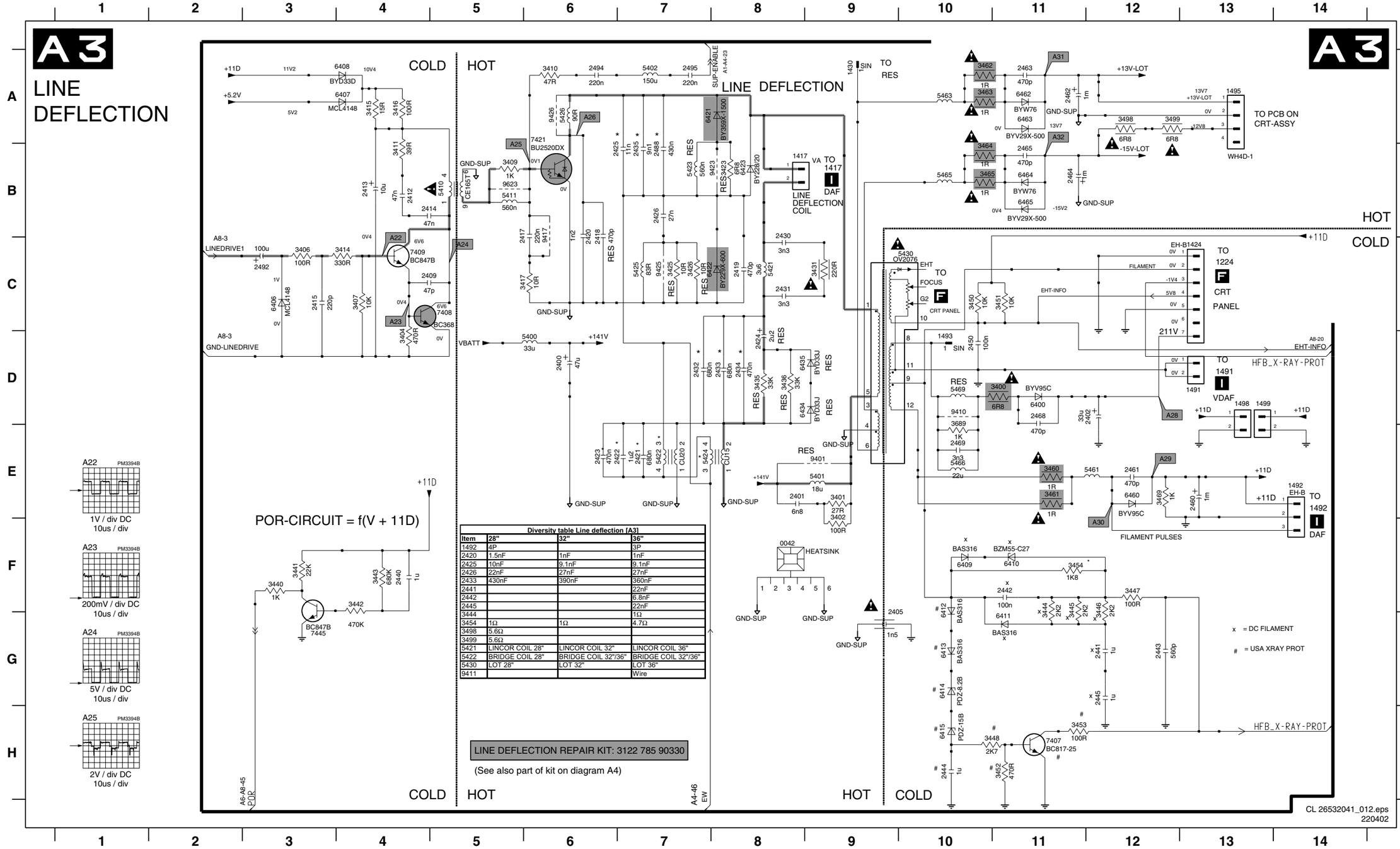
About DC-voltages measured:
- NORMAL ..V.
- STANDBY (..V.)

STANDBY SUPPLY REPAIR KIT: 3122 785 90460



Large Signal Panel: Line Deflection

0042 F8	1498 D13	2413 B4	2422 E7	2433 D8	2445 G12	2468 D11	3402 F9	3415 A4	3436 D8	3447 F11	3461 E11	3689 E10	5423 B7	5466 E10	6411 F10	6434 D8	7408 C5	9425 C7
1417 B8	1499 D13	2414 B4	2423 E6	2434 D8	2450 D10	2469 E10	3404 D4	3416 A4	3440 F3	3448 H10	3462 A10	5400 D6	5424 E7	5469 D10	6412 F10	6435 D8	7409 C4	9426 A6
1424 C13	2400 D6	2415 C3	2424 D8	2435 B7	2460 E13	2488 B7	3406 C3	3417 C6	3441 F3	3450 C10	3463 A10	5401 E9	5425 C7	6400 D11	6413 G10	6460 E12	7421 A6	9623 B5
1430 A10	2401 E8	2417 B6	2425 B7	2440 F4	2461 E12	2492 C3	3407 C4	3423 B8	3442 F4	3451 C11	3464 B10	5402 A7	5426 A6	6406 C3	6414 G10	6462 A11	7445 F3	
1491 D13	2402 D12	2418 B6	2426 B7	2441 G12	2462 A11	2494 A6	3409 B5	3425 C7	3443 F4	3452 H11	3465 B10	5410 B5	5430 C10	6407 A4	6415 H10	6463 A11	9401 E9	
1492 E14	2405 G9	2419 C8	2430 C8	2442 F10	2463 A11	2495 A7	3410 A6	3426 C7	3444 F12	3453 H11	3469 E12	5411 B5	5461 E12	6408 A4	6421 A7	6464 B11	9410 D10	
1493 D10	2409 C4	2420 B6	2431 C8	2443 G11	2464 B11	3400 D11	3411 B4	3431 C9	3445 F13	3454 F11	3498 A12	5421 C8	5463 A10	6409 F10	6422 C7	6465 B11	9417 B6	
1495 A13	2412 B4	2421 E7	2432 D7	2444 H10	2465 B11	3401 E9	3414 C4	3435 D8	3446 F13	3460 E11	3499 A12	5422 E7	5465 B10	6410 F11	6423 B8	7407 H11	9423 B8	



A22 PM3394B
1V / div DC
10us / div

A23 PM3394B
200mV / div DC
10us / div

A24 PM3394B
5V / div DC
10us / div

A25 PM3394B
2V / div DC
10us / div

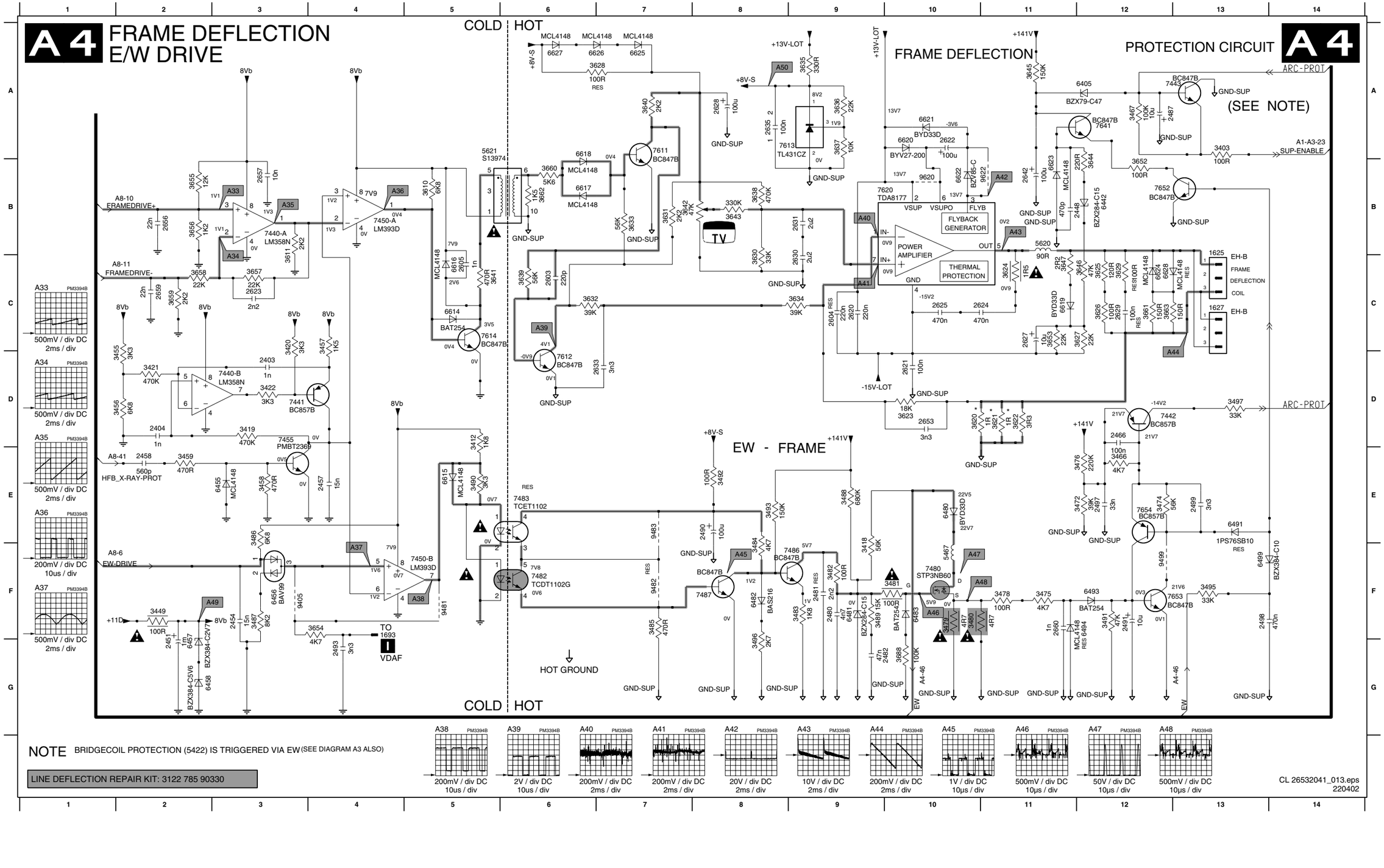
POR-CIRCUIT = f(V + 11D)

Diversity table Line deflection [A3]			
Item	28"	32"	36"
1492	4P		3P
2420	1.5nF	1nF	1nF
2425	10nF	9.1nF	9.1nF
2426	22nF	27nF	27nF
2433	430nF	390nF	360nF
2441			22nF
2442			6.8nF
2445			22nF
3444			1Ω
3454	1Ω	1Ω	4.7Ω
3498	5.6Ω		
3499	5.6Ω		
5421	LINCOR COIL 28"	LINCOR COIL 32"	LINCOR COIL 36"
5422	BRIDGE COIL 28"	BRIDGE COIL 32"/36"	BRIDGE COIL 32"/36"
5430	LOT 28"	LOT 32"	LOT 36"
9411			Wire

Large Signal Panel: Frame Deflection E/W Drive

1625 C13	2481 F9	2620 C9	2635 A8	3421 D2	3475 F11	3488 E9	3621 D11	3633 B7	3645 A11	3661 C12	6458 G2	6617 B6	7440-A B3	7487 F8	9482 F7
1627 C13	2482 G10	2621 D10	2642 B11	3422 D3	3476 E12	3489 F9	3622 D11	3634 C9	3646 C12	3662 B6	6480 E10	6618 A6	7440-B D3	7611 A7	9483 E7
1693 F4	2487 A12	2622 A10	2653 D10	3449 F2	3478 F11	3490 E5	3623 D10	3635 A9	3647 C11	3663 C12	6481 F9	6619 C11	7441 D3	7612 D6	9499 F12
2403 D3	2490 E8	2623 C3	2656 B2	3455 D2	3479 F10	3491 F12	3624 C11	3636 A9	3652 B12	3688 G10	6482 F8	6620 A10	7442 D13	7613 A8	9620 B10
2404 D2	2491 F12	2624 C11	2657 B3	3456 D2	3480 F10	3492 E8	3625 C12	3637 A9	3653 C11	5467 F10	6483 F10	6621 A10	7443 A12	7614 C5	9622 B11
2448 B12	2493 G4	2625 C10	2659 C2	3457 C4	3481 F10	3493 E8	3626 C12	3638 B8	3654 F4	5620 B11	6491 E13	6622 B10	7450-A B4	7620 B9	
2451 G2	2497 E12	2627 C11	2660 F11	3458 E3	3482 F9	3495 F13	3627 C12	3639 C6	3655 B2	5621 A5	6493 F12	6623 B11	7450-B F5	7641 A12	
2454 F3	2498 F13	2628 A8	3403 A13	3459 E2	3483 F9	3496 G8	3628 A7	3640 A7	3656 B2	6405 A12	6494 F12	6624 C12	7455 D3	7652 B12	
2457 E4	2499 E13	2629 C12	3412 D5	3466 E12	3484 F8	3497 D13	3629 C12	3641 C5	3657 C3	6442 B12	6499 F13	6625 A7	7480 F10	7653 F12	
2458 E2	2603 C6	2630 C9	3418 F9	3467 A12	3485 F7	3610 B5	3630 C8	3642 B7	3658 C2	6455 E3	6614 C5	6626 A7	7482 F6	7654 E12	
2466 D12	2604 C9	2631 B9	3419 D3	3472 E12	3486 E3	3611 C3	3631 B7	3643 B8	3659 C2	6456 F3	6615 E5	6627 A6	7483 E6	9405 F3	
2480 F9	2605 C5	2633 D7	3420 C3	3474 E12	3487 F3	3620 D10	3632 C6	3644 B12	3660 B6	6457 G2	6616 C5	6628 C12	7486 F8	9481 F5		

Diversity table Frame deflection [A4]			
Item	28"	32"	36"
1693			1P
2493			3.3nF
3480		6.8Ω	
3488	1MΩ	680kΩ	1MΩ
3621	1Ω	1.5Ω	1Ω
3622	1.5Ω	1.8Ω	1Ω
3625	120Ω	220Ω	56Ω
3626	100Ω	220Ω	56Ω
3654			4.7kΩ
3661		470Ω	120Ω
6499	BZX384-C10	PDZ9.1B	BZX384-C10
6624		BAS316	BAS316



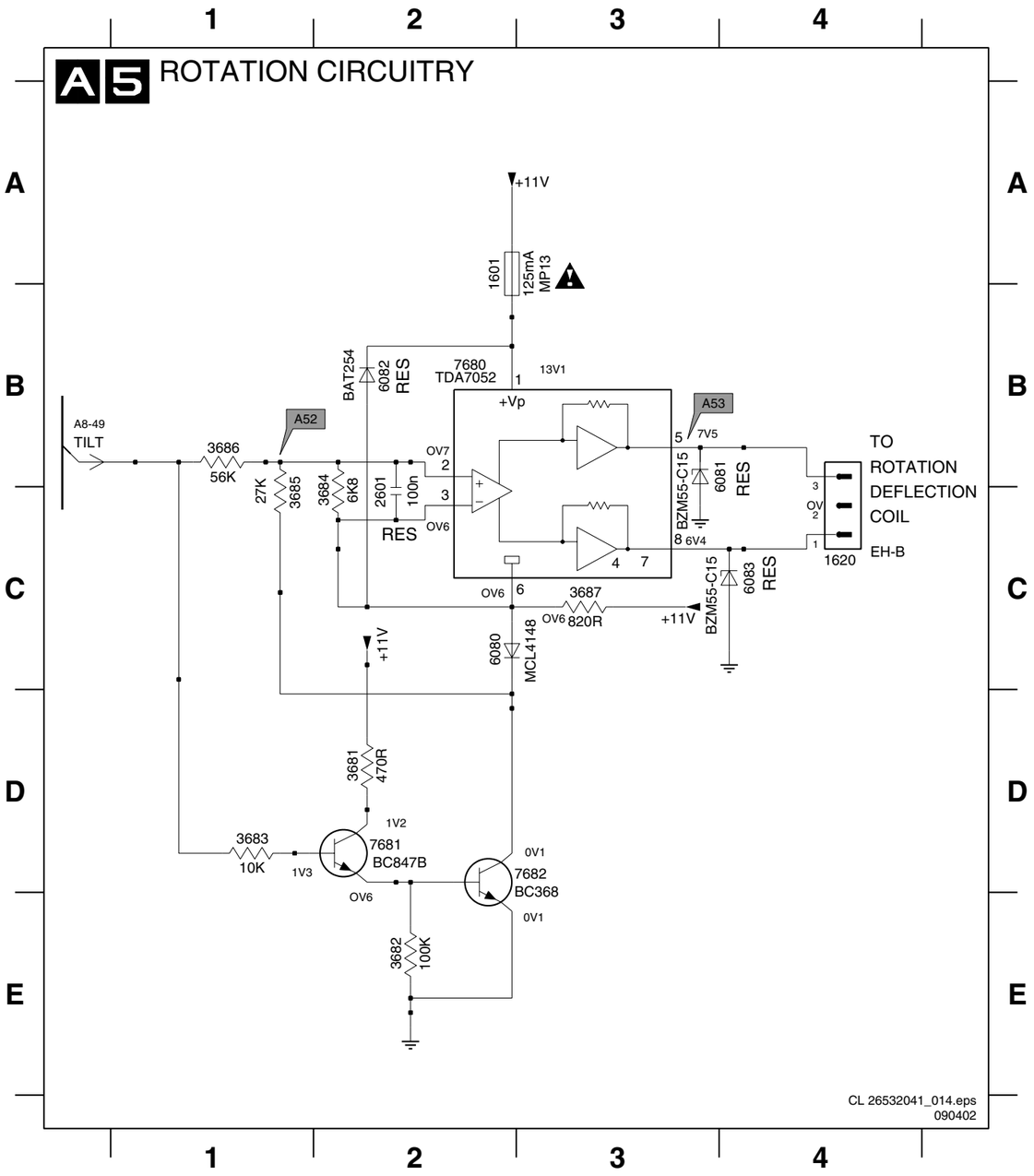
NOTE BRIDGECOIL PROTECTION (5422) IS TRIGGERED VIA EW (SEE DIAGRAM A3 ALSO)

LINE DEFLECTION REPAIR KIT: 3122 785 90330

CL 26532041_013.eps 220402

Large Signal Panel: Rotation Circuitry

1601 A2	3681 D2	3684 C2	3687 C3	6082 B2	7681 D2
1620 C4	3682 E2	3685 C1	6080 C2	6083 C4	7682 D2
2601 C2	3683 D1	3686 B1	6081 B3	7680 B2	

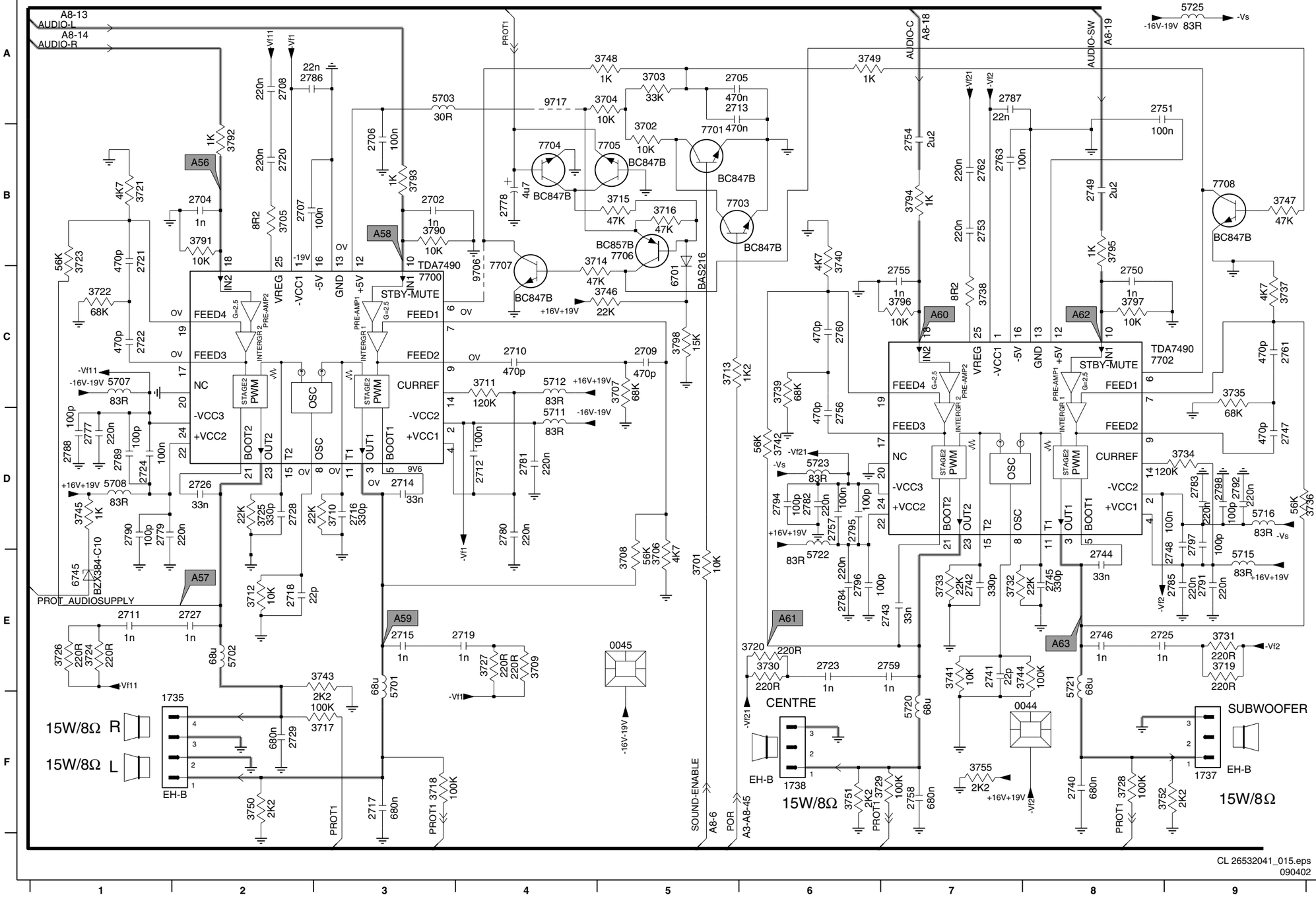


Personal Notes:

Large Signal Panel: Audio Amplifier

A6 AUDIO AMPLIFIER

A56 200mV / div DC 2ms / div
A57 PM3394B 20V / div AC 2us / div
A58 200mV / div DC 2ms / div
A59 PM3394B 10V / div DC 2us / div

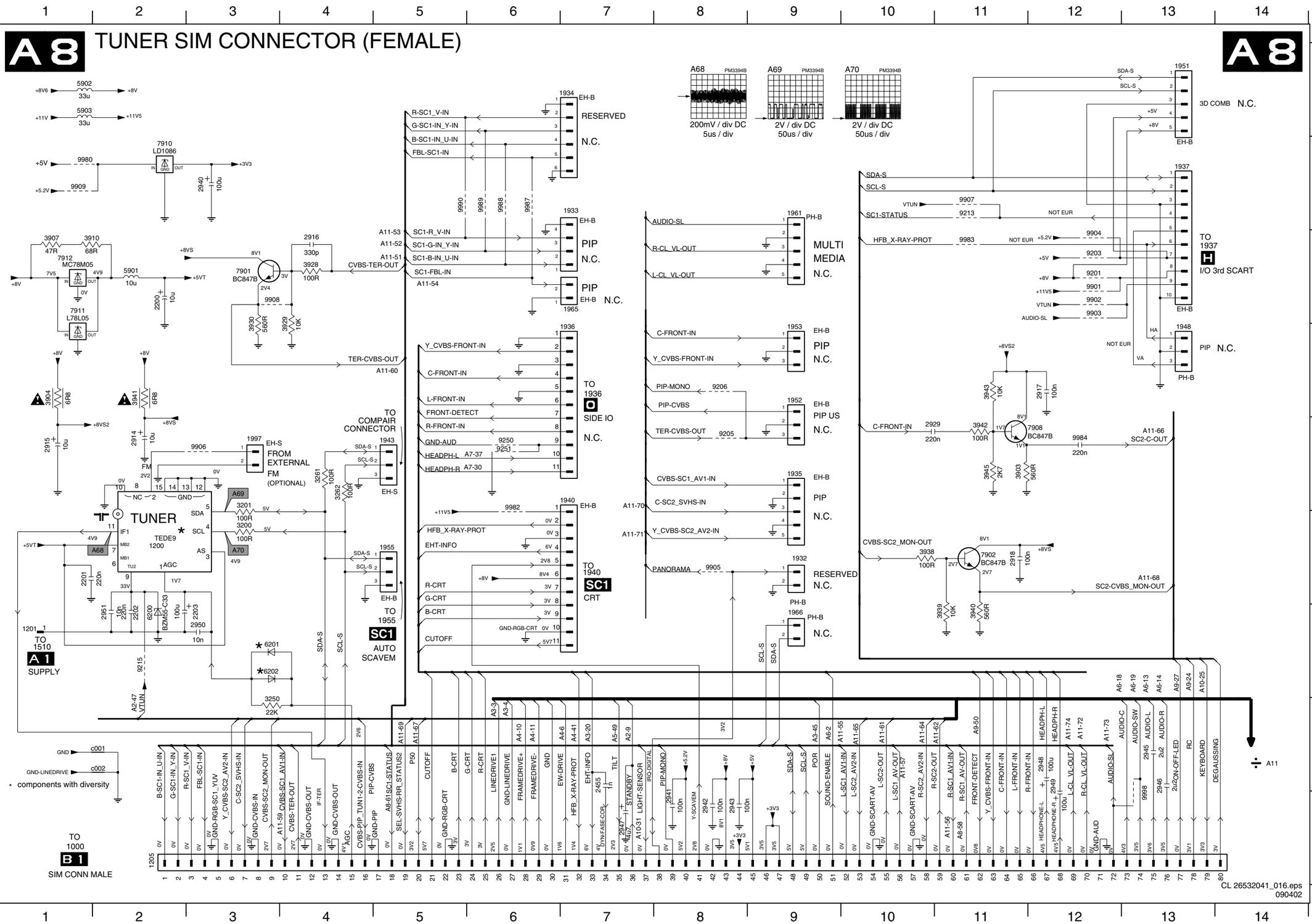


0044 F7	2785 E9	3751 F6
0045 E5	2786 A2	3752 F9
1735 F2	2787 A7	3755 F7
1737 F9	2788 D1	3790 B3
1738 F6	2789 D1	3791 B2
2702 B3	2790 D1	3792 B2
2704 B2	2791 E9	3793 B3
2705 A5	2792 D9	3794 B7
2706 B3	2794 D6	3795 B8
2707 B2	2795 D6	3796 C7
2708 A2	2796 E6	3797 C8
2709 C5	2797 D9	3798 C5
2710 C4	2798 D9	5701 E3
2711 E1	3701 E5	5702 E2
2712 D4	3702 A5	5703 A3
2713 A5	3703 A5	5707 C1
2714 D3	3704 A5	5708 D1
2715 E3	3705 B2	5711 D4
2716 D3	3706 E5	5712 C4
2717 F3	3707 C5	5715 E9
2718 E2	3708 E5	5716 D9
2719 E4	3709 E4	5720 F7
2720 B2	3710 D3	5721 E8
2721 B1	3711 C4	5722 E6
2722 C1	3712 E2	5723 D6
2723 E6	3713 C5	5725 A9
2724 D1	3714 B4	6701 C5
2725 E8	3715 B5	6745 E1
2726 D2	3716 B5	7700 C3
2727 E2	3717 F3	7701 B5
2728 D2	3718 F3	7702 C8
2729 F2	3719 E9	7703 B5
2740 F8	3720 E6	7704 B4
2741 E7	3721 B1	7705 B5
2742 E7	3722 C1	7706 B5
2743 E7	3723 B1	7707 C4
2744 E8	3724 E1	7708 B9
2745 E8	3725 D2	9706 C4
2746 E8	3726 E1	9717 A4
2747 D9	3727 E4	
2748 E9	3728 F8	
2749 B8	3729 F7	
2750 C8	3730 E6	
2751 A8	3731 E9	
2753 B7	3732 E7	
2754 B7	3733 E7	
2755 C7	3734 D9	
2756 D6	3735 C9	
2757 D6	3736 D9	
2758 F7	3737 C9	
2759 E7	3738 C7	
2760 C6	3739 C6	
2761 C9	3740 B6	
2762 B7	3741 E7	
2763 B7	3742 D6	
2777 D1	3743 E3	
2778 B4	3744 E8	
2779 D1	3745 D1	
2780 D4	3746 C5	
2781 D4	3747 B9	
2782 D6	3748 A5	
2783 D9	3749 A6	
2784 E6	3750 F2	

Large Signal Panel: Tuner SIM Connector (Female)

A8 TUNER SIM CONNECTOR (FEMALE)

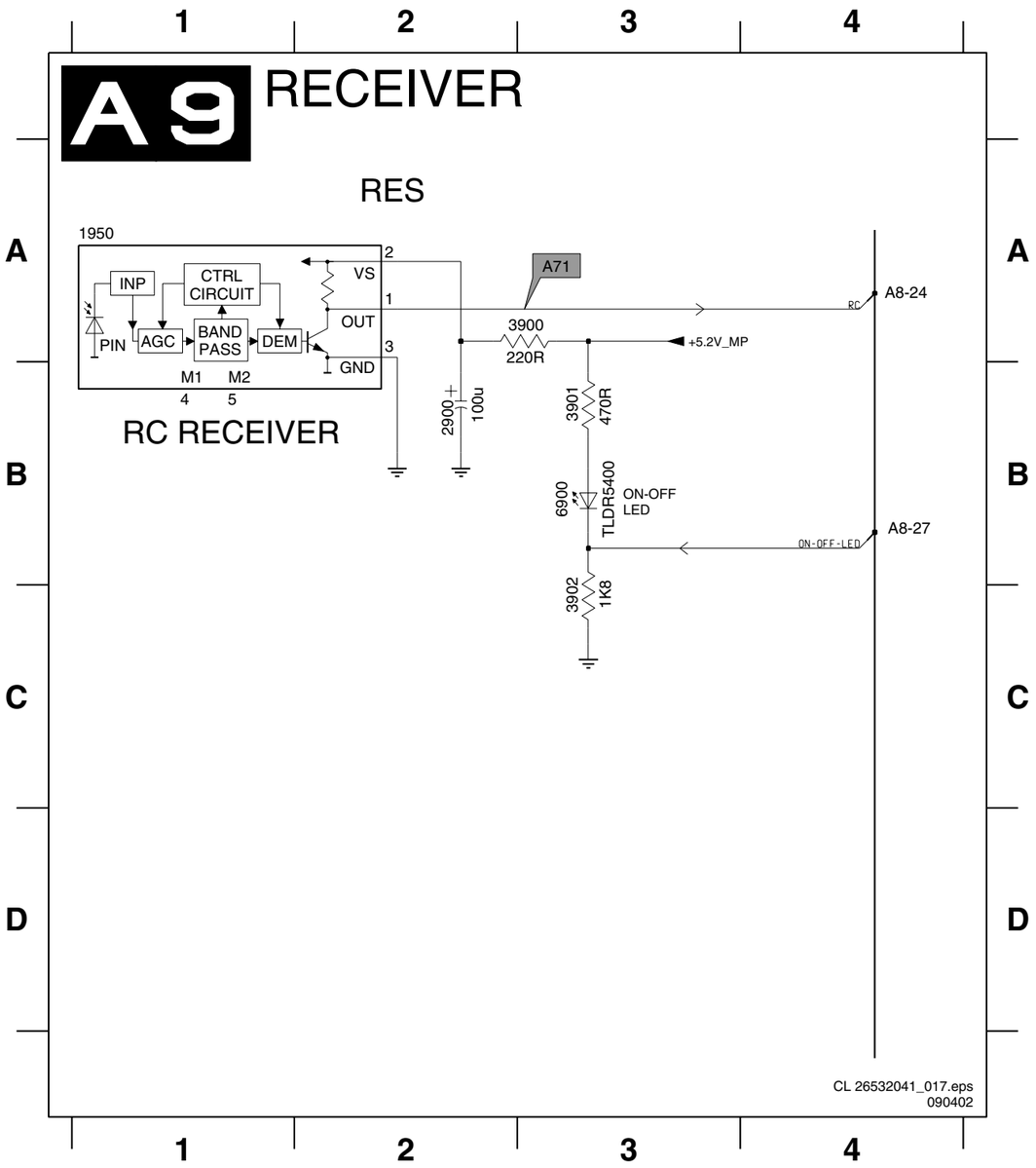
A8



1200 F2
1201 G1
1205 I2
1932 F9
1933 B7
1934 A6
1935 E9
1936 D6
1937 B13
1940 E6
1943 E5
1948 D13
1951 A13
1952 D9
1953 D9
1955 F5
1961 B9
1965 C7
1966 G9
1997 E3
2200 C2
2201 F1
2202 G2
2203 G3
2455 H7
2914 E2
2915 E1
2916 C4
2917 D12
2918 F11
2929 E10
2940 B3
2941 I8
2942 I8
2943 I8
2945 H13
2946 H13
2947 I7
2948 H12
2949 H12
2950 G3
2951 G2
3200 F3
3201 E3
3250 H3
3261 E4
3262 E4
3903 E11
3904 D1
3907 C1
3910 C1
3928 C4
3929 D4
3930 D3
3938 F10
3939 G11
3940 G11
3941 D2
3942 E11
3943 D11
3945 E11
5901 C2
5902 A1
5903 A1
6200 G2
6201 G3
6202 G3
7901 C3
7902 F11
7908 E11
7910 B2
7911 C1
7912 C1
9201 C12
9203 C12
9205 E8
9206 D8
9213 B11
9215 G2
9250 E6
9251 E6
9901 C12
9902 C12
9903 C12
9904 C12
9905 F8
9906 E3
9907 B11
9908 C3
9909 B1
9980 B1
9982 E6
9983 C11
9984 E12
9987 B6
9988 B6
9989 B6
9990 B5
9998 I13

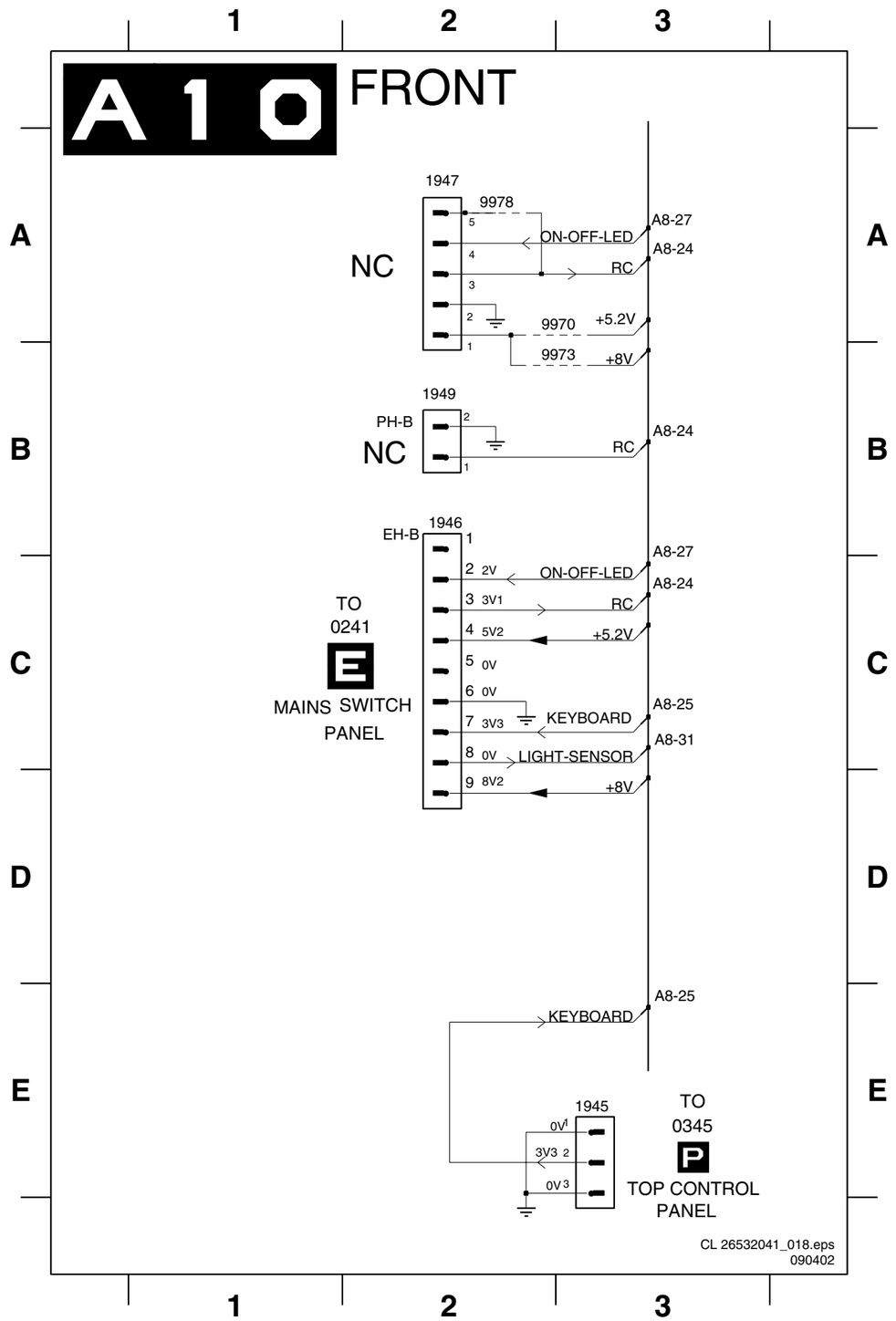
Large Signal Panel: REceiver

1950 A1 2900 B2 3900 A3 3901 B3 3902 C3 6900 B3



Large Signal Panel: Front

1945 E3
1946 B2
1947 A2
1949 B2
3999 E1
9970 A3
9973 B3
9978 A2



Large Signal Panel: Inputs/Outputs

A11 INPUTS/OUTPUTS

A11

(SCART1)

1901-B

A8-58 R-SC1_AV-OUT — 3960 150R — 3959 150R

A8-57 L-SC1_AV-OUT — 3993 150R — 3992 150R

2997 330p — 2996 330p

A8-51 SC1-B-IN_U-IN — 3987 100R — 6950 PDZ-6.8B — 3985 75R

3995 1K — 2999 100p — A8-56 R-SC1_AV1-IN

3989 1K — A8-55 L-SC1_AV1-IN

3986 SC1-STATUS — 3K9 — A8-61

1910 INPUTs — 2992 330p — 3984 8K2 — 2991 100p

3979 75R — 3980 100R — A8-52 SC1-G-IN_Y-IN — 6953 PDZ-6.8B

3978 100R — A8-53 SC1-R_V-IN

3976 100R — A8-54 SC1-FBL-IN

3974 75R — 3973 75R — 6954 PDZ-6.8B — 6955 PDZ-6.8B

A8-60 TER-CVBS-OUT — 3972 75R — 6951 PDZ-6.8B

3970 100R — A8-59 CVBS-SC1_AV1-IN

3968 75R — 6956 PDZ-6.8B

(SCART2)

1901-A

A-62 R-SC2-OUT — 3997 150R — 3996 150R

A-61 L-SC2-OUT — 3991 150R — 3990 150R

2994 330p — 2995 330p

A8-66 SC2-C-OUT — 6957 PDZ-6.8B

A8-67 P50 — 6958 PDZ-6.8B — 3983 100R

3994 1K — 2998 100p — A8-64 R-SC2_AV2-IN

3988 1K — 2993 100p — A8-65 L-SC2_AV2-IN

1911 — 3982 3K9 — A8-69 SEL-SVHS-RR_STATUS2

2990 330p — 3981 8K2 — BZX284-C12 — 6960

3977 100R — A8-70 C-SC2_SVHS-IN — 6961 PDZ-6.8B

3975 75R

2985 390p

A8-68 SC2-CVBS_MON-OUT — 3971 75R — 6959 PDZ-6.8B

3969 100R — A8-71 Y_CVBS-SC2_AV2-IN — 6962 PDZ-6.8B

3967 75R

1902-B — AUDIO - R OUT

1902-C — AUDIO -SURROUND OUT

1902-A — AUDIO - L OUT

3966 150R — 3965 150R — A8-72 R-CL_VL-OUT — 330p 2989

3964 150R — 3963 150R — A8-73 AUDIO-SL — 3n3 2988

3962 150R — 3961 150R — A8-74 L-CL_VL-OUT — 330p 2987

CL 26532041_019.eps
090402

1901-A A6
1901-B A2
1902-A D2
1902-B D1
1902-C D2
1910 B3
1911 B7
2985 C5
2987 E2
2988 E2
2989 D3
2990 B7
2991 B4
2992 B3
2993 A7
2994 A5
2995 A6
2996 A2
2997 A1
2998 A7
2999 A3
3959 A2
3960 A1
3961 E3
3962 E2
3963 E3
3964 E2
3965 D3
3966 D2
3967 C7
3968 C3
3969 C7
3970 C3
3971 C5
3972 C1
3973 C3
3974 C3
3975 C7
3976 C4
3977 B7
3978 B3
3979 B3
3980 B3
3981 B8
3982 B7
3983 B6
3984 B4
3985 B2
3986 A3
3987 A1
3988 A7
3989 A3
3990 A6
3991 A5
3992 A2
3993 A1
3994 A7
3995 A3
3996 A6
3997 A5
6950 A1
6951 C1
6953 B4
6954 C3
6955 C4
6956 C3
6957 A5
6958 B5
6959 C5
6960 B8
6961 C8
6962 C8

Layout Large Signal Panel (Top Side)

0042	C8	1492	A10	1620	F1	1937	G7	1965	E9	2119	F3	2401	A7	2431	B7	2469	A8	2511	G5	2542	G5	2914	F10	3110	C2	3144	F2	3418	C6	3464	C9	3501	A4	3533	F4	3626	C10	3728	F6	3983	E10	5112	F2	7101	C2	9659	B6
0043	D5	1493	A8	1625	B10	1940	F9	1966	F8	2120	G2	2402	A10	2432	B6	2487	A7	2512	G4	2543	F5	2915	E9	3111	D2	3161	F2	3423	C7	3465	C9	3505	E3	3536	A4	3628	D9	3747	E6	3985	E10	5113	D2	7102	D3	9660	B6
0044	E7	1495	C10	1627	B10	1943	G10	1997	G10	2121	E2	2405	A7	2433	B6	2488	C8	2515	D4	2622	C10	2940	F7	3113	E2	3162	F2	3425	C6	3469	A10	3507	E5	3537	D5	3634	C10	3749	D7	3986	E10	5130	F2	7103	E1	9661	B5
0045	F5	1498	A10	1693	D9	1945	G5	2100	F3	2122	E2	2413	D8	2434	B6	2490	D6	2516	B4	2624	B10	2947	G2	3114	E1	3170	G2	3426	C6	3476	A7	3508	D4	3540	E4	3635	C9	3755	E6	3987	E10	5400	C5	7104	E1	9663	B5
1146	G2	1499	D9	1735	G5	1946	G5	2101	D2	2124	C2	2418	C8	2435	C8	2491	A6	2517	C4	2625	B10	2948	F7	3115	G1	3171	G2	3431	B7	3478	C6	3509	B2	3542	E5	3641	D10	3904	E9	3989	E10	5401	A7	7105	C1	9664	C10
1148	G3	1500	A2	1737	F7	1947	G4	2102	E2	2126	G2	2419	C7	2450	A10	2492	E8	2518	D3	2627	B10	2949	F7	3116	G2	3400	A9	3435	B6	3479	C6	3511	D3	3543	D3	3642	B10	3941	F10	3993	D10	5402	B8	7120	E2	9665	C8
1149	F2	1501	B2	1738	F7	1948	G8	2104	F3	2140	G3	2420	C8	2451	D10	2501	D4	2519	F4	2628	D10	3101	C2	3117	D2	3401	A7	3436	B5	3480	C6	3513	C3	3550	C4	3645	A7	3967	F10	3998	C1	5410	D9	7131	F3	9666	C8
1200	G10	1502	A3	1901	E10	1949	G2	2107	F3	2141	F2	2421	B6	2460	A10	2503	E3	2520	A3	2642	A6	3102	D2	3118	C2	3402	A7	3449	E9	3488	C5	3514	E4	3551	A3	3661	C10	3968	F10	5100	E2	5411	C8	7141	G4	9667	C7
1201	G6	1503	C3	1902	F10	1950	B1	2108	C2	2143	F2	2422	A5	2461	A10	2505	D5	2522	F4	2717	G5	3103	D2	3124	F1	3403	A7	3450	A10	3492	D7	3515	D5	3620	C10	3663	C10	3971	F10	5102	D1	5421	B7	7408	D8	9669	D8
1205	F8	1505	A2	1932	E8	1951	F7	2111	D1	2148	F1	2423	A6	2462	C10	2506	E5	2523	D4	2729	G6	3104	D2	3125	D1	3409	C9	3451	B10	3493	C6	3516	C3	3621	C10	3681	G1	3972	F10	5103	F3	5422	A6	7421	D8	9670	C7
1417	B8	1510	E5	1933	E10	1952	G9	2114	C2	2152	E3	2424	C5	2463	C9	2507	A2	2531	E4	2740	E7	3105	E2	3126	E1	3411	D8	3460	A10	3495	A6	3518	C3	3622	C10	3687	G1	3973	F10	5104	E2	5423	C7	7440	D9	9671	B6
1424	A10	1550	B3	1934	F10	1953	E7	2115	E2	2200	G9	2425	C7	2464	C10	2508	C5	2537	B4	2758	E7	3106	E1	3127	E1	3415	D8	3461	A10	3498	C10	3520	E4	3623	C10	3689	A8	3974	E10	5105	F2	5424	A6	7480	D6	9674	A8
1430	C9	1590	A3	1935	F9	1955	G8	2116	F1	2203	G9	2426	C6	2465	C9	2509	B5	2540	F4	2778	D6	3107	E2	3137	G1	3416	E8	3462	C9	3499	C10	3521	A2	3624	B10	3711	F6	3975	F10	5106	E1	5425	C7	7482	D8	9675	A10
1491	A7	1601	G1	1936	F7	1961	G7	2118	F2	2400	B6	2430	B7	2468	A9	2510	D3	2541	C3	2900	B1	3108	C2	3141	G3	3417	C8	3463	C9	3500	A4	3526	E5	3625	C10	3713	E6	3979	E10	5111	F2	5426	C8	7483	D7	9701	E6
																																													5430	B10	7502	E3	9703	E6
																																													5461	A10	7504	D4	9708	D7
																																													5463	C9	7506	E4	9712	E6
																																													5465	C8	7507	E4	9715	D6
																																													5466	A8	7528	B2	9718	E6
																																													5467	C6	7529	F4	9719	E6
																																													5469	A8	7613	D9	9720	E6
																																													5502	A5	7620	C10	9721	D6
																																													5503	A3	7680	F1	9901	G7
																																													5504	A3	7682	G1	9902	G8
																																													5505	D4	7700	F6	9903	G8
																																													5506	E5	7702	E6	9906	G10
																																													5507	F4	7910	G6	9907	G7
																																													5509	F5	7911	G9	9909	G6
																																													5511	A4	7912	G9	9910	E8
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																																													5515	A3	9110	C2	9913	E8
																																													5516	A5	9112	F2	9914	E8
																																													5620	B10	9114	D2	9915	E9
																																													5621	D10	9117	E2	9916	E8
																																													5701	F6	9118	G2	9917	E8
																																													5702	F6	9119	G2	9918	E10
																																													5707	G6	9120	G2	9919	E9
																																													5708	F6	9121	G3	9920	E9
																																													5711	G5	9122	F2	9921	E9
																																													5712	F6	9123	E3	9922	E10
																																													5715	E7	9124	F2	9923	E10
																																													5716	E6	9125	G2	9924	E9
																																													5720	E7	9126	G3	9925	F10
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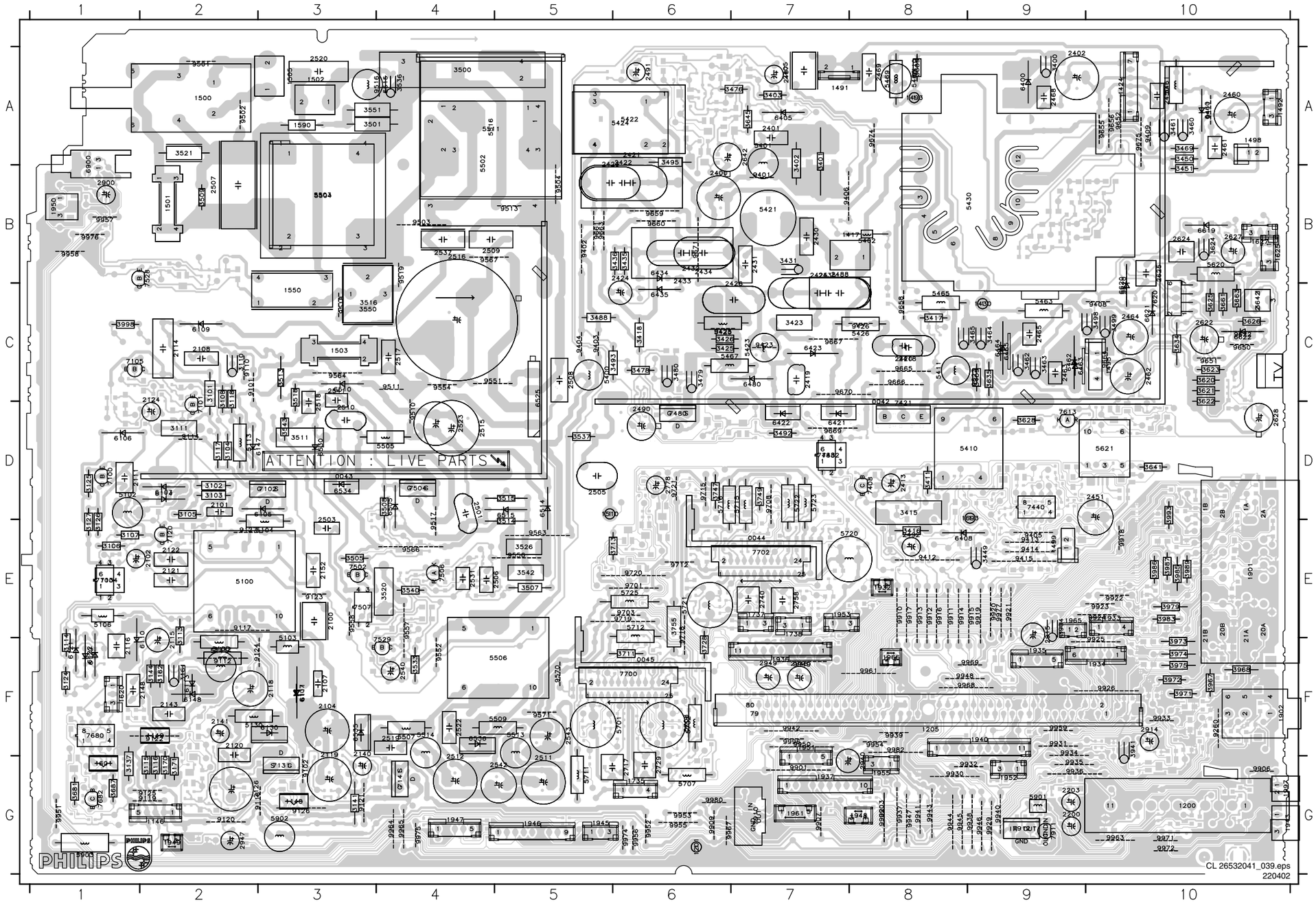
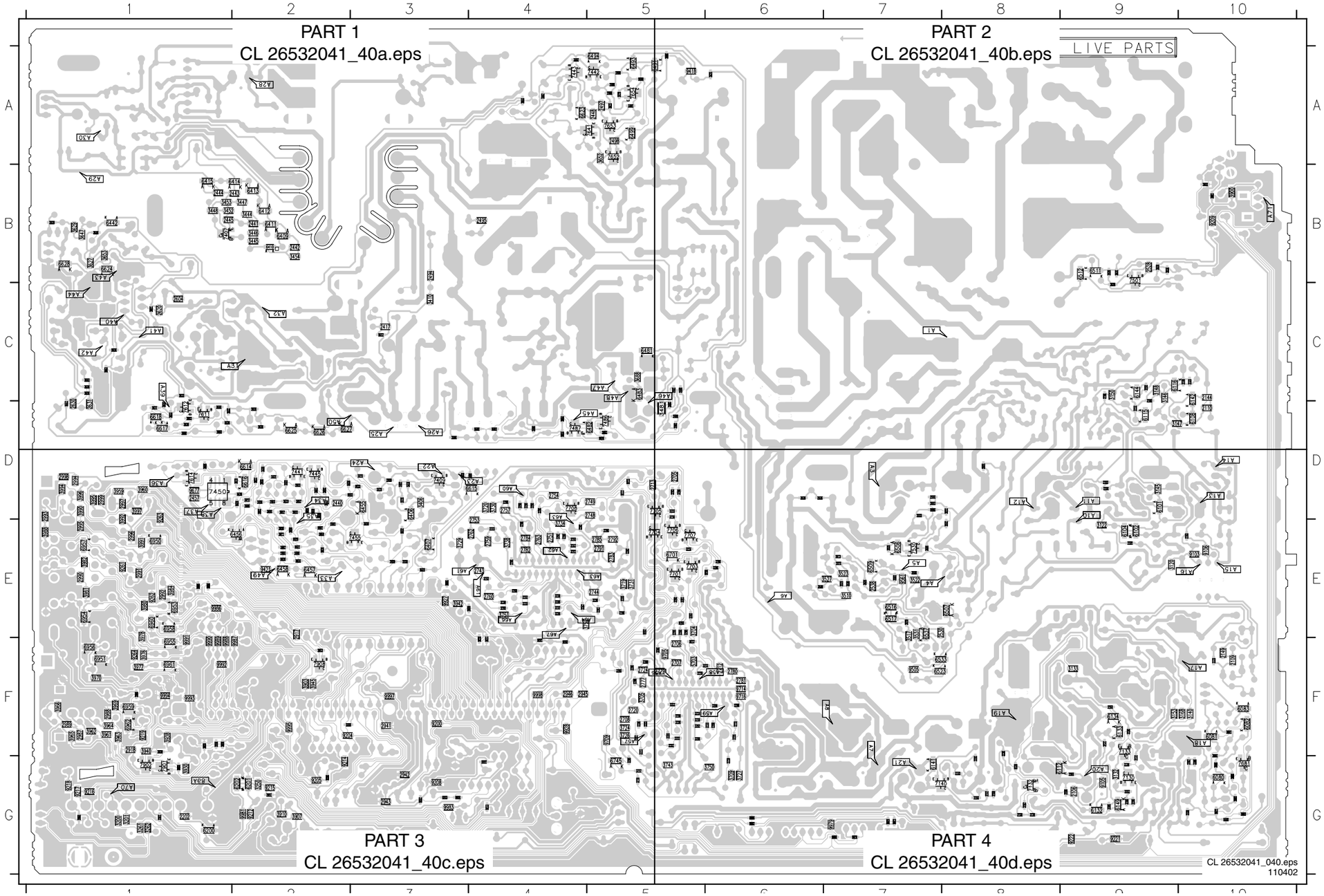
																																													5723	D7	9401	B7	9930	G8
																																													5725	E5	9402	B5	9931	F9
																																													5901	G9	9403	C5	9932	G9
																																													5902	G3	9404	C5	9933	F10
																																													5903	G1	9405	E9	9934	F9
																																													6103	D2	9406	B7	9935	G9
																																													6105	D2	9408	C10	9936	G9
																																													6106	D1	9409	A10	9937	G8
																																													6107	F3	9410	A8	9938	G9
																																													6109	C2	9411	A10	9939	F8
																																													6110	E2	9412	E8	9940	G9
																																													6111	F3	9413	E9	9941	G8
																																													6113	F2	9414	E9	9942	F7
																																													6114	D2	9415	E9	9943	G8
																																													6120	F1	9423	C7	9944	G8
																																													6121	E1	9425	C6	9945	G8
																																													6122	F1	9426	C8	9946	G9
																																													6130	F2	9501	A2	9947	G8
																																													6147	D3	9502	A2	9948	F8
																																													6148	F2	9503	B4	9949	F7
																																													6400	A9	9504	B5	9950	F7
																																													6405	A7	9510	D4	9951	G1
																																													6408	E8	9511	C4	9952	G6
																																													6421	D8	9513	B5	9953	G6
																																													6422	D7	9516	A3	9954	F8
																																													6423	C7	9517	E4	9955	G6
																																													6434	B6	9518	C3	9956	G6
																																													6435	C6	9519	B4	9957	B1
																																													6460	A10	9551	C4	9958	B1
																																													6462	C9	9552	F4	9959	F9
																																													6463	C9	9554	C4	9961	F8
																																													6464	C9	9556	E5	9963	G10
																																													6465	C9	9557	E4	9964	G4
																																													6480	C7	9558	E3	9965	G4
																																													6505	D4	9563	E5	9967	G6
																																													6510	C3	9564	C3	9968	F8
																																													6514	D5	9566	E4	9969	F9
																																													6515	D5	9567	B4	9971	G10
																																													6525	D5	9570	F5	9972	G10
																																													6530	D3	9571	F5	9974	G6
																																													6534	D3	9620	C10	9975	G4
																																													6535	F3	9622	C10	9976	B1
																																													6536	G4	9623	C9	9977	E9
																																													6619	B10	9650	C10	9980	G6
																																													6620	C10	9651	C10	9982	F8
																																													6621	C10	9652	A10	9996	F7
																																													6622	C10	9655	A10		
																																													6900	B1	9656	A10		
																																													7100	D1	9658	C8		



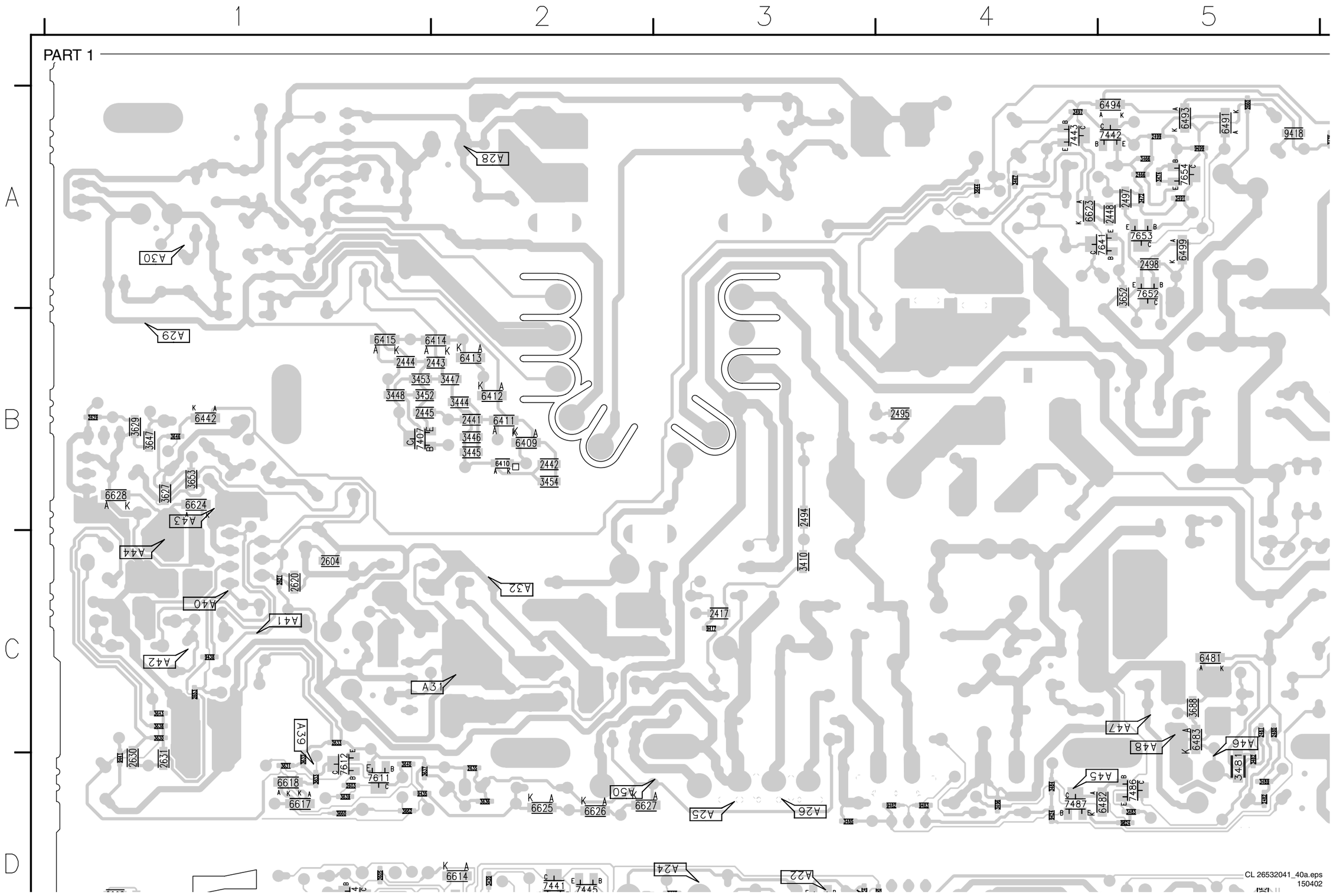
Layout Large Signal Panel (Overview Bottom Side)

2103 D9 2153 E10 2443 B2 2495 B4 2544 D7 2656 D2 2713 D5 2728 F5 2755 D4 2784 E4 2916 F1 2989 F1 3122 E9 3147 D9 3165 G9 3414 D3 3452 B1 3482 D5 3512 D8 3535 D6 3637 D1
2105 D9 2154 F9 2444 B1 2497 A5 2601 F10 2657 D2 2714 F6 2741 E4 2756 E4 2785 E5 2917 E2 2990 E1 3123 F10 3148 C9 3166 G10 3419 D2 3453 B1 3483 D5 3517 E7 3547 E8 3638 C1
2106 G9 2201 G1 2445 B1 2498 A5 2603 D1 2659 D2 2715 F6 2742 E4 2757 D4 2786 F6 2918 F1 2991 E1 3130 F9 3149 C10 3167 G10 3420 D2 3454 B2 3484 D4 3519 E7 3549 E6 3639 D1
2109 F10 2202 G1 2448 A5 2499 A5 2604 C1 2660 A5 2716 F5 2743 E4 2759 E4 2787 E5 2929 E4 2992 E1 3131 F9 3150 C9 3168 F10 3421 D2 3455 D2 3485 D3 3522 E7 3552 D7 3640 D1
2110 D10 2403 D2 2454 E2 2502 E7 2605 D1 2702 E5 2718 F5 2744 E5 2760 E4 2788 F5 2941 F3 2993 D1 3132 G9 3151 G9 3200 G1 3422 D2 3456 D2 3486 D2 3523 E7 3553 D7 3643 C1
2112 D9 2404 D2 2455 F2 2504 D8 2620 C1 2704 E5 2719 G6 2745 E4 2761 E5 2789 F5 2942 G3 2994 D1 3133 F9 3152 C9 3201 G1 3440 E2 3457 D2 3487 E2 3524 B9 3610 D2 3644 A4
2123 C10 2409 D3 2457 D1 2513 E7 2621 C1 2705 D5 2720 F5 2746 E5 2762 E4 2790 F5 2943 G3 2995 E1 3134 G8 3153 F9 3250 G2 3441 D2 3458 E3 3489 D5 3525 E7 3611 E2 3646 B1
2130 G8 2412 D3 2458 E3 2514 E7 2623 D2 2706 F5 2721 F5 2747 E4 2763 E4 2791 E5 2945 F4 2996 E1 3135 G9 3155 G8 3261 G1 3442 D2 3459 E3 3490 D4 3527 E7 3627 B1 3647 B1
2131 G9 2414 D3 2466 A5 2524 E7 2629 B1 2707 F5 2722 F5 2748 D5 2777 F5 2792 E5 2946 F4 2997 D1 3136 F8 3156 G9 3262 G1 3443 D2 3466 A5 3491 A5 3528 C9 3629 B1 3652 A5
2144 C10 2415 D3 2480 C5 2525 E7 2630 D1 2708 F5 2723 E4 2749 D5 2779 F5 2794 E4 2950 G1 2998 D1 3140 F10 3157 G8 3404 D3 3444 B2 3467 A4 3496 D4 3529 B9 3630 C1 3653 B1
2145 C9 2417 C3 2481 C5 2528 B9 2631 D1 2709 F6 2724 F5 2750 E4 2780 F6 2795 D4 2951 G2 2999 D1 3142 G8 3158 G9 3406 D3 3445 B2 3472 A5 3497 A4 3530 E7 3631 D1 3654 E2
2147 G8 2440 D2 2482 D5 2530 E7 2633 C1 2710 F6 2725 E5 2751 E4 2781 F6 2796 E4 2985 F1 3109 G10 3143 G8 3159 G8 3407 D3 3446 B2 3474 A5 3504 E7 3531 E7 3632 D1 3655 D2
2149 F10 2441 B2 2493 E2 2535 D6 2635 D2 2711 F5 2726 F5 2753 E4 2782 E4 2797 E4 2987 F1 3120 E9 3145 D9 3160 C9 3410 C3 3447 B2 3475 A6 3506 E7 3532 B9 3633 D1 3656 E2
2150 G9 2442 B2 2494 B3 2538 E7 2653 C1 2712 F6 2727 F5 2754 D4 2783 E5 2798 E5 2988 F1 3121 E9 3146 C9 3164 G9 3412 D2 3448 B1 3481 D5 3510 E7 3534 B9 3636 D2 3657 D2

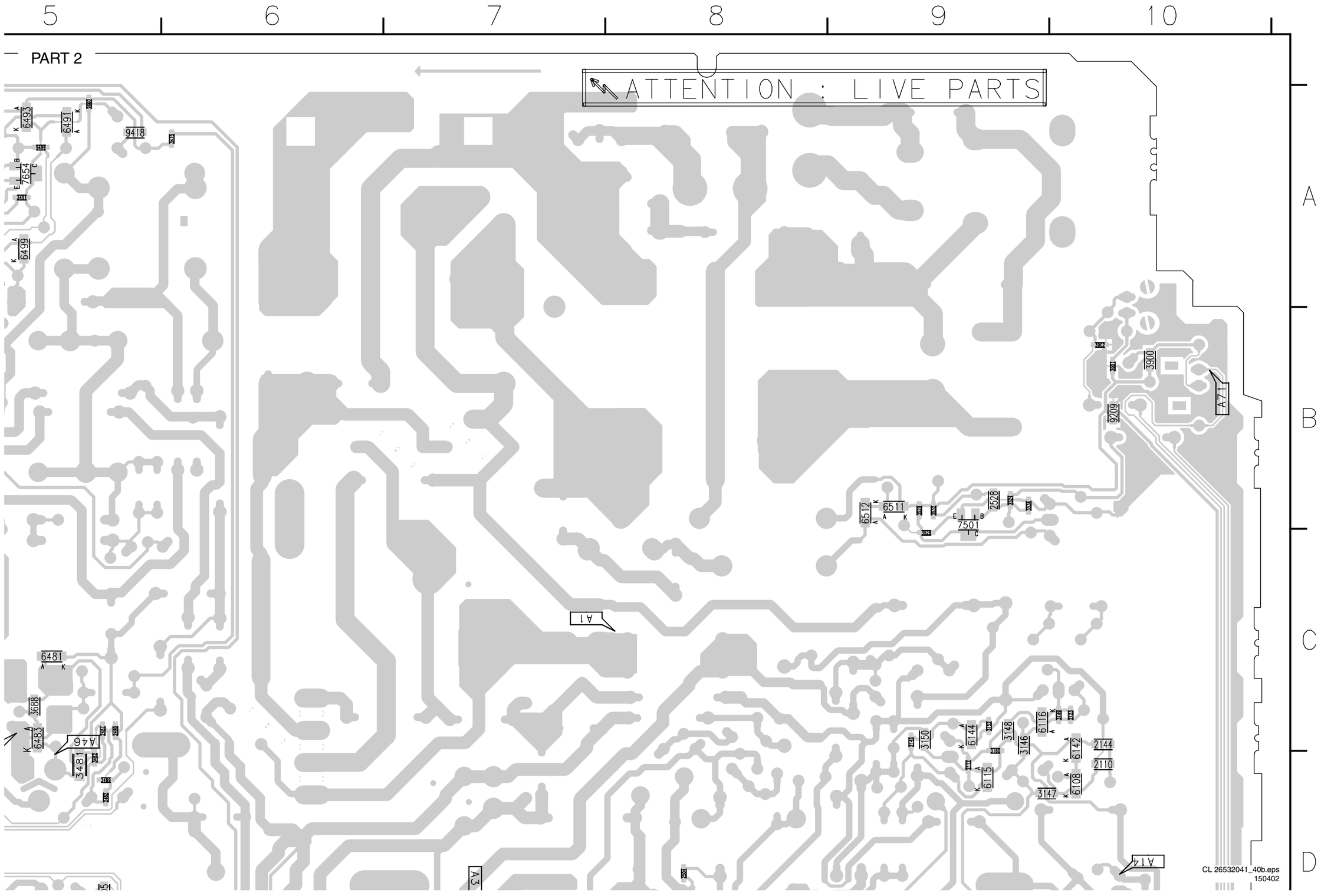


3658 E2 3959 D1 6617 D1 9250 F
3659 D2 3960 D1 6618 D1 9251 F
3660 D1 3961 F1 6623 A5 9261 E
3662 D1 3962 F1 6624 B1 9262 E
3682 G10 3963 F1 6625 D2 9263 D
3683 G10 3964 F1 6626 D2 9264 F
3684 F10 3965 F1 6627 D2 9417 C
3685 G10 3966 F1 6628 B1 9418 A
3686 G10 3969 F1 6701 E5 9421 E
3688 C5 3970 F1 6745 G5 9422 E
3701 E5 3976 F1 6950 E1 9424 D
3702 E5 3977 F1 6951 F1 9427 E
3703 D5 3978 E1 6953 E1 9428 D
3704 E5 3980 E1 6954 E1 9429 E
3705 F5 3981 E1 6955 E1 9430 E
3706 F5 3982 E1 6956 F1 9431 D
3707 F5 3984 E1 6957 E1 9432 E
3708 F6 3988 E1 6958 E1 9433 D
3709 G6 3990 D1 6959 F1 9434 D
3710 F5 3991 E1 6960 E1 9435 D
3712 F6 3992 D1 6961 F1 9436 D
3714 E5 3994 D1 6962 F1 9437 E
3715 D5 3995 D1 7130 G9 9438 C
3716 D5 3996 D1 7132 G8 9440 C
3717 G5 3997 D1 7133 F9 9441 D
3718 G5 5703 F5 7140 G7 9443 D
3719 E5 6080 G10 7407 B1 9481 E
3720 D4 6081 F10 7409 D3 9482 D
3721 F5 6082 F10 7441 D2 9483 D
3722 F5 6083 F10 7442 A5 9499 A
3723 F5 6101 D9 7443 A4 9505 F
3724 F5 6102 E9 7445 D2 9560 D
3725 F5 6104 E9 7450 D1 9561 E
3726 F5 6108 D10 7455 E3 9621 C
3727 G6 6112 G9 7486 D5 9624 D
3729 E3 6115 D9 7487 D4 9676 E
3730 D4 6116 C9 7501 C9 9677 D
3731 E5 6132 G9 7530 E7 9702 E
3732 E4 6133 F9 7611 D1 9705 F
3733 E4 6134 F9 7612 C1 9706 E
3734 E4 6141 G7 7614 D1 9707 E
3735 E4 6142 C10 7641 A4 9709 F
3736 E5 6144 C9 7652 B5 9711 D
3737 E4 6149 G9 7653 A5 9713 D
3738 E4 6200 G1 7654 A5 9714 F
3739 E4 6201 G2 7681 G10 9716 F
3740 E4 6202 G2 7701 E5 9717 F
3741 E4 6406 D3 7703 E5 9904 C
3742 E4 6407 E3 7704 E5 9905 E
3743 G5 6409 B2 7705 D5 9908 C
3744 E4 6410 B2 7706 E5 9927 E
3745 G5 6411 B2 7707 E5 9928 F
3746 E6 6412 B2 7708 D4 9960 C
3748 D5 6413 B2 7901 G1 9962 C
3750 G6 6414 B2 7902 F1 9966 C
3751 E4 6415 B1 7908 F2 9970 C
3752 E4 6442 B1 9103 E10 9973 C
3790 E5 6455 D3 9105 G9 9978 C
3791 F5 6456 E1 9106 E10 9979 C
3792 E5 6457 E2 9128 G8 9981 C
3793 F5 6458 E2 9200 F3 9983 C
3794 D4 6481 C5 9201 G4 9984 E
3795 D4 6482 D5 9203 G3 9985 E
3796 D4 6483 C5 9204 F2 9986 E
3797 E4 6491 A5 9205 G2 9987 F
3798 E6 6493 A5 9206 G2 9988 F
3900 B10 6494 A5 9207 G3 9989 F
3901 B10 6499 A5 9208 G3 9990 F
3902 B10 6506 E7 9209 B10 9991 F
3903 F2 6507 E7 9210 F4 9992 F
3907 G2 6509 E7 9211 F4 9993 F
3910 G2 6511 B9 9212 G2 9994 F
3928 F1 6512 C9 9213 G4 9995 F
3929 F1 6516 E7 9214 G2 9997 F
3930 G1 6517 E7 9215 G2 9998 F
3938 F1 6523 F7 9216 G1
3939 F1 6533 F8 9217 G1
3940 F1 6537 E7 9218 G1
3942 E3 6614 D2 9219 F1
3943 F2 6615 D3 9221 G9
3945 F2 6616 D2 9222 G9

Layout Large Signal Panel (Part 1 Bottom Side)

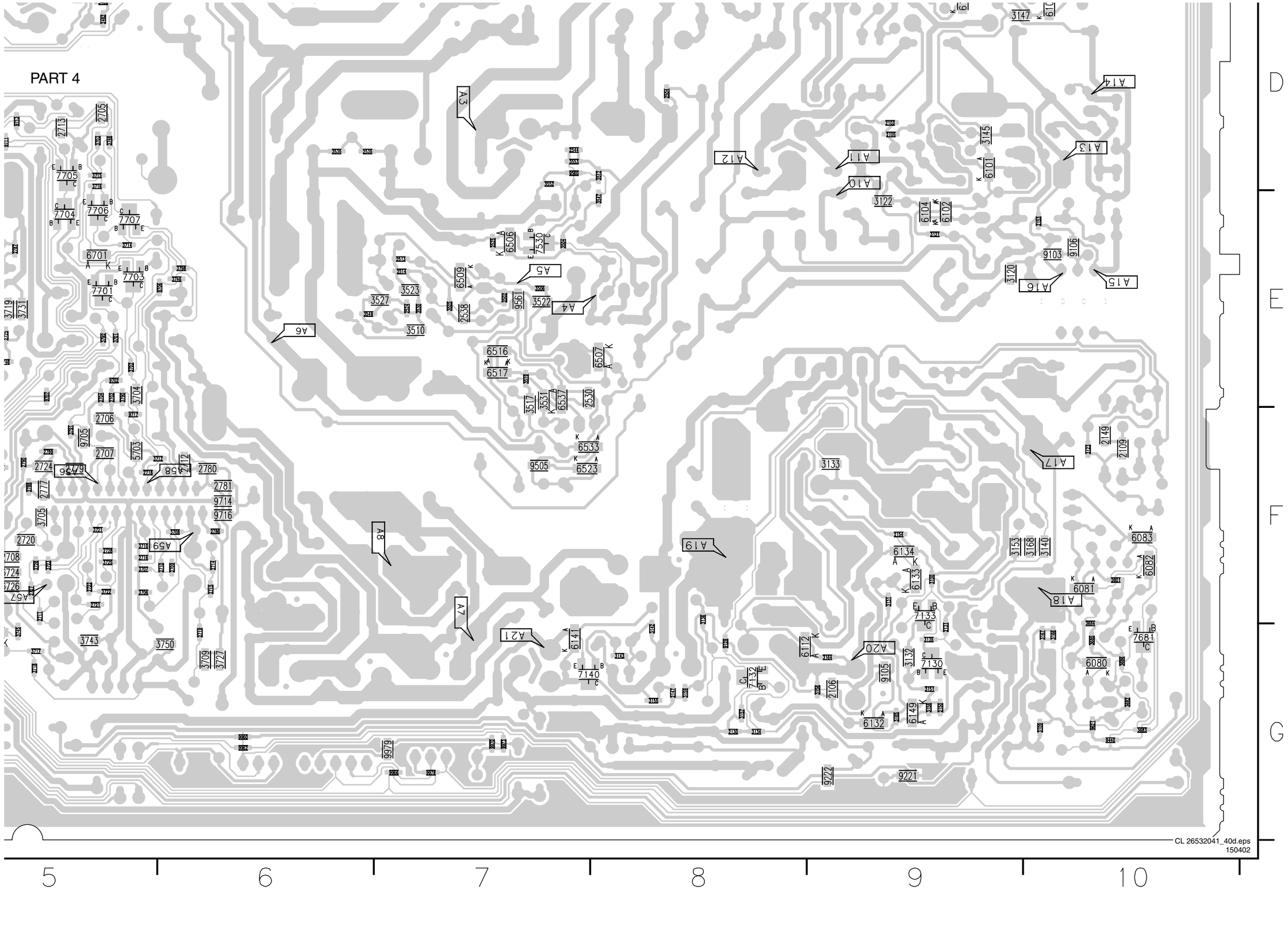


Layout Large Signal Panel (Part 2 Bottom Side)

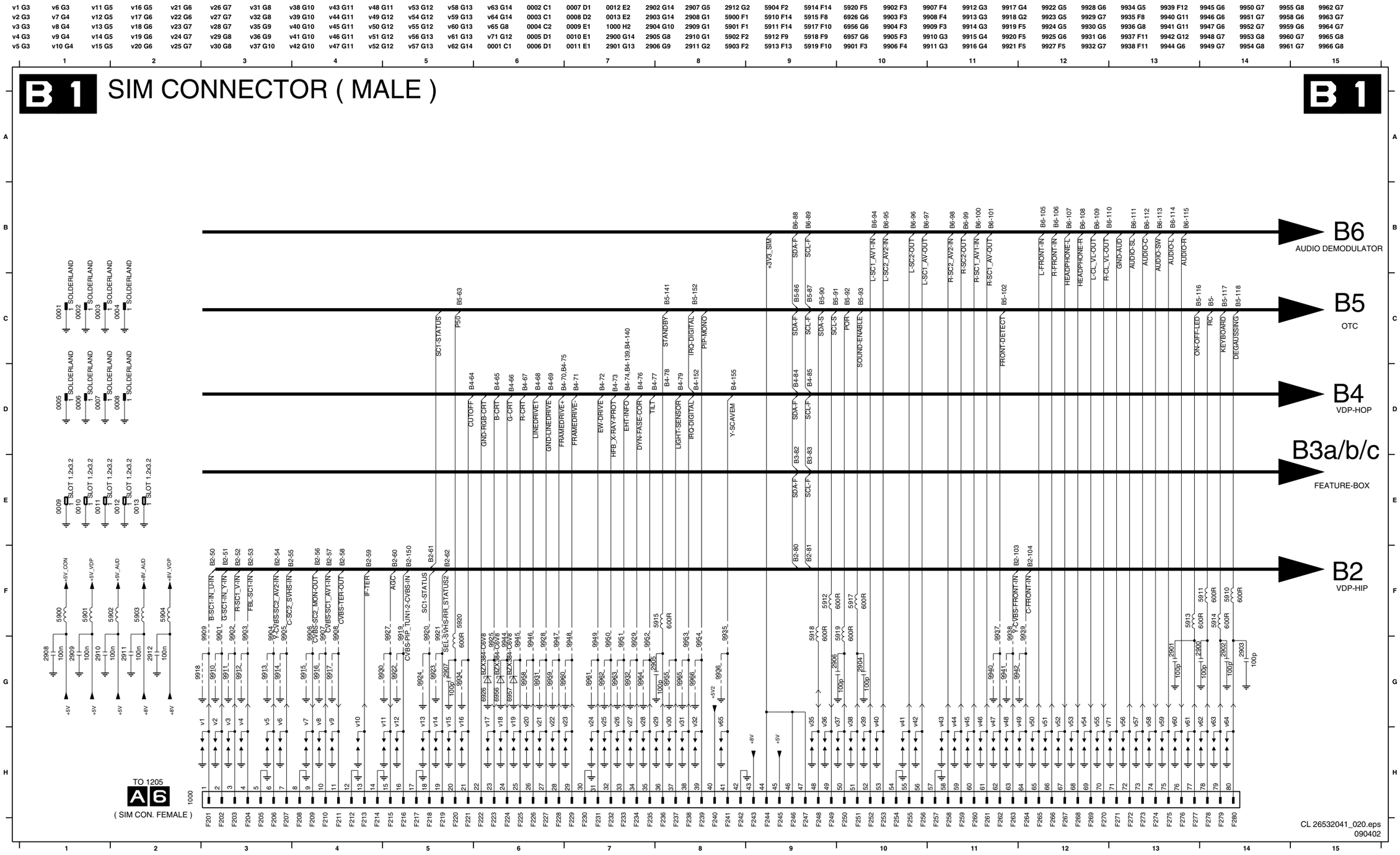


Layout Large Signal Panel (Part 3 Bottom Side)

Layout Large Signal Panel (Part 4 Bottom Side)



Small Signal Board: SIM Connector (Male)



Small Signal Board: IF. I/O Video Processing

B2 IF,I/O VIDEOPROCESSING B2

B1÷B10

HIP

7323 TDA9320H

7307 TDA9181

LUMA & CHROMA PROC.

I/O SWITCH

COIL 40.4 SUPPRESSION

CL 26532041_021.eps 220402

I5 PM3394B 20mV / div AC 10us / div

I6 PM3394B 1V / div DC 10us / div

V1 PM3394B 1V / div DC 10us / div

V2 PM3394B 1V / div DC 10us / div

V5 PM3394B 1V / div DC 10us / div

V6 PM3394B 500mV / div DC 20us / div

V7 PM3394B 500mV / div DC 20us / div

V8 PM3394B 1V / div DC 20us / div

V9 PM3394B 2V / div DC 200us / div

V10 PM3394B 2V / div DC 200us / div

F14 1V / div DC 5ms / div

L8 1V / div DC 20us / div

1303 B13
1305 E11
1306 E12
1307 E12
1308 E13
1403 A1
1406 E5
1407 E6
1408-A F4
1408-B G3
1409-A B4
1409-B C3
1410-A E4
1410-B E3
1411 G6
2302 H14
2305 C11
2316 C11
2322 C11
2327 D12
2339 H8
2350 A11
2351 A11
2352 A11
2353 I12
2354 G12
2355 C12
2356 F11
2357 F11
2358 F11
2359 F11
2360 F12
2361 F13
2362 F13
2364 C12
2365 F7
2366 F8
2367 F8
2368 F8
2369 F8
2370 F9
2371 B10
2372 B10
2373 B8
2374 B8
2375 B8
2376 B7
2377 B6
2378 B7
2379 F12
2380 F12
2381 F12
2382 F13
2383 D12
2384 F7
2385 G13
2387 H9
2388 A11
2389 B12
2390 B1
2391 B3
2394 B6
2399 F7
2401 C7
2402 G7
2404 C7
2405 D1
2406 G2
2407 G3
2408 H3
2409 C7
2411 C7
2412 C1
2413 D5
2417 E7
2418 D7
2419 D7
2420 G8
2421 F14
2422 E13
2423 F14
2424 G11
2425 B1
2426 C14
2427 C14
2428 C14
3301 I12
3303 H10
3370 F9
3371 G9
3372 G9
3373 C12
3374 C12
3375 C12
3376 B10
3377 A10
3378 B10
3379 D11
3380 B8
3381 H8
3382 F7
3385 G7
3389 F9
3393 F11
3400 B6
3401 B7
3402 B1
3403 G7
3404 I6
3405 H5
3406 G2
3407 F2
3408 B5
3409 G2
3410 E3
3411 C2
3412 E12
3414 D2
3415 A5
3416 D5
3417 G5
3418 C7
3419 D5
3420 G6
3421 F5
3423 H1
3433 G1
3434 E2
3435 G5
3436 D6
3437 D7
3439 E6
3441 B5
3444 B11
3445 F6
3446 F8
3447 B11
3448 B12
3449 B12
3450 E14
3451 F14
3452 F14
3456 G5
3457 H5
3460 D13
3461 D14
3462 D14
3463 B5
3468 H11
3473 F7
3474 F6
5309 B14
5310 B14
5311 B14
5312 F14
5401 D3
5402 E5
5403 H2
5404 B7
5405 B7
5406 E6
5408 C6
5409 G8
5411 C1
5415 A2
5416 A3
5417 G7
6402 E2
6403 D2
6404 G2
6405 E2
7307 G11
7320 F9
7322 E7
7323 D9
7401 E2
7402 H7
7403 D2
7404 D12
7405 H1
7406 F5
7407 F5
7408 A12
7409 A12
7410 G5
7411 D6
7412 F14
7413 D13
9318 G11
9319 G11
9322 F8
9324 G11
9401 F3
9402 E3
9403 E2
9405 E2
9406 F13
9407 A4
9408 H7
9410 A4
9412 F6
9413 F6
9414 E7
9415 C3
9416 D5
9417 D6
9418 E5
9419 E7
9420 F6
c002 A8

Small Signal Board: PICNIC

B3A PICNIC

B3A

L6 PM3394B 500mV / div DC 10us / div

L7 PM3394B 500mV / div DC 10us / div

L9 PM3394B 1V / div DC 250ns / div

L10 1V / div DC 20us / div

L11 1V / div DC 5ms / div

FBX SOFTWARE

PROM

7714 MS81V04160 FIELD MEMORY FM1

MICRO-PROCESSOR PSP

7713 PICNIC SAA4978H

BACK END

PEAKING

MUX

3 X DAC

MID END

HISTOGRAM

NOISE REDUCTION

TBC/SRC

MUX

ANALOG PROCESSING

3 X ADC

FRONT END

PLL

OSC

BST

TO B3c MAPPING I1

TO B3c MAPPING G1

TO B3b

B1 B10

L1 1 V / div DC 10µs / div

L2 1 V / div DC 10µs / div

L3 1 V / div DC 10µs / div

L4 1 V / div DC 10ms / div

L5 1 V / div DC 20µs / div

CL 26532041_022.eps 220402

0018 K15 3756 D4
0019 K15 3758 E6
1701 J5 3759 H5
1702 K5 3760 J5
1710 K4 3762 J12
2700 A2 3763 J12
2701 B2 3764 E9
2702 B2 3765 E10
2703 B2 5700 B2
2704 B2 5701 B2
2705 B2 5702 C2
2706 C2 5706 L1
2707 C2 5710 B6
2708 C2 5711 C6
2713 F1 5712 D4
2714 F2 5713 E4
2718 H2 5714 G4
2719 H2 5729 H15
2720 I2 5731 I15
2721 I2 5733 I15
2722 J1 5736 I5
2723 D1 5737 C11
2724 E1 5744 B11
2728 L2 7703 D2
2729 L2 7706 K2
2730 L3 7707 C3
2740 H4 7708 B5
2741 H4 7709 C4
2742 H4 7710 C5
2743 B4 7711 B7
2744 B5 7712 D6
2745 B6 7713 H8
2746 C6 7714 D15
2748 E5 7715 F2
2749 E5 9700 A6
2750 E5 9701 E5
2751 G4 9702 D5
2752 H4 9703 G5
2753 I5 9704 K5
2755 G5 9705 K3
2756 J5 9706 K3
2757 H5 9707-A I12
2758 K4 9707-B I13
2759 K5 9707-C I13
2760 L8 9707-D I13
2761 L9 9708-A H12
2762 J13 9708-B I13
2763 H13 9708-C I13
2764 E12 9708-D I13
2765 E10 9709-A H12
2766 E8 9709-B H13
2767 C11 9709-C H13
2769 D13 9709-D H13
2773 F15 9710-A G12
2775 F16 9710-B G13
2777 F17 9710-C G13
2778 F17 9710-D G13
2779 D17 9711 G13
2781 C15 9725 D3
2823 B6 9726 E3
2824 C6 9730 B6
2831 G2 9731 B6
2870 B11 9732 C6
2871 H15 9733 C6
2872 H16 9734 E4
2874 J15 9735 D4
2877 I15 9736 A1
2878 I16 9737 B1
2881 I5 9738 C1
3703 A2 9739 G17
3704 B2 9760 C15
3705 C2 9761 F15
3706 A3
3707 B3
3708 C3
3709 E2
3710 F2
3712 L6
3713 G1
3714 H1
3715 I1
3716 H2
3717 H2
3718 I2
3719 F2
3720 G2
3721 E2
3722 E2
3725 I3
3726 J2
3727 I3
3728 I2
3729 D2
3730 I2
3731 D2
3733 D2
3734 E2
3735 E2
3736 B4
3737 C4
3738 C4
3739 C4
3741 C4
3742 C4
3743 C5
3746 C5
3747 B4
3748 B4
3749 C3
3750 C5
3751 A5
3752 B5
3753 B5
3754 B5
3755 C3

Small Signal Board: Diversity Tables

[B2] IF I/O VIDEOPROCESSING

Item	EUROPE	AP, Dobly ProLogic ,Pixel Plus, NON PIP	AP, Virtual Dolby, NON Pixel Plus	AP, Dobly ProLogic, Pixel Plus	USA	Description
1303					X	5p
1305	X	X	X	X		XTL 4.433619MHz
1406					X	Filter 4.5MHz TPSCC*MB BS
1406		X	X	X		Filter 5.5MHz/5.74MHz TPWCC04BS
1407		X	X	X		Filter 4.5MHz TPSCC*MB BS
1407	X					Filter 5.5MHz/5.74MHz TPWCC04BS
1408						Saw filter 38MHz OFWK3955L
1408	X					Saw filter 38.9MHz OFWK3953L
1409						Saw filter 38MHz OFWK9352L
1409		X	X	X		Saw filter 38.9MHz OFWK9361L
1409	X					Saw filter 38.9MHz OFWK9656L
1410					X	Saw filter 45.75MHz OFWM1967L
1410		X	X	X		Saw filter 38.9MHz OFWK7265L
1411					X	Filter 4.5MHz SFSCC*MCC BP
2305	X					100nF
2316	X					100nF
2322	X					100nF
2353	X	X	X	X		100nF
2354	X	X	X	X		100nF
2359	X	X	X	X		15pF
2360	X	X	X	X		1.2pF
2385	X	X	X	X		100nF
2388		X	X	X	X	33nF
2389		X	X	X	X	2.2 F
2399					X	47pF
2399				X		100pF
2399		X	X			68pF
2401					X	10nF
2404					X	2.2 F
2404	X	X	X	X		1 F
2406	X					220pF
2407	X					68pF
2408	X					2.7pF
2409	X	X	X	X		2.2 F
2413					X	47 F
2417	X	X	X	X		470nF
2418					X	12pF
2418	X	X	X	X		5.6pF
2424	X	X	X	X		100nF
3301	X	X	X	X		100kR
3303	X	X	X	X		100kR
3373	X					Jumper
3374	X					Jumper
3375	X					Jumper
3379	X					Jumper
3380	X	X	X	X		100R
3382		X	X	X	X	390R
3382	X					560R
3401					X	100kR
3406	X					27R
3407		X	X	X		5kR6
3409		X	X	X		4kR7
3410		X	X	X		4kR7
3411	X					2kR7
3414	X					4kR7

[B4] HOP

Item	EUROPE	AP, Dobly ProLogic ,Pixel Plus, NON PIP	AP, Virtual Dolby, NON Pixel Plus	AP, Dobly ProLogic, Pixel Plus	USA	Description
1304		X	X	X	X	7p
2301		X				100nF
2303		X	X	X	X	10nF
2303	X					1uF
2312	X	X		X	X	33nF
2342		X	X	X	X	100nF
2395		X	X	X	X	100nF
2396		X	X	X	X	100nF
2397		X	X	X	X	100nF
2398		X				100nF
3305		X				22kR
3308		X	X		X	470kR
3308				X		220kR
3308	X					150kR
3329	X	X		X	X	6.8R
3329			X			3R9
3330		X	X	X	X	1kR
3332		X	X	X	X	1kR
3335		X	X	X	X	1kR
3339			X			Jumper
3355		X	X	X	X	33kR
3360		X	X	X	X	100kR
3387		X	X	X	X	100R
3395		X	X	X	X	100R
3396		X	X	X	X	100R
3397		X	X	X	X	100R
3398		X	X	X	X	100R
3453			X			10kR
3454			X			100R
3455			X			100R
3467		X	X	X	X	10kR
3470		X	X	X	X	33kR
3471		X	X	X	X	100kR
5303		X	X	X	X	Jumper
5304		X	X	X	X	Jumper
5305		X	X	X	X	Jumper
5306		X	X	X	X	Jumper
5307		X	X	X	X	Jumper
5308		X	X	X	X	Jumper
6308			X			BAS316
6320		X	X	X	X	BZX384-C6V8
6321		X	X	X	X	BZX384-C6V8
6322		X	X	X	X	BZX384-C6V8
7302			X			TDA9178T/N1
7305		X	X	X	X	SIGBC847BW
7312	X	X		X	X	SIGPDTC144EU
7375		X	X	X	X	SIGBC847BW
9302	X	X		X	X	Jumper
9303	X	X		X	X	Jumper
9304	X	X		X	X	Jumper

[B5] OTC

Item	EUROPE	AP, Dobly ProLogic ,Pixel Plus, NON PIP	AP, Virtual Dolby, NON Pixel Plus	AP, Dobly ProLogic, Pixel Plus	USA	Description
1001	X	X	X	X	X	XTL 6.000MHz
2001	X	X	X	X	X	33pF
2002	X	X	X	X	X	27pF
2003	X	X	X	X	X	220nF
2004	X	X	X	X	X	220nF
2005	X	X	X	X	X	100nF
2006	X	X	X	X	X	100nF
2007	X	X	X	X	X	100nF
2008	X	X	X	X	X	100nF
2010	X	X	X	X	X	47pF
2011	X	X	X	X	X	47pF
2012	X	X	X	X	X	47pF
2013	X	X	X	X	X	100 F
2016	X	X	X	X	X	100 F
2016	X	X	X	X	X	100 F
2017	X	X	X	X	X	100nF
2019	X	X	X	X	X	100nF
2020	X	X	X	X	X	220pF
2022	X	X	X	X	X	100nF
2023	X	X	X	X	X	100nF
2024	X	X	X	X	X	100nF
2025	X	X	X	X	X	100nF
2026	X	X	X	X	X	100nF
2027	X	X	X	X	X	100nF
2028	X	X	X	X	X	100nF
2029	X	X	X	X	X	100nF
2031	X	X	X	X	X	100nF
2033	X	X	X	X	X	82pF
2034	X	X	X	X	X	82pF
2035	X	X	X	X	X	82pF
2036	X	X	X	X	X	82pF
2037	X	X	X	X	X	82pF
2038	X	X	X	X	X	100nF
2039	X	X	X	X	X	100nF
2040	X	X	X	X	X	100nF
3001	X	X	X	X	X	4.7kR
3002	X	X	X	X	X	4.7kR
3003	X	X	X	X	X	24kR
3006	X	X	X	X	X	470R
3007	X	X	X	X	X	4x470R
3008	X	X	X	X	X	4x150R

[B6] AUDIO DEMODULATOR

Item	EUROPE	AP, Dobly ProLogic ,Pixel Plus, NON PIP	AP, Virtual Dolby, NON Pixel Plus	AP, Dobly ProLogic, Pixel Plus	USA	Description
1681				X	X	3p
1682				X	X	10p
2509	X	X		X	X	10 F
2546	X					10 F
2547	X					10 F
2551	X					3.3nF
2572	X	X		X	X	1nF
2573	X	X		X	X	1nF
2580	X					1nF
2581	X					1nF
2592	X	X		X	X	1nF
2600	X	X		X	X	1 F
2601	X	X		X	X	1 F
2602	X	X		X	X	1 F
2603	X	X		X	X	1 F
2604	X	X		X	X	1 F
2612				X		1 F
2629	X	X		X	X	330nF
2630	X	X		X	X	2.2 F
2632	X	X		X	X	330nF
2637	X	X		X	X	330nF
2697	X	X		X	X	100nF
2698	X	X		X	X	2.2 F
2699	X	X		X	X	2.2 F
3520	X	X		X	X	47kR
3528	X	X		X	X	10kR
3544	X	X		X	X	47kR
3545	X	X		X	X	1.2kR
3547	X	X		X	X	47kR
3551	X					1kR
3552	X	X		X	X	10kR
3553	X	X		X	X	22kR
3554	X	X		X	X	22kR
3555	X	X		X	X	22kR
3556	X	X		X	X	100R
3557	X	X		X	X	100R
3568	X					100R
3569	X					100R
3577	X	X		X	X	100R
3601	X	X		X	X	22kR
3602	X	X		X	X	120kR
3603	X	X		X	X	220kR
3604	X	X		X	X	120kR
3605	X	X		X	X	220kR
3606	X	X		X	X	120kR
3607	X	X		X	X	220kR
3608	X	X		X	X	120kR
3609	X	X		X	X	220kR
3612	X					47kR
3613	X					47kR
3616	X					2.7kR
3617				X		10kR
3618				X		10kR
3619				X		1kR
3624	X	X		X	X	1.2kR
3626	X	X		X	X	150kR
3627	X	X		X	X	10kR
3628	X	X		X	X	22kR

[B9] ANTI-MOIRE

Item	EUROPE	AP, Dobly ProLogic ,Pixel Plus, NON PIP	AP, Virtual Dolby, NON Pixel Plus	AP, Dobly ProLogic, Pixel Plus	USA	Description
2062					X	22nF
2063					X	47nF
2064					X	22nF
2065					X	100nF
2066					X	47nF
3022					X	39kR
3023					X	10kR
3028					X	4.7kR
3030					X	1.2kR
3032					X	470R
3036					X	2.7kR
3037					X	2.2kR
3038					X	10kR
3043					X	1.5kR
3060					X	2.7kR
3070					X	10kR
3071					X	10kR
6006					X	BAS316
6007					X	BAS316
7017					X	SIGBC847BW
7018					X	SIGBC847BW
7019					X	SIGBC847BW
7020					X	SIGBC847BW

[B3A] PICNIC

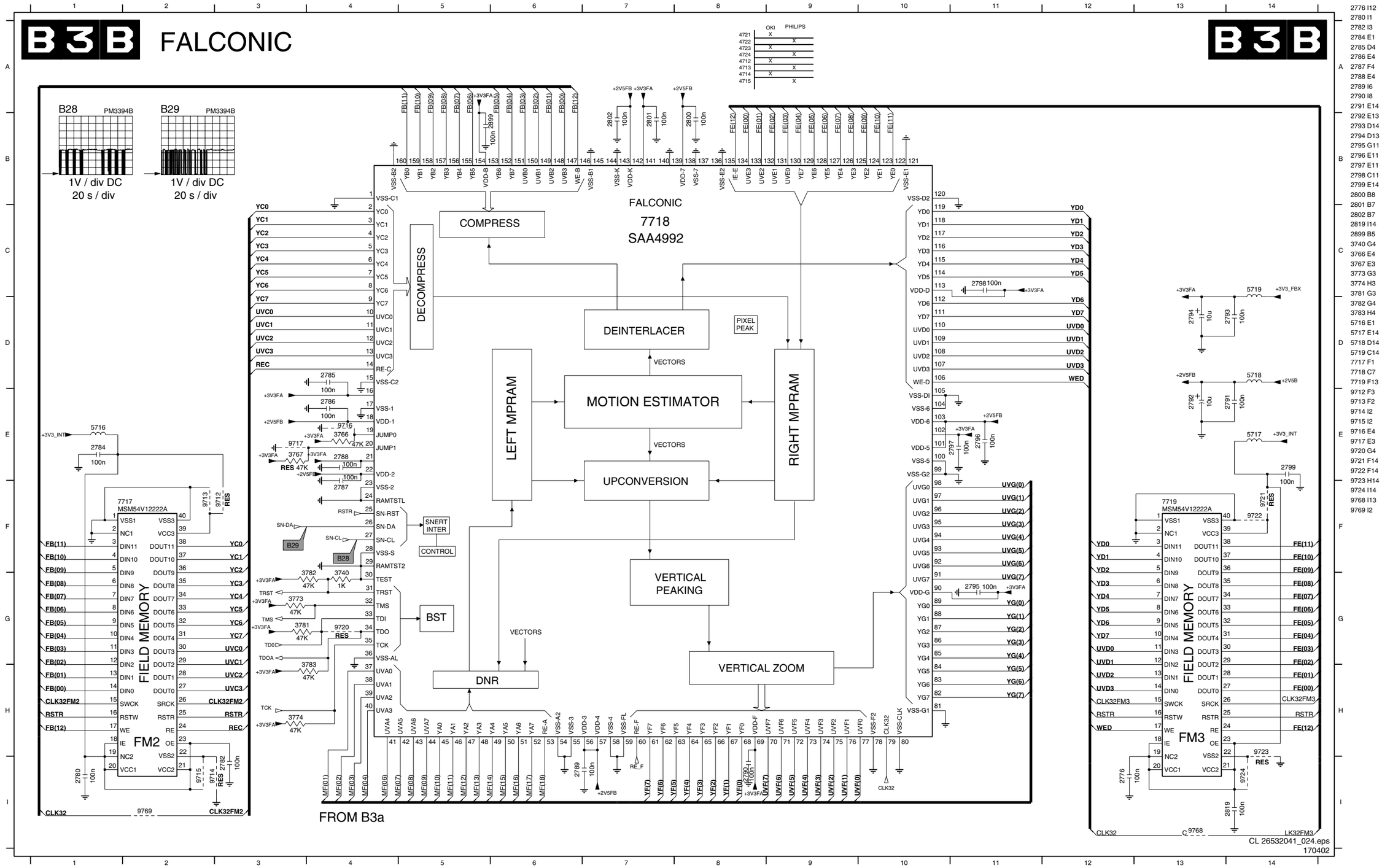
Item	EUROPE	AP, Dobly ProLogic ,Pixel Plus, NON PIP	AP, Virtual Dolby, NON Pixel Plus	AP, Dobly ProLogic, Pixel Plus	USA	Description
2700			X			Jumper
2701	X	X		X	X	12pF
2703			X			Jumper
2704	X	X		X	X	12pF
2706			X			Jumper
2707	X	X		X	X	12pF
3703	X	X		X	X	330R
3704	X	X		X	X	330R
3705	X	X		X	X	330R
3706			X			390R
3707			X			390R
3708			X			390R
3734			X			1R
3735	X	X		X	X	1R
3736	X	X		X	X	100R
3737	X	X		X	X	1kR
3738	X	X		X	X	1kR
3739	X	X		X	X	15kR
3741	X	X		X	X	18kR
3742	X	X		X	X	18kR
3746	X	X		X	X	3.9kR
3749	X	X		X	X	3.9kR
3750	X	X		X	X	3.3kR
3755	X	X		X	X	4.7kR
3756	X	X		X	X	8.2kR
5700	X	X		X	X	2.2 H
5701	X	X		X	X	1 H
5702	X	X		X	X	1 H
7707	X	X		X	X	SIGBC847B
7709	X	X		X	X	SIGBC847B
7710	X	X		X	X	SIGBC847B
9707			X			4x10R
9708			X			4x10R
9709			X			4x10R
9710			X			4x10R
9711			X			Jumper
9725	X	X		X	X	Jumper
9726			X			Jumper

[B3C] EAGLE

Item	EUROPE	AP, Dobly ProLogic ,Pixel Plus, NON PIP	AP, Virtual Dolby, NON Pixel Plus	AP, Dobly ProLogic, Pixel Plus	USA	Description
2709	X	X		X	X	100nF
2710	X	X		X	X	100nF
2711	X	X		X	X	100nF
2712	X	X		X	X	100nF
2716	X	X		X	X	100nF
2717	X	X		X	X	12pF
2725	X	X		X	X	12pF
2726	X	X		X	X	27pF
2727	X	X		X	X	12pF
2731	X	X		X	X	100nF
2732	X	X		X	X	100nF
2733	X	X		X	X	100nF
2734	X	X		X	X	100nF
2735	X	X		X	X	100nF
2736	X	X		X	X	27pF
2737	X	X		X	X	12pF
2738	X	X		X	X	12pF
2739	X	X		X	X	27pF
2747	X	X		X	X	100nF
2754	X	X		X	X	100nF
2768	X	X		X	X	100nF
2770	X	X		X	X	10 F
2771	X	X		X	X	100nF
2772	X	X		X	X	100 F
2774	X	X		X	X	100nF
2783	X	X		X	X	100nF
2803	X	X		X	X	100nF
2804	X	X		X	X	100nF
2805	X	X		X	X	100nF
2807	X	X		X	X	100nF
2808	X	X		X	X	10 F
2809	X	X		X	X	100nF
2810	X	X		X	X	100nF
2811	X	X		X	X	100nF
2812	X	X		X	X	100nF
2813	X	X		X	X	100nF
2814	X	X		X	X	100nF
2815	X	X		X	X	2.2pF
2816	X	X		X	X	2.2pF
2817	X	X		X	X	100nF
2818	X	X		X	X	2.2pF
2820	X	X		X	X	100nF
2821	X	X		X	X	100nF
2822	X	X		X	X	100nF
2825	X	X		X	X	100nF
2826	X	X		X	X	100nF
2827	X	X		X	X	100nF
2828	X	X		X	X	100nF
2829	X	X		X	X	100nF
2830	X	X		X	X	100nF
2832	X	X		X	X	100nF
2833	X	X		X	X	100nF
2835	X	X		X	X	100nF
2838	X	X		X	X	100nF
2843	X	X		X	X	100nF
2845	X	X		X	X	100nF
2846	X	X		X	X	100nF
2847	X	X		X	X	100nF

CL 26532041_023.eps
220402

Small Signal Board: Falconic



Small Signal Board: Eagle

B3C EAGLE

7722
MS81V04160
FIELD MEMORY
FM4

7723
MS81V04160
FIELD MEMORY
FM5

7724
T8F24EF
EAGLE - IC

7725
PMBT2369

7726
LD1117

7727
LF15AB

7728
BFS20

7729
BFS20

7730
BFS20

7731
BFS20

7732
BFS20

7733
BFS20

CLK32OFM4

CLK32OFM5

CLK32O

CLK32I

B1 ÷ B10

L24

1 V / div DC
10µs / div

L25

1 V / div DC
10µs / div

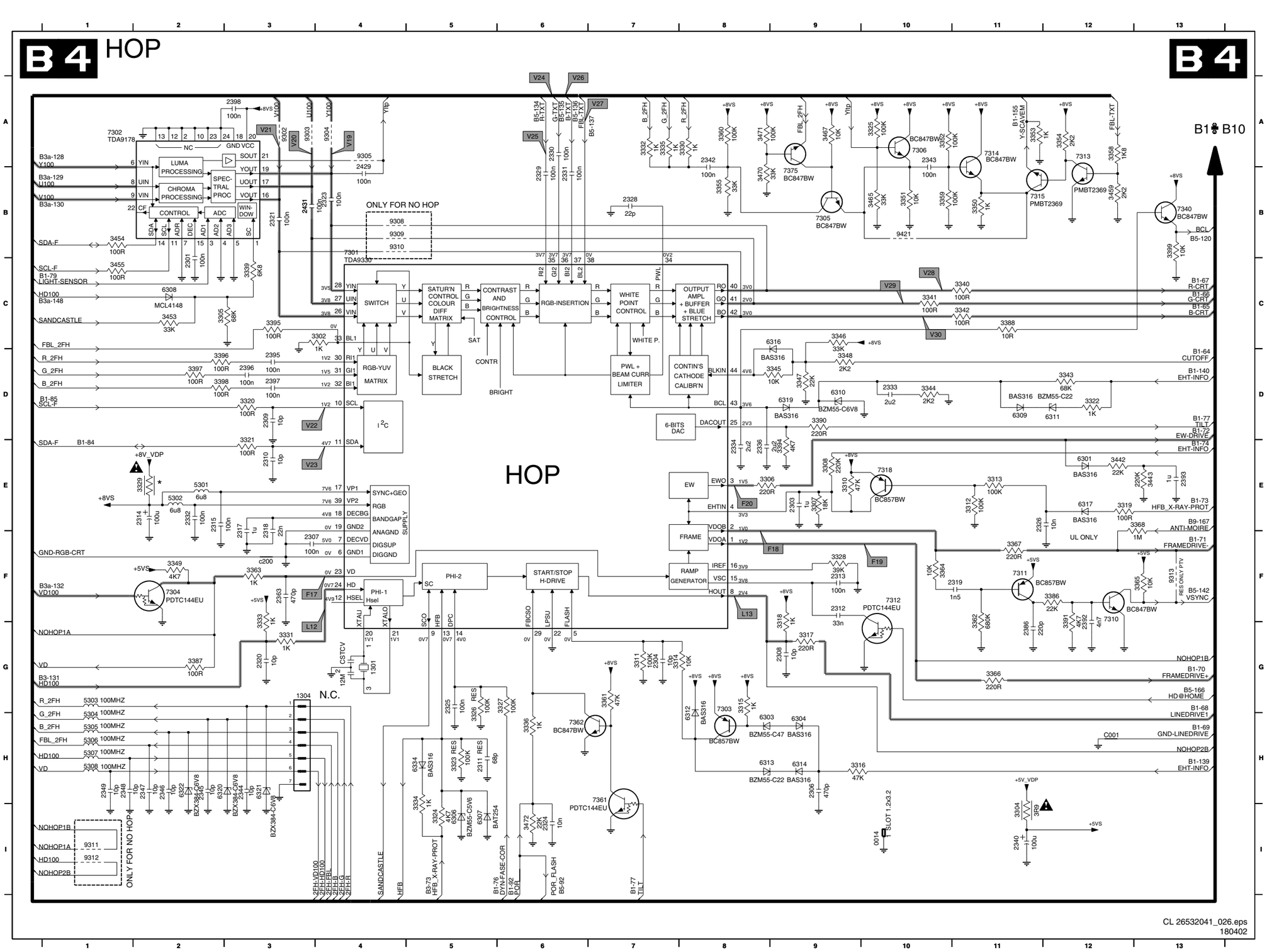
L26

1 V / div DC
10µs / div

CL 26532041_025.eps
220402

2709 C6	3795 F6	
2710 D6	3800 G7	
2711 E7	3801 H1	
2712 A8	3802 G7	
2716 D7	3803 H7	
2717 J7	3804 C1	
2725 J7	3805 J1	
2726 J7	3806 J1	
2727 J9	3807 J6	
2731 A10	3808 J9	
2732 B12	3809 J1	
2733 C12	3810 J6	
2734 D13	3811 J8	
2735 G11	3812 J8	
2736 J9	3813 J9	
2737 J12	3814 J1	
2738 J12	3815 J1	
2739 J12	3816 J1	
2747 A9	3817 J1	
2754 A12	3818 J1	
2768 A9	3819 G1	
2770 F14	3820 G1	
2771 F14	3821 H7	
2772 F14	3822 H7	
2774 C14	3823 H7	
2783 I11	3824 H7	
2803 B14	3825 G7	
2804 B14	3826 G7	
2805 G13	3827 H7	
2806 B13	5705 H1	
2807 B13	5721 A1	
2808 B12	5722 B1	
2809 E5	5723 A1	
2810 B4	5724 F1	
2811 E5	5725 B1	
2812 F5	5726 F5	
2813 B3	5727 E5	
2814 I12	5728 D1	
2815 J7	5738 G1	
2816 J10	5739 J7	
2817 C1	5740 J9	
2818 J12	5741 J1	
2820 E2	5742 F1	
2821 E3	5743 C1	
2822 E3	5745 G1	
2825 D4	7720 A1	
2826 F5	7722 C3	
2827 I6	7723 H3	
2828 I9	7724 D1	
2829 F3	7725 B6	
2830 I10	7726 G1	
2832 G4	7727 E1	
2833 H5	7728 I6	
2835 I4	7729 I9	
2838 J3	7730 I11	
2839 J6	7731 J6	
2840 J9	7732 J8	
2841 J11	7733 J11	
2843 H1	9718 A1	
2845 C5	9719 A1	
2846 C5	9740 F6	
2847 A12	9741-A G	
2848 B7	9741-B G	
2851 A11	9741-C G	
2853 F13	9741-D F	
2854 E13	9744 C1	
2855 G7	9745 C1	
2857 F12	9746 C1	
2859 G10	9747 C1	
2860 G11	9750 F6	
2861 B7	9753 E7	
2864 D13	9754 B8	
2865 E13	9762 B3	
2866 G10	9763 E3	
2867 E6	9764 G3	
2875 H12	9765 I3	
2876 H13	9766 H1	
2880 H13		
2884 D14		
2885 J10		
2886 G7		
2887 G7		
2888 G7		
2889 G8		
2890 G9		
2891 G9		
2892 G7		
2893 H8		
2894 H9		
2895 H10		
2896 H8		
2897 H9		
2898 H7		
3711 F7		
3744 A5		
3745 B6		
3757 B8		
3771 F6		
3772 G6		
3785 I6		
3786 I8		
3787 I11		
3788 I6		
3789 I9		
3790 I11		
3791 J7		
3792 C12		
3793 A6		
3794 A9		

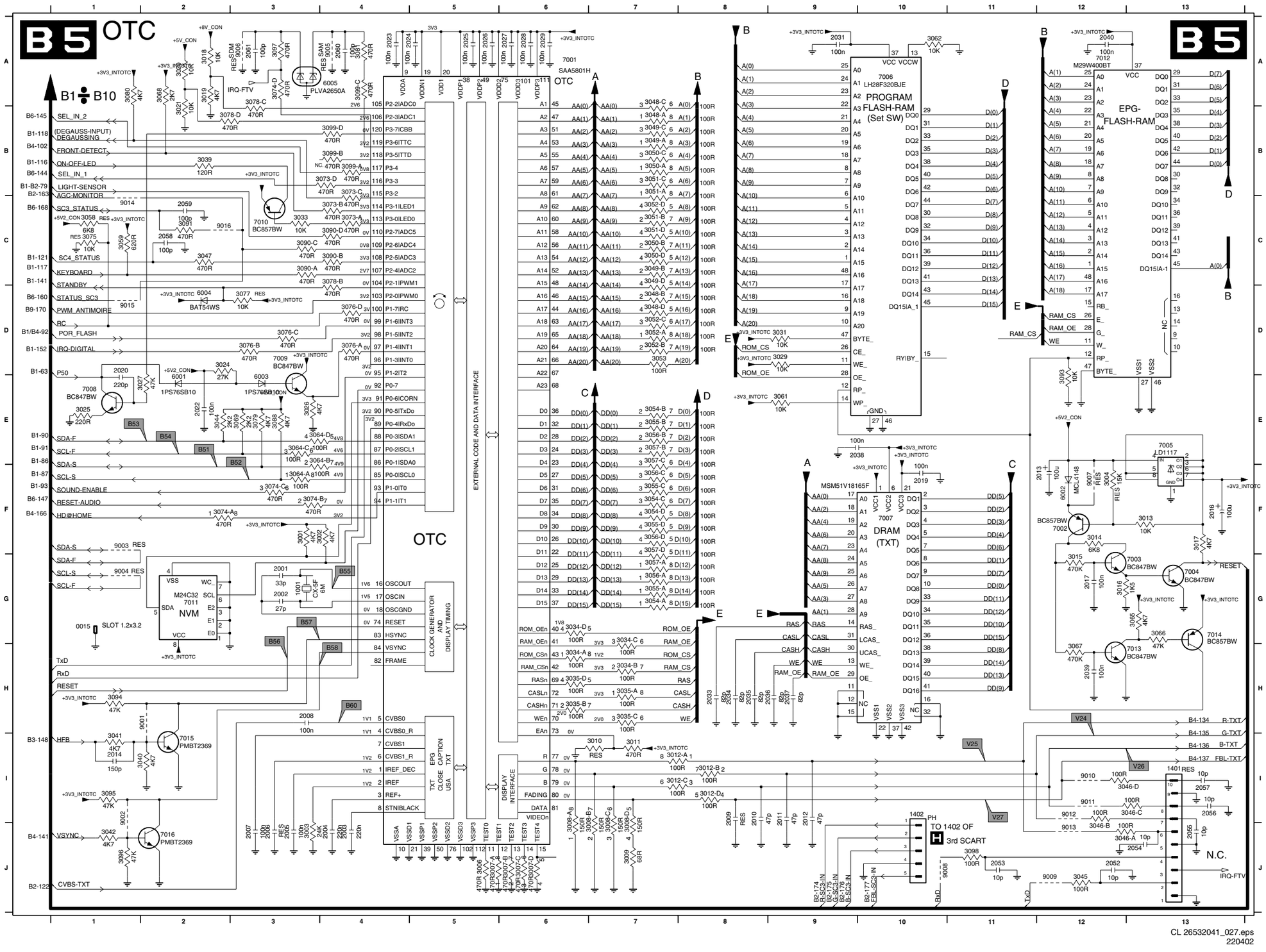
Small Signal Board:



0014 I10	3351 B10	6301 E12	9309 B4
1301 G4	3352 A10	6303 H8	9310 B4
1304 G3	3353 A11	6304 H9	9311 I1
2301 C2	3354 A12	6306 I5	9312 I1
2303 E9	3355 B8	6307 I5	9313 F13
2304 G7	3358 A12	6308 C2	9421 B10
2306 H9	3359 B10	6309 D11	C001 H12
2307 F3	3360 A8	6310 D9	c200 F3
2308 G9	3361 G7	6311 D12	
2309 D3	3362 F11	6312 H8	
2310 E3	3363 F3	6313 H8	
2311 H5	3364 F10	6314 H9	
2312 F9	3365 F13	6316 C9	
2313 F9	3366 G11	6317 E12	
2314 E2	3367 F11	6319 D9	
2315 E2	3368 E13	6320 H2	
2317 F3	3386 F12	6321 H3	
2318 F3	3387 G2	6322 H2	
2319 F11	3388 C11	6334 H5	
2320 G3	3390 D9	7301 B4	
2321 B3	3391 F12	7302 A1	
2323 B4	3394 E9	7303 G8	
2324 I6	3395 C3	7304 F2	
2325 G5	3396 D2	7305 B9	
2326 E11	3397 D2	7306 A10	
2328 B7	3398 D2	7310 F12	
2329 B6	3399 B13	7311 F11	
2330 A6	3442 E12	7312 F10	
2331 B6	3443 E13	7313 A12	
2332 E2	3453 C2	7314 A11	
2333 D10	3454 B1	7315 B12	
2334 E8	3455 C1	7318 E10	
2336 E8	3459 B12	7340 B13	
2340 I11	3465 B10	7361 H7	
2342 A8	3467 A9	7362 H6	
2343 A10	3470 B8	7375 B9	
2344 H3	3471 A8	9302 A3	
2345 H2	3472 I6	9303 A3	
2346 H2	5301 E2	9304 A4	
2347 H2	5302 E2	9305 A4	
2348 H1	5303 G1	9308 B4	
2349 H1	5304 H1		
2363 F3	5305 H1		
2386 G11	5306 H1		
2392 G12	5307 H1		
2393 E13	5308 H1		
2395 D3	6301 E12		
2396 D3	6303 H8		
2397 D3	6304 H9		
E 2398 A3	6306 I5		
2429 B4	6307 I5		
2431 B3	6308 C2		
3302 C4	6309 D11		
3304 I11	6310 D9		
3305 C2	6311 D12		
3306 E8	6312 H8		
3307 E9	6313 H8		
3308 E9	6314 H9		
F 3310 E9	6316 C9		
3311 G7	6317 E12		
3312 E11	6319 D9		
3313 E11	6320 H2		
3314 G7	6321 H3		
3315 G8	6322 H2		
3316 H9	6334 H5		
3317 G9	7301 B4		
3318 F9	7302 A1		
3319 E12	7303 G8		
G 3320 D3	7304 F2		
3321 E3	7305 B9		
3322 D12	7306 A10		
3323 H5	7310 F12		
3324 I5	7311 F11		
3325 A10	7312 F10		
3326 H5	7313 A12		
3327 G6	7314 A11		
3328 F9	7315 B12		
H 3329 E2	7318 E10		
3330 A8	7340 B13		
3331 G3	7361 H7		
3332 A7	7362 H6		
3333 F3	7375 B9		
3334 H5	9302 A3		
3335 A7	9303 A3		
3336 H6	9304 A4		
3339 C3	9305 A4		
3340 C11	9308 B4		
I 3341 C10	9309 B4		
3342 C11	9310 B4		
3343 D12	9311 I1		
3344 D10	9312 I1		
3345 D9	9313 F13		
3346 C9	9421 B10		
3347 D9	C001 H12		
3348 D9	c200 F3		
3349 F2			
3350 B11			

F17 1V / div DC 5ms / div
F18 PM3394B 500mV / div DC 5ms / div
F19 PM3394B 500mV / div DC 5ms / div
F20 PM3394B 500mV / div DC 5ms / div
L12 1V / div DC 10us / div
V19 1V / div DC 10us / div
V20 1V / div DC 10us / div
V21 1V / div DC 10us / div
V28 PM3394B 1V / div DC 10us / div
V29 PM3394B 1V / div DC 10us / div
V30 PM3394B 1V / div DC 10us / div

Small Signal Board: OTC



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B51 PM3394B
2V / div DC
100us / div

B52 PM3394B
2V / div DC
100us / div

B53 PM3394B
2V / div DC
5ms / div

B54 PM3394B
2V / div DC
5ms / div

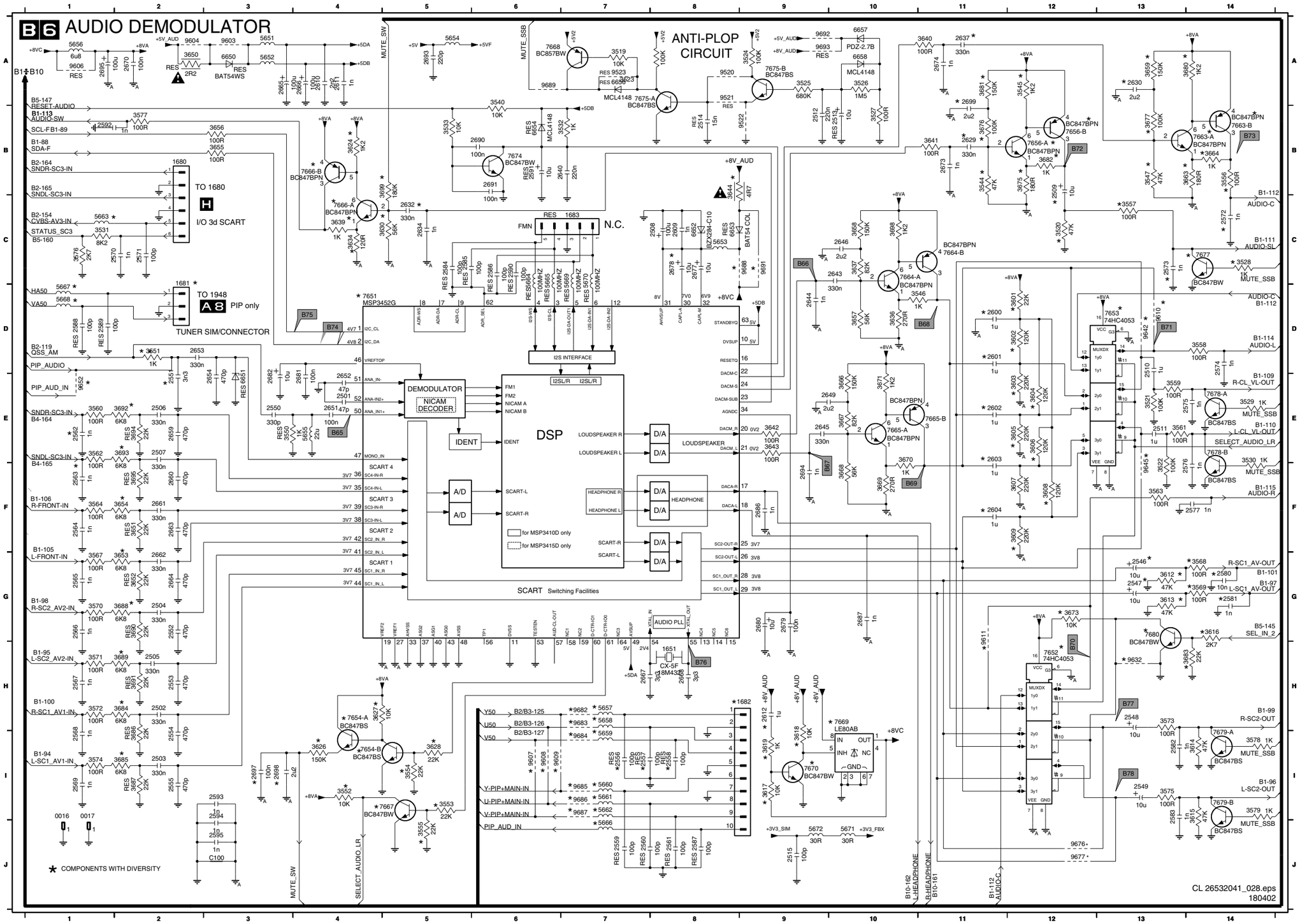
B55 PM3394B
2V / div DC
250ns / div

B57 PM3394B
500mV / div AC
10us / div

B58 PM3394B
1V / div DC
5ms / div

B60 PM3394B
500mV / div DC
10us / div

Small Signal Board: Audio Demodulator



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2552 G2
2553 H2
2554 I2
2555 I2
2556 I7
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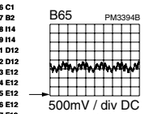

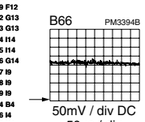

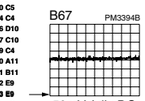

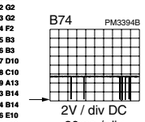

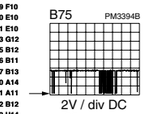

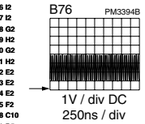

Small Signal Board: Anti-moiré

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2063 C4	2066 A3	3023 A3	3032 B3	3038 C2	3063 D2	6006 C2	7018 C3	
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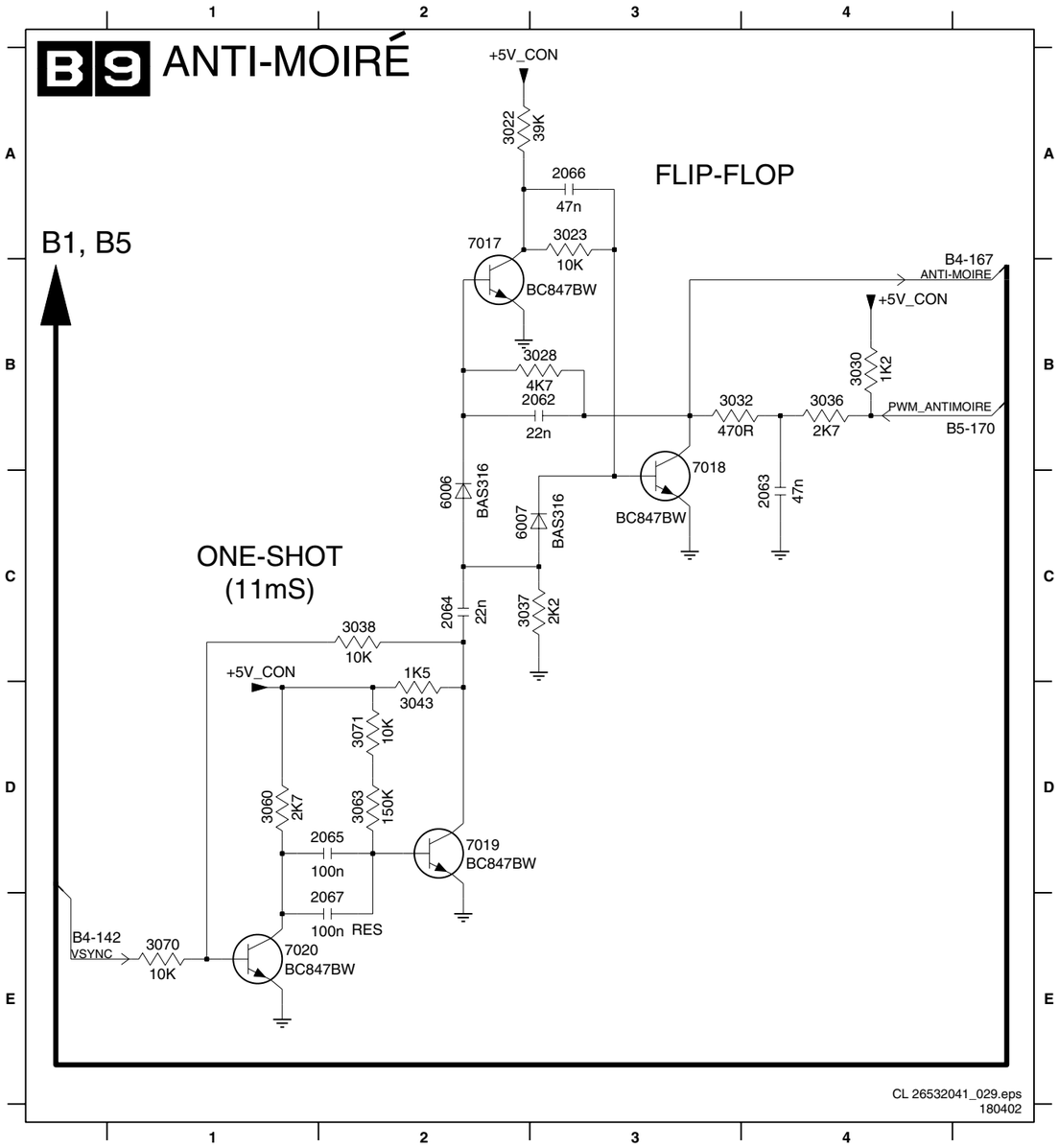

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180402

Small Signal Board:

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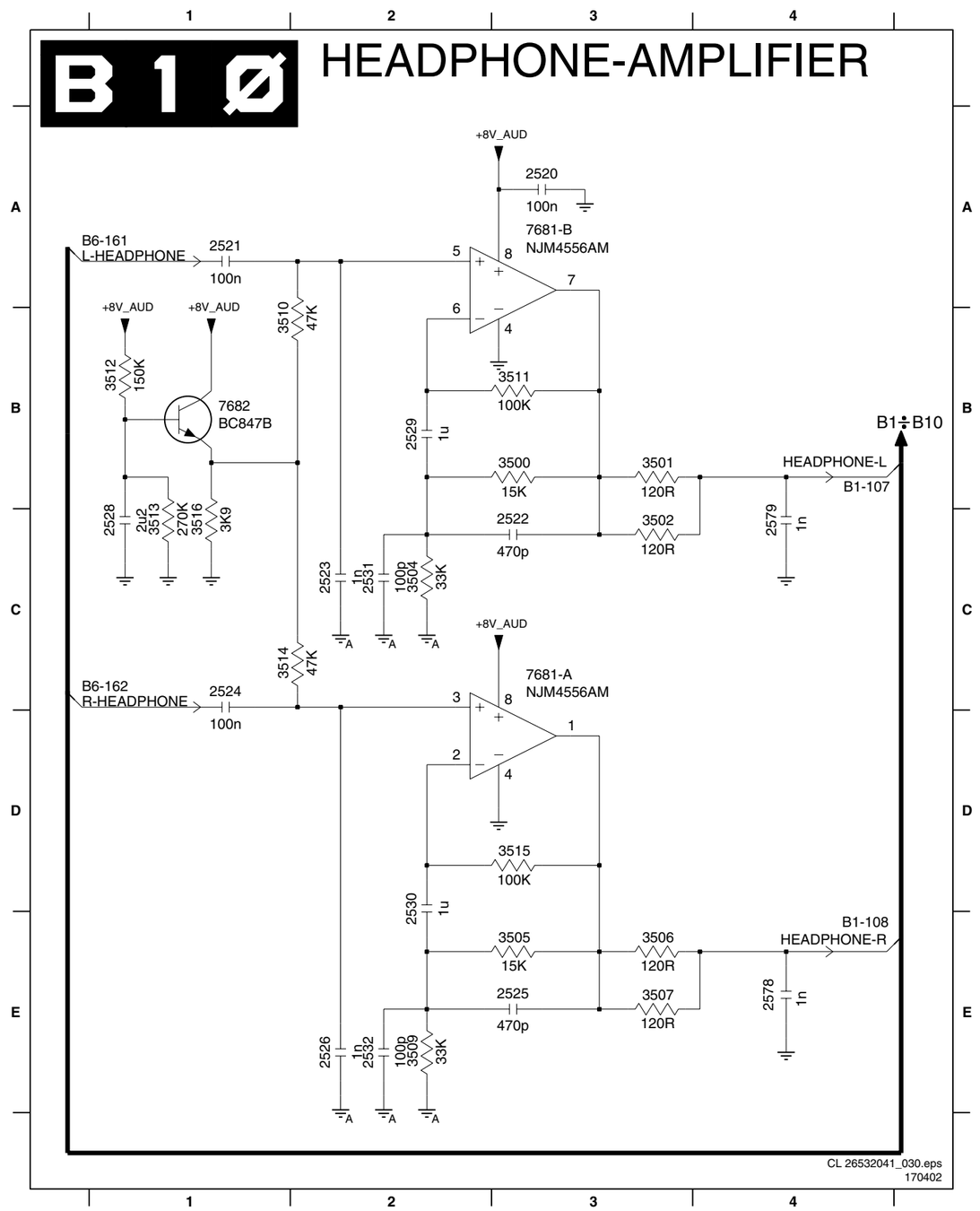
2522 C3	2528 C1	2578 E4	3504 C2	3510 B1	3515 D3	
2523 C2	2529 B2	2579 C4	3505 E3	3511 B3	3516 C1	
2524 C1	2530 D2	3500 B3	3506 E3	3512 B1	7681-A C3	



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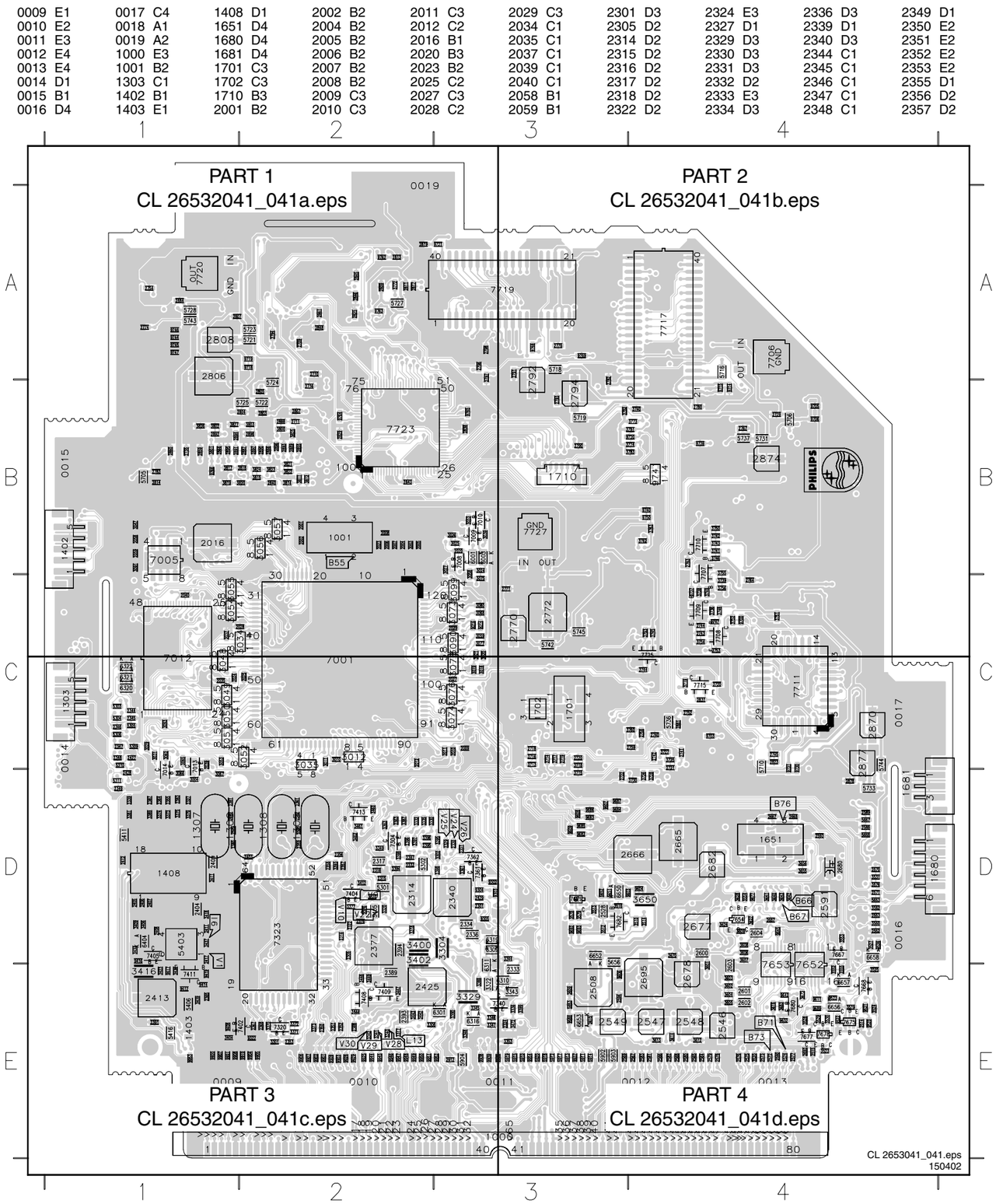
170402

Layout Small Signal Board (Overview Top Side)



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0011 E3
0012 E4
0013 E4
0014 D1
0015 B1
0016 D4

0017 C4
0018 A1
0019 A2
1000 E3
1001 B2
1303 C1
1402 B1
1403 E1

1408 D1
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1680 D4
1681 D4
1701 C3
1702 C3
1710 B3
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2008 B2
2009 C3
2010 C3

2011 C3
2012 C2
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9522 E4

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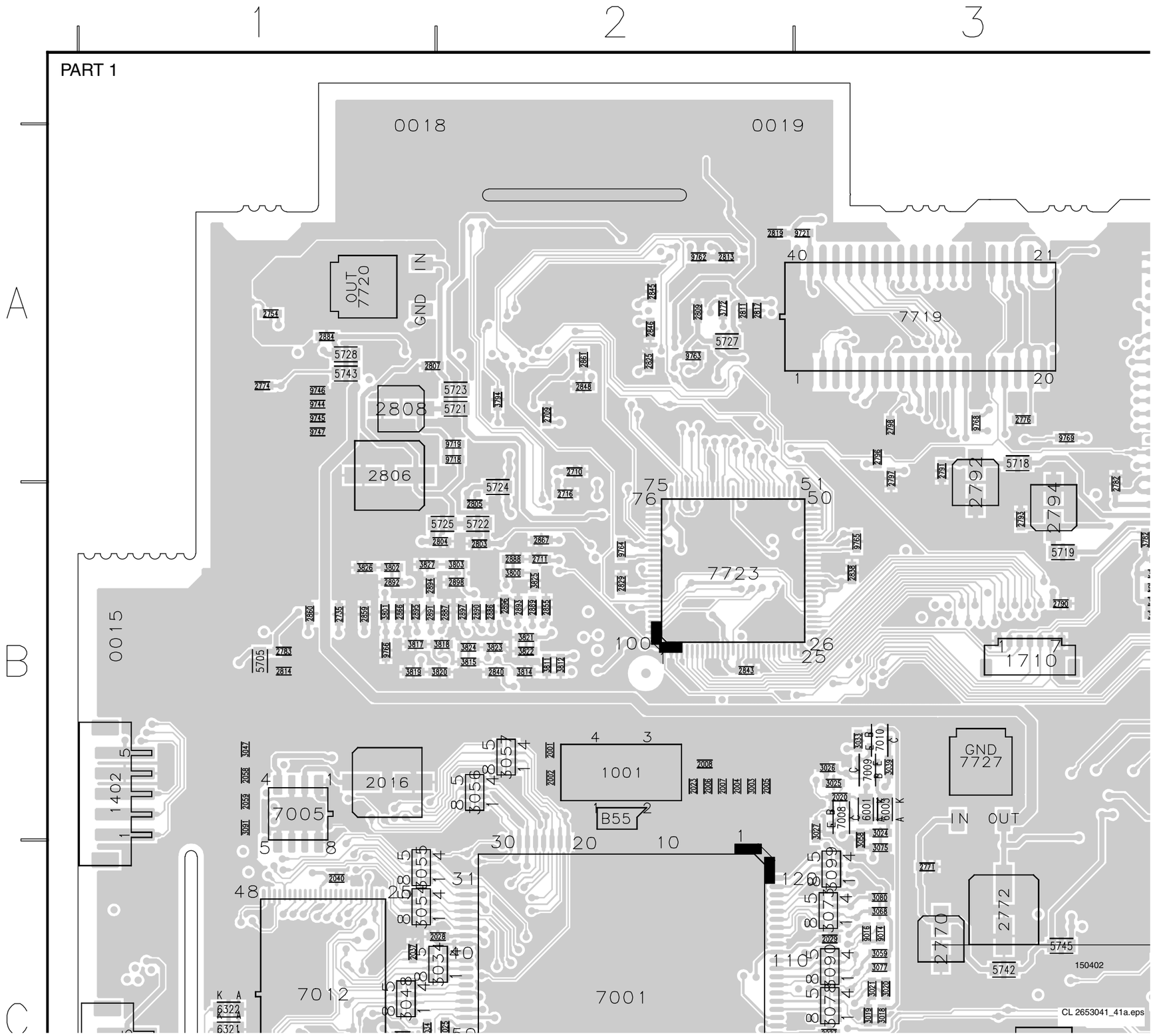
9954 E3

Layout Small Signal Board (Part 1 Top Side)



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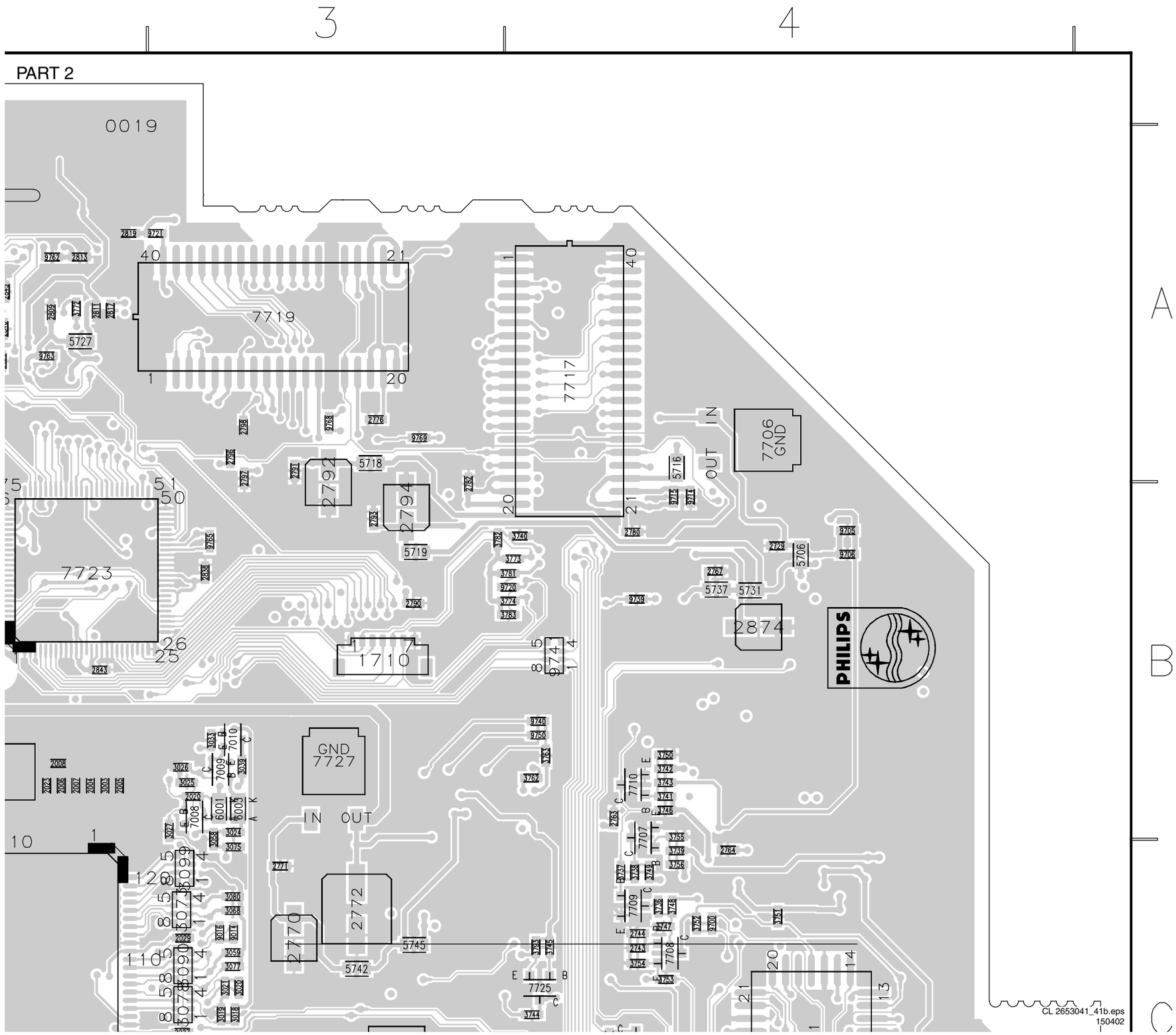
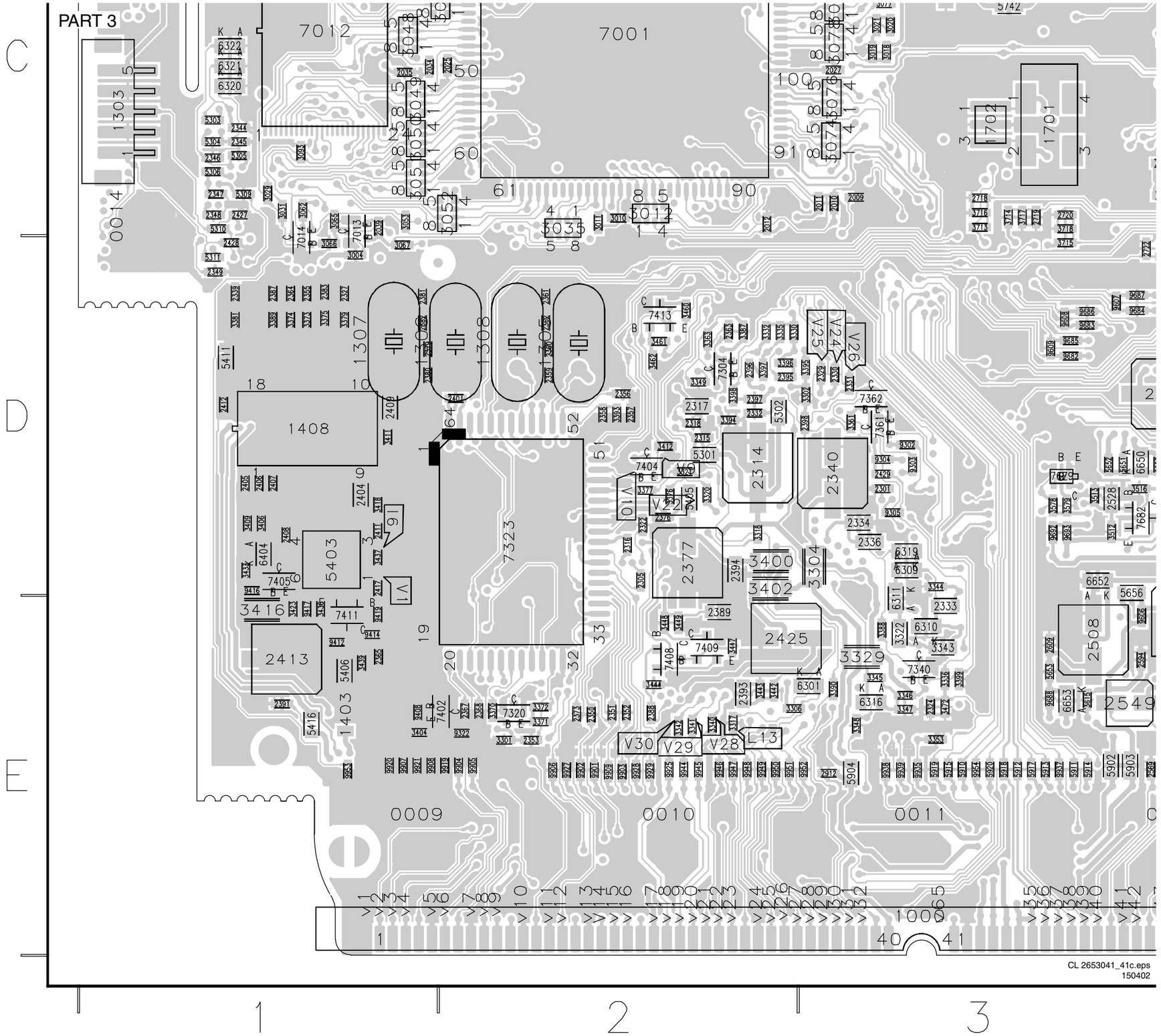
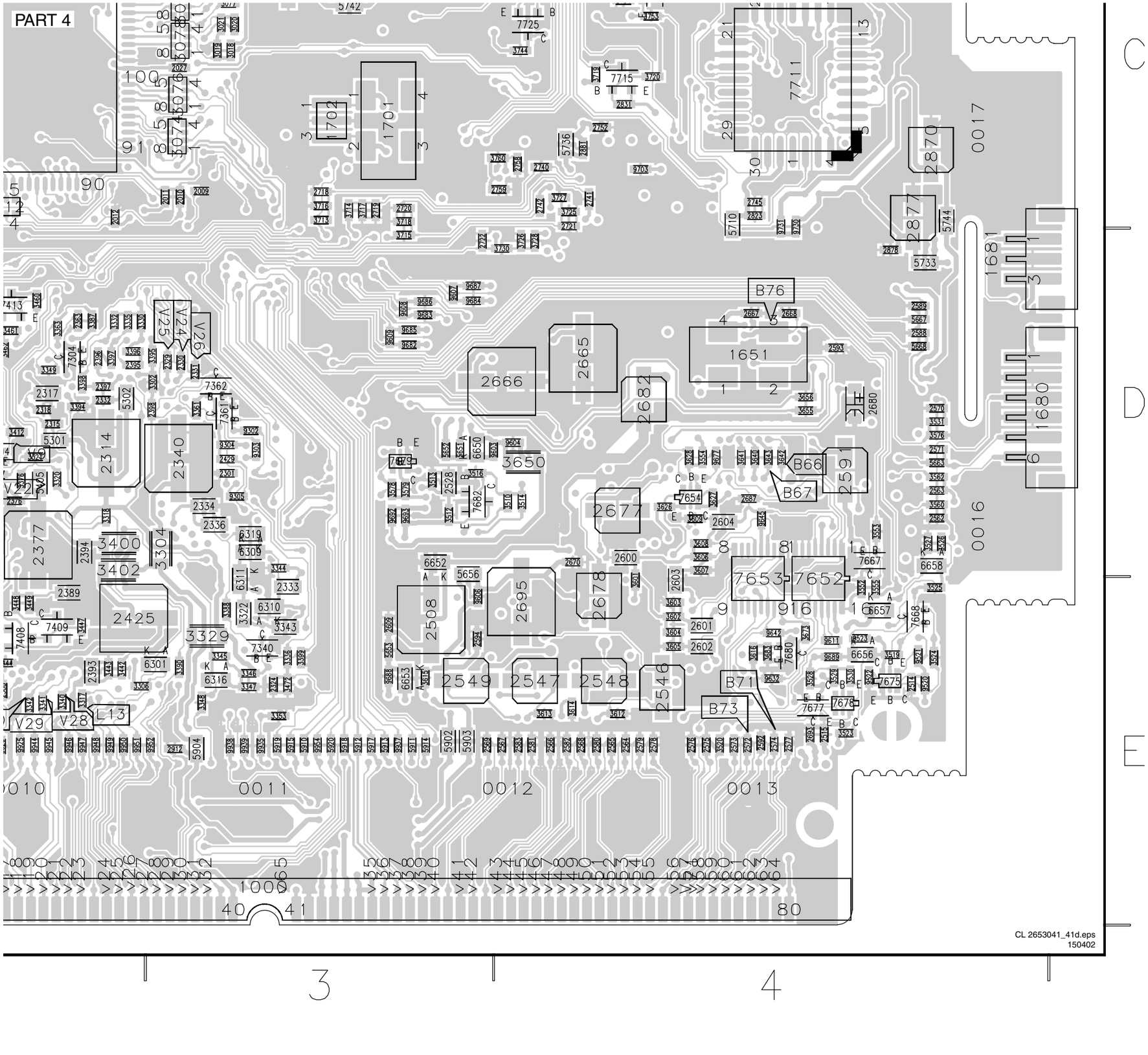


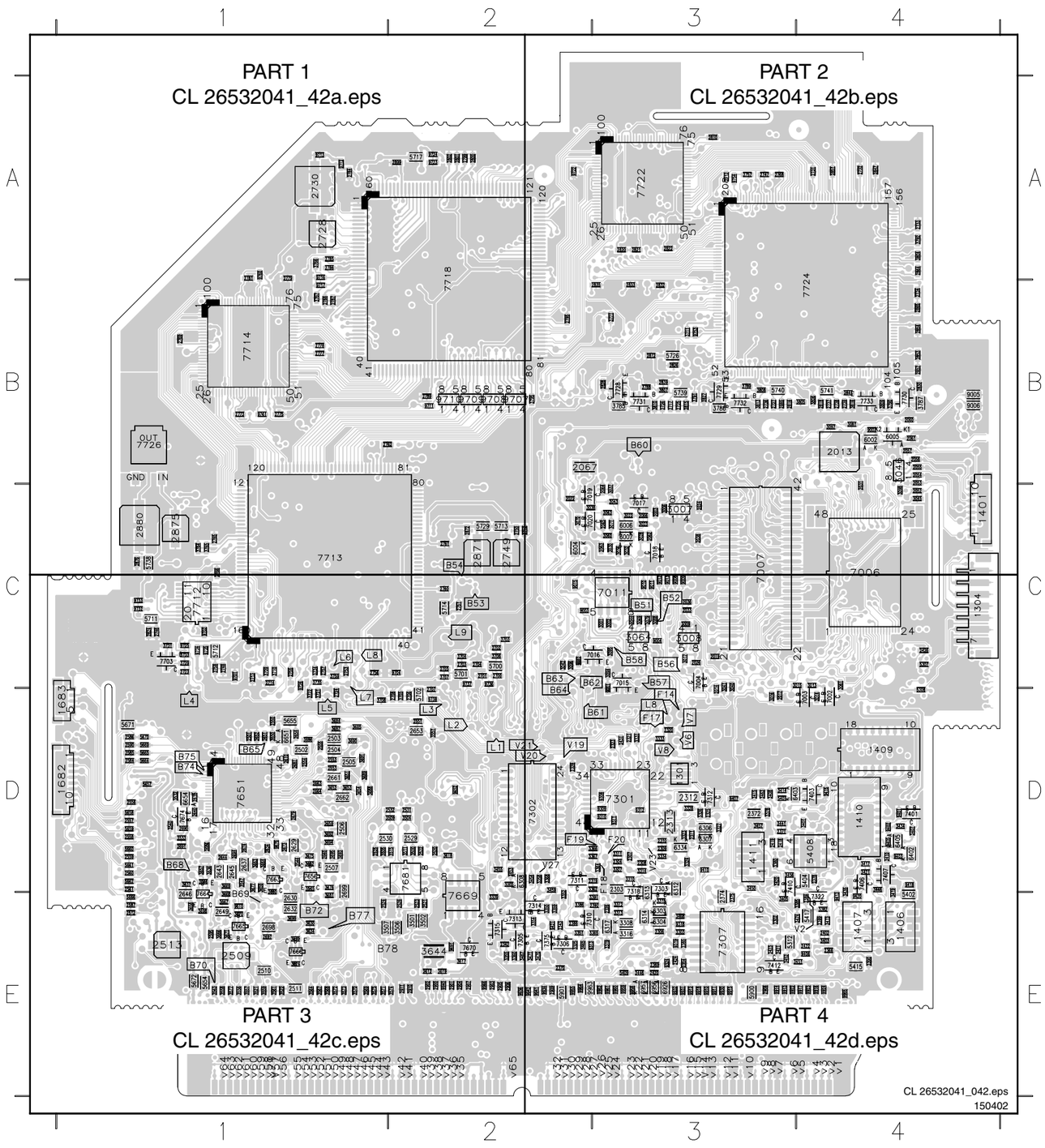
Layout Small Signal Board (Part 3 Top Side)



Layout Small Signal Board (Part 4 Top Side)



Layout Small Signal Board (Overview Bottom Side)



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1411 D3
1682 D1
1683 D1
2003 C3
2013 B4
2014 D3
2017 D3
2019 C3
2022 C2
2024 C3
2026 C3
2031 C4
2033 C3
2036 C3
2038 C3
2052 C4
2053 B4
2054 B4
2055 B4
2056 B4
2057 B4
2060 B4
2061 B4
2062 C3
2063 C3
2064 C3
2065 C3
2066 C3
2067 B2
2302 E3
2303 D3
2304 D3
2306 E3
2307 D3
2308 D3
2309 D3
2310 D3
2311 D3
2312 D3
2313 D3
2319 D3
2320 D3
2321 D3
2323 D3
2325 D3
2326 E3
2328 D2
2342 E2
2343 E2
2354 E3
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2372 D3
2374 E3
2375 E3
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2385 E3
2386 E2
2390 E4
2392 E3
2399 E4
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2418 D3
2419 D3
2420 E3
2421 E3
2422 E4
2423 E3
2424 E3
2426 C4
2431 D3
2501 D1
2502 D1
2503 D1
2504 D1
2505 D1
2506 D1
2507 D1
2509 E1
2510 E1
2511 E1
2512 E1
2513 E1
2520 D2
2521 E2
2522 D2
2523 E2
2524 E1
2525 D1
2526 E2
2529 D2
2530 D1
2531 D2
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2551 D2
2552 D1
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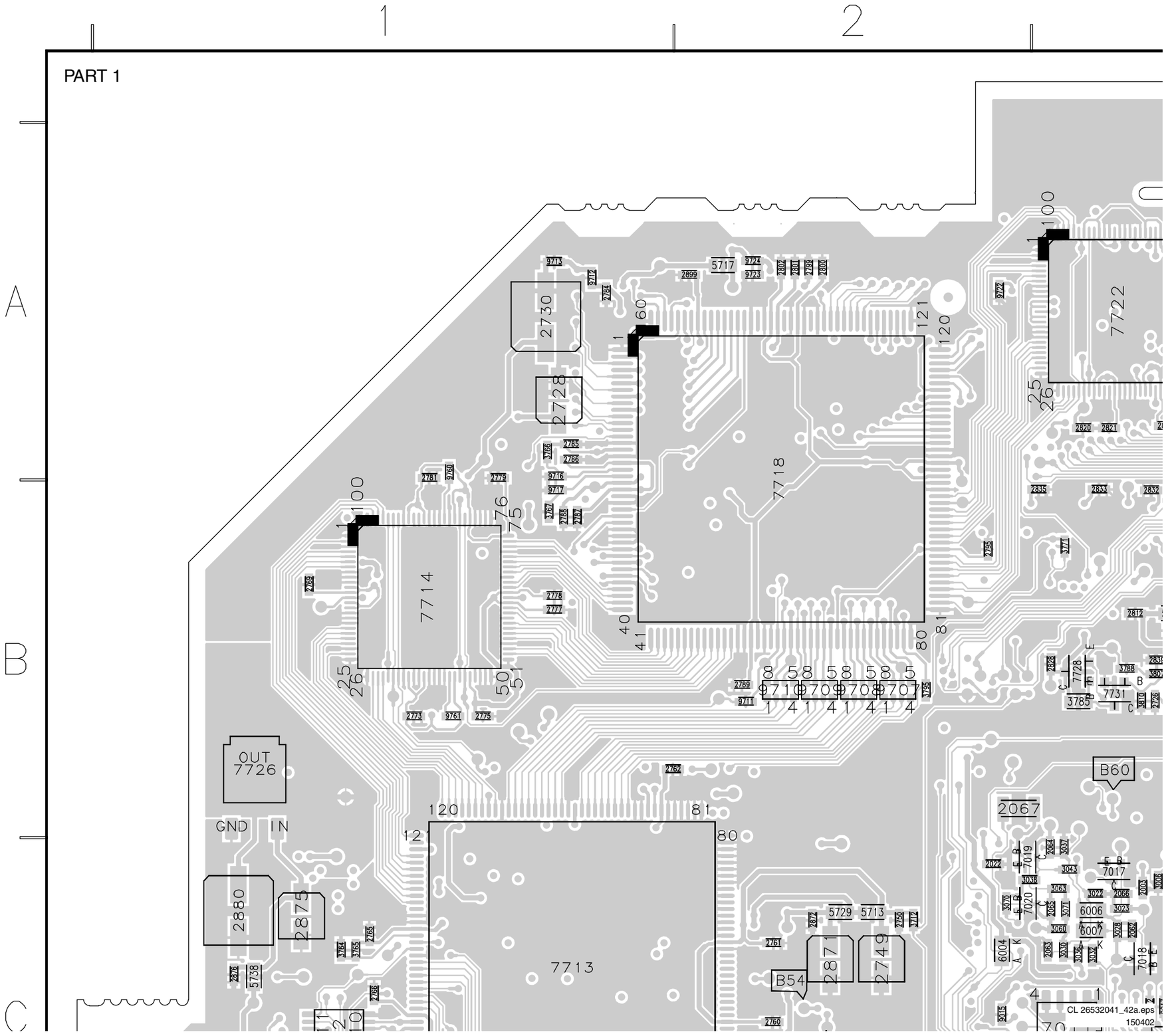
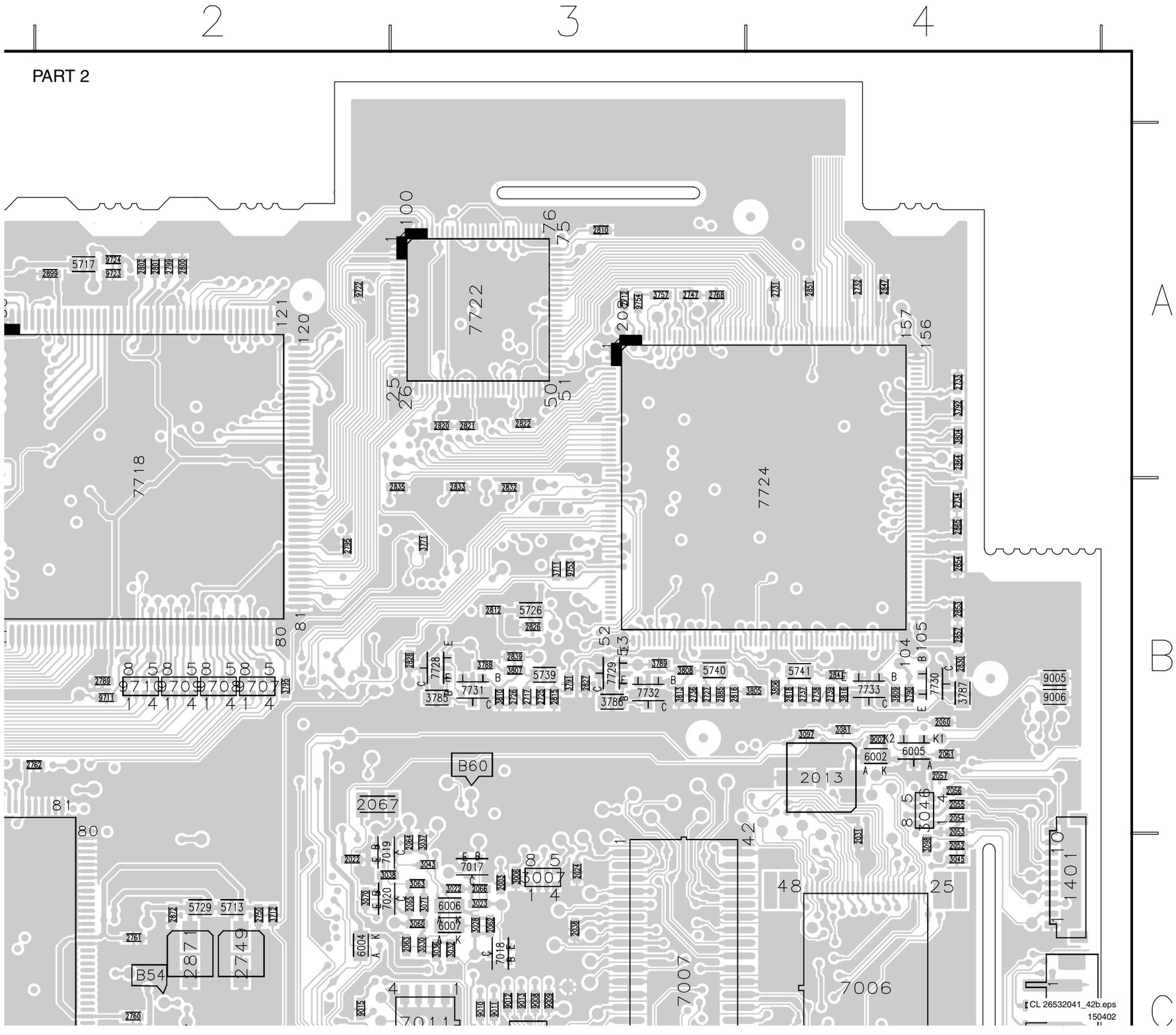
Layout Small Signal Board (Part 1 Bottom Side)

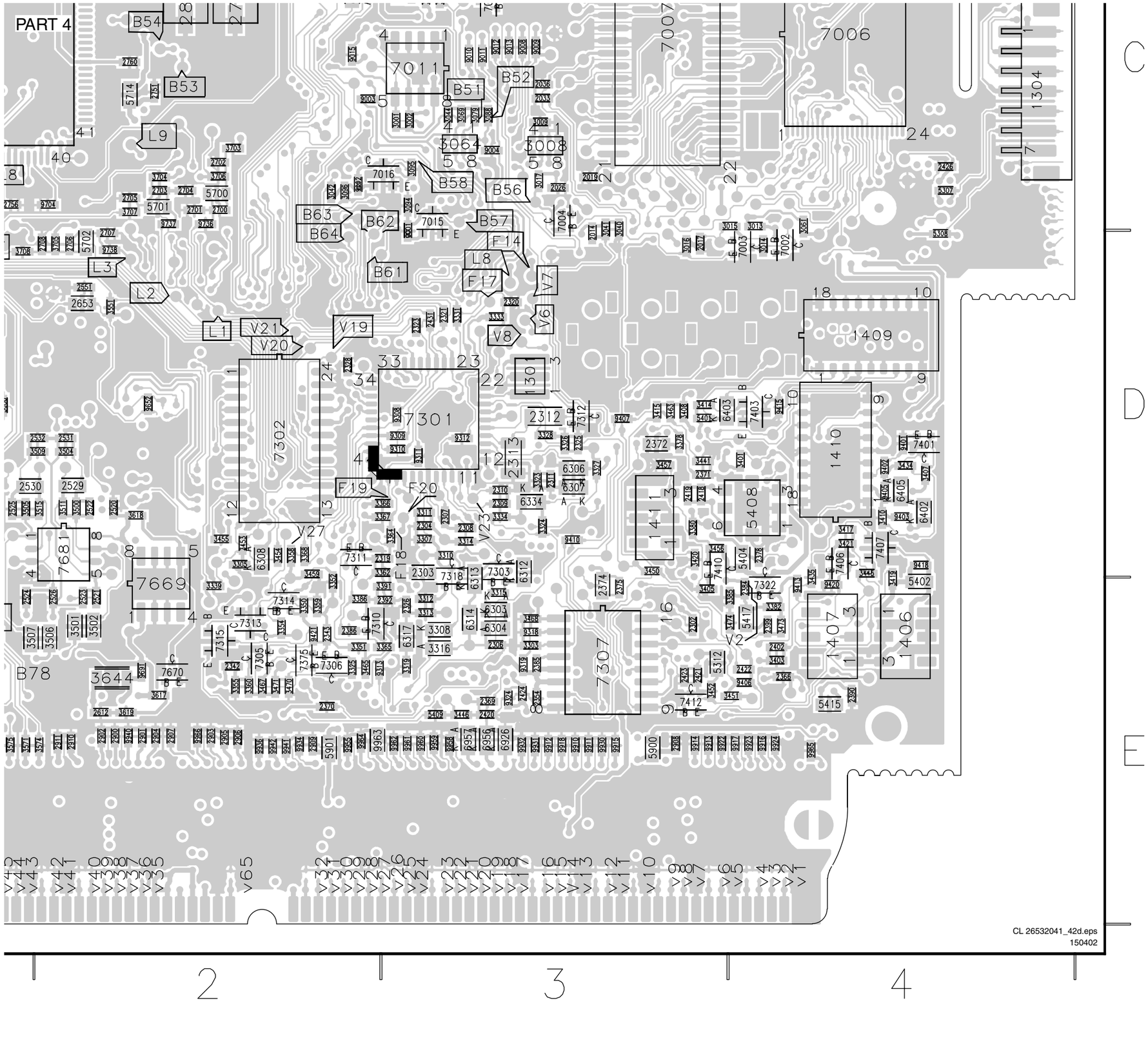


Layout Small Signal Board (Part 2 Bottom Side)

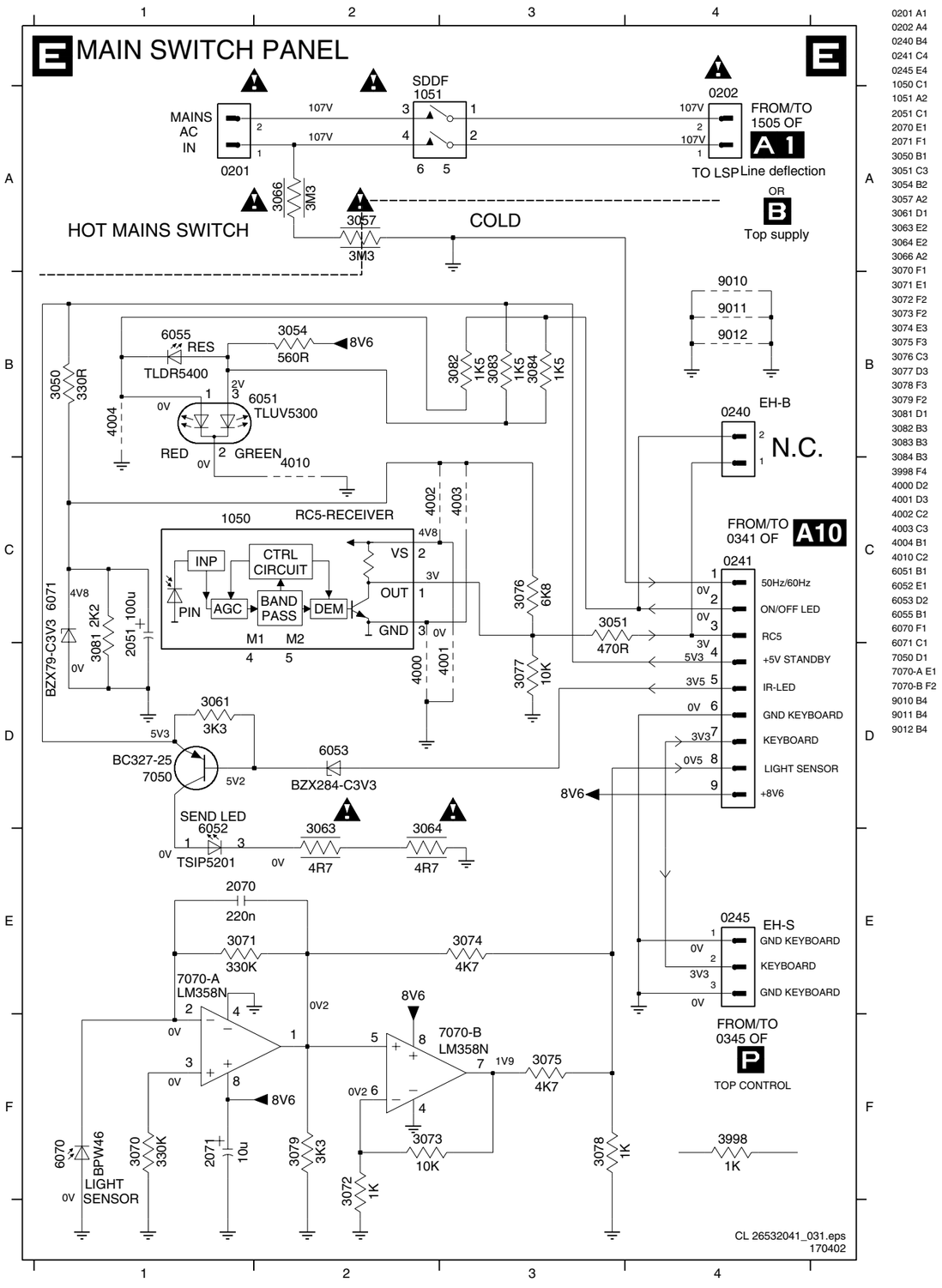


Layout Small Signal Board (Part 3 Bottom Side)

Layout Small Signal Board (Part 4 Bottom Side)



Mains Switch Panel



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0240 B4
0241 C4
0245 E4
1050 C1
1051 A2
2051 C1
2070 E1
2071 F1
3050 B1
3051 C3
3054 B2
3057 A2
3061 D1
3063 E2
3064 E2
3066 A2
3070 F1
3071 E1
3072 F2
3073 F2
3074 E3
3075 F3
3076 C3
3077 D3
3078 F3
3079 F2
3081 D1
3082 B3
3083 B3
3084 B3
3998 F4
4000 D2
4001 D3
4002 C2
4003 C3
4004 B1
4010 C2
6051 B1
6052 E1
6053 D2
6055 B1
6070 F1
6071 C1
7050 D1
7070-A E1
7070-B F2
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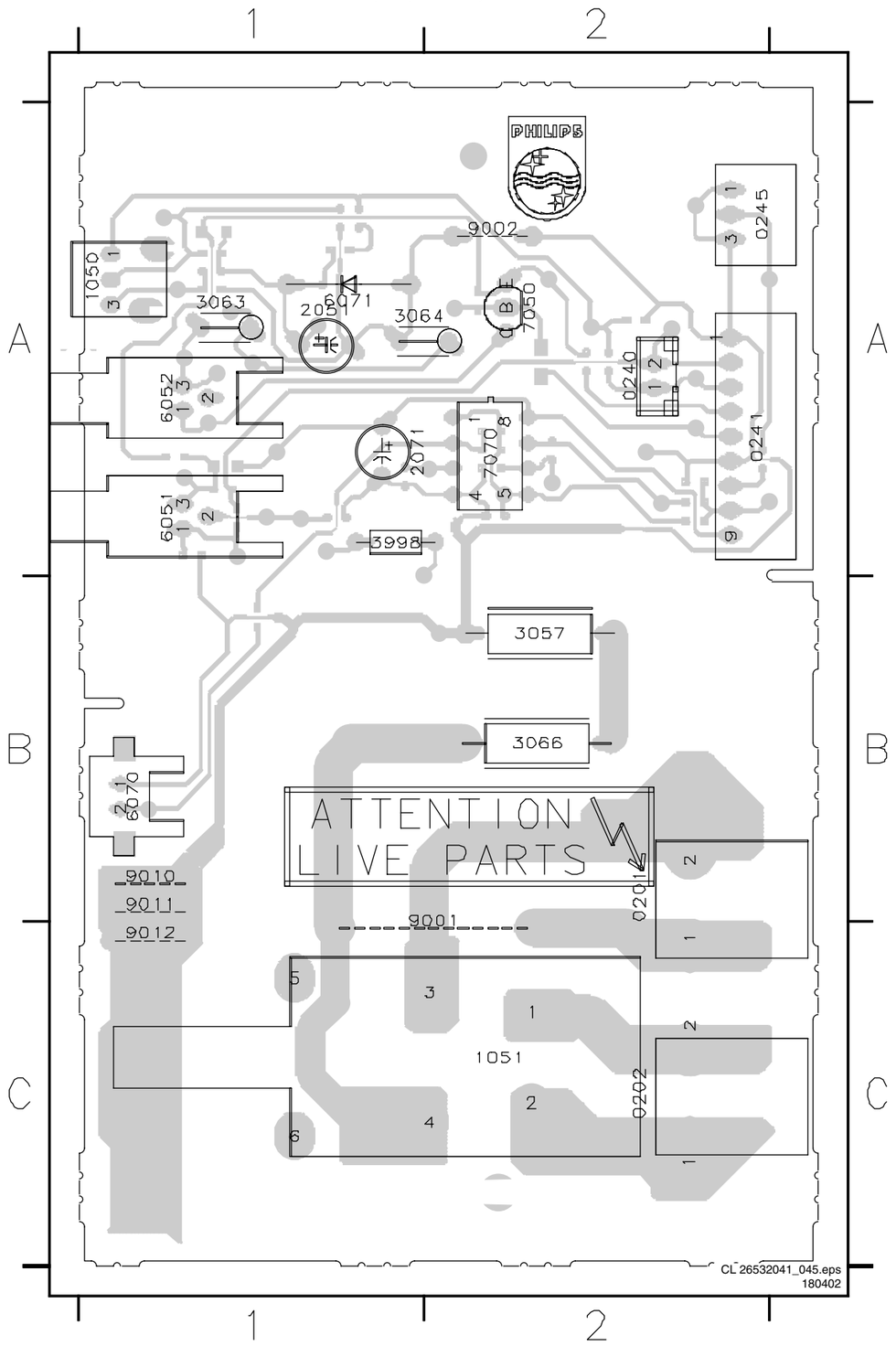
9011 B4
9012 B4

Personal Notes:

Layout Mains Switch Panel (Top Side)



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0245 A2
1050 A1
1051 C2
2051 A1
2071 A1
3057 B2
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3064 A2
3066 B2
3998 A1
6051 A1
6052 A1
6070 B1
6071 A1
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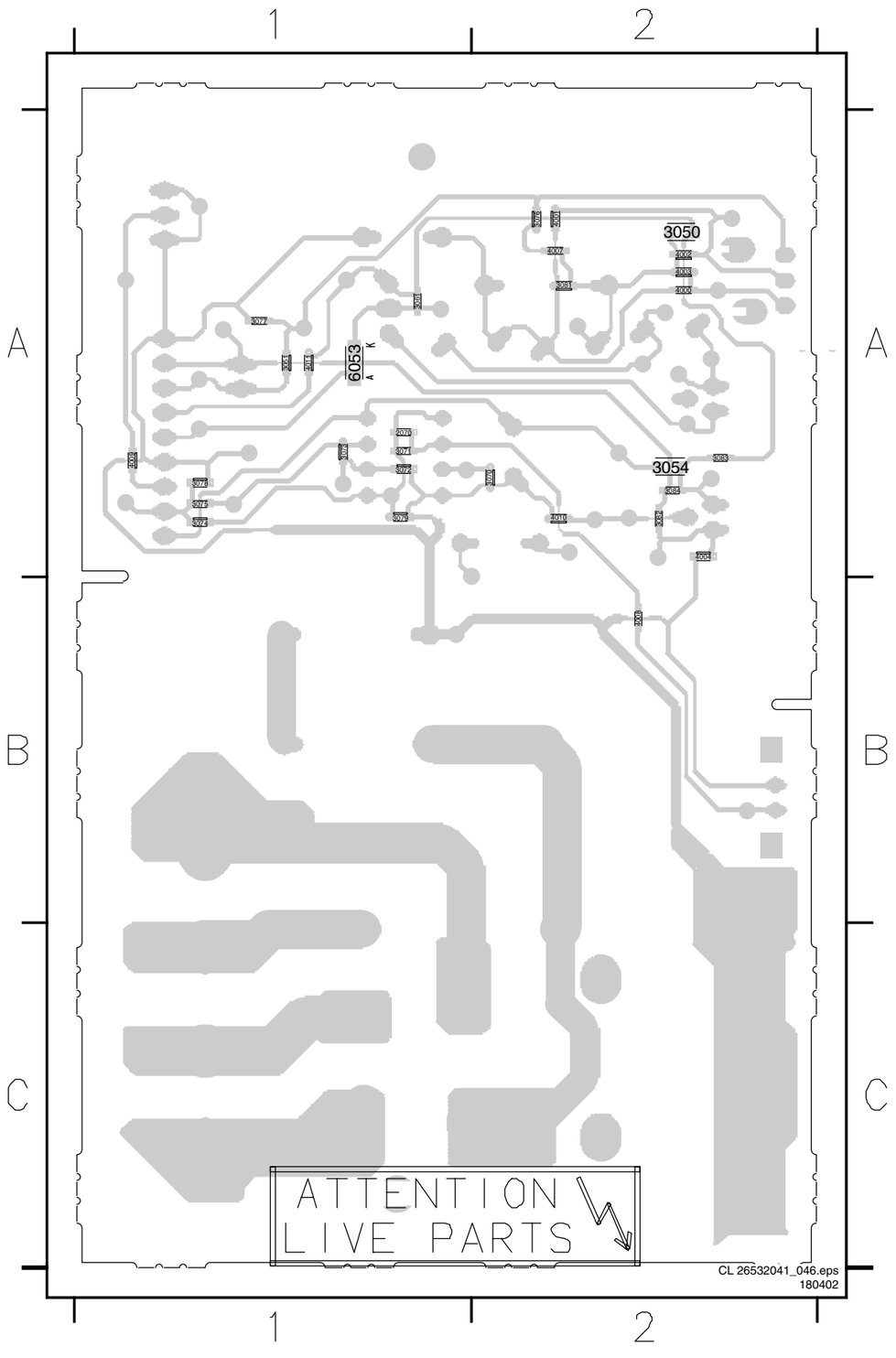
7070 A2
9001 B2
9002 A2
9010 B1
9011 B1
9012 C1

Layout Mains Switch Panel (Bottom Side)



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3076 A2
3077 A1
3078 A1
3079 A1
3081 A2
3082 A2
3083 A2
3084 A2
4000 A2
4001 A2
4002 A2
4003 A2
4004 A2
4007 A2
4008 B2
4009 A1
4010 A2
4011 A1
6053 A1

CRT Panel

0031 C7	1237-H H11	1298-I G11	2312 B10	2342 C9	2408 G1	3301 I5	3347 H14	3501 C2	3511 E2	3521 G2	3531 C3	3541 E2	5400 H5	6400 H7	6430 B10	7506 F2	9307 D6	9503 F4
0033 E7	1237-I E11	1298-J H11	2313 I5	2347 B13	2409 H3	3303 E1	3348 H13	3502 B2	3512 D3	3522 F2	3532 E4	3542 E2	5500 B3	6405 H7	7330 A6	7507 F4	9308 F6	9504 C14
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1237-A G14	1298-B G13	1424 H2	2318 H12	2357 I10	2502 B4	3305 A12	3350 E9	3504 B3	3514 E3	3524 G3	3534 D4	3544 B10	5502 F3	6407 C9	7350 E6	9300 B14	9314 D7	
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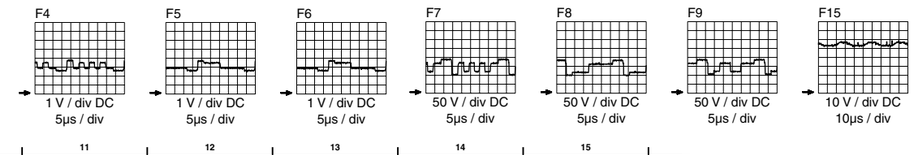
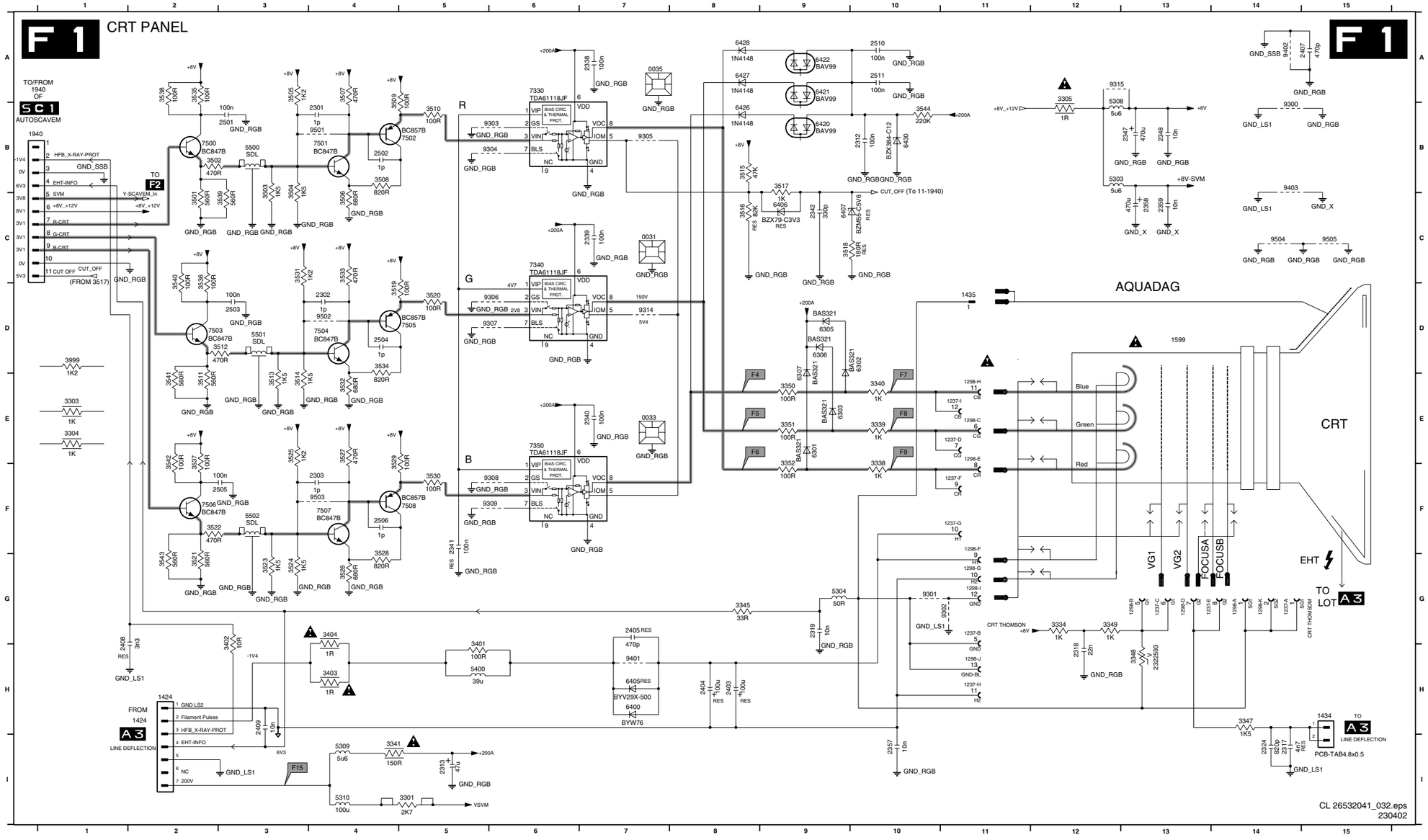
1237-C G13	1298-D G13	1435 D11	2324 I14	2359 C13	2504 D4	3338 F10	3352 F9	3506 C4	3516 C8	3526 G4	3536 C2	5303 B12	6302 D10	6421 A9	7501 B4	9302 G11	9401 H7	
1237-D E11	1298-E E11	1940 B1	2338 A7	2403 H8	2505 F3	3339 E10	3401 H5	3507 A4	3517 B9	3527 E4	3537 E2	5304 G9	6303 E9	6422 A9	7502 B5	9303 B6	9402 A14	
1237-E G13	1298-F F11	2301 B4	2339 C7	2404 H8	2506 F4	3340 E10	3402 G3	3508 B4	3518 C9	3528 G4	3538 A2	5305 D9	6426 B8	7503 D2	9304 B6	9403 B14		
1237-F F11	1298-G G11	2302 D4	2340 E7	2405 G7	2510 A10	3341 I4	3403 H4	3509 A4	3519 D4	3529 E4	3539 C3	5309 I4	6306 D9	6427 A8	7504 D4	9305 B7	9501 B4	
1237-G F11	1298-H E11	2303 F4	2341 F5	2407 A15	2511 A10	3345 G8	3404 G4	3510 B5	3520 D5	3530 F5	3540 C2	5310 I4	6307 E9	6428 A8	7505 D5	9306 D6	9502 D4		



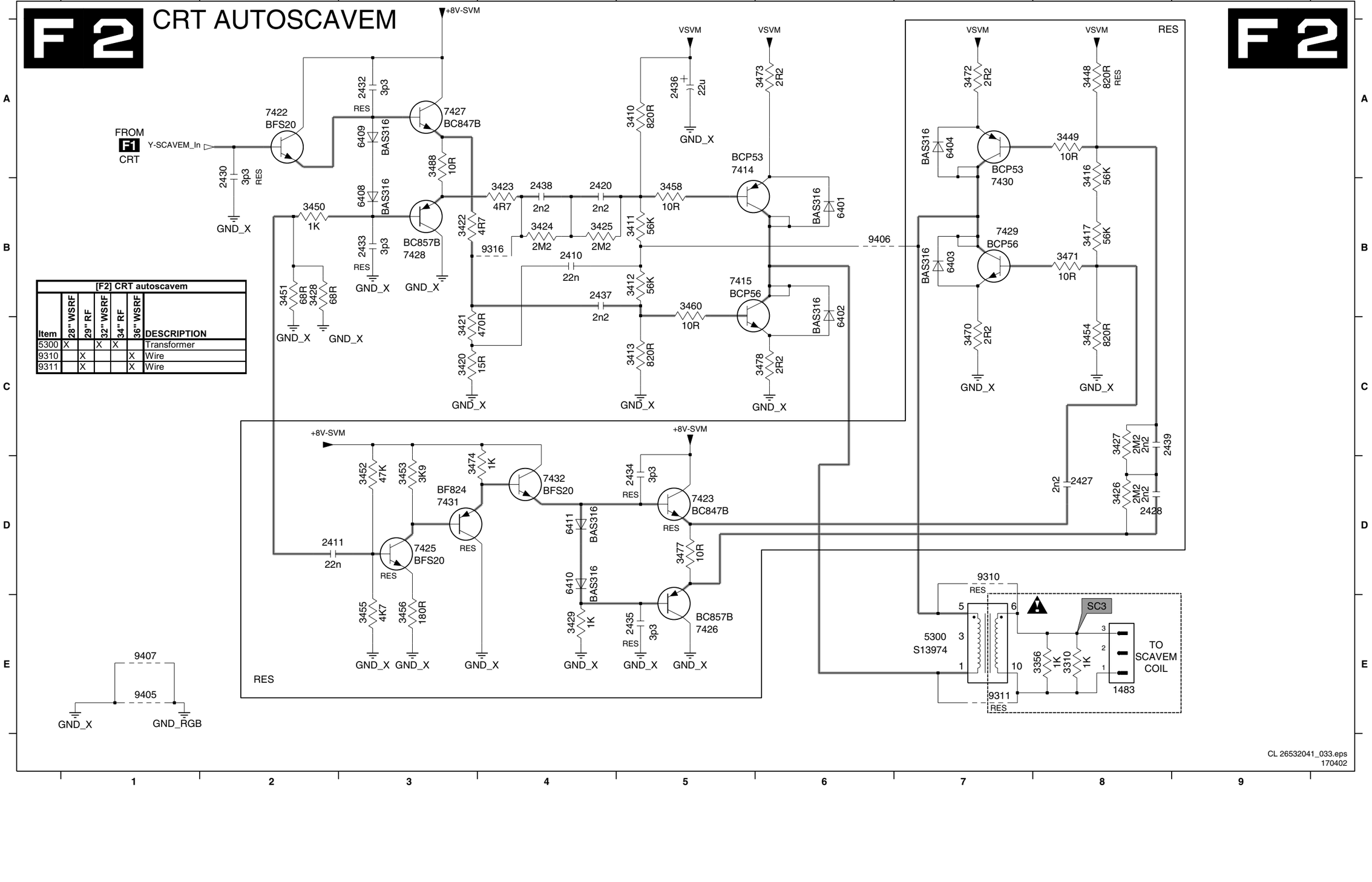


[F1] CRT panel							
Item	28" WSRF	29" RF	32" WSRF	34" RF	36" WSRF	DESCRIPTION
1237				X		CRT socket 9p female
1298	X	X			X	CRT socket 10p female
1298			X			CRT socket 11p female
2324	X					1N
2324			X			1N5
2324		X		X	X	4N7
2403		X		X	X	100U
2404		X		X	X	100U
2405		X		X	X	470P
3303				X		FUSE 1K
3304	X	X	X		X	FUSE 1K
3402	X		X		X	10R
3402		X		X		150R
3403		X			X	FUSE 1R
3403				X		FUSE 1R5
3403	X		X			FUSE 1R
3404		X			X	FUSE 1R
3404				X		FUSE 1R5
3510					X	100R
3510	X		X			150R
3510				X		220R
3510		X				560R
3520	X				X	150R
3520				X		220R
3520			X			390R
3520		X				560R
3530	X					150R
3530				X		220R
3530					X	270R
3530			X			390R
3530		X				560R
3999				X		1K5
3999	X					1K8
3999		X				2K2
3999					X	2K7
3999			X			3K9
5400	X		X			33U
5400				X		18U
5400		X				27U
5400					X	39U
6405		X		X	X	BYV29X-500
9301	X	X		X	X	Jumper
9302			X			Jumper
9303	X	X	X		X	Jumper
9306	X	X	X		X	Jumper
9308	X	X	X		X	Jumper
9401	X		X			Jumper

CRT/ Auto SCAVEM Panel

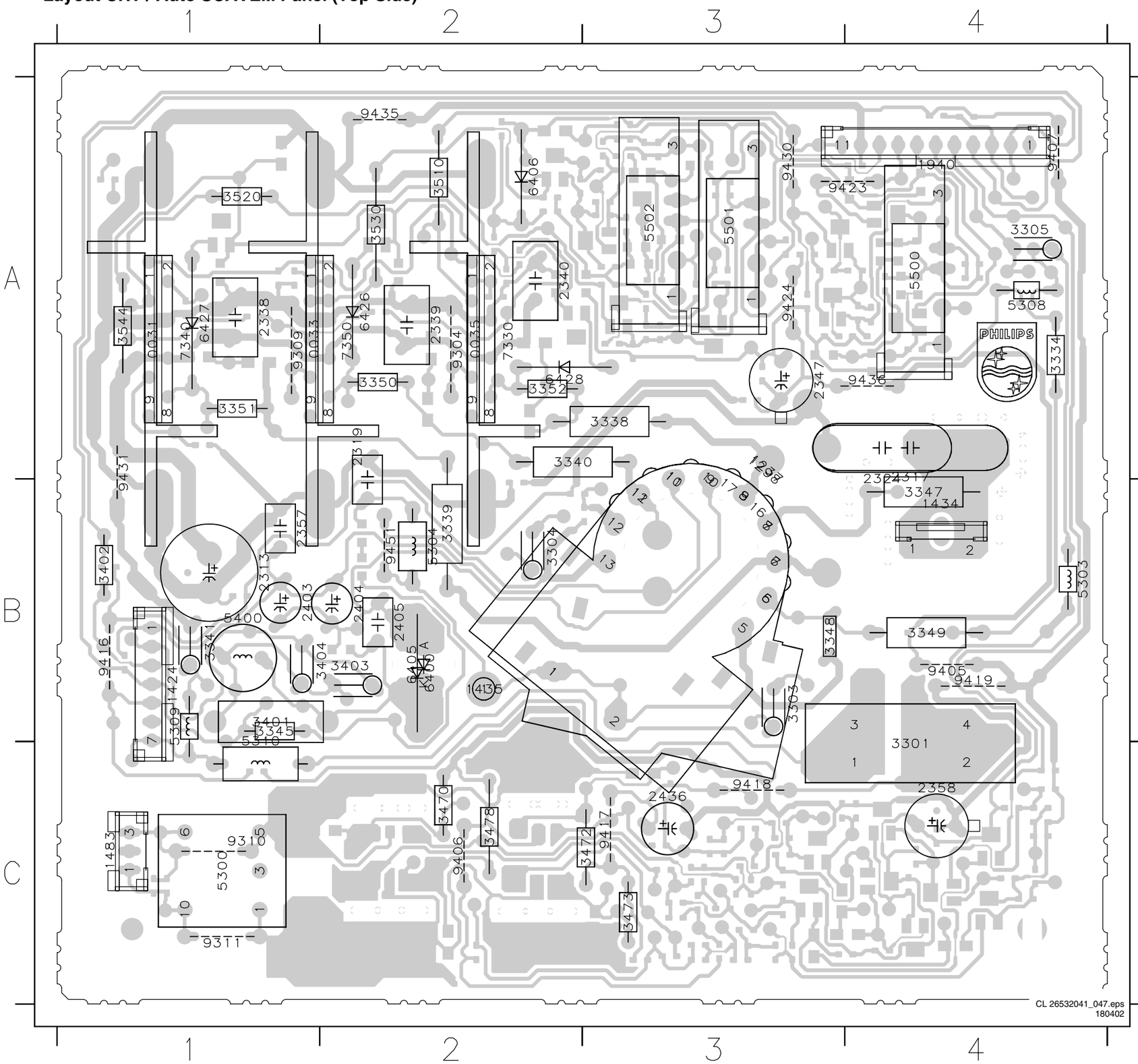
1483 E8	2430 A2	2437 B4	3411 B5	3421 C3	3427 C8	3451 B2	3458 B5	3474 D3	6402 B6	6411 D4	7426 E5	7432 D4	9407 E1	
2410 B4	2432 A3	2438 B4	3412 B5	3422 B3	3428 B2	3452 D3	3460 B5	3477 D5	6403 B7	7414 A5	7427 A3	9310 D7		
2411 D2	2433 B3	2439 C8	3413 C5	3423 B4	3429 E4	3453 D3	3470 C7	3478 C6	6404 A7	7415 B5	7428 B3	9311 E7		
2420 B4	2434 D5	3310 E8	3416 A8	3424 B4	3448 A8	3454 C8	3471 B8	3488 A3	6408 B3	7422 A2	7429 B7	9316 B4		
2427 D8	2435 E5	3356 E8	3417 B8	3425 B4	3449 A8	3455 E3	3472 A7	5300 E7	6409 A3	7423 D5	7430 A7	9405 E1		
2428 D8	2436 A5	3410 A5	3420 C3	3426 D8	3450 B2	3456 E3	3473 A6	6401 B6	6410 D4	7425 D3	7431 D3	9406 B6		

F2 CRT AUTOSCAVEM



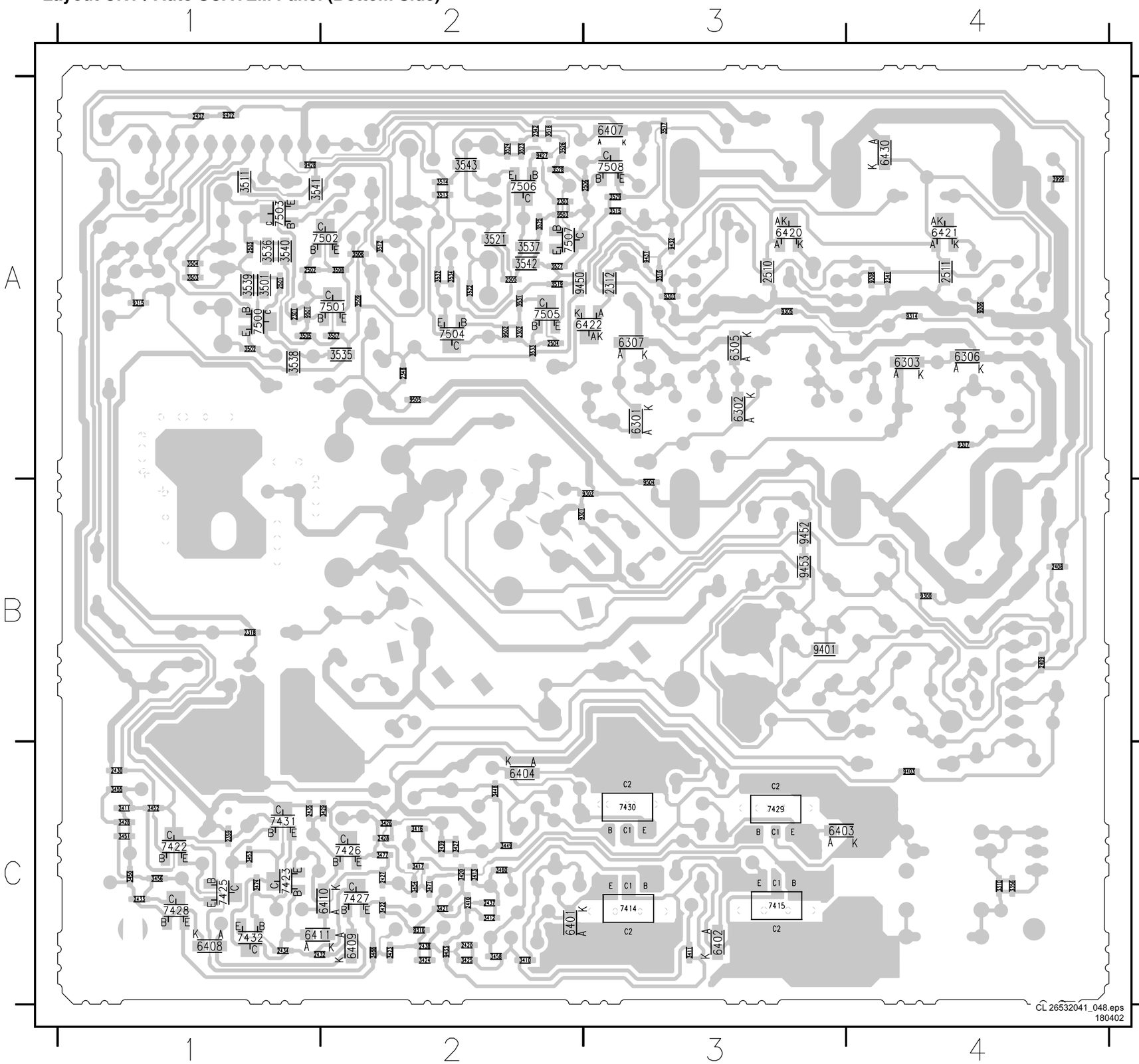
[F2] CRT autoscavem						
Item	28" WSRF	29" RF	32" WSRF	34" RF	36" WSRF	DESCRIPTION
5300	X		X	X		Transformer
9310		X			X	Wire
9311		X			X	Wire

Layout CRT / Auto SCAVEM Panel (Top Side)



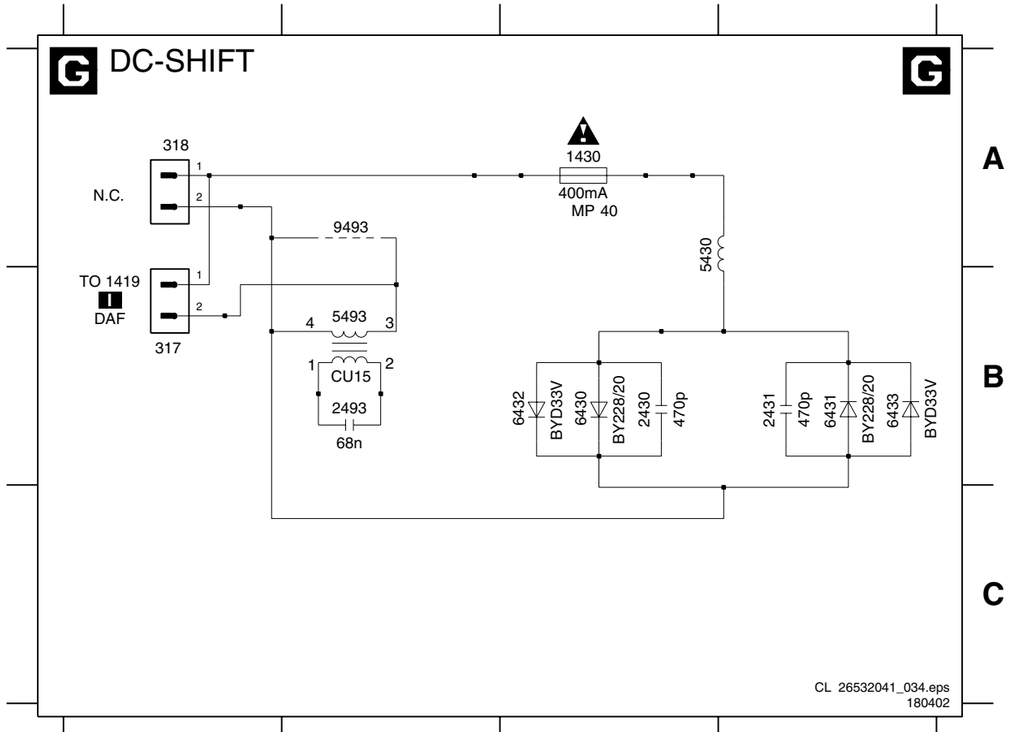
0031 A1
0033 A1
0035 A2
1237 A3
1298 C3
1424 B1
1434 B4
1435 B2
1483 C1
1940 A4
2313 B1
2317 A4
2319 A2
2324 A4
2338 A1
2339 A2
2340 A2
2347 A3
2357 B1
2358 C4
2403 B1
2404 B1
2405 B2
2436 C3
3301 B4
3303 B3
3304 B2
3305 A4
3334 A4
3338 A3
3339 B2
3340 B2
3341 B1
3345 B1
3347 B4
3348 B4
3349 B4
3350 A2
3351 A1
3352 A2
3401 B2
3402 B1
3403 B2
3404 B1
3470 C2
3472 C2
3473 C3
3478 C2
3510 A2
3520 A1
3530 A2
3544 A1
5300 C1
5303 B4
5304 B2
5308 A4
5309 C1
5310 C1
5400 B1
5500 A4
5501 A3
5502 A3
6400 B2
6405 B2
6406 A2
6426 A2
6427 A1
6428 A2
7330 A2
7340 A1
7350 A2
9304 A2
9309 A1
9310 C1
9311 C1
9405 B4
9406 C2
9407 A4
9416 B1
9417 C3
9418 C3
9419 B4
9423 A4
9424 A3
9430 A3
9431 A1
9435 A2
9436 A4

Layout CRT / Auto SCAVEM Panel (Bottom Side)



2301	A1	3506	A2	7504	A2
2302	A2	3507	A2	7505	A2
2303	A2	3508	A2	7506	A2
2312	A3	3509	A2	7507	A3
2318	B1	3511	A1	7508	A3
2341	A4	3512	A2	9300	B4
2342	A2	3513	A2	9301	B2
2348	A2	3514	A2	9302	B3
2359	C1	3515	A3	9303	A3
2407	A1	3516	A3	9305	A3
2408	B4	3517	A3	9306	A4
2409	B4	3518	A2	9307	A4
2410	C2	3519	A2	9308	A4
2411	C1	3521	A2	9314	A4
2420	C2	3522	A2	9315	A1
2427	C2	3523	A2	9316	C2
2428	C2	3524	A2	9401	B3
2430	C1	3525	A2	9402	A1
2432	C1	3526	A2	9403	C4
2433	C1	3527	A2	9427	A2
2434	C1	3528	A2	9428	A1
2435	C1	3529	A3	9432	A3
2437	C2	3531	A2	9433	C2
2438	C2	3532	A2	9437	A3
2439	C2	3533	A2	9450	A2
2501	A1	3534	A2	9452	B3
2502	A1	3535	A2	9453	B3
2503	A1	3536	A1	9501	A1
2504	A2	3537	A2	9502	A2
2505	A2	3538	A1	9503	A2
2506	A3	3539	A1	9504	B3
2510	A3	3540	A1	9505	A2
2511	A4	3541	A1		
3310	C4	3542	A2		
3356	C4	3543	A2		
3410	C2	3999	A4		
3411	C3	6301	A3		
3412	C2	6302	A3		
3413	C2	6303	A4		
3416	C2	6305	A3		
3417	C2	6306	A4		
3420	C2	6307	A3		
3421	C2	6401	C2		
3422	C2	6402	C3		
3423	C2	6403	C3		
3424	C2	6404	C2		
3425	C2	6407	A3		
3426	C2	6408	C1		
3427	C2	6409	C2		
3428	C1	6410	C1		
3429	C2	6411	C1		
3448	C2	6420	A3		
3449	C2	6421	A4		
3450	C1	6422	A3		
3451	C1	6430	A4		
3452	C1	7414	C3		
3453	C1	7415	C3		
3454	C2	7422	C1		
3455	C1	7423	C1		
3456	C1	7425	C1		
3458	C2	7426	C2		
3460	C2	7427	C2		
3471	C2	7428	C1		
3474	C1	7429	C3		
3477	C2	7430	C3		
3488	C2	7431	C1		
3501	A1	7432	C1		
3502	A1	7500	A1		
3503	A1	7501	A2		
3504	A1	7502	A2		
3505	A1	7503	A1		

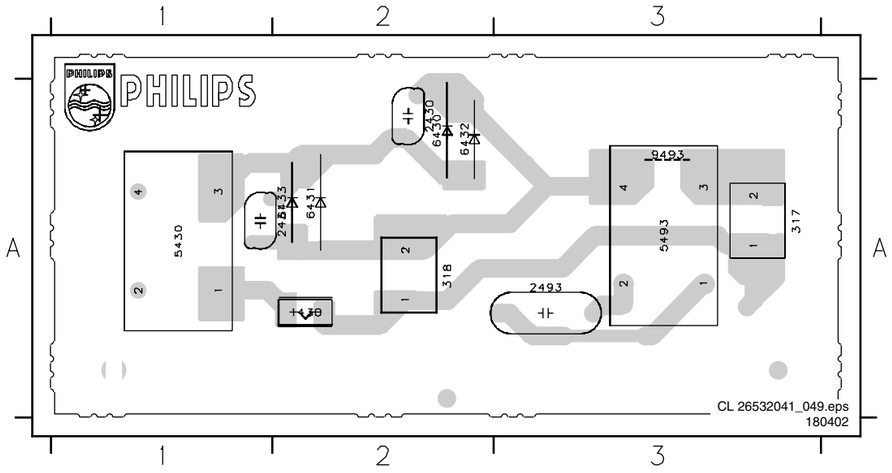
DC Shift Panel



317 B1
318 A1
1430 A3
2430 B3
2431 B4
2493 B2
5430 A3
5493 B2
6430 B3
6431 B4
6432 B3
6433 B4

Layout DC Shift Panel

317 A3
318 A2
1430 A2
2430 A2
2431 A1
2493 A3
5430 A1
5493 A3
6430 A2
6431 A2
6432 A2
6433 A2
9493 A3



Personal Notes:

I/O 3rd Scart

I/O 3rd SCART

3rd SCART

1992

SND_Rin
SND_Lin
GND_AUD_SC
B
G
R
FBL
CVBSin
STATUS_SC3
GND_VID

3501 1K
3502 6K8
2500 680n
1500
2504 100p
6500 BZX284-C6V8
6501 BZX284-C6V8
3504 22K
GND
GND_AUD_SC

3507 1K
3508 6K8
2508 680n
1502
2509 100p
6502 BZX284-C6V8
6503 BZX284-C6V8
3509 22K

1501
6507 BZX284-C12

3538 100R
1508
BZX384-C6V8 6509
75R 3539

1402 PH-S

3540 100R
1507
BZX384-C6V8 6510
75R 3541

3542 100R
1506
BZX384-C6V8 6511
75R 3543

3544 100R
1505
BZX384-C6V8 6512
75R 3545

3526 100R

3999 1K
9530
9532
9533

SNDR_SC3
SNDL_SC3
CVBS_AV3in

3512 100R
1504
6506 BZX384-C6V8
3533 75R

TO 1402 OF B5

FROM / TO 1680 OF B6

1680

I/O EXPANDER

7501 PCF8574T

INT_
A0
A1
A2
SCL
SDA
VDD
VSS
INTERRUPT LOGIC
LP FILTER
INPUT FILTER
I²C BUS CONTROL
POWER-ON RESET
SHIFT REGISTER
8 BIT I/O PORTS
P0
P1
P2
P3
P4
P5
P6
P7

H1
H2
3520 100R
3521 100R
2514 100n

IO_3
IO_6
IO_4
SCL2
SDA2

IO_4
10K 3503
10K 3506
BC847B 7502
BC847B 7503
SCL2
SDA2
H3
H4
SDA2_TM
SCL2_TM

+5V_IO
3510 10K
IO_4
3511 100K
7504 BC847B
+11V_IO
9502
GND
7506 BC327-25
15V
2515 10n Res
3522 10K
3523 4K7
+5V_IO
2516 470p
3532 1K
GND_AUD
7508 BC847B
3531 1K
3530 1K
3529 1K
9503
2512 1u
2510 180p
2517 220p
3528 470R
3527 1K

+5V_IO
3519 10K
IO_3
9501
3524 100K
3525 47K Res
7507 BC847CW

+5V_IO
3515 100K
IO_6
3516 100K
7505 BC847B

+5V
3500 1R5
2501 100u
2502 100n
2503 1n
H5
+5V_IO

+11V
3505 1R5
2505 100u
2506 100n
2507 1n
H6
+11V_IO

TO WIRELESS TRANSMITTER

1690
I2C_MUTE
AUDIO_SL_S_TM
GND_AUD
0V

PILOT_MUTE

3517 150R
3518 150R
1339 YKB21-5165
2513 220p
6504 BZX284-C6V8
6505 BZX284-C6V8
1503
SURROUND JACK

1937

AUDIO_SL_TM
+11V
+5V

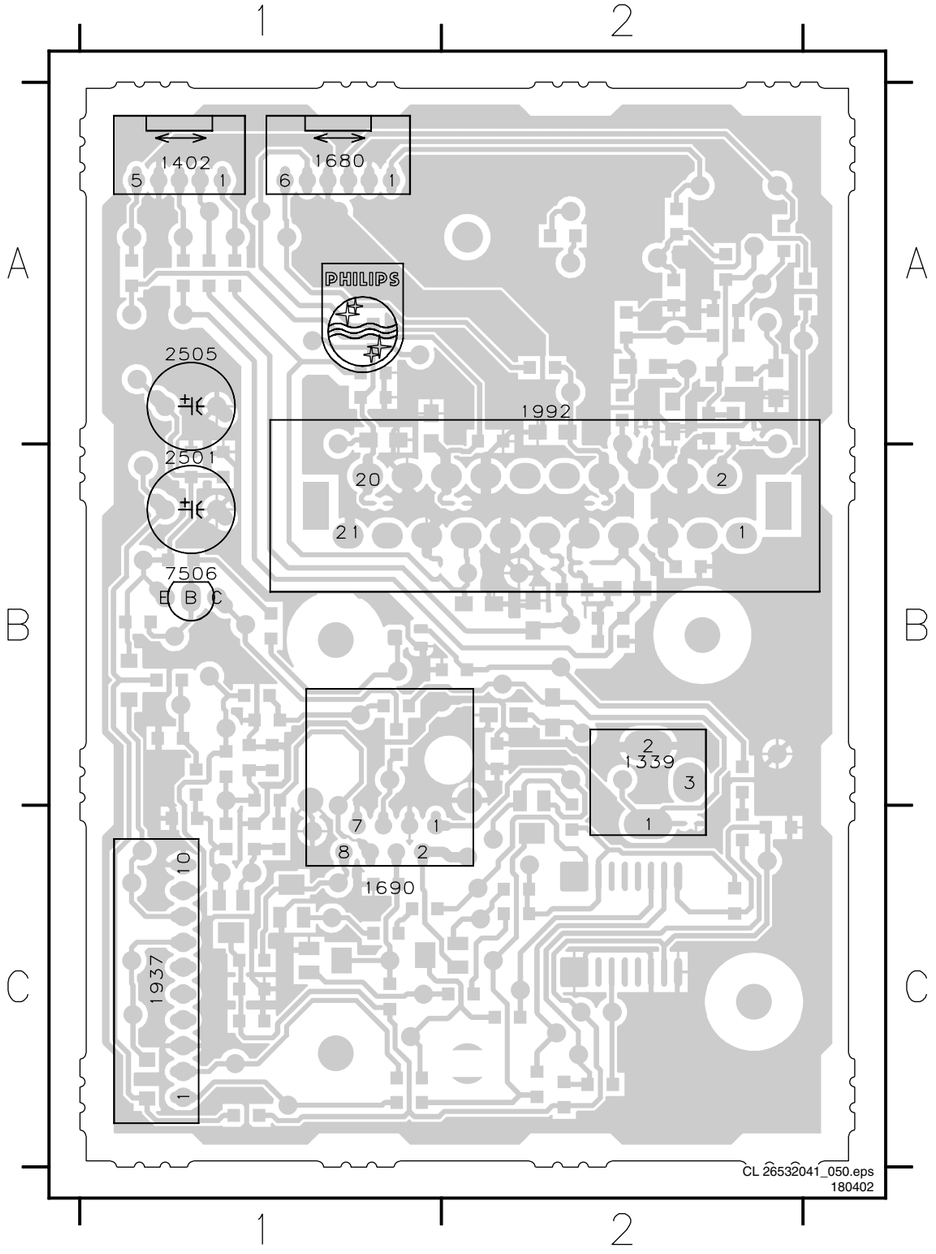
FROM 1937 A8

TUNER / SIM CONNECTOR

CL 26532041_035.eps 170402

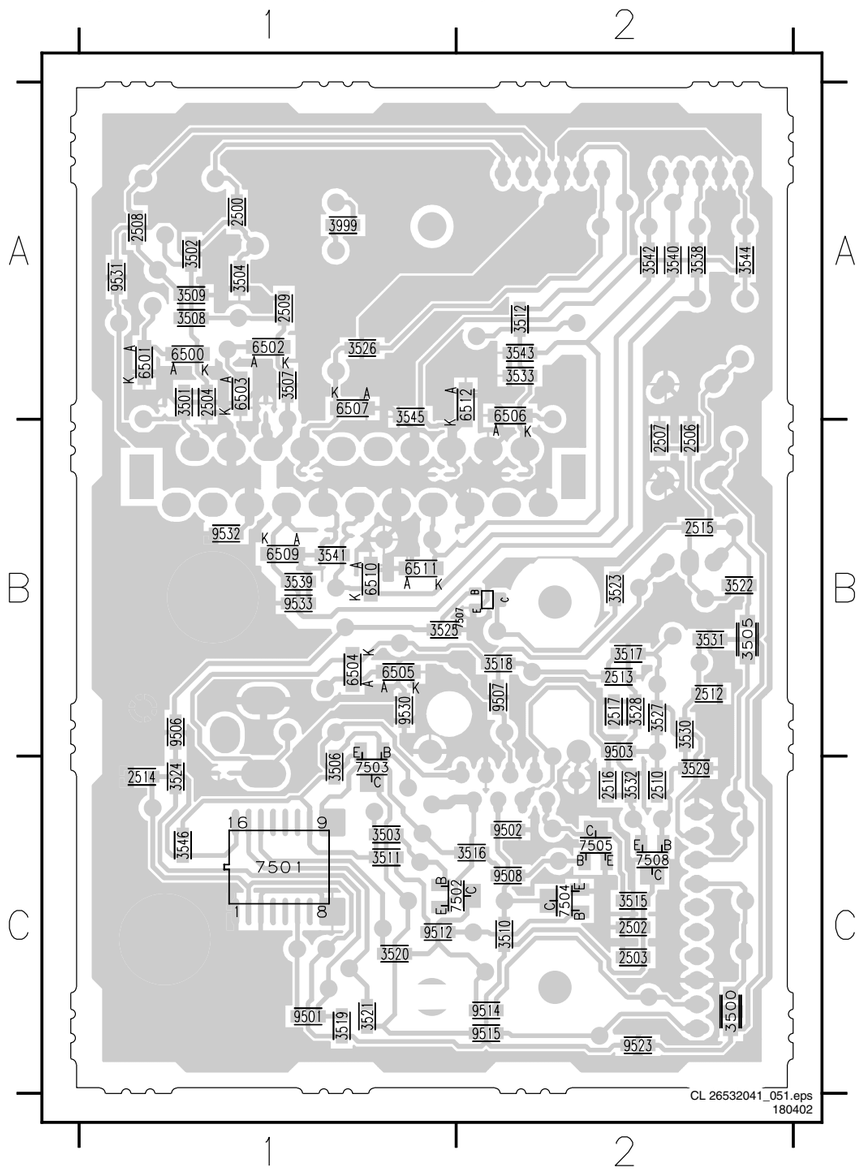
1339 G13
1402 C6
1500 A3
1501 B2
1502 B3
1503 G12
1504 G3
1505 F3
1506 E4
1507 D3
1508 C4
1680 H1
1690 C13
1937 H11
1992 A2
2500 A5
2501 B11
2502 B11
2503 B11
2504 A4
2505 B11
2506 B11
2507 B11
2508 B5
2509 B4
2510 E11
2512 E10
2513 G11
2514 I3
2515 D9
2516 D11
2517 F11
3500 A10
3501 A4
3502 A5
3503 B8
3504 A5
3505 B10
3506 B9
3507 B4
3508 B5
3509 B5
3510 C8
3511 D7
3512 F5
3515 F8
3516 G8
3517 G11
3518 G12
3519 E8
3520 H3
3521 I3
3522 D9
3523 E10
3524 E9
3525 E9
3526 D2
3527 F11
3528 F11
3529 E11
3530 E11
3531 E10
3532 D11
3533 G4
3538 C5
3539 C5
3540 D4
3541 D4
3542 E5
3543 E5
3544 E4
3545 F4
3546 I7
3999 E2
6500 A4
6501 A4
6502 B4
6503 C4
6504 G12
6505 H12
6506 G3
6507 C3
6509 C5
6510 D4
6511 E4
6512 F3
7501 H4
7502 B8
7503 B9
7504 D8
7505 G8
7506 D10
7507 E10
7508 E11
9501 E8
9502 D9
9503 E11
9530 F2
9532 F2
9533 G2

Layout I/O 3rd Scart (Top Side)



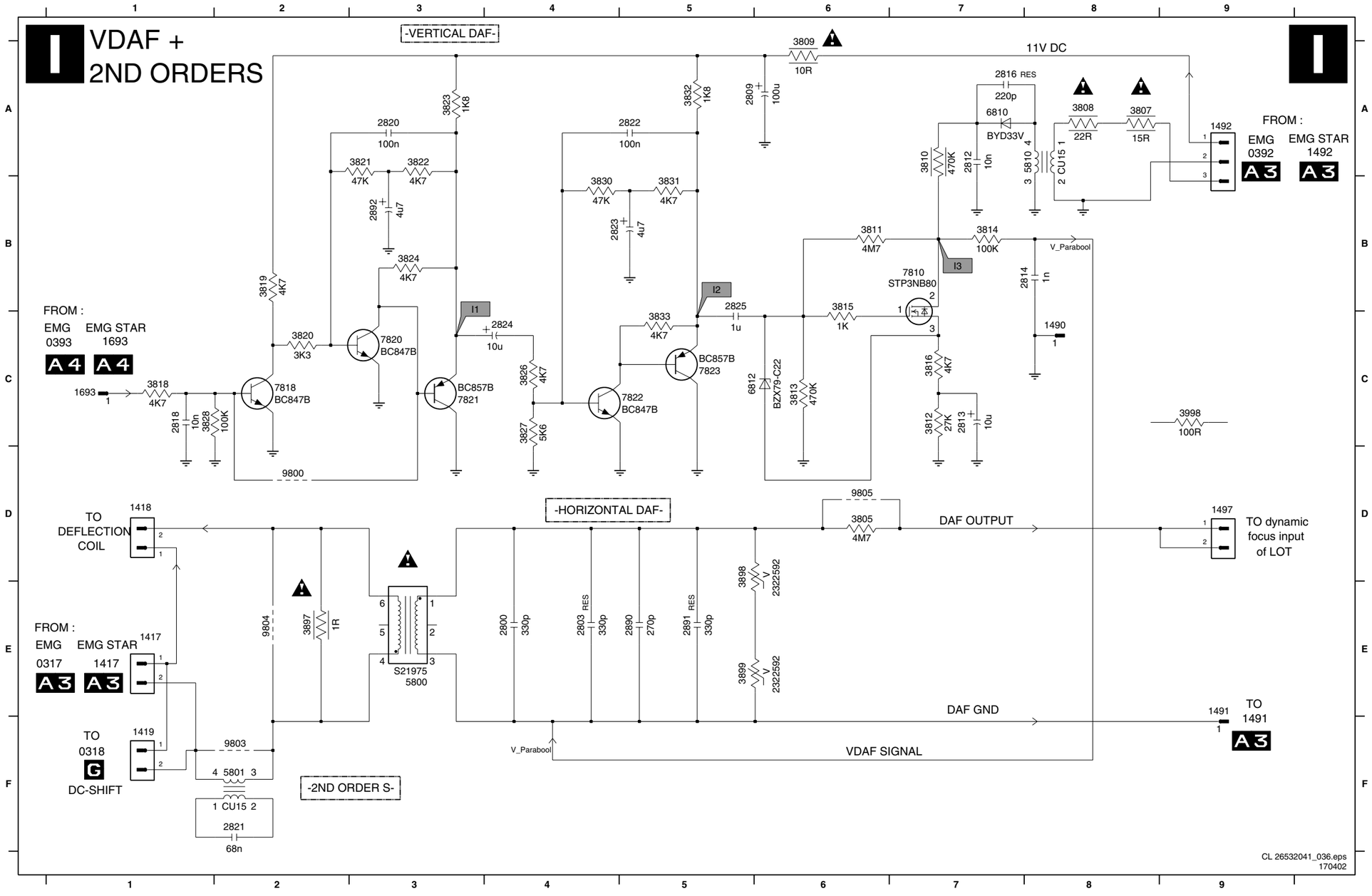
1339 B2
1402 A1
1680 A1
1690 B1
1937 C1
1992 A2
2501 B1
2505 A1
7506 B1

Layout I/O 3rd Scart (Bottom Side)



2500 A1
2502 C2
2503 C2
2504 A1
2506 B2
2507 B2
2508 A1
2509 A1
2510 C2
2512 B2
2513 B2
2514 C1
2515 B2
2516 C2
2517 B2
3500 C2
3501 A1
3502 A1
3503 C1
3504 A1
3505 B2
3506 C1
3507 A1
3508 A1
3509 A1
3510 C2
3511 C1
3512 A2
3515 C2
3516 C2
3517 B2
3518 B2
3519 C1
3520 C1
3521 C1
3522 B2
3523 B2
3524 C1
3525 B1
3526 A1
3527 B2
3528 B2
3529 C2
3530 B2
3531 B2
3532 C2
3533 A2
3538 A2
3539 B1
3540 A2
3541 B1
3542 A2
3543 A2
3544 A2
3545 A1
3546 C1
3999 A1
6500 A1
6501 A1
6502 A1
6503 A1
6504 B1
6505 B1
6506 A2
6507 B1
6509 B2
6510 B1
6511 B1
6512 A2
7501 C1
7502 C2
7503 B1
7504 C2
7505 B2
7508 B2
9501 C1
9502 C2
9503 B2
9506 B1
9507 B2
9508 C2
9512 C1
9514 C2
9515 C2
9523 C2
9530 B1
9531 A1
9532 B1
9533 B1

VDAF Panel + 2nd Orders

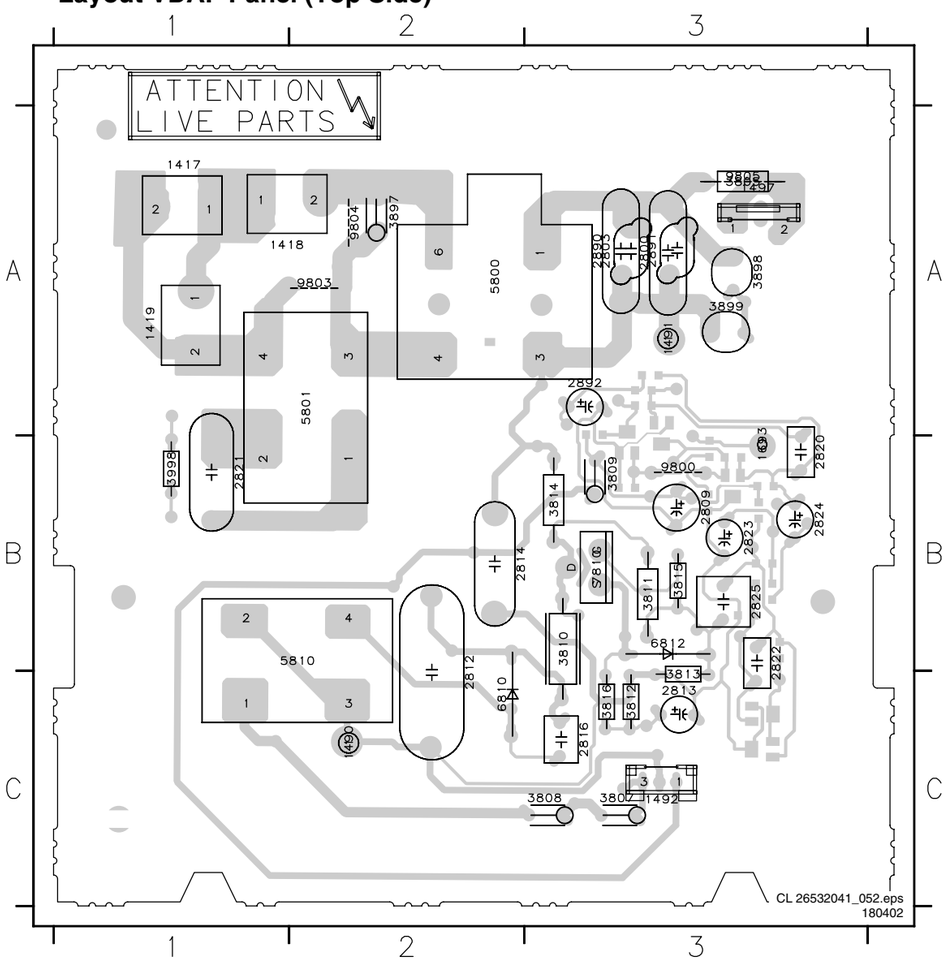


1417 E1	7818 C2
1418 D1	7820 C3
1419 F1	7821 C3
1490 C8	7822 C5
1491 E9	7823 C5
1492 A9	9800 D2
1497 D9	9803 F2
1693 C1	9804 E2
2800 E4	9805 D6
2803 E4	
2809 A5	
2812 A7	
2813 C7	
2814 B8	
2816 A7	
2818 C1	
2820 A3	
2821 F2	
2822 A5	
2823 B4	
2824 C4	
2825 B5	
2890 E5	
2891 E5	
2892 B3	
3805 D6	
3807 A8	
3808 A8	
3809 A6	
3810 A7	
3811 B6	
3812 C7	
3813 C6	
3814 B7	
3815 B6	
3816 C7	
3818 C1	
3819 B2	
3820 C2	
3821 A3	
3822 A3	
3823 A3	
3824 B3	
3826 C4	
3827 C4	
3828 C1	
3830 B4	
3831 B5	
3832 A5	
3833 C5	
3897 E2	
3898 D5	
3899 E5	
3998 C9	
5800 E3	
5801 F2	
5810 A8	
6810 A7	
6812 C6	
7810 B7	

[I] VDAF+2ND ORDER S

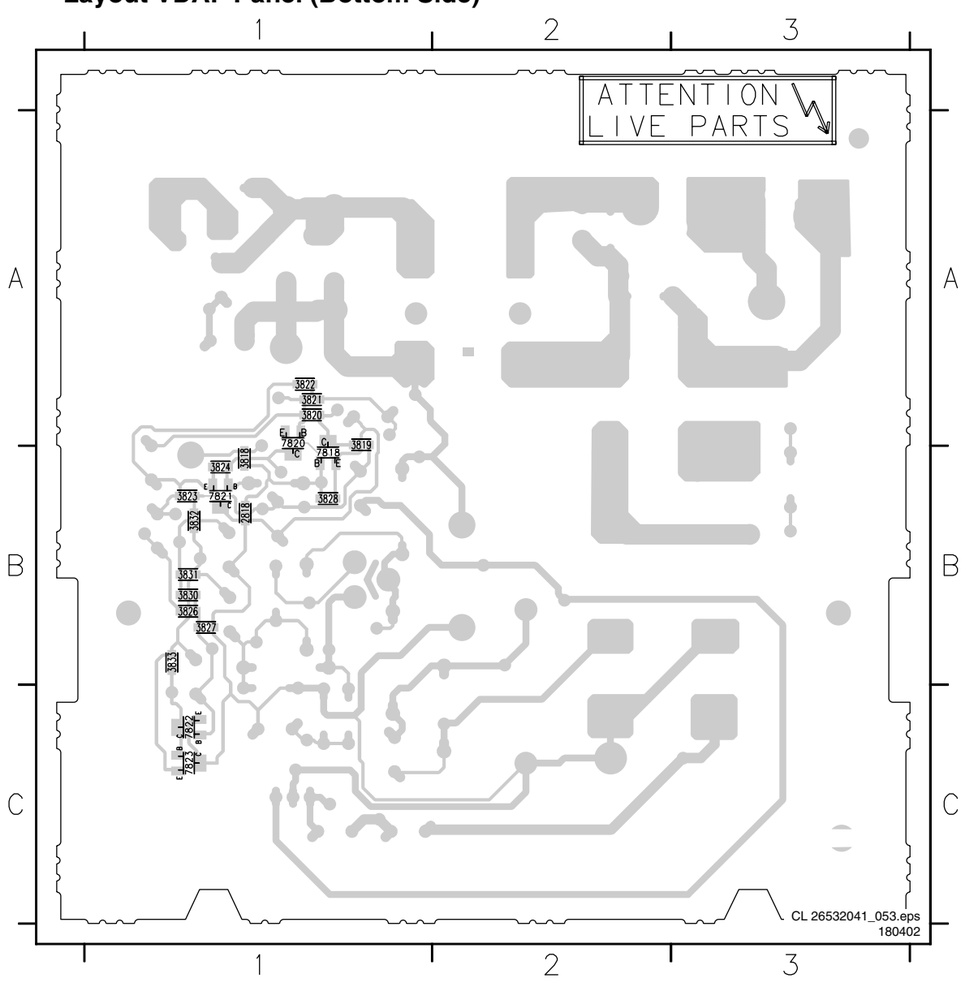
Item	29RF	28RF/32RF	34RF/38RF	36RF	Description
1492	X		X	X	3p
1693	X		X	X	1p
2800	X				330pF
2800		X	X		470pF
2800				X	390pF
2809	X		X	X	100 F
2812	X		X	X	10nF
2813	X		X	X	10 F
2814	X		X	X	1nF
2821	X	X			68nF
2822	X		X	X	4nF
2824	X		X	X	10 F
2825	X		X	X	1 F
2890	X				270pF
2890		X			220pF
2890			X		470pF
2890				X	390pF
3807	X		X	X	15R
3808	X		X	X	15R
3809	X		X	X	10R
3810	X		X	X	470kR
3811	X		X	X	4.7MR
3812	X		X	X	27kR
3813	X		X	X	470kR
3814	X		X	X	100kR
3815	X		X	X	1kR
3816	X		X		4.7kR
3816				X	2.2kR
3818	X		X	X	33kR
3820	X		X	X	Jumper
3821	X		X	X	Jumper
3822	X		X	X	Jumper
3823	X		X	X	1.5kR
3824	X		X	X	33kR
3826	X		X	X	3.3kR
3827	X		X	X	5.6kR
3828	X		X	X	100kR
3830	X		X	X	47kR
3831	X		X	X	4.7kR
3832	X		X	X	1.8kR
3833	X		X	X	4.7kR
5801	X	X			Transformer
5810	X		X	X	Bridge coil
6810	X		X	X	BYD33V
6812	X		X	X	BZX79-C22
7810	X		X	X	STP3NB80FP
7818	X		X	X	BC847B
7822	X		X	X	BC847B
7823	X		X	X	BC857B
9800	X		X	X	Wire
9803			X	X	Wire

Layout VDAF Panel (Top Side)



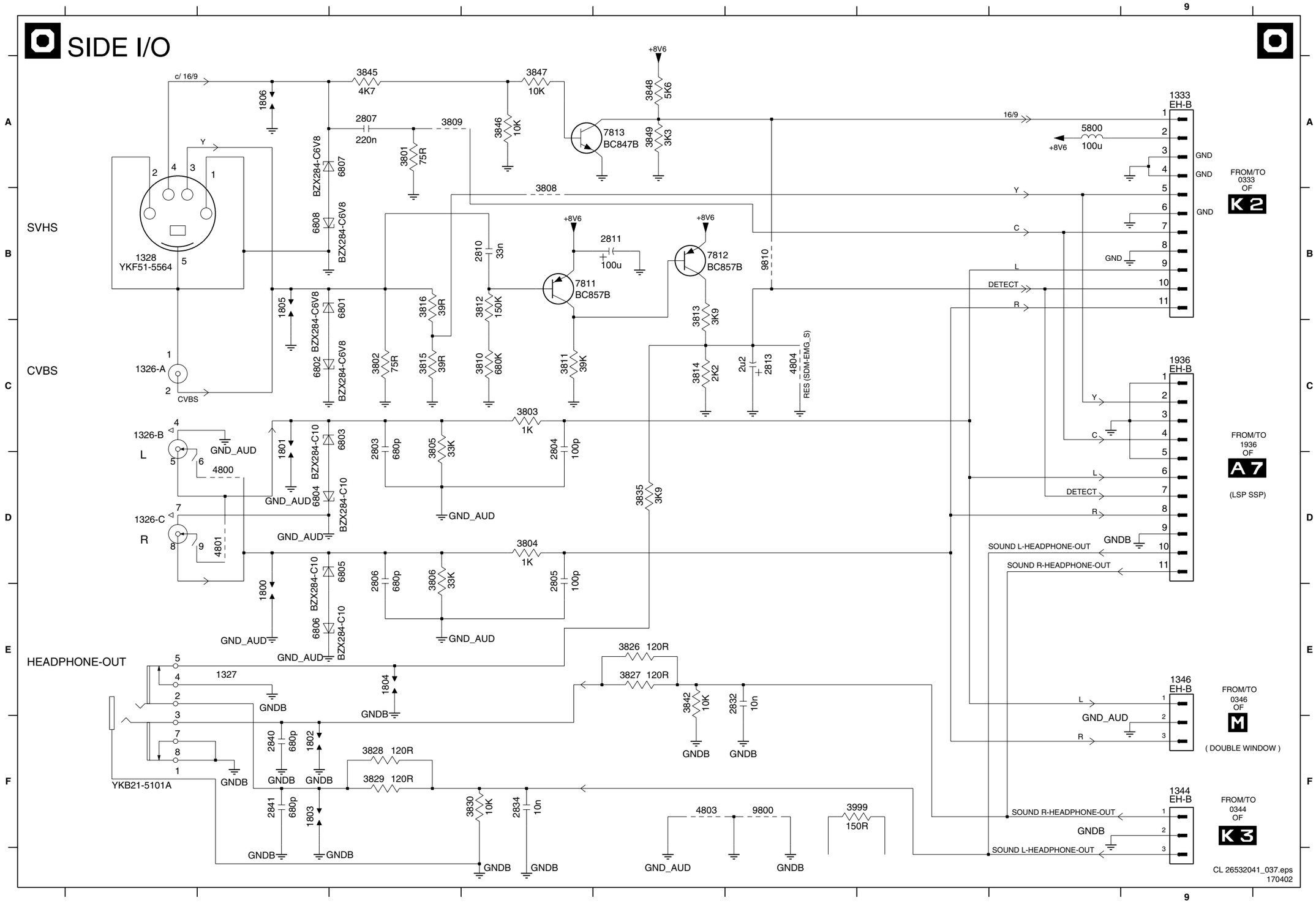
1417 A1
1418 A1
1419 A1
1490 C2
1491 A3
1492 C3
1497 A3
1693 B3
2800 A3
2803 A3
2809 B3
2812 C2
2813 C3
2814 B2
2816 C3
2820 B3
2821 B1
2822 B3
2823 B3
2824 B3
2825 B3
2890 A3
2891 A3
2892 A3
3805 A3
3807 C3
3808 C3
3809 B3
3810 B3
3811 B3
3812 C3
3813 C3
3814 B3
3815 B3
3816 C3
3897 A2
3898 A3
3899 A3
3998 B1
5800 A2
5801 A1
5810 B2
6810 C2
6812 B3
7810 B3
9800 B3
9803 A2
9804 A2
9805 A3

Layout VDAF Panel (Bottom Side)



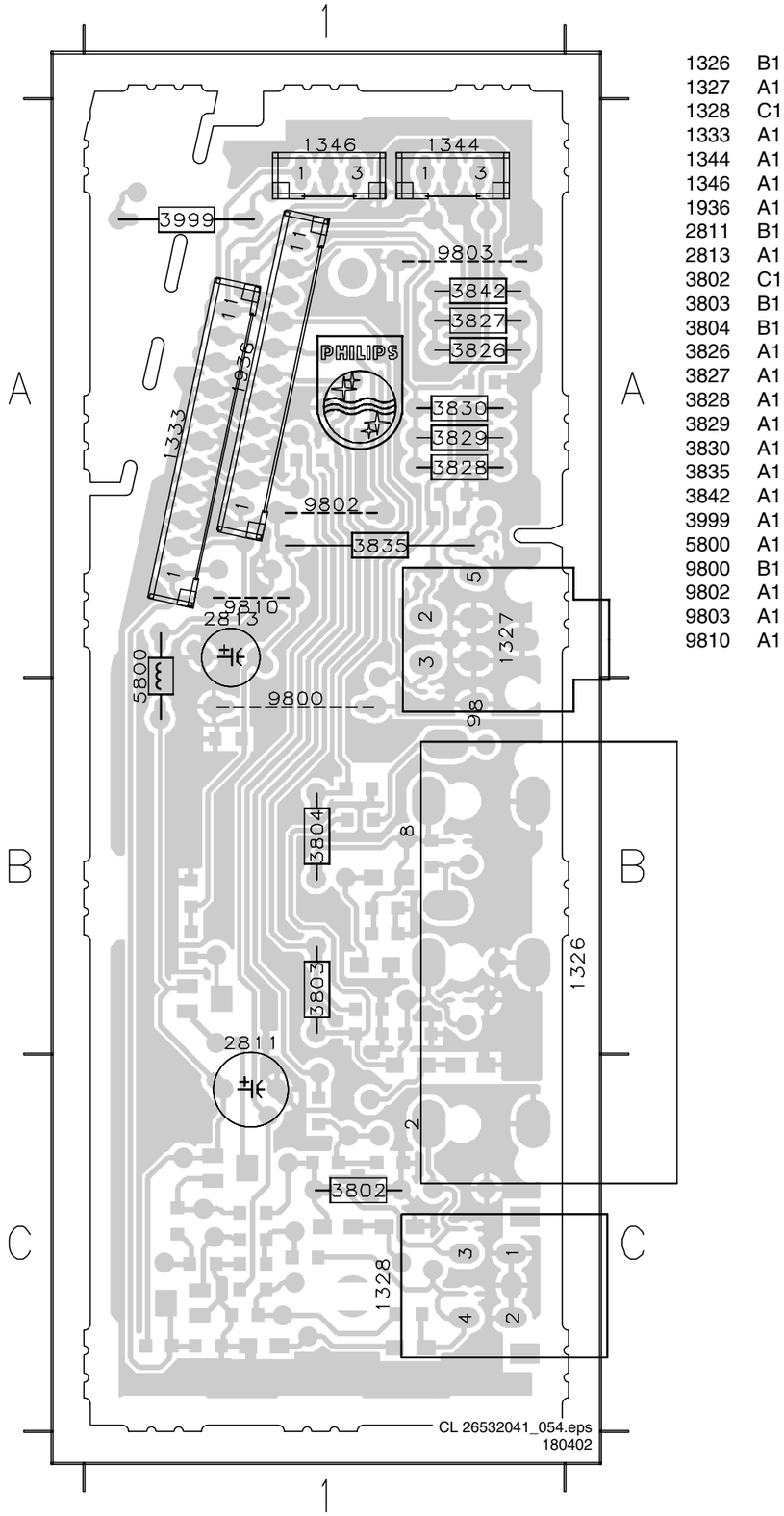
2818 B1
3818 B1
3819 A1
3820 A1
3821 A1
3822 A1
3823 B1
3824 B1
3826 B1
3827 B1
3828 B1
3830 B1
3831 B1
3832 B1
3833 B1
7818 B1
7820 A1
7821 B1
7822 C1
7823 C1

Side I/O Panel



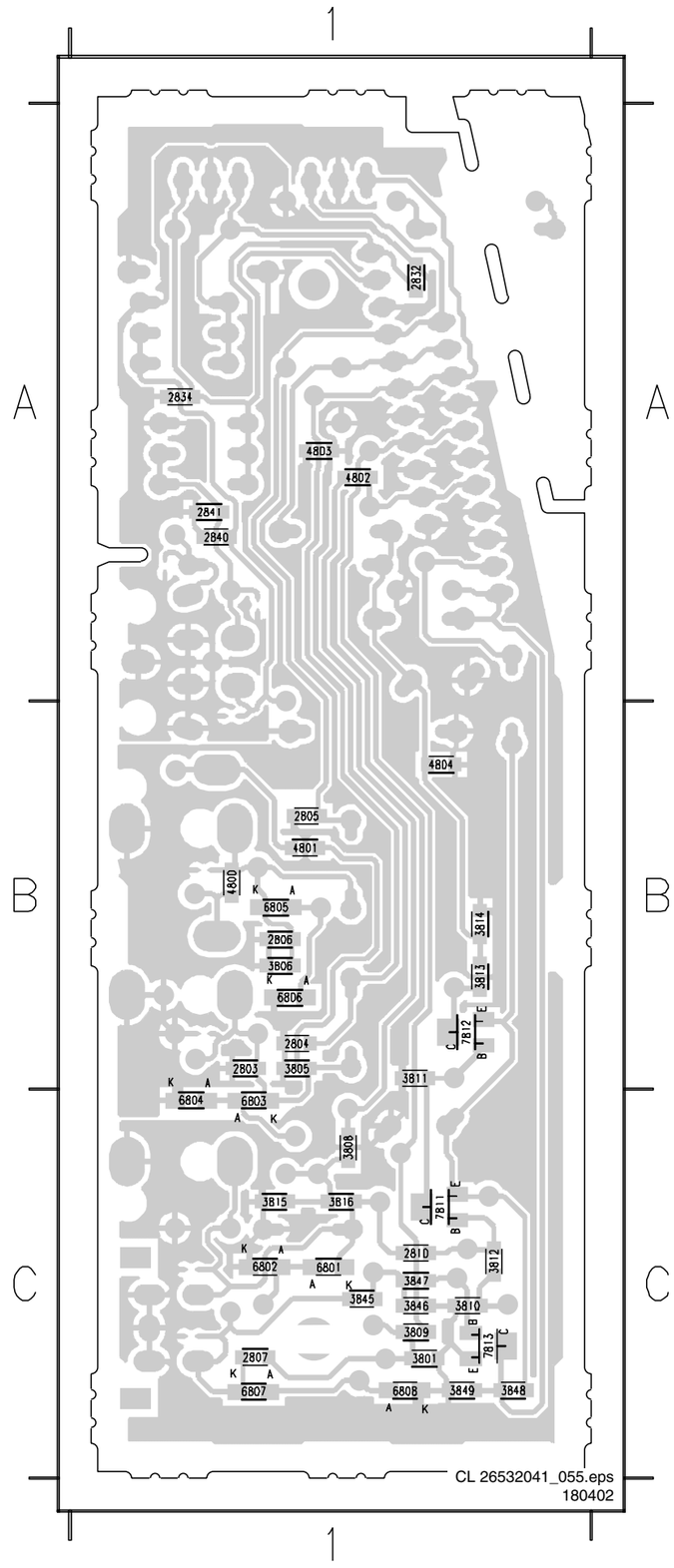
1326-A C1
1326-B C1
1326-C D1
1327 E2
1328 B1
1333 A9
1344 F9
1346 E9
1800 E2
1801 C2
1802 F2
1803 F2
1804 E3
1805 B2
1806 A2
1936 C9
2803 C3
2804 C4
2805 D4
2806 D3
2807 A3
2810 B4
2811 B5
2813 C6
2832 E6
2834 F4
2840 F2
2841 F2
3801 A3
3802 C3
3803 C4
3804 D4
3805 C3
3806 D3
3808 B4
3809 A3
3810 C4
3811 C4
3812 B4
3813 B5
3814 C5
3815 C3
3816 B3
3826 E5
3827 E5
3828 F3
3829 F3
3830 F4
3835 D5
3842 E5
3845 A3
3846 A4
3847 A4
3848 A5
3849 A5
3999 F7
4800 D2
4801 D2
4803 F5
4804 C6
5800 A8
6801 B3
6802 C2
6803 C3
6804 D2
6805 D3
6806 E2
6807 A3
6808 B2
7811 B4
7812 B5
7813 A5
9800 F6
9810 B6

Layout Side I/O Panel (Top Side)



1326	B1
1327	A1
1328	C1
1333	A1
1344	A1
1346	A1
1936	A1
2811	B1
2813	A1
3802	C1
3803	B1
3804	B1
3826	A1
3827	A1
3828	A1
3829	A1
3830	A1
3835	A1
3842	A1
3999	A1
5800	A1
9800	B1
9802	A1
9803	A1
9810	A1

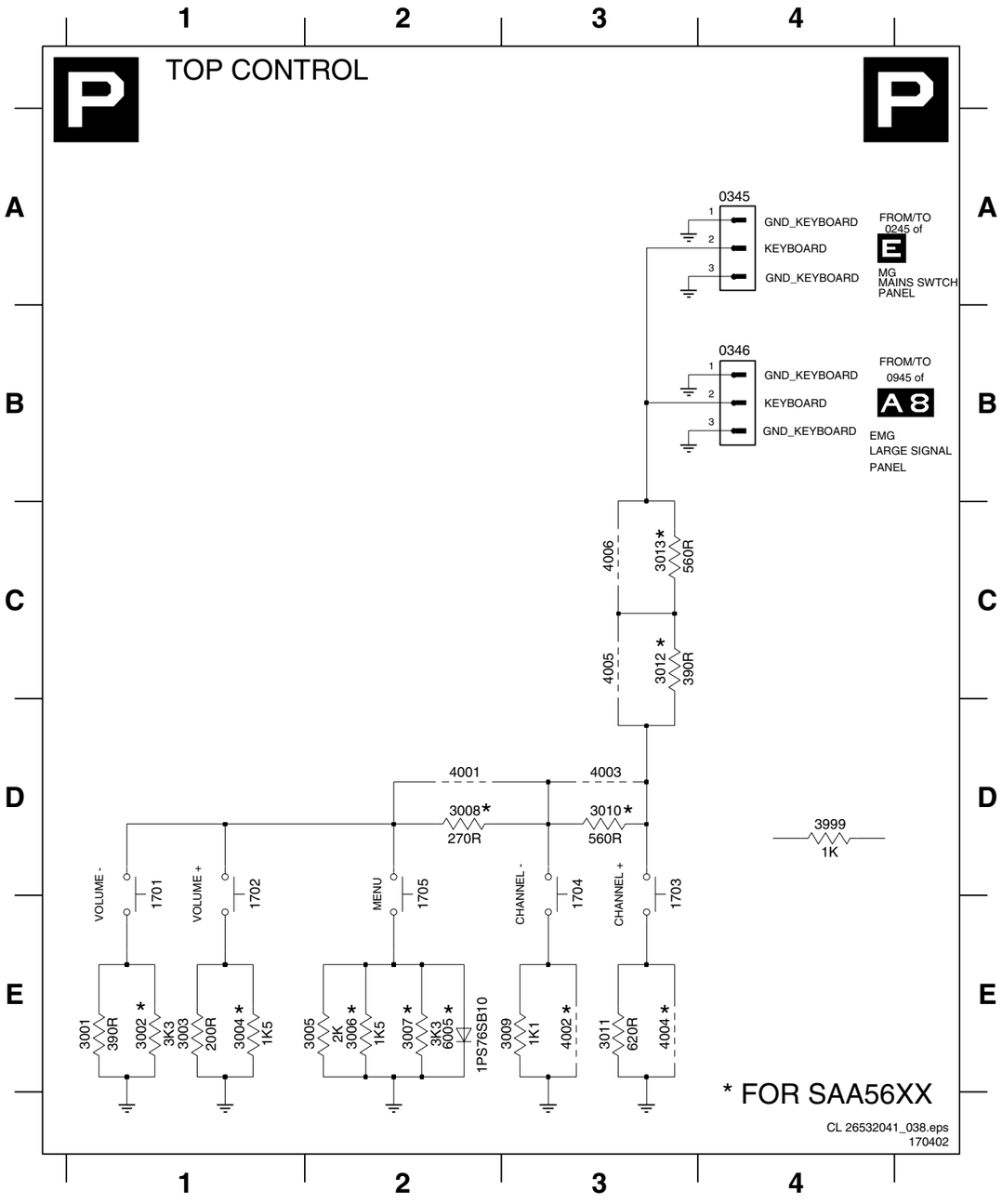
Layout Side I/O Panel (Bottom Side)



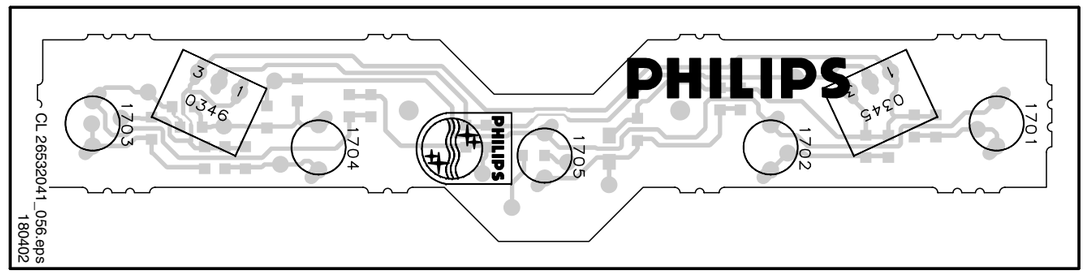
2803	B1
2804	B1
2805	B1
2806	B1
2807	C1
2810	C1
2832	A1
2834	A1
2840	A1
2841	A1
3801	C1
3805	B1
3806	B1
3808	C1
3809	C1
3810	C1
3811	B1
3812	C1
3813	B1
3814	B1
3815	C1
3816	C1
3845	C1
3846	C1
3847	C1
3848	C1
3849	C1
4800	B1
4801	B1
4802	A1
4803	A1
4804	B1
6801	C1
6802	C1
6803	B1
6804	C1
6805	B1
6806	B1
6807	C1
6808	C1
7811	C1
7812	B1
7813	C1

Top Control Panel

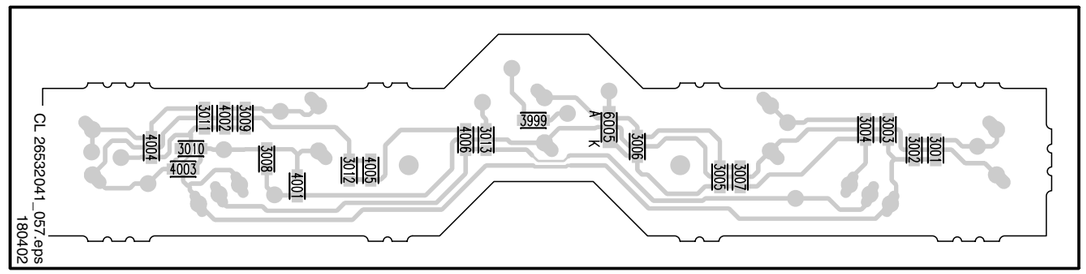
0345 A4	1703 D3	3002 E1	3006 E2	3010 D3	3999 D4	4004 E3
0346 B4	1704 D3	3003 E1	3007 E2	3011 E3	4001 D2	4005 C3
1701 D1	1705 D2	3004 E1	3008 D2	3012 C3	4002 E3	4006 C3
1702 D1	3001 E1	3005 E2	3009 E3	3013 C3	4003 D3	6005 E2



Top Control Panel (Top Side)



Top Control Panel (Bottom Side)



Auto SCAVEM Panel

SC1 AUTOSCAVEM

MATRIX

DIFFERENTIATOR

CORING / CLIPPING

SCAVEM CONTROL

PARABOLA MODULATION

LINE PARABOLA
(OPTIONAL)

TO 1940
A8
SIM

N.C.
RESERVED FOR FUTURE

TO 1955
A8
SIM

TO / FROM
1940
F1
OF
CRT

SC1:SC3

CL 26532041_043.eps
230402

SC1
1 V / div DC
10µs / div

SC2
1 V / div DC
10µs / div

SC3
1 V / div DC
10µs / div

SC4
2 V / div DC
10µs / div

SC5
2 V / div DC
10µs / div

SC6
2 V / div DC
10µs / div

SC7
2 V / div DC
10µs / div

SC8
2 V / div DC
10µs / div

SC9
2 V / div DC
10µs / div

SC10
1 V / div DC
10µs / div

SC11
200mV / div DC
10µs / div

SC12
1 V / div DC
10µs / div

SC13
50mV / div DC
10µs / div

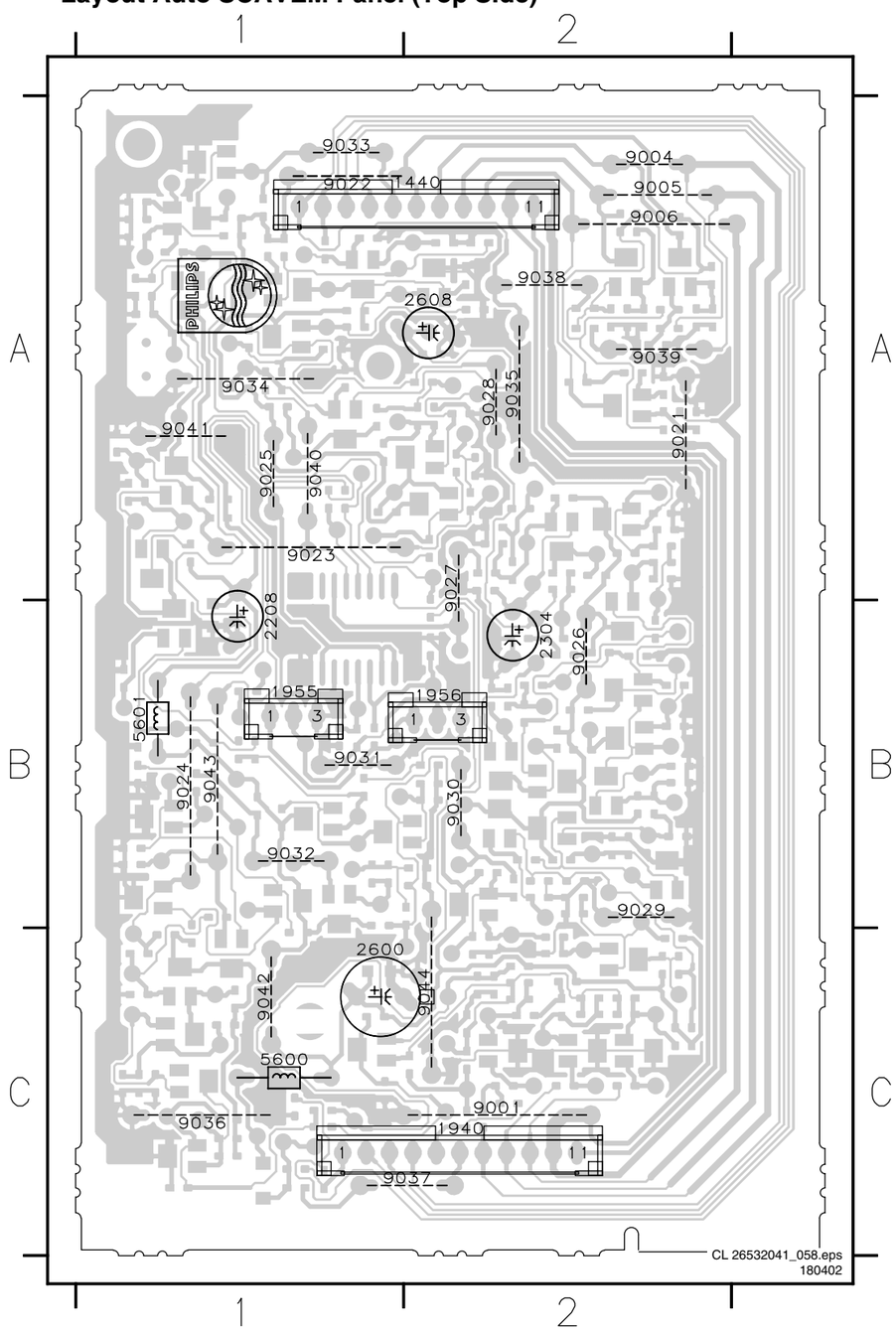
SC23
2 V / div DC
100µs / div

SC24
2 V / div DC
100µs / div

1440 L17
1940 B4
1955 E4
1956 D4
2000 B8
2002 C8
2003 C9
2004 D8
2006 C8
2008 C9
2010 C11
2012 B12
2014 C12
2016 B14
2018 C15
2020 C15
2022 I12
2024 F12
2026 E12
2028 H11
2038 F15
2040 F16
2200 J14
2202 J15
2208 I3
2210 A6
2212 A7
2500 E7
2502 F7
2503 I6
2504 K6
2600 H3
2602 I3
2605 G11
2606 I13
2607 H3
2608 J12
3000 B6
3002 C6
3004 D6
3006 B7
3008 B7
3010 C7
3012 B8
3014 C8
3016 C8
3018 B8
3020 C8
3022 B9
3024 C9
3026 B10
3028 C9
3030 C10
3032 B10
3034 B10
3036 B11
3038 C11
3040 B11
3042 C11
3044 C12
3046 B13
3048 D12
3050 B13
3052 D13
3054 C14
3056 C14
3058 B14
3060 D14
3062 C15
3064 D15
3066 B16
3068 D16
3070 D9
3072 E11
3074 G11
3076 F12
3078 G12
3080 F12
3082 G12
3084 G12
3086 E13
3088 G13
3090 E13
3091 G15
3092 E14
3093 F15
3094 F14
3096 F14
3106 G15
3108 E15
3110 F15
3112 E16
3114 F16
3116 E16
3118 D10
3120 E10
3121 H5
3122 H6
3123 I6
3124 I5
3125 I5
3126 I5
3127 J5
3128 K6
3129 K6
3130 K5
3131 K5
3132 L5
3133 M5
3134 M6
3135 M6
3136 M5
3137 N5
3138 N5
3200 J10
3202 J10
3204 I14
3206 H11
3208 H15
3210 J11
3212 H15
3214 H11
3216 J11
3218 J12
3220 I12
3222 I16
3224 J16
3226 I12
3228 J12
3230 I13
3232 I13
3234 J13
3236 I13
3238 J13
3240 H14
3242 J15
3244 J15
3254 A7
3500 E6
3502 E6
3600 G2
3999 A3
5600 G3
5601 H3

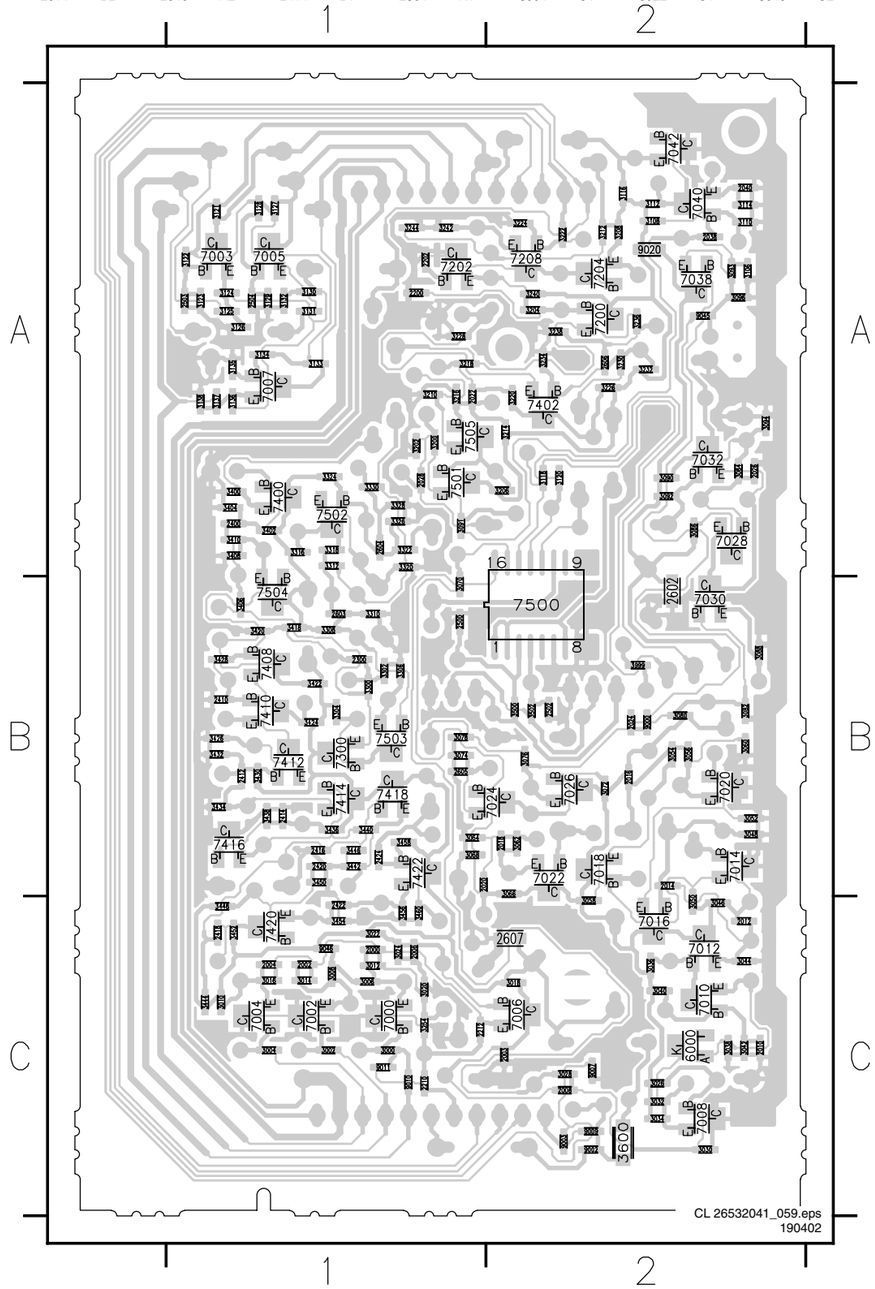
6000 C10
7000 B7
7002 C7
7003 I5
7004 D7
7005 K5
7006 C8
7007 M5
7008 C10
7010 C10
7012 B11
7014 B13
7016 D13
7018 B14
7020 D14
7022 C15
7024 F11
7026 F11
7028 F13
7030 F13
7032 F13
7038 E14
7040 F16
7042 F16
7200 I13
7202 I14
7204 I15
7208 I15
7402 I13
7501 I11
7505 I11
9000 G13
9001 E2
9002 G2
9003 B3
9004 C3
9005 C3
9006 C3
9007 B3
9009 H2
9010 B5
9011 B5

Layout Auto SCAVEM Panel (Top SIde)



1440	A2	2000	C1	2016	B2	2200	A1	2416	B1	2602	B2	3006	C1	3024	C1	3042	C2	3330	A1
1940	C2	2002	C1	2018	B2	2202	A1	2418	C1	2603	B1	3008	C1	3026	C2	3044	C2	3400	A1
1955	B1	2003	C2	2020	B1	2210	C1	2420	B1	2604	A1	3010	C1	3028	C2	3046	C2	3402	A1
1956	B2	2004	C1	2022	A1	2212	C1	2422	C1	2605	B1	3012	C1	3030	C2	3048	B2	3404	A1
2208	B1	2006	C1	2024	B2	2300	B1	2424	B1	2606	A2	3014	C1	3032	C2	3050	C2	3406	B1
2304	B2	2008	C2	2026	A2	2400	A1	2500	B1	2607	C2	3016	C1	3034	C2	3052	B2	3408	A1
2600	C1	2010	C2	2028	A1	2410	B1	2502	B2	3000	C1	3018	C2	3036	C2	3054	B2	3410	A1
2608	A2	2012	C2	2038	A2	2412	B1	2503	A1	3002	C1	3020	C1	3038	C2	3056	B2	3418	B1
5600	C1	2014	B2	2040	A2	2414	B1	2504	A1	3004	C1	3022	C1	3040	C2	3058	C2	3420	B1
5601	B1															3060	B2	3422	B1
9001	C2															3062	B2	3424	B1
9004	A2															3064	B1	3426	B1
9005	A2															3066	B2	3428	B1
9006	A2															3068	B1	3430	B1
9021	A2															3070	B1	3432	B1
9022	A1															3072	B2	3434	B1
9023	A1															3074	B1	3436	B1
9024	B1															3076	B2	3438	B1
9025	A1															3078	B1	3440	B1
9026	B2															3080	B2	3442	B1
9027	A2															3082	B2	3444	C1
9028	A2															3084	A2	3446	B1
9029	B2															3086	A2	3448	C1
9030	B2															3088	B2	3450	B1
9031	B1															3090	A2	3452	C1
9032	B1															3091	A1	3454	C1
9033	A1															3092	A2	3456	C1
9034	A1															3093	A2	3458	B1
9035	A2															3094	A2	3460	C1
9036	C1															3096	A2	3500	B2
9037	C1															3106	A2	3502	B2
9038	A2															3108	A2	3600	C2
9039	A2															3110	A2	3999	B2
9040	A1															3112	A2	6000	C2
9041	A1															3114	A2	7000	C1
9042	C1															3116	A2	7002	C1
9043	B1															3118	A2	7003	A1
9044	C2															3120	A2	7004	C1
																3121	A1	7005	A1
																3122	A1	7006	C2
																3123	A1	7007	A1
																3124	A1	7008	C2
																3125	A1	7010	C2
																3126	A1	7012	C2
																3127	A1	7014	B2
																3128	A1	7016	C2
																3129	A1	7018	B2
																3130	A1	7020	B2
																3131	A1	7022	C2
																3132	A1	7024	B1
																3133	A1	7026	B2
																3134	A1	7028	A2
																3135	A1	7030	B2
																3136	A1	7032	A2
																3137	A1	7038	A2
																3138	A1	7040	A2
																3200	A1	7042	A2
																3202	A1	7200	A2
																3204	A2	7202	A2
																3206	A2	7204	A2
																3208	A2	7208	A2
																3210	A1	7300	B1
																3212	A2	7400	A1
																3214	A2	7402	A2
																3216	A1	7408	B1
																3218	A1	7410	B1
																3220	A2	7412	B1
																3222	A2	7414	B1
																3224	A2	7416	B1
																3226	A2	7418	B1
																3228	A1	7420	C1
																3230	A2	7422	B1
																3232	A2	7500	A2
																3234	A2	7501	A1
																3236	A2	7502	A1
																3238	A2	7503	B1
																3240	A2	7504	A1
																3242	A1	7505	A1
																3244	A1	9000	B2
																3254	C1	9002	C2
																3300	B1	9003	C2
																3302	B1	9007	C2
																3304	B1	9009	C2
																3306	B1	9010	C1
																3308	B1	9011	C1
																3310	B1	9020	A2
																3312	A1	9045	A2
																3316	A1	9046	C1
																3318	A1		
																3320	A1		
																3322	A1		
																3324	A1		
																3326	A1		
																3328	A1		

Layout Auto SCAVEM Panel (Bottom SIde)



8. Electrical Alignments

Index of this chapter

8.1 General Alignment Conditions

8.1.1 Start Conditions

Perform all electrical adjustments under the following conditions:
- Power supply voltage: 230 V_{AC}/50 Hz (± 10 %).
- Connect the set to the mains via an isolation transformer with low internal resistance.
- Allow the set to warm up for approximately 20 to 30 minutes.
- Measure the voltages and waveforms in relation to chassis ground (with the exception of the voltages on the primary side of the power supply). **Caution:** never use the cooling fins/plates as ground.
- Test probe: Ri > 10 MΩ, Ci < 20 pF.
- Use an isolated trimmer/screwdriver to perform the alignments.

Perform all electrical adjustments with the following start settings (for all CRTs):
- Set LIGHT SENSOR 'off', by setting ACTIVE CONTROL to 'off' with the remote control.
- Set CONTRAST to '75', BRIGHTNESS and COLOUR to '40' (via PICTURE menu).
- Set COLOUR ENHANCEMENT to 'off' (via PICTURE menu).
- Set DIGITAL OPTIONS to 'Pixel Plus' (via PICTURE menu), unless otherwise stated (for sets without 'Pixel Plus' (= Eagle), set to 'Natural Motion').
- Set DYNAMIC CONTRAST to 'off' (via PICTURE menu).
- Set CATHODE DRIVE at '15' (via SAM - Alignments - General - Drive - Cathode).

8.1.2 Adjustment Sequence

Use the following adjustment sequence:
1. Set the correct TV-set 'options' (after storing, re-start the set!).
2. Rough adjustment of 'Vg2' and 'Focus'.
3. Rough adjustment of 'Geometry'.
4. Allow the set to warm up.
5. Accurate adjustment of 'Vg2' and 'Focus'.
6. Accurate adjustment of 'Geometry'.
7. Software alignments (cut-off, cathode drive, peak white, white drive, etc).

8.2 Hardware Alignments

Note: The Service Alignment Mode (SAM) is described in chapter 5 of the Service Manual. Menu navigation is done with the 'CURSOR UP, DOWN, LEFT or RIGHT' keys of the remote control (RC) transmitter.

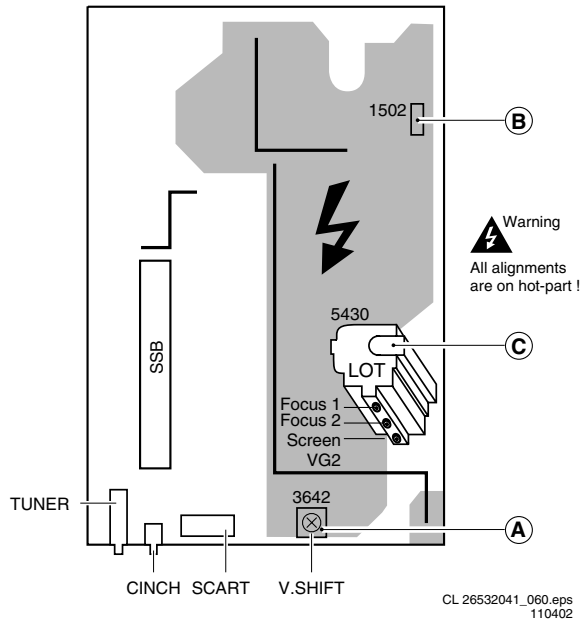


Figure 8-1 Top-view LSP

8.2.1 Vg2 Adjustment

Method 1 (with oscilloscope)
In the frame-blanking period of the R, G, and B signals applied to the CRT, the 'HOP' video processor inserts a measuring pulse with different DC levels. Measure the black level pulse during the vertical flyback at the RGB cathodes of the CRT.
1. Go, via the 'MENU' key, to the normal user menu, select 'PICTURE', and set 'CONTRAST' and 'BRIGHTNESS' to '0'.
2. Activate the SAM.
3. Connect the RF output of a pattern generator to the antenna input. Test pattern is a 'black' picture (blank screen on CRT without any OSD info).
4. Set the channel of the oscilloscope to 20 V/div and the time base to 20 us/div. Use external triggering on the vertical pulse (**caution**: use a trigger point at the '**cold**' side!).
5. Ground the scope at the CRT panel ('**cold**' side) and connect a 10:1 probe to one of the cathodes of the picture tube socket (see diagram F).
6. Measure the cut-off pulse during first full line after the frame blanking. You will see two pulses, one being the cut-off pulse and the other being the white drive pulse. Choose the one with the lowest value; this is the cut-off pulse.
7. Select the cathode with the highest V_{DC} value for the alignment. Adjust the V_{CUTOFF} of this gun with the SCREEN (lower) potentiometer on the LOT to the correct DC-value (tolerance is +/- 3 V_{DC}):
   - 28": 160 V.
   - 29": 160 V.
   - 32": 160 V.
   - 36": 170 V.
8. Restore 'CONTRAST' and 'BRIGHTNESS' to normal (CONTRAST = 75 and BRIGHTNESS = 40).

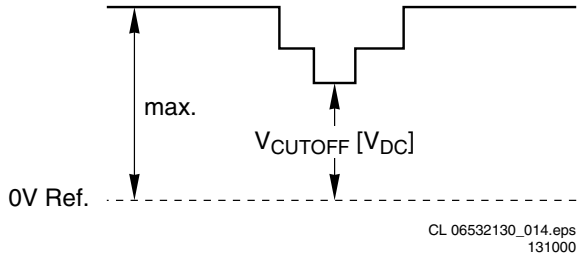


Figure 8-2 Waveform Vg2 alignment

Method 2 (without oscilloscope)
Note: Use this 'software driven' alignment **only** in cases when there is no oscilloscope available, because of the high spread and tolerances.
1. Activate the SAM with the RC-code '062596' directly followed by 'OSD [i+]'.
2. Select 'Alignments'.
3. Select the 'General' sub-menu.
4. Set 'Vg2 Test Pattern' to 'On'
5. You will now get OSD feedback during Vg2 alignment.
6. First, turn the Vg2 potmeter on the LOT to the left. OSD feedback will show '**Out/High**'.
7. Turn the Vg2 potmeter slowly clockwise until the OSD toggles between '**In/High** and **In/ Low**'. This is the correct value.

8.2.2 Focus alignment

Notes:
- Tune the set to a 'circle with crosshatch' test pattern (use an external video pattern generator).
- Choose picture mode 'NATURAL' with the 'SMART PICTURE' button on the remote control transmitter.
- ELDOR LOT outline:
  – Focus 1 (F1) = Static alignment (black wire).
  – Focus 2 (F2) = Dynamic alignment (red wire).

Focus method for Philips 32" tube with bleeder gun
1. Start the alignment with the STATIC focus (upper potmeter) turned to the **left** and the DYNAMIC focus (middle potmeter) to the **right**.
2. Adjust the DYNAMIC focus until the horizontal lines at the centre of the screen have minimum width.
3. Adjust the STATIC focus until the vertical lines at the corners of the screen have minimum width.
4. Adjust the DYNAMIC focus until the horizontal lines at the centre of the screen have minimum width.
5. Check overall spot performance and repeat steps 3 and 4 to achieve the best result.

Focus method for all other tubes
1. Start with the STATIC and DYNAMIC focus potentiometers on the LOT at **midway**.
2. Adjust the STATIC focus until the vertical lines at 1/4 from east and west, at the height of the centre line, has minimum width without introducing a visible haze.
3. Adjust the DYNAMIC focus until the horizontal line at the centre of the screen has minimum width without introducing a visible haze.
4. Check overall spot performance and repeat steps 2 and 3 to achieve the best result: a compromise between minimal visible haze at the middle of the screen and sharp lines at the edges of the screen.

8.3 Software Alignments

8.3.1 Introduction

With the software alignments, it is possible to align the Geometry, White Tone, and Tuner IF settings.
Put the set in the SAM (see chapter 5). The SAM menu will now appear on the screen. Select, via '**Alignments**', one of the sub-menus. They are explained below in the sequence of the sub-menus.

Notes:
- All changes to menu items and alignments are stored automatically, except the option codes. They must be stored manually.
- If the Option codes have been changed **and stored**, the set has to be switched 'OFF' and 'ON' using the mains switch to activate the new settings (when switching via Standby, the option code settings are NOT read by the microprocessor).
- If an empty EAROM (permanent memory) is detected, all settings are set to pre-programmed default values.

8.3.2 General

Vg2 Test Pattern
In this sub-menu, you can turn 'On' the OSD feedback for the Vg2 alignment (see chapter 8.2.1).

Adjust Peak White Limiter
Fixed setting: 4.

EHT compensation
Enter value '9' for the 28" and 32", '12' for the 29", or '10' for the 36" picture tubes.

Soft clipper
Fixed setting: Pwl + 0%

Luma gain
Fixed setting: 2.

IF AFC
Supply, via an external video generator (e.g. PM5518), a TV signal with strength of at least 1 mV and a frequency of 475.25 MHz. Use system BG if possible, otherwise match the system of your generator with the received signal in the set.

Alignment procedure:
1. Go to the 'Installation' menu.
2. Select 'Manual installation'.
3. Tune the TV-set to the system and frequency described above via 'Search' - '475' - 'OK'.
4. If the frequency, showed in the line 'Fine tune', is between 475.18 MHz and 475.31 MHz, you do not need to re-adjust the 'IF AFC'.
5. If not, adjust the frequency in the 'Fine tune' line to 475.25 MHz and 'Store' the program (this is very important because this will disable the AFC algorithm).
6. Now go to the SAM and select 'Alignments' - 'General' - 'IF AFC'.
7. During the 'IF AFC'-parameter adjustment, one can see OSD feedback in the top of the screen.
8. This OSD feedback can give 4 kind of messages:

Table 8-1 OSD feedback of AFC alignment

AFC-window	AFC-frequency vs. reference
Out	High
In	High
In	Low
Out	Low

1. The first item ('In' or 'Out') informs you whether you are in or out the AFC-window.
2. The second item ('High' or 'Low') informs you about whether the AFC-frequency is too high or too low.
3. First you must align the 'IF AFC'-parameter such that you come into the AFC-window (= 'In')
4. Then you must look for the point where the 'IF AFC'-parameter changes from 'High' to 'Low'. This level is the value you are looking for.
5. After adjustment, 'Store' the value.
6. Now return to the 'Installation' menu.
7. Select 'Manual Installation' - 'Search' - '475' - 'OK' and 'Store'. This will set the AFC 'on' again.

Service tip: If you do not trust the frequency accuracy of your service generator, connect it to a 'good' TV set and check it with the 'Fine tune'-line.

IF Lprime AFC

Use the same procedure as for the 'IF AFC' alignment, but set the video generator to SECAM L/L' (only necessary for countries that have or can receive this system).

Tuner AGC

1. Set the external pattern generator to a colour bar video signal and connect the RF output to the aerial input. Set the amplitude to 10 mV and set the frequency to 475.25 MHz.
2. Connect a DC multimeter between pin 1 and the shielding of the Tuner (item 1200 on the LSP).
3. Adjust the 'TUNER AGC' value (default value is 25) with the LEFT/RIGHT cursor keys until the voltage at pin 1 of the tuner lies between 3.8 and 2.3 V.
4. 'Store' the alignment.

Blend intensity

Use this alignment when you replace the microcontroller or the HOP. It aligns the level of transparency of the menu-picture blended into the main-picture.
Position the BRIGHTNESS, CONTRAST, and COLOUR setting in the middle position (picture-menu).

1. Apply a signal with a 100 % white video-pattern.
2. Connect an oscilloscope to pin 8 of connector 1298 of the CRT panel and measure the Red output level.
3. Align the 'Blend intensity' parameter such, that the blended signal is 65 % of the black-white amplitude. In practice, this is about 1.3 V (blended signal) versus 2 V (full white signal).
4. The parameter can be adjusted in between 0 and 31.

8.3.3 Drive

Method 1 (with colour analyser):

1. Select '**Test pattern**' and turn it 'On'. During the following alignments, you will get a white block in middle of the screen.
2. Select '**Cathode**' and adjust the set to the correct light output. This setting depends on the picture tube size and brand. See table 'Cathode parameter' for the colour analyser readings.
3. Select a '**Colour Temperature**' (Cool', 'Normal' or 'Warm').
4. Adjust the white level (via '**Red**', '**Green**', and '**Blue**') according to the values in table 'White levels'.

Table 8-2 Cathode parameter

CRT	Light output (cd/m^2)
28" RF WS	400
29" RF 4:3	400
32" RF WS	380
36" RF WS	330

Table 8-3 White levels

ColourTemp. (K)	Cool (10200)	Normal (8700)	Warm (6500)
X	280	289	313
Y	287	299	329

Method 2 (without colour analyser):

Without having a colour-analyser, one can set some parameters. This is the next best solution. The setting-parameters are average values coming from production (statistics).

1. Select '**Cathode**' and enter the value '15' (for all picture tubes).
2. Select a '**Colour Temperature**' (Cool', 'Normal' or 'Warm').
3. Set the '**Red**', '**Green**' and '**Blue**' parameters according to the values in table 'Tint settings'.
4. '**Red BL offset**': herewith the Black Level can be aligned very precise (default value is 7).
5. '**Green BL offset**': herewith the Black Level can be aligned very precise (default value is 6).

Table 8-4 Tint settings

	∆ Cool	Normal	∆ Warm
R	-1	37	+3
G	0	30	0
B	+4	31	-10

8.3.4 Lum. Del. (Luminance Delay)

With this alignment, you place the luminance information exactly on the chrominance information (brightness is pushed onto the colour). Use a colour bar/grey scale pattern as test signal (default value = 11 for all).

- **Lum. Delay PAL BG:** Apply a PAL BG colour bar/grey scale pattern as a test signal. Adjust this parameter until the transients of the colour part and black and white part of the test pattern are at the same position.
- **Lum. Delay PAL I:** Apply a PAL I colour bar/grey scale pattern as a test signal. Adjust this parameter until the transients of the colour part and black and white part of the test pattern are at the same position.
- **Lum. Delay Secam:** Apply a SECAM colour bar/grey scale pattern as a test signal. Adjust this parameter until the transients of the colour part and black and white part of the test pattern are at the same position.
- **Lum. Delay Bypass:** apply a NTSC colour bar/greyscale pattern as a test signal. Adjust this value until the transients of the colour and black & white part of the test area are at the same position.

8.3.5 Geo-Nor (Normal Geometry)

Note: Use for all geometry alignments an **external** pattern generator with a geometry pattern (e.g. crosshatch).

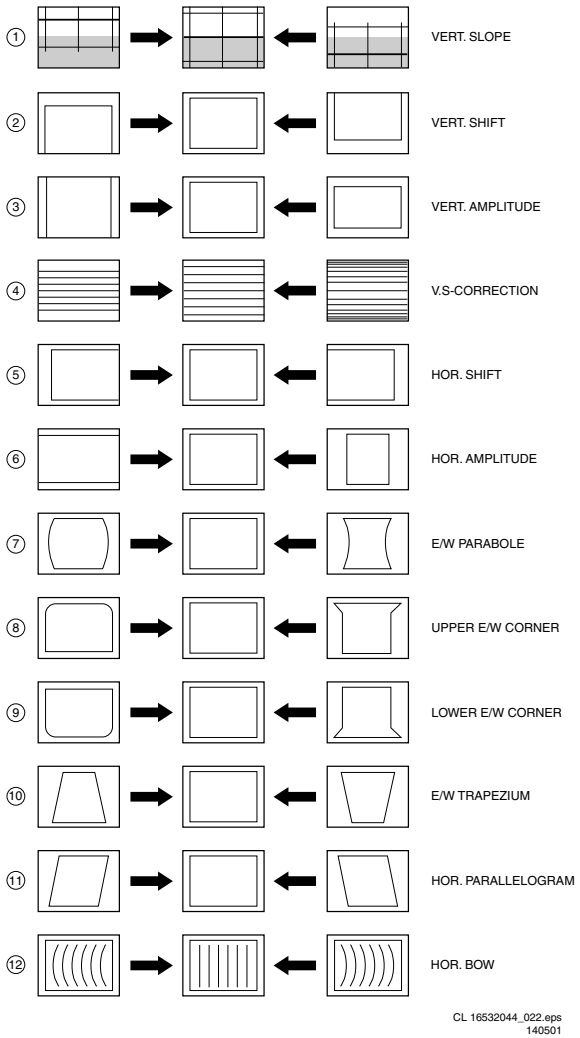


Figure 8-3 Geometry Alignments

Service tip: When the set is equipped with a rotation coil, use this menu item to check its correct alignment. If alignment is not correct, go to the INSTALLATION menu, choose SETUP, press OK, and choose PICTURE TILT. With the use of a crosshatch test pattern, align it to a correct horizontal picture.

V. slope

Align the zero crossing of the frame deflection to the mechanical middle of the picture tube.

1. First set the start conditions for 16:9 sets: 'V. S-correction' value on '8' for the 28", '26' for the 29", '16' for the 32", or '20' for the 36" sets. Position the boundary-stripes of the test pattern on the edges of the picture tube.
2. Align 'V. slope' (during alignment, the lower half of the picture is blanked) such, that the middle line of the test pattern is matched with the edge of the pattern transient in the middle of the picture.
3. Repeat the alignment if necessary.

V. shift and V. amplitude (vertical alignment)

Align the vertical centre and height of the picture.

1. Use 'V. amplitude' to align the vertical amplitude so that the entire test pattern is visible.
2. Set 'V. shift' to value '32'.
3. Connect a voltmeter (V_{DC}) between R3624 and 'hot' ground.
4. Adjust the DC voltage to '0' with potmeter R3642 (see figure 8-1).
5. Use 'V. shift' again to align the test pattern roughly vertically in the middle.
6. Repeat the alignment if necessary.

V. S-correction

Align for equal blocks on top, middle, and bottom of the picture tube.

Align 'V. S-correction' such that a block at the top (or bottom) of the picture has the same height as a block in the middle of the picture.

H. shift and H. amplitude (horizontal alignment)

1. Use 'H. amplitude' to align the horizontal amplitude so that the entire test pattern is visible.
2. Use 'H. shift' to align the picture horizontally in the middle.
3. Repeat the 'H. amplitude' alignment if necessary.

Note: In case the horizontal linearity in wide-screen mode is out of tolerance, add a 'DC-shift correction' panel (3104 328 06230) to connector 1419 of the DAF-panel [diagram I]. On the DC-shift panel, cut diode **6433** for correction to the right or diode **6432** for correction to the left.

Caution: Be sure to switch 'off' the set first. **Never plug in a not pre-aligned module in a playing set!**

East/west alignment

1. Use 'East/West Parabola' to align the vertical lines until straight.
2. Use 'Upper East/West corner' to align the vertical lines in the upper corners until straight.
3. Use 'Lower East/West corner' to align the vertical lines in the lower corners until straight.
4. Use 'East/West Trapezium' to align for a rectangular.
5. Use 'Horizontal Parallelogram' to align for straight vertical lines if necessary.
6. Use 'Horizontal Bow' to correct the E/W parabola such, that it becomes symmetrical.

Repeat steps 1 to 6 if necessary.

8.3.6 Geo-4:3 (4:3 geometry alignment in 16:9 sets)

1. Use 'East/West Parabola' to align the vertical lines until straight.
2. Use 'Upper East/West corner' to align the vertical lines in the upper corners until straight.
3. Use 'Lower East/West corner' to align the vertical lines in the lower corners until straight.

8.3.7 Geo-SW (Super Wide geometry alignment in 16:9 sets)

You only need to set the following values (if the normal geometry alignment has been performed correctly):

1. 'V. S-Correction', enter value of 'normal geometry' alignment.
2. 'H. amplitude', enter value of 'normal geometry' alignment subtracted by '1'.
3. 'East/west Parabola', enter value of 'normal geometry' alignment.

8.3.8 Geo-100Hz (Digital Scan geometry alignment)

As all alignments are done in Pixel Plus mode (at 75 Hz), the 100 Hz mode needs an extra alignment:

- Select '100Hz Geometry'. The set automatically switches to 100 Hz mode.
- V. slope: Match the middle line of the test pattern with the upper edge of this blanking picture.
- After the alignment, return to the previous menu. The set automatically returns to 'Pixel Plus' mode.

8.4 Option Settings

8.4.1 Introduction

The microprocessor communicates with a large number of I^2C ICs in the set. To ensure good communication and to make digital diagnosis possible, the microprocessor has to know which ICs to address. The presence / absence of these specific ICs (or functions) is made known via the option codes.

You can set the 'hardware related' options via the SAM - 'Alignments' - 'Options' or 'Option Numbers' menu.

You can set the 'software related' options via the SAM - 'Dealer Options' menu.

After you have changed the option(s), save them via the 'Store' command.

The new option setting is only active after the TV is switched OFF and ON again via the mains switch (the EAROM is then read out again).

8.4.2 Options

Select this sub-menu to set the initialisation codes (= options) of the set via text menu's.

Table 8-5 Option overview

Menu-item	Subjects	Options	Physically in the set
Dual screen	PIP / Dual Screen	Yes	Feature present.
		None	Feature not present.
	Text / EPG	Yes	Feature present.
		No	Feature not present.
	NextView type	Flashram	Flash-RAM present.
		No Flashram	Flash-RAM not present.
Picture Tube	CRT Type	4:3	4:3 picture tube.
		16:9	16:9 picture tube.
	Picture Rotation	Yes	Frame rotation circuitry present (diagram A5).
		No	Frame rotation circuitry not present .
	CRT size	28 / 32 / 36 29 / 34 / 38	CRT size (in inches).
	Anti Moire filter	Yes	Feature present.
		No	Feature not present.
Video repro	Featurebox type		Eagle not present.
		Eagle	Eagle present.
	Lightsensor	Yes	Feature present.
		No	Feature not present.
	2D Combfilter	Yes	Feature present.
		No	Feature not present.
	Picture improvement	Yes	LTP (TOPIC) present.
		No	LTP (TOPIC) not present.
	Auto Scavem	Yes	Feature present.
		No	Feature not present.
	(WS) Signalling bits	Yes	For 16:9 sets
		No	For 4:3 sets
Audio Repro	Dolby	None	Set without Dolby.
		Pro Logic	Set with Dolby ProLogic.
	Rear speakers	Corded	Passive surroundbox present.
		Virtual	Virtual Dolby (without rear speakers).
		Cordless	Wireless active surroundbox present.
	Subwoofer present	Yes	Feature present.
		No	Feature not present.
	Acoustic system	FL11	'Soft' design (with 'flying saucer' on top of rear cover).
		FL12	'Edgy' design with full range speakers (no centre sp.).
		PV02	'Edgy' design for 4:3 sets.
	Virtual Dolby	Yes	Feature present.
		No	Feature not present.
	AVL	On	Automatic Volume Limiter 'on'.
		Off	Automatic Volume Limiter 'off'.
Miscellaneous	Home Cinema	Yes	Set with Home Cinema Link (EU only)
		No	Set without Home Cinema Link
	Integrated RC	Yes	Feature present.
		No	Feature not present.
	Tuner type	Philips	Set with Philips tuner.
		Alps	Set with Alps tuner.
	38.0 IF	Yes	For AP PAL-multi set.
		No	For non AP PAL-multi sets
	Integrated DVD	Yes	Feature present.
		No	Feature not present.
	P50 DVD menu line	Yes	Feature present.
		No	Feature not present.
Option no.	Group 1		Group 1 option code overview.
	Group 2		Group 2 option code overview.

8.4.3 Option numbers

Select this sub-menu to set all options at once (expressed in two long numbers).

An option number (or 'option byte') represents a number of different options. When you change these numbers directly, you can set all options very fast. All options are controlled via eight option numbers.

When the EAROM is replaced, all options will require a re-setting. To be certain that the factory settings are reproduced exactly, you must set both option number lines. You can find the correct option numbers on a CRT sticker inside the TV set.

Example: The CRT sticker in the 32PW9527 gives the following option numbers:
04866 04384 08001 00016
12407 00001 00000 00071
The first line (group 1) indicates options 1 to 4, the second line (group 2) options 5 to 8 (see tables below).
Every 5-digit number represents 16 bits (so maximum number can be 65536 if all options are set).
When all the correct options are set, the sum of the decimal values of each Option Byte (OB) will give the option number.

Table 8-6 Option bytes Group 1

OB	Bit	Option name	Settings(in decimal values)	Option number
1	0 1 2	Featurebox	0 = Eco (n/a) 1 = Prozonic (n/a) 2 = Melzonic (n/a) 3 = Eagle 4 = Falconic 5 = Falconic+	Sum OB1
	3	2D Comb Filter	0 = Off 8 = On	
	4	Auto-Scavem	0 = Off 16 = On	
	6	Light Sensor	0 = Off 64 = On	
	7	Luma Trans. Proc.	0 = Off 128 = On	
	12	WSS	0 = Off 4096 = On	
	13	3D Comb Filter	0 = Off 8192 = On	
2	1	Dolby ProLogic	0 = Off 2 = On	Sum OB2
	2	Virtual Rear Spkrs	0 = Off 4 = On	
	3	Cordless Rear Spkrs	0 = Off 8 = On (EU)	
	5	Virtual Dolby	0 = Off 32 = On	
	6 7	Subwoofer	0 = Not present 64 = Present	
	13	EPG Type (EU only)	0 = Type 2 8192 = Type 2C3	
3	2	AV4 (2fH)	0 = Off (EU) 4 = On (AP/US)	Sum OB3
	3	AV3 (2fH)	0 = Off (EU) 8 = On (AP/US)	
	4	Dual Screen	0 = None (EU) 16 = PIP/DS (AP/US)	
	6	TXT/EPG/DS	0 = Off (AP/US) 64 = On	
	8	Aspect Ratio	0 = 4:3 256 = 16:9	
	9	Tilt	0 = Off 512 = On	
	13	Integrated DVD	0 = Off 8192 = On	
	14	Home Cinema	0 = Off 16384 = On (EU)	
	15	Integrated RC	0 = Off 32768 = On (EU)	
4	2	China IF	0 = Off 4 = On	Sum OB4
	3	Tuner	0 = Philips 8 = Alps	
	13	DVD-door lock	0 = Off 8192 = On	

Table 8-7 Option bytes Group 2

OB	Bit	Option name	Settings(in decimal values)	OB
5	1 2	Auto Store Mode	0 = None (AP/USA) 2 = PDC/VPS 4 = TXT Page 6 = PDC/VPS/TXT Page	Sum OB5
	4	Picture Mute	0 = Off 16 = On	
	6	Virgin	0 = Off 64 = On	
	12	TXT Preference	0 = TOP 4096 = FLOF	
6	0	P50 DVD menu-line	0 = Off 1 = On	Sum OB6
7				Sum OB7
8	0 1 2 3	Cabinet	0 = FL6 (n/a) 1 = FL7 (n/a)2 = FL8 (n/a) 3 = FL9 DAS (n/a) 4 = FL9 Monitor (n/a) 5 = FL10 (n/a) 6 = FL11 7 = FL12 8 = FL14 (n/a) 9 = PV02	Sum OB8
	6	AVL	0 = Off 64 = On	
	8 9 10 11	Picture tube size	0 = 28" 256 = 32" 384 = (n/a) 512 = 36" 768 = 29" 1024 = 34" 1280 = 38" 2048 = (n/a)	
	12	Anti-moire	0 = Off 4096 = On	

8.4.4 Dealer Options

Table 8-8 Dealer options overview

Menu name	Subjects	Options	Physically in set
Personal Options	Picture Mute	Yes	Picture mute active in case no picture detected
		No	Noise in case of no picture detected
	Virgin Mode	Yes	TV starts up once with language selection menu after mains switch on for the first time (virgin mode)
		No	TV does not starts up once with language selection menu after mains switch on for the first time (virgin mode)
	Auto Store Mode	None	Autostore mode disabled (not in installation menu)
		PDC-VPS	Autostore mode via ATS (PDC/VPS) enabled
		TXT page	Autostore mode via ACI enabled
		PDC-VPS-TXT	Autostore mode via ACI or ATS enabled
	TXT Preference	TOP	Preference to TOP Teletext
		FLOF	Preference to FLOF Teletext

9. Circuit Descriptions and Abbreviation List

Index of this chapter

9.1 Introduction

The base for the 95xx Europe segment for the year 2002 is the EM5 platform, which is the successor of the EM3 platform.

The EM2, EM3, and the EM5, make use of the same architectural set-up, which consists of a full sized LSP/SSP combination and a smaller double sided four layer SSB, which is mounted on the SSP using a SIMM connector. The main functionalities of the LSP are supply, deflection, and sound amplification.
The main functionalities of the SSP are tuner input, SIMM interface, I/O and interface provisions for extended functions such as PIP.
The main functionalities of the SSB are the core TV functionalities, being TXT/control, video and audio decoding, feature box, video featuring, and sync/geometry control.

The LSP (single sided) is built up very conventional, with hardly any surface mounted components on the copper side. Similar with the EM3 (but different as with the MG-chassis), the EM5 LSP has a very large 'hot' part, including both deflection coils.

The SSB is a high tech module (four layer, 2 sides reflow technology, full SMC) with very high component density and complete shielding for EMC-reasons. Despite this, it is designed in such a way, that repair on component level still is possible. To achieve this, attention was paid to:
- The position of service test lands: most of them are at the Tuner side.
- Accessibility (Tuner side). If there are still problems with the accessibility, one can order an extension board (see parts list).
- Clearance around surface mounted ICs (for replacing).
- Detailed diagnostics and fault finding is possible via ComPair.

In the architecture, provisions are made for more features/ extensions like:
- Pixel Plus.
- Auto TV.
- Double Window/PIP.
- Wireless surround sound.
- Integrated DVD-player.

9.2 Block Diagram

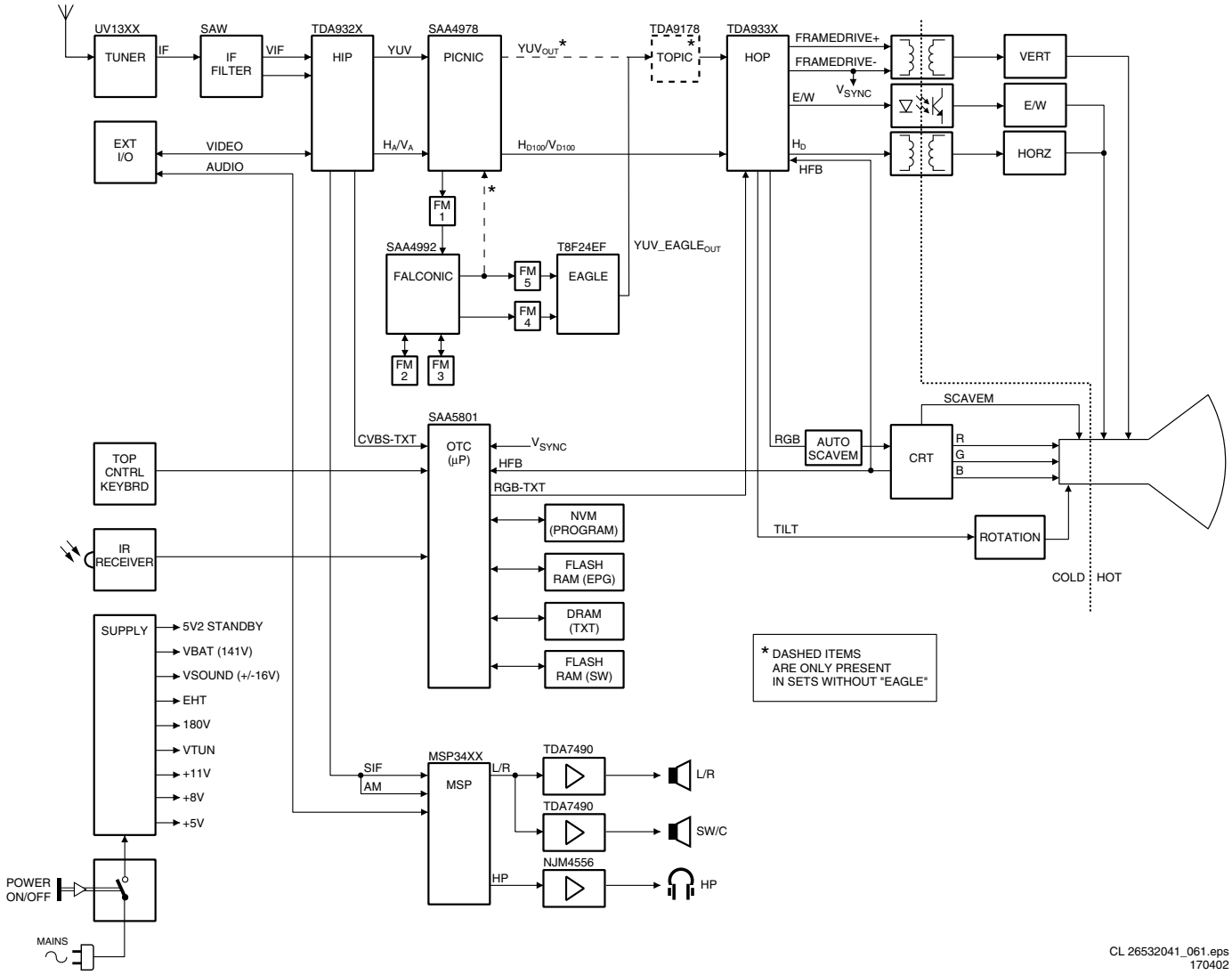


Figure 9-1 Block Diagram

The Tuner (item 1200) is a PLL tuner and delivers the IF-signal, via audio & video SAW-filters, to the HIP (High-end Input Processor). The HIP has the following functions:
- IF modulation.
- Video source- and record select.
- Colour decoder.
- Synchronisation.

Three SCART-connectors can be used:
- SCART1 is fully equipped,
- SCART2 is meant for VCR. Pin 10 is used for Easylink and there is a possibility for Y/C in. The CVBS-out on pin 19 is meant for WYSIWYR (What You See Is What You Record).
- SCART3 is a RGB/CVBS and audio L/R input.

The HIP delivers YUV and sync signals to the PICNIC. This IC takes care of:
- Analogue to Digital conversion and vice versa.
- 50 to 100 Hz conversion.
- Panorama mode.
- Noise reduction.
- Dynamic contrast.

The '2fH features'-block in the diagram gives several options:
- For Digital Scan, the PICNIC is required.
- For Natural Motion, the FALCONIC is required.
- For Pixel Plus, the EAGLE is required.

After the PICNIC the, now 100 Hz, YUV-signals are fed to the FALCONIC for 'Natural Motion', followed by the Eagle for 'Pixel Plus' enhancement (if present). The processed YUV signals (from Eagle or PICNIC) are, together with the sync-signals from the PICNIC, then fed to the HOP (High-end Output Processor). This IC handles the video control and geometry part. The RGB-signals for TXT/OSD (from the P) are also inserted via the HOP. The video part delivers the RGB signals to the CRT-panel and the geometry part delivers the H-drive, V-drive, and a drive-signal for rotation.

Both deflection circuits are 'hot' and located on the LSP. They are driven by the HOP. To make a galvanic separation, the Line Drive is driven via transformer 5410 and the Frame Drive via transformer 5621.The horizontal output stage generates some supply voltages and the EHT-, focus- and Vg2-voltages.

The RGB amplifiers on the CRT-panel are supplied with 200 V from the LOT.
The Auto-SCAVEM circuit modulates transitions of the Luminance (Y) signal on the horizontal deflection current, giving a sharper picture.

The sound part is built around the MSP34xx (Multi-channel Sound Processor) for IF sound detection, sound control and source selection. Dolby decoding is also done by the MSP.

Amplification is done via a 'class D' integrated power amplifier IC, the TDA7490.

The microprocessor, called OTC (OSD, Teletext and Control) takes care of the analogue TXT input- and output processing. The OTC, ROM, and RAM are supplied with 3.3 V, which is derived from the +5V2.
The NVM (Non Volatile Memory) is used to store the settings, one Flash-RAM contains the set software, the other Flash-RAM (7012) is for EPG, and the DRAM is used for storing the Teletext pages.

There is a separate Standby Supply, in order to reduce the Standby power consumption. During Standby, the Main Supply is switched 'off' (via TS7529).
A relay (1550) is used to switch the Degaussing circuit. It is switched 'on' after set start-up and switched 'off' by the P after 12 s.
The Main Supply, an SMPS based on the 'down-converter' principle, generates the 141 V (V_{BAT}) and the +/- 16 V for the audio part.
Note: Voltage V_{BAT} is not mains isolated ('hot'), but is alignment free.

9.3 Power Supply (Diagram A1 & A2)

The power supply has a number of main functions:
- Mains harmonic filter.
- Degaussing picture tube.
- Standby power supply.
- Main supply.

9.3.1 Mains Harmonic Filter (Diagram A1)

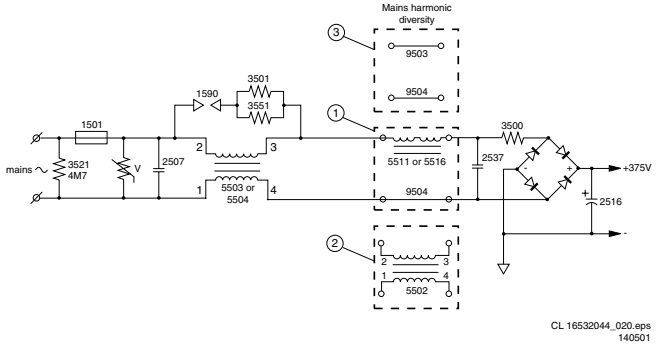


Figure 9-2 Mains harmonic filter circuitry

The mains harmonic filter has two functions: to prevent that high frequency signals (harmonics) are transferred into the mains and to protect the set from lightning damage.

C2507 prevents that the high frequency signals, generated by the set, are conveyed into the mains (it forms a short-circuit).

In case of a lightning surge between the 2 phases (differential mode), the energy is immediately bled away through the VDR (R3509) to the other phase.
In case of a lightning surge on both phases of the mains in relation to the aerial earth (common mode), the filter acts as a high resistance ($U_{EMK} = L * dI/dt$), as a result of which the voltage across coil L5503/04 increases. A spark gap (1590) prevents that the voltage increases too much, which would lead to a damaged coil. When ignited, the current will be discharged via this spark gap.
Resistor R3500 is used for limiting the inrush-current.

9.3.2 Degaussing (Diagram A1)

As soon as the set is switched 'on' via the mains switch, the 5V2 is present. As the 'DEGAUSSING' signal from the processor (OTC) is 'low', transistor 7528 will conduct and relay 1550 is activated. Initially a considerable current will flow, via PTC 3516, through the degaussing coil. The PTC will heat up, resistance will rise, and the current will decay rapidly. The OTC makes the 'DEGAUSSING' signal 'high' after 12 s, which will switch 'off' the relay.

9.3.3 Standby power supply (Diagram A2)

Principle
This power supply is delivering the standby voltage, but also the main voltages for the small signal part. It is a SOPS type (Self-Oscillating Power Supply) and is regulated by the controlled switching of an oscillator. It uses the so-called 'Flyback' principle:

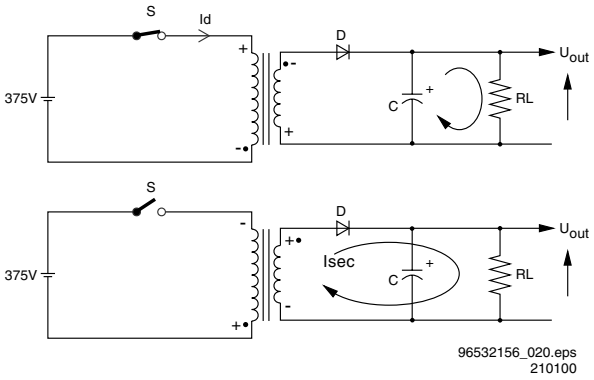


Figure 9-3 Flyback principle

After closing switch 'S', the current I_D will increase linear in time. The magnetic energy in the primary coil is directly proportional with the self-inductance of the coil and current I_D (thus with the time the switch is closed).
The voltage polarity at the secondary winding is negative (due to different winding direction), meaning that diode D will block. Capacitor C will discharge via R_L, U_{OUT} will decrease.
Opening switch 'S' will generate a counter-e.m.f. in the primary winding, trying to maintain current I_D. Through this the polarity of the secondary voltage will inverse. The magnetic energy, stored in the coil, will now be transformed to the secondary side. Diode D will now conduct, capacitor C will be charged and U_{OUT} will increase.

Implementation

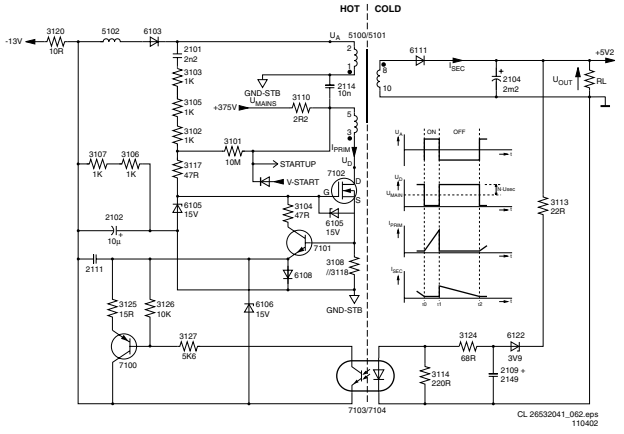


Figure 9-4 Standby supply circuitry

To apply this on the EM5E (diagram A2): replace switch 'S' by FET TS7102, coil L by L5101/L5100, diode D by D6111, and C by C2104.
- **Time interval t0-t1:** After switching 'on' the TV-set, the gate of MOSFET TS7102 will be high (max. 15 V due to zener diode D6105). This will drive the FET into saturation

(U_{DS} = 0 V). The DC-voltage U_{MAINS} will be transposed across the primary winding of L5101 (3, 5), resulting in a linear increasing current through this coil. The voltage across the co-coupled coil (1, 2) is also positive and will keep the FET into conductivity via C2101, R3103/3105/3102 and R3117 for some time. The self-induction of the coil and the magnitude of the supply voltage (+375 V) determine the slope of the primary current. The maximum current is determined by the time the FET stays into conductance (t0-t1). This time is directly determined by the voltage across R3108//R3118 (0.7 Ω). This voltage is a measure of the current and if it exceeds 1.4 V, TS7101 will be driven into conductivity and consequently connects the gate of TS7102 to earth. The FET will block. The current is: 1.4 V / 0.7 Ω = 2 A. The voltage across the secondary winding (8, 9) will be negative, diodes D6111 and D6107 will block.

- **Time interval t1-t2:** The sudden current interruption in the primary coil will induce a counter-e.m.f. that wants to maintain the current. The voltage on the drain of the FET will increase. The secondary voltage (8, 9) will become positive and will charge C2104 via D6111. All energy that was stored in L5101 during t0-t1 will be transferred into the load. Due to the transformer principle, a voltage will now be induced in the primary winding (3, 5) and the co-coupled winding (1, 2). This voltage will be N* U_{SEC} (N= winding ratio). The voltage across the co-coupled coil will be negative, keeping the FET blocked.
- **Time t2:** At t2, the current through the secondary coil will be reduced to zero, as C2104 is no longer charged. Consequently, the voltages will decay and will change polarity. The gate of the FET will be again made positive, is driven into conductivity and the cycle starts again.

Power On Reset (POR)

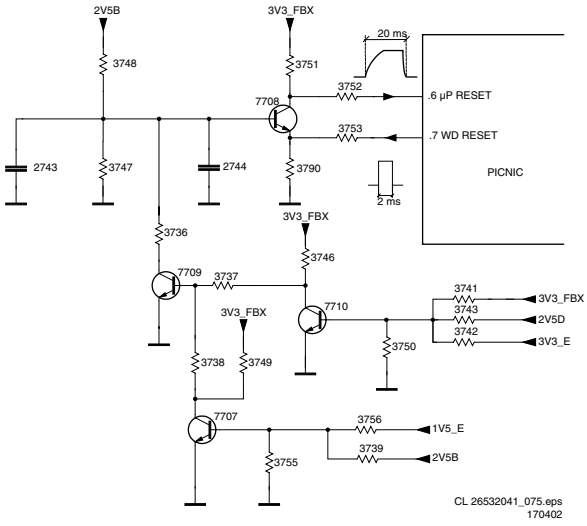


Figure 9-5 Power On Reset

Via a reset circuit (TS7708) a reset pulse (POR) of 20 ms is generated for the µP inside the PICNIC and for the ROM. After 'power on', the 3V3 is built up (derived from the 5V2). Transistor TS7708 blocks and pin 6 of the PICNIC will follow the rising slope of the power supply. As soon as the power supply is stabilised, capacitor C2744 will charge (via R3748). When this voltage reaches 0.6 V (after 20 ms), TS7708 starts to conduct, and the voltage at pin 6 goes low again. The µP is reset now. If the PICNIC cannot communicate with the ROM, the 'watchdog' will generate a reset pulse (on pin 7), which will re-start the cycle again.

If one of the power supplies is absent (or too low), then a safety problem can occur in some cases (e.g. a too high temperature of the stabiliser). To prevent this from happening, the voltage dividers at the bases of the transistors TS7710 and TS7707 are calculated such that they will block when above described situation occurs. In this case, the base of TS7708 is kept 'low' by the conducting TS7709, until the problem is solved. The µP receives no POR pulse, and cannot be reset.

5V2 Stabilisation and Feedback

The Standby Power Supply always oscillates at maximum power. The only limiting factor is the maximum primary current, which has been pre-set with R3108//3118.

R3113, zener diode D6122, R3124, and R3114 determine U_{OUT}. If the voltage across R3114 exceeds the threshold voltage of the diode of the optocoupler 7104 (± 1 V) or, in other words, U_{OUT} exceeds 5.2 V, the transistor of the optocoupler will conduct.

Transistor TS7100 is now driven, and a negative voltage will be transposed to the emitter of TS7101. When TS7101 conducts, the gate of the FET is at earth potential, forcing the oscillator stop. Due to the load, the secondary voltage U_{OUT} will decrease. At a certain voltage, optocoupler TS7104 will block and the oscillator will start again.

Since there are no capacitors, and there is a high amplification factor in the feedback circuit, the feedback is ultra-fast. This is why the ripple on U_{OUT} is minimal. The negative supply voltage (-20 V) used in the feedback circuit, originates from the co-coupling coil, and is rectified through D6103.

Stabilisation is not effected through duty-cycle control but through burst-mode of TS7100.

Burst-mode is load dependent. If the power supply is less loaded, the secondary voltage will have the tendency to increase more rapidly. If the load on the power supply increases, then the oscillator stops less often, right up to the moment that the oscillator is operating continuously: maximum load. If the power supply is now loaded even more, the output voltage will decay. The maximum primary current set by R3108//3118 determines the maximum load.

8V6 Stabilisation and Feedback

In general with a fly-back supply with multiple output, as used in the EM3, one of the output voltages is controlled via the primary feedback loop. The additional secondary output voltages are determined via the turn-ratio of the transformer. It is often seen that a linear voltage regulator is used for post regulation of the non-primary regulated secondary voltages. Disadvantage of this approach is the power loss in the linear voltage regulator.

For the EM5E, a power economic solution is achieved, by implementing a kind of secondary down-converter. The advantage, compared to conventional down-converter, is that no extra coil is required. It is using the inductance of the main transformer. In this way one large current coil, a power diode and one elcap are saved.

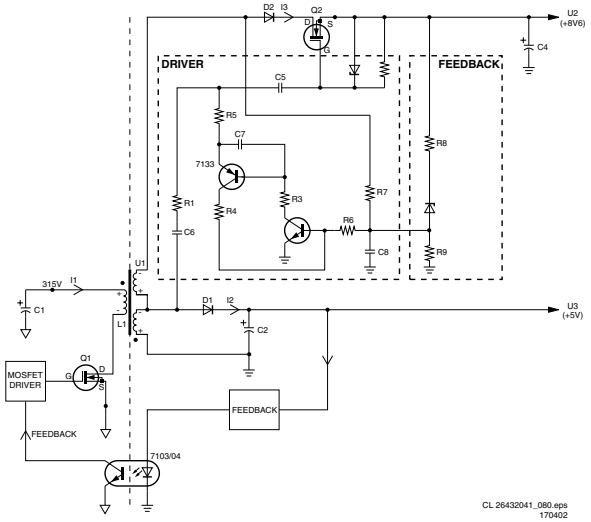


Figure 9-6 Circuit principle

A basic fly-back converter is used, with a MOSFET Q1, transformer L1, and a primary feedback circuit. The output of the primary controlled voltage is U1.

The additional secondary controlled supply consists of D2 and Q2, with output voltage U2.

The main fly-back supply is working independently, where the duty cycle is controlled via the primary feedback, and the MOSFET Q1 is switching at a certain frequency. MOSFET Q2 is also switching at the same frequency, as it is synchronised with Q1.

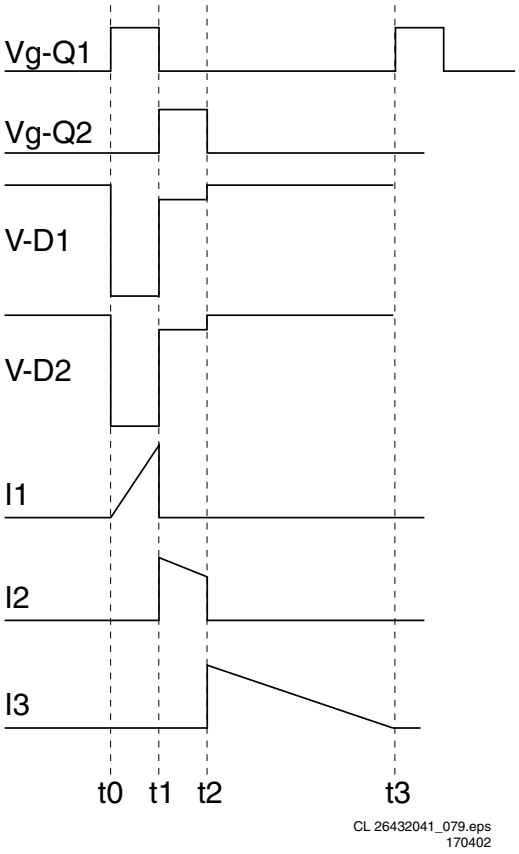


Figure 9-7 Timing diagram

- **Time interval t0-t1:** The primary MOSFET Q1 is switched 'on', both diodes D1 and D2 are blocked.
- **Time interval t1-t2:** MOSFET Q1 is switched 'off' and Q2 is switched 'on'. During this period, the energy is transferred to output U2 of the supply. Diode D1 is blocked, because U3 is lower than U1.
- **Time t2:** Q2 is switched 'off'.
- **Time interval t2-t3:** During this period, the rest of the energy will be transferred to output U1.

The two controllers, the primary feedback for U1, and the secondary feedback for U2, all work independently.
The secondary voltage U2 is controlled by the 'on' time of Q2. As soon as the load on U2 increases, the 'on' time of Q2 (the period t1-t2) is automatically increased by the secondary feedback. More energy will be taken by the output U2, and less energy will be transferred to U1. Automatically U1 will drop. The primary feedback loop will change the primary drive to enlarge the total amount of energy to be transferred, from the primary side, and U1 will rise again.

Protection
If the optocoupler would fail, the secondary voltage will increase. This would have disastrous consequences since many ICs (e.g. OTC, Flash-RAM and DRAM) are fed with this 5.2 V. In other words, very expensive repairs would be required.
We already know that the negative supply is directly dependent upon the secondary 5.2 V, because of which the negative supply will increase proportionally as the secondary voltage increases.
If the negative supply in the mean time reaches -25 V, D6106 will start to zener and therefore TS7101 will start conducting. D6106 will take over the stabilisation task of the optocoupler, however, with a considerable spread: from -20 to -25 V is a 25 % increase, thus U_{OUT} will increase from 5.2 V to max. 6.5 V.

Tuner Supply
The Standby supply produces two voltages for the Tuner: +33V (V_{TUN}) and +5VT.
The +33V is the tuning voltage for the Tuner.
The +5VT is derived from the +8V with stabiliser 7912 (see diagram A8), and is used to supply the tuner only.

SSB Supply
There are several voltages going to the SSB: +8V6, +5V2 and +3V3.
The +5V2 and +8V6 (always present) come directly from the Standby power supply.
The +3V3 is derived from the +5V with stabiliser 7910 (diagram A8).

9.3.4 Main Supply (Diagram A1)

The main power supply is able to deliver a continuous power between 100 W and 160 W.
Some **important** notes on beforehand:
- V_{BAT} is not isolated from the main supply ('hot').
- V_{BAT} is alignment free.

Principle
The Main Power Supply, generates the 141 V (V_{BAT}) and the +/- 16 V for the audio part. It is based on the so-called 'down converter' principle.

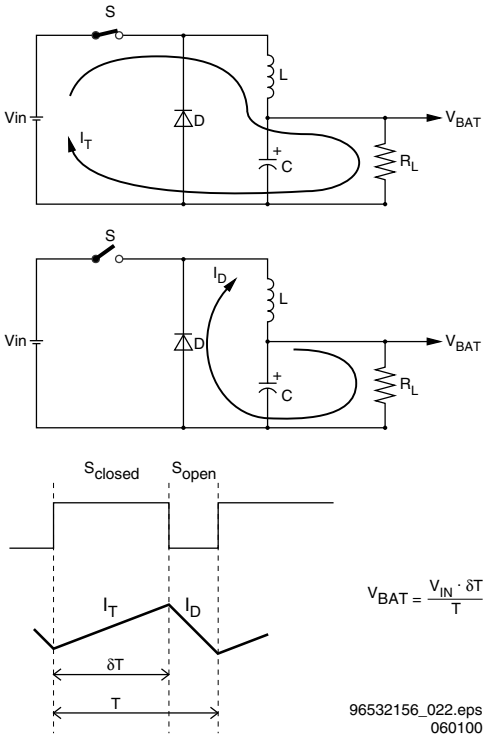


Figure 9-8 Down-converter principle

1. After closing switch 'S', the linear in time increasing current I_T, will charge capacitor C.
2. Opening switch 'S' will generate a counter-e.m.f. in coil L, trying to maintain current I_T. This is possible via diode D (this diode is also called 'freewheel diode'). Therefore, after opening 'S', the magnetic energy stored in coil L will be transferred to electrostatic energy in capacitor C. The V_{IN} will only supply current during the time that 'S' is closed while a constant current is flowing through R_L.
3. V_{BAT} is directly proportional with V_{IN} and the time that 'S' is closed and reverse proportional with period time 'T'. Therefore, by changing the duty cycle, it will be possible to control V_{BAT}.

Implementation

At start-up of the main supply, C2515 (diagram A1) can be assumed as being a short-circuit. U_{AB} will be 15 V (R3513, D6510) and U_{GS} of the FET will be +5.4 V (via D6515). The FET will be driven into saturation (same as closing switch 'S'). The drain-current will increase linear in time. With other words: resistors R3513 and R3518 will start the oscillator.
The voltage across the co-coupled coil (4, 5) will keep the FET into conductivity.

The TS7502 is a low-voltage semiconductor, which drives the MOSFET TS7504. To bridge the different voltage levels, an opto-coupler (item 7507) is used. Via this opto-coupler, the DC-current through R3504 is influenced. The changed current through R3504 changes the V_{BE} of TS7502, which will influence the drive of MOSFET TS7504 (= switch 'S' in figure 'Down-converter principle').

The sudden current interruption in the primary coil will induce a counter-e.m.f. that wants to maintain the current via the 'freewheel' diode D6534. This current is linear decreasing in time and, as it is also flowing through R3514//R3515, TS7502 will be blocked after a certain period. The gate of the FET will be again made positive, is driven into conductivity and the cycle starts again.

For safety reasons, transistor TS7530 is added as a back-up solution for TS7502. If B-E of TS7502 is shorted, TS7530 takes over its function.

Stabilisation of V_{BAT}

The output voltage V_{BAT} is determined by: $V_{BAT} = V_{IN} * (T_{ON} / (T_{ON} + T_{OFF})) = V_{IN} *$ duty-cycle.
To stabilise the output voltage, a feedback loop is implemented, which will reduce T_{ON} when V_{BAT} increases and vice versa.

Via a voltage divider, existing of (1 %) resistors R3507, R3510, and R3527//3549, a voltage of 2.5 V (when V_{BAT} = 141 V) is fed to the input of precision shunt regulator 7506. This regulator will conduct, and a current will flow through the diode part of the opto-coupler 7507. The base of TS7502 will now be set at a certain positive voltage. As this transistor switches the FET TS7504 'on' and 'off', this circuit can determine the duty-cycle. E.g. when the load increases, V_{BAT} will decrease. Consequently, the input voltage of regulator 7506 will decrease, resulting in a lower current. Via opto-coupler 7505 and transistor TS7502, T_{ON} of the FET is changed (will increase). The output voltage V_{BAT} will rise.
If the load continues to increase, the regulator will block at a certain moment. T_{ON} is now at maximum value. This is the point where V_{BAT} will go below 141 V and, at further increasing load, is switched 'off'. The voltage across the co-coupled coil (L5506, pin 4 and 5) will decrease, due to the increasing load. Therefore, the voltage on the gate of TS7504 comes below the threshold voltage. The supply switches 'off', and an audible hiccupping can be heard.
On the other hand when the load decreases, V_{BAT} will rise. Consequently, the input voltage of TS7506 will also rise, resulting in a higher current. This changes the base voltage of TS7502, and through that the T_{ON} of the FET will decrease. The output voltage V_{BAT} will be reduced.
If, for instance, V_{IN} will decrease (e.g. U_{MAINS} is 180 V i.s.o. 240 V), the slope of the drain-current will be flattened, through which the FET will be longer into conductance, keeping VOUT constant.
If, for any reason, the stabilisation circuit might fail, the output voltage V_{BAT} can never exceed 200 V (via D6514). D6514 will form a short-circuit, V_{BAT} will drop and the set will switch 'off' (this will also result in an audible hiccupping of the supply).

Switch to 'Standby' (via RC)

When the set is switched to 'Standby' mode via the Remote Control, the Main supply is switched 'off' by the circuit around TS7529 (see diagram A1).
During 'on'-state, the Main supply is fed with line pulses via the 'SUP-ENABLE' line. They are rectified and smoothed via D6517, D6516, and C2530, and fed to TS7529. Because they are less than -20 V, this transistor is blocked. When these pulses are stopped, TS7529 will be saturated and TS7502 will switch 'off'. This will switch 'off' the Main supply.

Set to 'On' (via 'SUP-ENABLE')

Via the 'STANDBY' command from the OTC, the MOSFETS 7141 and 7131 (diagram A2) are switched 'on'. When the +5V and +8V are sensed by the OTC, a command is given to the HOP to start the drive (via I^2C).
When this is sensed via the 'SUP-ENABLE' line (at the base of line transistor TS7421, diagram A3), the main supply is switched 'on' via TS7529 (diagram A1).

Audio Supply

The pulses on the secondary winding of L5506 (or L5512) are rectified by D6535 (+16 V) and D6536 (-16V), and smoothed by C2542 and C2543.

9.4 Control (Diagram B5)

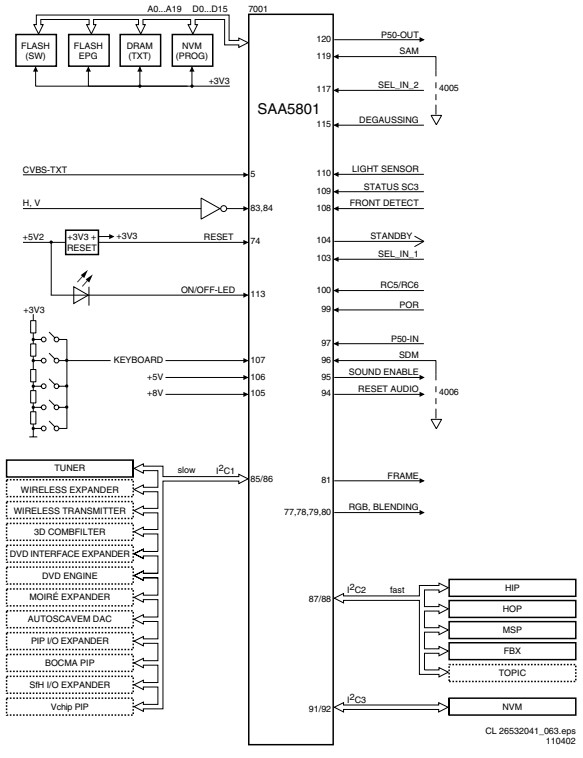


Figure 9-9 Microprocessor (OTC)

9.4.1 OTC

Introduction
The SAA5801 (IC7001) is called the OTC (OSD, TXT, and Control). In this IC, the microprocessor and the TXT-decoder (level 2.5) are integrated.
Some of its functions are:
- Set control.
- TXT/OSD acquisition.
- RGB-outputs to the HOP
- Menu blending; for blending the contrast, software controlled.
- I/O-ports for I^2C, RC5/RC6, LED, and service modes.
- Error code generation.

Data Storage
- The software for EM5E can be 2 MB (Megabyte), and is stored in IC7006.
- It is possible to store 1200 TXT pages in IC7007. This is a DRAM of 4 MBit and this IC is also used to store data of a working set.
- For EPG a Flash-RAM (7012) is used.
- The Non Volatile Memory IC7011 is a 4 kB version M24C32W6.

Power Supply
All ICs in this part are supplied with 3V3. For this voltage, a 3V3 stabiliser is used (IC7005).

With the circuitry around TS7003 and 7004 (diagram B5), a reset is generated to wake up the OTC (pin 74). During this reset, all I/O pins of the OTC are made 'high'.

Via pins 105 and 106, the +8 V and the +5 V are sensed. If one of them is not present, the Main supply is switched 'off' (set in protection and the red LED will blink at 3 Hz).
The OTC will generate an error code to indicate what was wrong.

OSD/TXT
The horizontal (H_{D100}) and vertical (V_{SYNC}) sync pulses are also fed to the OTC for stable OSD and TXT.
The RGB-outputs (77/78/79) together with fading (pin 80) are fed to the HOP. The fading pin has a double function: it is used for making a transparent menu and as fast-blanking signal for TXT.

9.4.2 I^2C Bus Specifications

In the EM5E chassis with OTC-processor there are three I^2C busses used:
- Slow (max. 100 kHz) hardware I^2C-bus, called I^2C1, used for the Tuner.
- Fast (max. 400 kHz) hardware I^2C -bus, called I^2C2, used for all ICs.
- Separate short bus, called I^2C3, for the Non Volatile Memory (NVM), to avoid data corruption.

9.4.3 NVM

The Non Volatile Memory contains all set related data that must be kept permanently, such as:
- Software identification.
- Operational hours.
- Error-codes.
- Option codes.
- All factory alignments.
- Last Status items for the customer + a complete factory recall.
- Txt featuring (keeping habit watch data).
- EPG data.

9.5 Tuner & IF (Diagram A8 & B2)

The tuner is I^2C controlled, and is capable of receiving off-air, S- (cable) and Hyperband channels:
- Low (44 - 156 MHz).
- Mid (156 - 441 MHz).
- High (141 - 865 MHz).

The tuning is done via I^2C. The reference voltage on pin 9 is 33 V. This voltage (V_{TUN}) is derived from the secondary side of the standby supply, via D6110 and R3116//R3115 and a 33 V zener diode (D6200). The OTC, together with the HIP, controls the tuning procedure. There is also automatic switching for the different video systems.

The IF-filter is integrated in a SAW (Surface Acoustic Wave) filter. The type of this filter depends on the received standard(s). There are two SAW filters: one for filtering picture-IF and a second one for sound-IF. An extra filter (5403), tuned at 40.4 MHz, is necessary for L/L' sets (with 6.5 MHz sound), to suppress the neighbour channel.

The output of the tuner is controlled via an IF-amplifier with AGC-control. This is a voltage feedback from pin 62 of the HIP to pin 1 of the tuner. AGC take-over point is adjusted via the service alignment mode 'Tuner AGC'. If there is too much noise in the picture, it is possible that the AGC setting is wrong. It is also possible that the AGC-setting is mis-aligned, if the picture deforms with a perfect signal. Then the IF-circuit amplifies too much.

The video IF-signal is fed to pins 2/3 of the PLL-controlled IF-demodulator. The voltage-controlled oscillator of the PLL is adjusted via the service menu 'IF AFC'. If the alignment is correct, the displayed frequency in the installation menu is the same as the applied frequency from a generator. The external coil L5408 connected between pins 7/8 is used as reference.
The demodulated IF-video signal is available at pin 10 of the HIP. In this video signal, there is a rest of the sound carrier, which is filtered out by the sound trap 1407.
Then the signal is again fed to the HIP on pin 12, where the group delay is corrected, dependent on the standard that is received.
The CVBS-signal is available at pin 13 for further processing in the set. Via TS7322, the signal is supplied to EXT1 (monitor out) and again back into the HIP (pin 14) to the source/record selection.

To realise Quasi Split Sound (QSS), the IF-signal is fed to the HIP on pin 63/64 via SAW-filter 1405. The FM (or AM for L-norm) modulated signal is available on pin 5 and is fed to the audio demodulator MSP34xx (7651).

9.6 Video: High-end Input Processor (HIP, Diagram B2)

In the EM5E, the HIP TDA932xH is used, which contains the following functions:
- IF demodulation.
- Group delay correction.
- AFC signal generation, used to track drifting transmitters.
- Sound carrier re-generation (SIF).
- AM demodulation.
- Sync acquisition, delivering HA, and VA.
- Switching off IF-filtering.

9.6.1 Inputs

The HIP has various inputs:
- Full matrix switch with:
  - Two CVBS inputs.
  - Two Y/C (or additional CVBS) inputs.
  - One CVBS front-end input.

- Two RGB inputs and two status-inputs.

The input signals from the Front I/O are fed to the HIP, and front detection is fed to the OTC.
- EXT1 is full SCART: thus CVBS and RGB/YUV. The RGB-selection is done in the HIP.
- EXT2 is meant for VCR and has therefore some additional signals in relation to EXT1 but no RGB. EXT2 has also the possibility for Y/C_in and Easylink-Plus (P50). Y_in is with pin 20 and Chroma_in with pin 15. Easylink is handled via pin 10 of the SCART and this is a bi-directional communication.
- EXT3 is meant for RGB and CVBS input only.

9.6.2 Outputs

One can select three, separate switchable, outputs:
- One YUV-output, which is fed to the PICNIC.
- Two CVBS outputs, one for Teletext Dual Screen, and the other for output to EXT2 to have WYSIWYR (What You See Is What You Record).

9.6.3 I/O Switching

The external signals are fed directly to the I/O part of the HIP with status from pin 8 of SCART. On the HIP, there are two status inputs available (pins 15, 17) with two voltage levels:
4:3 -> 2.2 V.
16:9 -> 5.5 V.

9.6.4 P50

EasyLink features are based on the 'one touch operation' approach. This means that a sequence of actions are executed at the same time in both the television and the video cassette recorder, provided both are fitted with the EasyLink function and connected with the eurocable supplied with your video recorder.

Easylink (P50.1) supports the next features:
- Signal quality and aspect ratio matching.
- One touch play.
- One touch text.
- Pre-set download.
- WYSIWYR.
- Automatic Standby.

With **Easylink-Plus** (P50.2) is added:
- Country and language installation.
- System Standby.
- NexTView download.
- Timer record control.
- VCR control feature.

Cinemalink (P50.3)
Cinema Link is a new Philips feature in which the TV, the audio receiver, and other video peripherals like DVD player and video recorder communicate with each other (on condition they all are equipped with the Cinema Link functionality and are connected via a SCART cable). They automatically offer the highest quality combination of picture and multi channel surround sound to create your own Home Cinema.
With one key on the remote control, with which you can control all Cinema Link products, your total Cinema Link system will be started and the DVD or video recorder will start to play and the audio receiver will provide the sound (on the condition Cinema link is enabled) on behalf of the TV.
The TV can function as the centre speaker of your system, making a separate centre speaker unnecessary.
By pressing the standby key on the remote control for at least 3 seconds, the complete Cinema Link system will be switched to standby.

9.6.5 Video Processing

The sandcastle-pulse, created by the HIP, is not used for synchronisation (only for the Comb filter). The HOP will generate synchronisation signals derived from the feature box (PICNIC, pin 60 and 61) signals.
If a VCR is connected, there is also an automatic correction for MacroVision (r). This is active for the external sources and the pre-sets 0, 90-99.
The HIP itself (no external voltage) controls the Y/C switch in the HIP.
The chrominance decoder in the HIP is full multi-standard: PAL/SECAM/NTSC.

Different crystals can be connected to the pins 54 to 57 without any alignment. The crystals are also used as a reference for the synchronisation. A digital control circuit that is locked to the reference signal of the colour decoder determines the start-up of the sync.
Note: You may only replace these crystals by the original ones. If just a crystal is taken, the internal capacitance will be different and the effect will be that there is no colour.

In the HIP a sync separation circuit is integrated; the HIP delivers the H_{A50} and V_{A50} to the PICNIC.

9.7 Video: Feature Box 7 (Diagram L)

The objective for this chassis was, to reach a sharper picture by means of a higher definition.
This is achieved via the so-called 'Pixel Plus' feature. So, what exactly is Pixel Plus?

9.7.1 Introduction

The basic function of the Feature box (FBX) is picture improvement, and depending on the version, several scan conversion methods are possible. The PICNIC (SAA4978H) is the central key component.
In the EM5E-chassis, the feature-box is integrated on the SSB.

In the Feature Box 7 (FBX7), a new IC is used, called the 'Eagle'. This IC does the following picture improvements:
- **Horizontal:** increases from 840 to 1680 pixels per line (the number of pixels is doubled per line). This, by itself, does not mean an improvement in definition however. To achieve that, the new pixels are digitally processed inside the Eagle with Luminance Transient Improvement (LTI) and Peaking. This will give the new pixels extra picture information, which results in steeper slopes and contrast improvement at details.
- **Vertical:** increases from 625 lines (PAL) to 833 lines. Also, those new lines are processed inside the Eagle with LTI and Peaking, again resulting in lines with extra picture information.
- The **line frequency** is fixed on 31250 Hz and the **frame frequency** at 75 Hz (this will give no frame-flicker). In addition, other modes, like 'Digital Scan' are still possible.
- The colour enhancement features of the TOPIC are done by the Eagle.

9.7.2 Block diagram

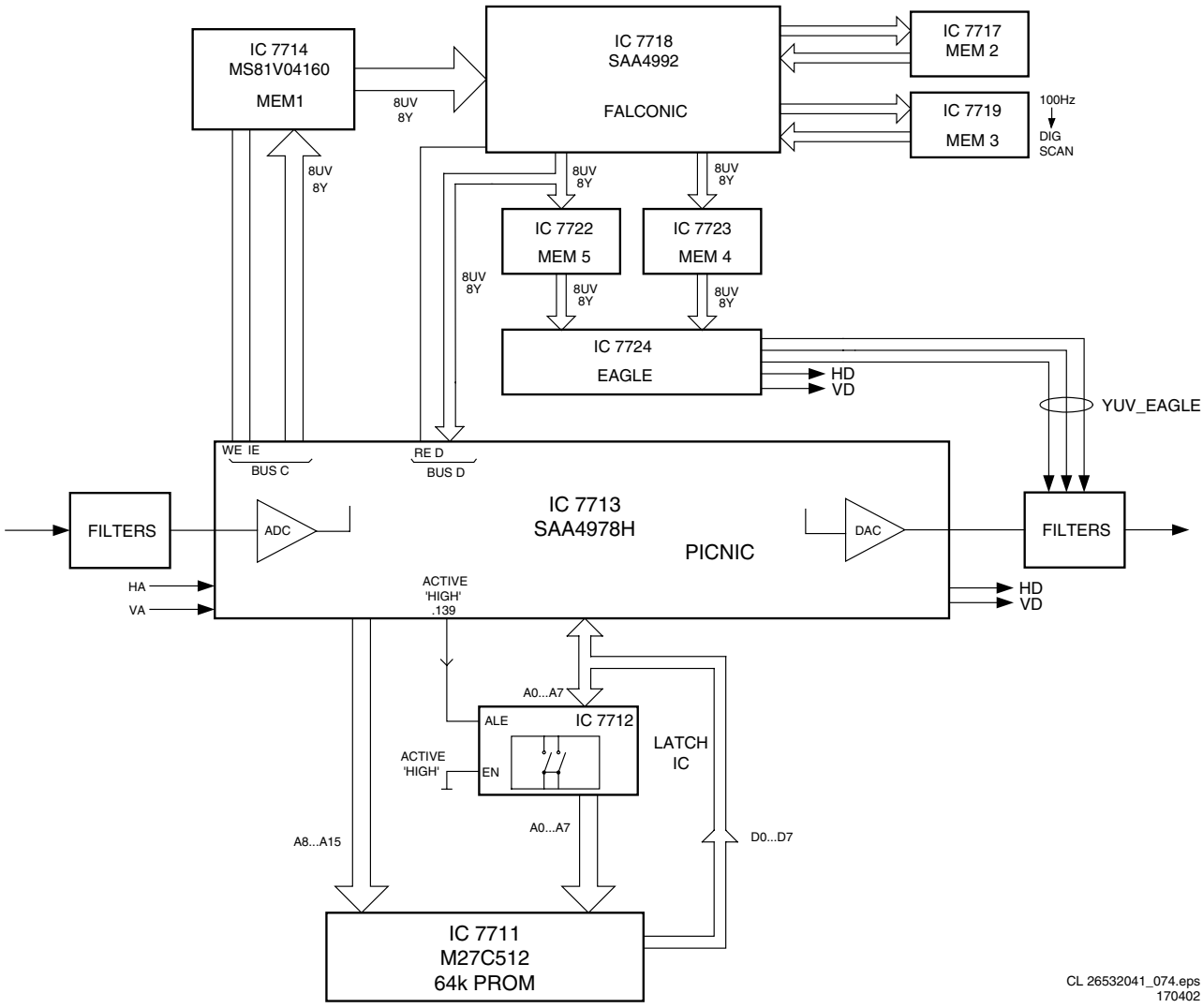


Figure 9-10 Block diagram FBX7

The 50 Hz YUV signals, coming from the HIP, are fed to the PICNIC via an anti-aliasing filter.
The (AABB) frame frequency doubling is done by the PICNIC (SAA4978, 160 pins QFP) together with a field memory (MEM1). This IC can handle most 100 Hz functions (except Progressive Scan).
The PICNIC has an internal CPU and a (small) integrated ROM. The actual FBX7 software is located in an external ROM (item 7711). In order to limit the number of connections between the PICNIC and the external ROM, a number of lines are used twice. The lines A8 to A15 are fixed lines, while the lines A0 to A7 are made switchable with the eight data lines of the ROM. This is done via a Latch (item 7712), which is controlled by pin 139 of the PICNIC (the ALE signal).
Via bus 'C', a digitalised signal is presented to FM1 (Field Memory 1), which is used for the 50 to 100 Hz conversion. The signal goes further via the data-bus to the FALCONIC. This IC has the following functions:

- Line flicker reduction.
- Digital Noise Reduction (DNR).
- Progressive scan (262.5 - 525 or 312.5 - 625 lines per frame).

At the end, the digital YUV signals enter, via FM4 and FM5, the Eagle IC.
This IC has the following functions:

- Luminance Transient Improvement (LTI).
- Peaking.
- Programmable number of lines.
- Programmable number of pixels per line.
- Demo mode (split screen).
- Improved colour transients (CTI) and colour enhancement (TOPIC).
- Improved vertical zoom.

The digital YUV-signals from the Eagle go, via a passive output filter, to the HOP.

9.7.3 PICNIC/FALCONIC (Diagram B3a and B3b)

The PICNIC is used for the 100Hz conversion and has the following functions:

- The ADC.
- The DAC.
- The 100 Hz conversion.
- Dual screen compression
- The Panorama mode.
- Automatic Aspect Ratio Adaptation (AARA)
- Colour Transient Improvement (CTI)
- The contrast improvement (Dynamic Contrast).

All these functions are integrated in one IC: SAA4978H, 160 pins QFP

ADC/DAC

- Analogue to Digital conversion is done with three identical 9-bit ADCs.

- Digital to Analogue conversion uses three identical 10-bit DACs.

In the PICNIC there are three nine bits ADCs present for Y, U, and V. For digitising the Y (luminance), nine bits are used (to realise a more detailed picture). These nine bits are only internally used. Via dithering, the nine bits are reduced to eight bits and this data is stored into memory. The data in the memory is fed back to the PICNIC and via un-dithering the data is again reproduced to nine bits for processing.
U/V (colour difference signals) is also sampled with nine bits. These two nine bit data streams are multiplexed to four bits data streams. As the perception for colours by the human eye is less sensitive as for luminance, this reduction is allowed.

100 Hz Conversion

The main task of the PICNIC is the conversion from 50Hz to 100Hz for YUV and HV-sync. In order to remove 'large area flicker' (especially visible in a white picture), the field-rate of the video is doubled by the FBX6. A 50/60 Hz frame frequency is converted to 100/120 Hz. In addition, the line frequency (16 kHz) is doubled (32 kHz).
Basically, when the video input contains fields A, B etc., the conversion provides an AABB sequence on the display. The actual conversion is done in the first Field Memory (by reading it twice at double speed, while writing it once.

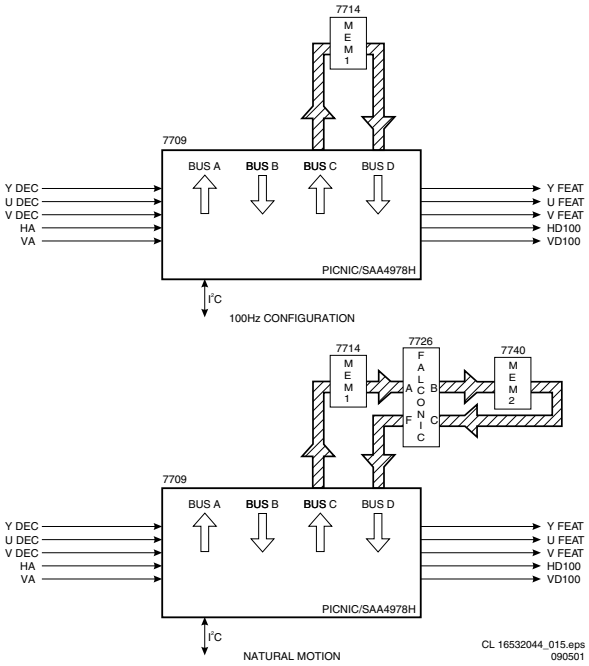


Figure 9-11 100 Hz conversion

For extra 100 Hz features, it is possible to add an extra IC to the PICNIC. This IC, called the 'Field And Line CONverter IC' (FALCONIC), has three modes:

- **100 Hz** (to eliminate field flicker). Only one memory IC (7714) is used to store one frame. It displays an AABB sequence.
- **Digital Scan** (to additional eliminate line flicker). Together with two memory ICs (7714 and 7740), it displays an AA'BB' or ABAB sequence.
- **Natural Motion** (to additional eliminate movement juddering). Together with two memory ICs (7714 and 7740), it displays an AB'A'B sequence.

Further features of the PICNIC:

- **Dual Screen Compression.** The PICNIC can provide horizontal video compression up to 50 %. The compress mode can be used to display dual screens with Teletext (only for wide-screen sets).
- **The Panorama Mode.** To fit 4:3 pictures into a 16:9 display, it is possible to apply a panoramic horizontal distortion, to make a screen-fitting picture without black sidebars or lost video. The centre horizontal gain is programmable and the side gain is automatically adapted to make a screen-fit.
- **Automatic Aspect Ratio Adaptation (AARA).** This feature uses data from the 'black bar detection circuit' to adapt the vertical and horizontal amplitude to an aspect ratio belonging to the display, without the black bars.
- **Colour Transient Improvement (CTI).** At CVBS video signals, the bandwidth of colour signals is limited to 1/4 of the luminance bandwidth. Transients between areas of different colours are therefore not very sharp. The PICNIC can steepen these transients artificially with a time manipulation algorithm.
- **Dynamic Contrast.** To make the contrast (black/white) range wider, Philips has invented Dynamic Contrast. It uses the digital memory used in 100 Hz sets. It measures every A-field (25 x per second), and digitally analyses where on the greyscale most of the image is located. If it is a relatively dark image, the lighter part of that image is stretched towards white, so that more contrast will become visible in that picture. If it is a relatively light image, the darker part of that image is stretched towards black, so that these darker parts will have more contrast. When the image is in the middle of the greyscale, both dark and light parts are stretched.

9.7.4 Eagle (Diagram B3c)

Introduction

Some strong picture improvements are carried out inside the Eagle, which all contribute to the excellent picture quality. These improvements are:

- LTI (both horizontal and vertical).
- CTI (only horizontal).
- Peaking (both horizontal and vertical).
- More pixels per line.
- More lines per frame.
- Better colour transitions.

By means of over sampling, the video signals get a sample frequency of 64 MHz, a bandwidth of 20 MHz, and 1680 pixels per line (was 32 MHz, 10 MHz and 840 pixels/line). This requires two extra field memories (MEM4 and MEM5).

The Eagle can handle four different modes:

- Digital Natural Motion (PAL): 100 Hz, 2fH, 2:1 Interlace (1680 pixels x 625 lines)
- Pixel Plus (PAL): 75 Hz, 2fH, 2:1 Interlace (1680 pixels x 833 lines)
- Double Lines (PAL): 50 Hz, 2fH, 2:1 Interlace (1680 pixels x 1250 lines)
- Pixel Plus (NTSC): 60 Hz, 2fH, 2:1 Interlace (1680 pixels x 1050 lines)

LTI (Luminance Transient Improvement)

The main objective of LTI is a steeper slope at contrast transitions (e.g. from 10 mV to 900 mV within 3 pixels i.s.o. 5 pixels for one detail). It is based on waveform altering around a signal jump.

Important: The LTI, as used in the Eagle, is designed for interpolated picture contents. This means that for pixel/line doubling, one of the two pixels/lines is an interpolated value. When a picture jump is interpolated, you will get extra room to make it steeper (you get extra pixels to describe the slope). Without interpolation, you cannot use this kind of LTI.

- LTI can add 'ears' to the waveform at the jump (a kind of controlled overshoot).
- LTI 'estimates' the frequency of the jump and will adapt the amplification to this frequency.
- LTI is applied both horizontal as vertical.

- LTI is amplitude dependent. This means that only 'big' jumps are processed. It works with a threshold, which is coupled to the noise meter via the Auto TV software.
- LTI is also frequency dependent. This means that it is distributed over the slopes. When there are many steep slopes in the signal, LTI will only process the steepest ones. If there are only a few slopes, LTI will process all of them. This is fully hardware implemented.

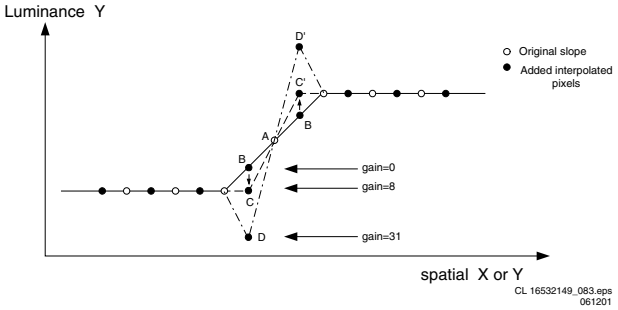


Figure 9-12 Horizontal LTI

For horizontal LTI, the number of pixels is doubled (64 MHz) by means of interpolation. Pixel A at the transition will keep its luminance value, while the (new) pixels B can have a luminance value of zero to max. 31. For example:

- Pixels B can keep the same value (gain = 0)
- Pixels B can get the value of C and C' (gain = 8), which will give a steeper slope.
- Pixels B can also get the value of D and D' (gain = 31), which will give an even steeper slope with the so-called 'ears'. These 'ears' will give a **contrast** improvement.

For CTI, the same principle is used, in order to get better **colour** transitions.

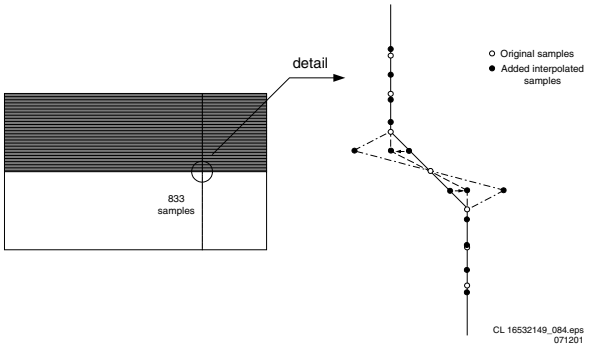


Figure 9-13 Vertical LTI

The principle for vertical LTI is the same as for horizontal LTI. The shift from 625 to 833 lines is done by means of a scaler. With these extra interpolated samples, it is possible to create steeper slopes, possibly with 'ears'.

Peaking/Coring

The objective of 'peaking' is contrast improvement (e.g. from 50 mV_{PP} to 70 mV_{PP} for one detail).
It uses a noise threshold (coring = non-linear filtering around zero-level), thus it works everywhere in the picture (except below the threshold level).
The added difference signal is frequency dependent, which results in frequency dependent contrast improvement. When the difference signal becomes too large, the peaking is reduced (smartness).

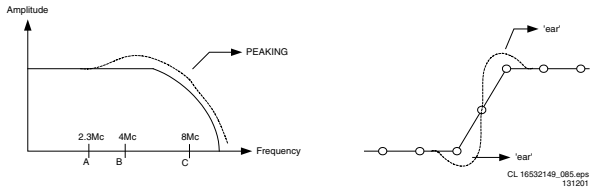


Figure 9-14 Peaking

To obtain above shown filter characteristic, filters are set at three parameters (see A, B, and C). In this way, only the higher frequencies are 'lifted'. After sending the luminance signal through these filters, the filter output is added to the original signal. In this way, the so-called 'ears' are created, together with the steeper slopes. These 'ears' will give a **contrast** improvement at details.

Both horizontal and vertical peaking is **amplitude dependent**: the higher the signal jump, the lower the peaking. This is done to avoid that high jumps get big 'ears', because this will introduce nasty contouring. To avoid peaking on noise levels, coring is used. The coring threshold is set via the Auto TV software, by means of the noise meter.
Therefore, the result is that **only details** are processed by the peaking.

The horizontal peaking is also **frequency dependent**: it is possible to perform peaking around three frequencies (when combined, it is even possible to peak at variable frequencies). In Auto TV, this feature is software coupled to the sharpness meter, in order to get the most optimal filter characteristic. The vertical peaking works on a fixed frequency.

Colour Enhancements

In the FBX6 (as used in the EM3E), the TOPIC handled the colour enhancement features, such as: 'skin tone correction', 'blue stretch', and 'green enhancement'. In the new FBX7, all this is done by the Eagle IC.

Output

The YUV signals presented to the HOP come from the Eagle. These three signals have all the same circuitry so it is explained once (for Y).

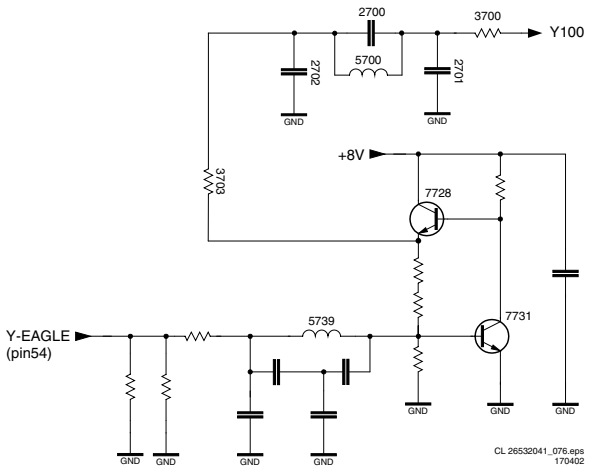


Figure 9-15 YUV Output Filter

The YUV signals are first filtered by a 64 MHz passive filter (L5739 with C's). Because the output signals from the Eagle are too small to drive the HOP directly, they are amplified by the circuit around TS7731 and TS7728. The gain is determined by R3791, R3788, and R3807. For the Y-signal the gain is 2, for the U-signal it is 1.33, and for the V-signal it is 1.05.

9.8 Video: High-end Output Processor (HOP) and TOPIC (diagram B4)

9.8.1 General

The YUV-signals from the PICNIC are fed to the HOP (High-end Output Processor, TDA9330). The video and geometry control parts are integrated in the HOP. Also the RGB-signals for TXT/OSD (from the P) are inserted via the HOP. The geometry part delivers the H-drive, EW-drive, V-drive, and also a drive signal for rotation.

The main functions of the HOP are:
- Video control (contrast, brightness, saturation, etc.).
- Deflection drive.
- Second RGB interface for OSD/TXT.
- Peak White Limiting.
- Cut-off control and White Drive (RGB outputs).
- Geometry control.

The TOPIC (The most Outstanding Picture improvement IC, item 7302, type TDA9178) is an **optional** IC between the PICNIC and the HOP. It has the following (picture improvement) functions:
- Luminance Transient Processor (LTP), for detail enhancement.
- Chrominance delay circuitry, to compensate timing differences between Y and C.
- Spectral processor, for improved sharpness and colour transient improvement (CTI).
- Colour vector processor, for skin tone correction, green enhancement and blue stretch.
- Measure and detection circuitry, for AutoTV.

The sandcastle pulse from the HOP is fed to pin 1 of the TOPIC, which is used as reference for timing.

9.8.2 Video Control

After source selection, the HOP controls the signals for Saturation, Contrast, and Brightness. Output is RGB again.

9.8.3 OSD/TXT Control

On pins 35 to 38, the RGB and fast blanking from the OTC (OSD and TXT) are inserted. The sync signal V_{SYNC} is derived from the 'FRAMEDRIVE-" signal.

9.8.4 Peak White Limiting

On pin 43 there is a Peak White Limiting signal line (PWL). If the beam current increases, the 'EHT-info' voltage will decrease. Average limiting via R3343/C2333 controls PWL.

9.8.5 Cut-off Control

The following will happen when you switch the TV to Standby:
1. The vertical scan is completed.
2. The vertical flyback is completed (the horizontal output is gated with the flyback pulse, so that the horizontal output transistor cannot be switched 'on' during the flyback pulse).
3. The 'slow stop' of the horizontal output is started, by gradually reducing the 'on' time at the horizontal output from nominal to zero (this will take 50 ms).
4. At the same time, the fixed beam current is forced via the black-current-loop for 25 ms. This is done by setting the RGB outputs to a maximum voltage of 5.6 V.

In the EM5E a 'one-point' cut-off control is used:
A current of 8 µA (for cut-off) is fed to pin 44 of the HOP. This is done with a measurement pulse during the frame flyback. During the first frame, three pulses are generated to adjust the cut-off voltage at a current of 8 µA. With this measurement, the black level at the RGB-outputs is adjusted. Therefore, at start-up there is no monitor pulse anymore. At start-up, the HOP measures the pulses, which come back via pin 44. The RGB-outputs have to be between 1.5 V and 3.5 V. If one of the outputs is higher than 3.5 V or one of them lower then 1.5 V, the RGB-outputs will be blanked.

9.8.6 Geometry control

All geometry control is done via I^2C and the data is stored in the NVM (IC7011) of the SSB.

9.8.7 Deflection Control

Line Drive
The Line drive is derived from an internal VCO of 13.75 MHz. As a reference, an external resonator is used (1301). The internal VCO is locked with the HD_{100}-pulse, which comes from the PICNIC.
The 'PHI-2' part in the HOP receives the HFB_X-RAY_PROT (pin 13) to correct the phase of the Line drive. The EHT-info is supplied to pin 14 (DYN-PHASE-CORR) to compensate picture breathing depending on the beam current.

Frame Drive
At pins 1 and 2, the symmetrical frame drive signals are available. The V_{SYNC} signal, for synchronisation of the OSD/TXT, is derived from the 'FRAMEDRIVE-' signal.

East/West Drive
At pin 3, the E/W drive signal is available. Pin 4 is a feedback input for the EHT-info, and is used to prevent pumping of the picture. The EHT varies also dependent on the beam current. E.g. for wide-screen without load this is 31.5 kV and with load (1.5 mA) 29.5 kV.

Frame Rotation
For frame rotation, a control voltage is used from pin 25 of the HOP. Frame rotation is only used in wide-screen sets.

9.8.8 Protections

Flash detection
When a flash occurs, the EHT-info will become negative very fast. Via R3316, D6304, and D6303, TS7303 starts to conduct. This makes pin 5 of HOP 'high'. The output (pin 8) is immediately stopped.
If the H-drive stops, then also pin 5 will become 'low' again, which will reset the flash detection.
A bit (FLS) is set in an output status register, so that the OTC can see that there was a flash. This FLS-bit will be reset when the OTC has read that register.

HFB protection
If the HFB is not present, this is detected via the HOP. The OTC puts the set into protection and reads a register in the HOP. An error code is generated.

9.9 Synchronisation (Diagram B2, B3 & B4)

The HIP video processor provides the vertical and horizontal sync pulses V_{A50} and H_{A50}. They are synchronised with the incoming CVBS signal. Then these pulses are fed to the PICNIC, where they are doubled to be synchronous with the 100 Hz picture. The outgoing pulses, V_{D100} and H_{D100}, are fed to the HOP, which supplies the vertical and horizontal drive pulses and the 100 Hz (2fH) sandcastle pulse.

The V_{D100} pulse from the PICNIC is inverted by TS7304 to the V_D signal. The OTC is synchronised on the HFB pulse from the

CRT and on the V_{SYNC} from the HOP, for the synchronisation of TXT/OSD/EPG

When no CVBS is offered to the video processor, the V_{A50} and H_{A50} pulses are switched 'off' by the HIP, and the pulses are generated by the PICNIC (to assure a stable OSD).

9.10 Horizontal (Line) Deflection (Diagram A3)

9.10.1 Principle

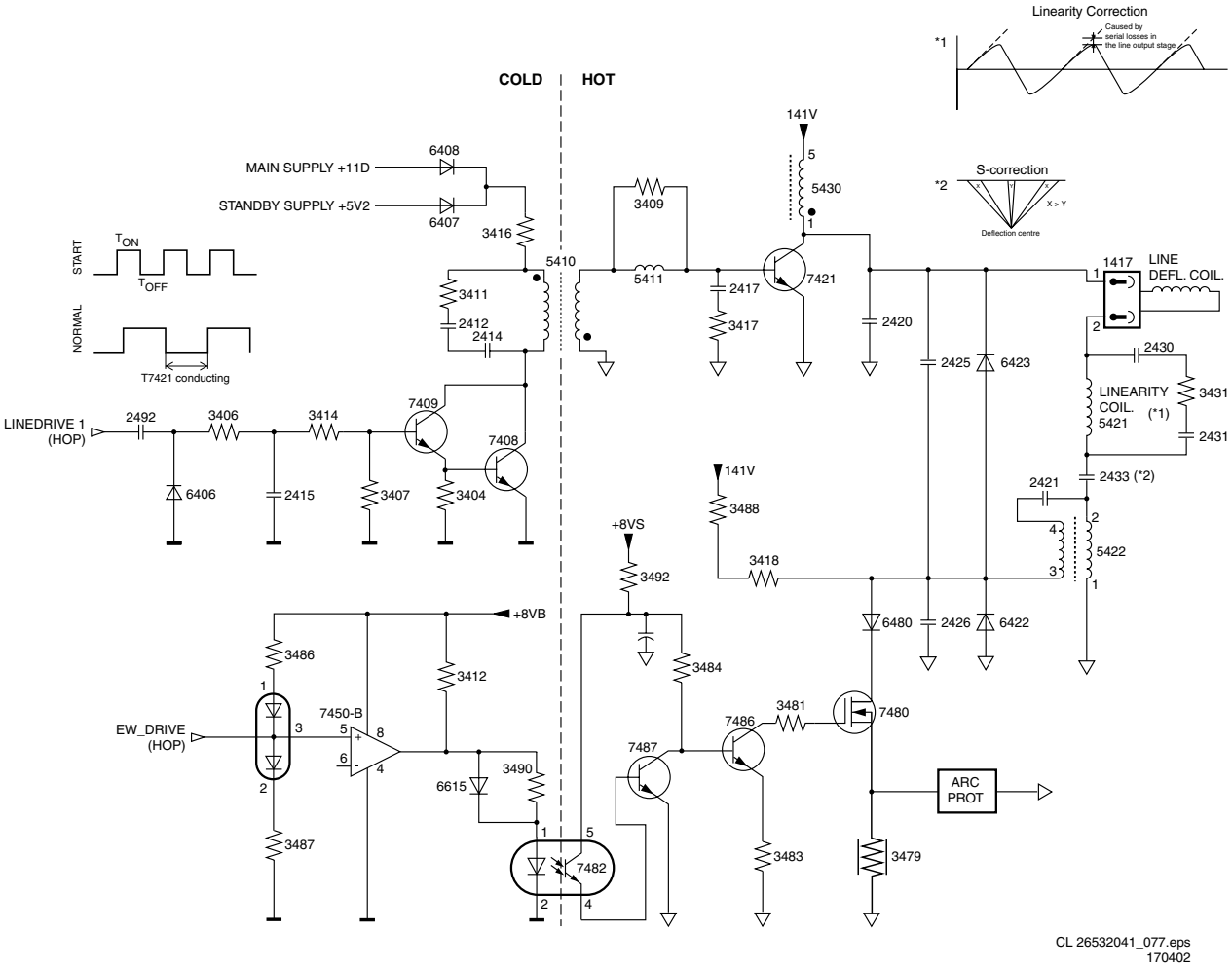


Figure 9-16 Line deflection circuitry

The HOP (located on the SSB) generates the line-drive pulses (LINEDRIVE1), which have a frequency of 31250 Hz ($T = 32\ \mu s$).

When the LINEDRIVE1 signal is high, TS7409 and TS7408 will conduct. A constant DC voltage will be applied across L5410, causing a linear increasing current through this coil. The secondary voltage of L5410 has a negative polarity so that TS7421 will block.
When the set is switched 'on', the current through L5410 is supplied by the 5V2 Standby supply (via D6407), and taken over by the +11D voltage (via D6408) of the main supply.

When the LINEDRIVE1 signal becomes low, TS7409 and TS7408 will block. The voltage polarity across the primary winding of L5410 will invert. The positive voltage on the secondary winding will now drive TS7421 into conductivity. Because of the storage time of the line transistor (TS7421), L5410 cannot transfer its energy immediately to the secondary side. This may result in high voltage peaks on the collector of TS7409 and TS7408. To prevent that these peaks will damage the transistors, a 'snubber' circuit (C2414, C2412 and R3411) will suppress them.

When the LINEDRIVE1 signal is high again, the above described sequence starts again. Circuit L5411 and R3409 will increase the switch 'off' time of the line transistor.

The line stage is started via a 'slow start' principle. During start-up, the HOP generates line drive pulses with a small T_{ON} and a high frequency (50 kHz). T_{OFF} is constant and T_{ON} is gradually increased until the frequency is 31250 Hz (normal condition). The time interval from start to normal condition takes about 150 ms.
When switching off, the same procedure is followed, but now in reverse order.

9.10.2 Implementation

To explain the operation of the line output stage, we use the following start conditions:

- C2433 is charged to max. 141 V (V_{BAT})
- TS7421 is driven into conductivity.

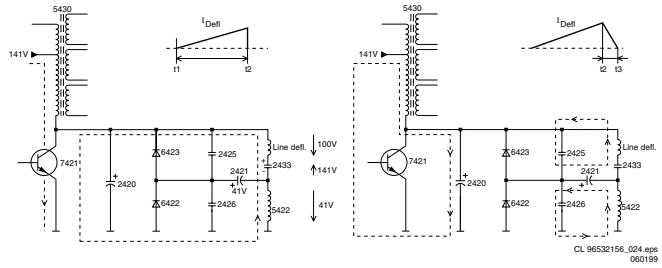


Figure 9-17 Line deflection part 1

- **Period t1-t2:** When TS7421 is driven into conductivity, the capacitor voltage of 141 V will be divided across bridge-coil L5422 and the deflection coil (connector 0317). Due to the chosen inductance values, there will be 100 V across the deflection coil and 41 V across L5422. The linear increasing current in the deflection coil will result in a spot moving from the centre of the picture tube to the right. The voltage across L5422 will also charge C2421 (41 V - 0.7 V).
- **Period t2-t3:** At the moment the LINEDRIVE signal becomes high, TS7421 will stop conducting. In the coils a voltage will be induced, trying to maintain the current. The current through the line deflection coils continues to flow through C2425 and C2421 and the current through L5422 continues to flow through C2426 and C2421. The energy stored in the line deflection coil is passed to C2425, and the energy of L5422 to C2426. The resonance-frequencies of these two LC-circuits define the flyback time of the spot from the right side of the picture tube to the left. On average, no current flows through C2421 and thus the voltage across this capacitor remains constant.

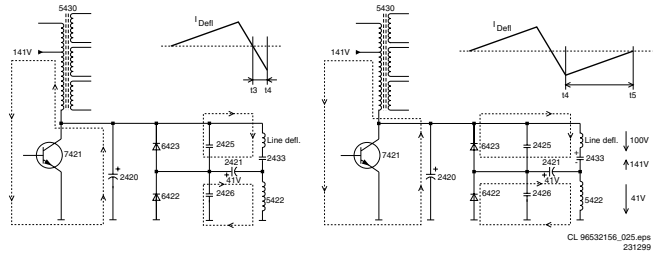


Figure 9-18 Line deflection part 2

- **Period t3-t4:** As for the period t2-t3; but now the current flows in the opposite direction, since the voltage across C2425 and C2426 is higher than the voltage across C2433 and C2421.
- **Period t4-t5:** The coils want to maintain the negative current and will charge the capacitors negative. Because of this, D6422 and D6423 will conduct. The voltage is 100 V across the deflection coil and 41 V across L5422. As both diodes conduct, we may consider the voltage constant. A linear current flows with the same changing characteristics as in period t1-t2. The spot now moves from the extreme left of the picture tube to the centre. Before the current becomes zero, and the spot is located in the centre of the frame, TS7421 reverts into conductivity. First a short negative current will flow. The cycle starts again.

9.10.3 Corrections

Several corrections are necessary to obtain a correct picture.

Linearity Correction

A constant voltage across the horizontal deflection coil should result in a linear increasing saw-tooth current. This is not the case however, as the resistance of the coil is not negligible. In order to compensate for this, a re-magnetised coil L5421 in series with the deflection coil is used. This coil ensures that during time interval t1-t3 the circuit resistance will be higher than during t4-t5.
L5421 is called the linearity coil. To avoid self-oscillation, R3431 and C2431 are placed parallel to L5421.
See also Figure 9-9 item '*1'.

S-correction

Since the sides of the picture are further away from the point of deflection than the centre, a linear saw-tooth current would result in a non-linear image (the centre would be scanned slower than the sides).
To solve this, the deflection current for the right- and left side is reduced.
C2433 is charged quadratic during time interval t1-t2. Left and right the voltage across the deflection coil decreases, causing the deflection to slow down. In the centre, the voltage increases and the deflection will be faster.
An S-shaped current is superimposed on the saw-tooth current. This correction is called 'finger-length correction' or 'S-Correction'.
C2433 is relatively small, as a result of which the saw-tooth current will generate a parabolic voltage with negative voltage peaks. The current also results in a parabolic voltage across C2421, resulting in the finger-length correction, proportionally increasing with the picture width.
The EW-DRIVE signal will ensure the largest picture width in the centre of the frame. Here the largest correction is applied. The larger the picture width, the higher the deflection current through C2433.
See also Figure 9-9 item '*2'.

E/W-correction

A line, written at the upper- or lower side of the screen, will be larger at the screen centre when a fixed deflection current is used. Therefore, the amplitude of the deflection current must be increased when the spot approaches the screen centre. This is called East/West correction.

The EW drive signal originates in the HOP and is supplied to TS7480 via OpAmp 7450-B and optocoupler TS7482. The shape of this signal determines the various geometric correction parameters:

- H amplitude
- EW-parabola
- EW-corner
- EW-trapezium
- Horizontal parallelogram
- Horizontal bow

TS7480 will charge capacitor C2421 more or less, increasing the deflection current when reaching the centre of the screen. The moment TS7480 is driven into saturation, C2421 will discharge during the flyback. As a consequence of which C2421 must be charged again during the scan via the conduction diode D6422 (as long as C2421 is not charged to the voltage across L5422, D6422 will conduct).
The current in the deflection coil is therefore larger than the current flowing in L5422 (1-2). The voltage across the deflection coil increases, so the picture width increases. When TS7480 blocks, C2421 will not discharge anymore, and the voltage across C2421 will remain constant.
The result is that the voltage across the deflection coil is minimal. The voltage across coil L5422, however, is maximal. This coil (L5422) consists of a transformer with the following properties:
As the current through the coil 1-2 increases (smaller picture width), the current through coil 3-4 decreases. Because of the transformer characteristic a higher voltage will be subjected to coil 3-4, which will counteract the current. The current will diminish even further.
When the current through coil 1-2 diminishes (larger picture width), the current through coil 3-4 increases.

Beam-current Correction

The 'EHT-info' signal at point 10 of the LOT depends on the value of the beam-current and the voltage from divider R3450, R3451, and C2450. This signal is fed to the HOP to trim the contrast, and to compensate for the changes in picture-width as a function of the EHT-info, when EHT is decreased.
The 'EHT-info' is also used to correct the EW-current.

The 'DYN-FASE-CORR' signal, derived from the 'EHT-info' signal, is fed to the HOP via C2455 and drives a dynamic phase correction necessary because of beam-current variations. This is done by regulating T_{ON} of the line transistor TS7421.

9.10.4 Secondary Line Voltages

During the blocking time of TS7421, the magnetic energy of coil 1-5 of the LOT is transferred to electrical energy in the secondary winding. Via rectifying and smoothing, the several secondary supply voltages are generated, like:

- EHT, Focus and Vg2-voltage.
- +200V for the CRT panel (pin 8 LOT).
- +11D for the line deflection (pin 12 LOT).
- +13V-LOT for the frame deflection (pin 6 LOT).
- -15V-LOT for the frame deflection (pin 3 LOT).
- Filament voltage (pin 9 LOT).

9.11 Vertical (Frame) Deflection (Diagram A4)

9.11.1 Frame Stage Drive

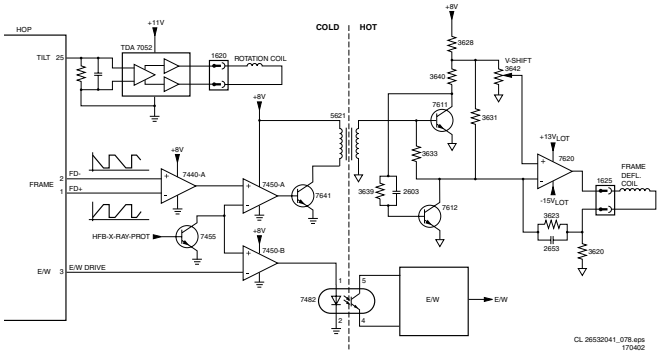


Figure 9-19 Frame deflection circuitry

The HOP drives the frame output stage with a symmetrical saw-tooth voltage. As the HOP is 'cold' and the frame output stage is 'hot', they are galvanic isolated. This is done via a transformer (5621). As in the MG-chassis, the HOP generates three signals needed for the frame output stage: FRAMEDRIVE+, FRAMEDRIVE- and TILT (for rotation).
The rotation circuit is kept at the 'cold' side of the chassis, to avoid the costs an extra optocoupler.
The circuit around IC7440 will amplify this signal and the output current will flow through the rotation coil.

9.11.2 Flyback Generator

The frame output stage is supplied via the +13 V and -15 V coming from the LOT. The output of the amplifier is 0 V_{DC}, so a coupling capacitor is not required.

During the (forward) scan, a supply of +13 and -15 V is sufficient to respond to the slow changing current. The internal flyback generator puts a voltage of -15 V on pin 3. Because of the voltage drop over zener diode D6622 (8.2 V), C2622 will be charged to 19 V: being 13 + (15 - 8.2 - 0.7) V.
During the flyback scan, the change in current-per-time is much larger, so a higher voltage is required. The flyback generator will now generate a voltage of +13 V on pin 3. Added to the charge on C2622 this will give a flyback voltage of 32 V (depending on the CRT size, this value can differ).

The amplifier IC (IC7620, pin 5) supplies the saw-tooth current to the frame deflection coil. The current through this coil is measured via R3620//R3621//R3622 and fed back to the inverting input of the amplifier.
R3624 and C2624 on the output of the amplifier, form a filter for high frequencies and in that way also prevents oscillations.
Peak voltages on the output, e.g. as a result of a possible flash, are damped by the clamp circuit consisting of D6619, C2627, and R3627. The network consisting of R3625, R3626, R3629, and C2629 form an extra damping circuit.

9.11.3 Anti-moiré circuit (Diagram B9)

Introduction

By shifting two following frames w.r.t. each other, it is possible to decrease the 'Moiré' effect. This is achieved by adding an extra current to the frame drive sawtooth.

For 50/75 Hz frame rates, the sequence is: one normal frame followed by one shifted frame.
For 100 Hz frame rates, the sequence is: two normal frames followed by two shifted frames.

Implementation

The circuit around TS7020 and 7019 (one shot timer) detects which frame rate is used.
The circuit around TS7017 and TS7018 (Flip-Flop) generates the extra current for the frame drive.

9.11.4 Protection circuits

Bridge Coil Protection

The secondary voltage of the bridge coil L5422 is guarded at the diode modulator (D6421/6422) via a 10 V zener diode (6499 on diagram A4). When the bridge-coil is working properly, the average voltage on D6422 is such that this zener diode will conduct. It will drive TS7652 into saturation.
When, for any reason, the secondary side of the bridge coil is shorted, the average voltage on D6422 will drop below the zener-voltage, and TS7652 will block. Now capacitor C2642 is charged. Transistor TS7407 starts conducting and the SUP-ENABLE signal is grounded via R3403. This will switch 'off' the main supply (see diagram A1).

Frame Output Protection

Via the circuit built around TS7641, the frame output stage is guarded. If the frame output stage is working properly, TS7641 and TS7652 will both conduct, and thereby discharge C2642. TS7443 is blocked, so the SUP-ENABLE signal is 'high'.
If there are frame pulses missing, TS7641 will block and capacitor C2642 is charged. Transistor TS7443 starts conducting and the SUP-ENABLE signal is grounded via R3403. This will switch 'off' the main supply (see diagram A1).

ARC Protection

If there are 'open' connections (e.g. bad solder joints) in the high-energy deflection circuitry, this can lead to damaging effects (read: fire). For that reason, the E/W current is sensed (via 3479//3480). If this current becomes too high, the 'thyristor' circuit (TS7653 and TS7654) is triggered. TS7442 is switched 'on' and TS7443 is forced into conduction. The 'SUP-ENABLE' signal is shorted now to ground level, which will force the Main Power Supply to Standby mode

9.12 Audio (Diagram B6, A6 & A7)

9.12.1 Introduction

All EM5E sets contain one of ITT's Multi-standard Sound Processing (MSP) ICs for sound decoding. The diversity arises because each member of the MSP-family handles its own set of sound standards:

- MSP34x1: Virtual Dolby decoding.
- MSP34x2: Dolby ProLogic decoding.

Both versions also handle NICAM.

The MSP IC takes care of the main FM sound decoding. AM decoding for the L system is done by the HIP. The demodulated L sound is then again source selected and processed in the MSP. The reason for this is the bad AM detection performance of the MSP. However, in case of NICAM L, it is handled by the MSP.

All MSP versions contain digital audio processing, used for the basic left/right stereo sound, such as bass, treble, balance, incredible sound and spatial.
In addition to that, both versions are capable of Dolby processing:
The MSP34x1can perform 'Virtual Dolby' processing (a Dolby approved sound mode for surround sound reproduction with left/right speakers only).

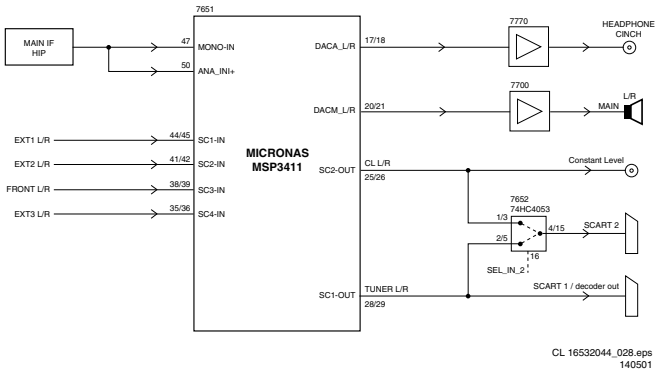


Figure 9-20 Virtual Dolby processing

The MSP34x2 can perform 'Dolby ProLogic' processing (left, right and (mono) surround).

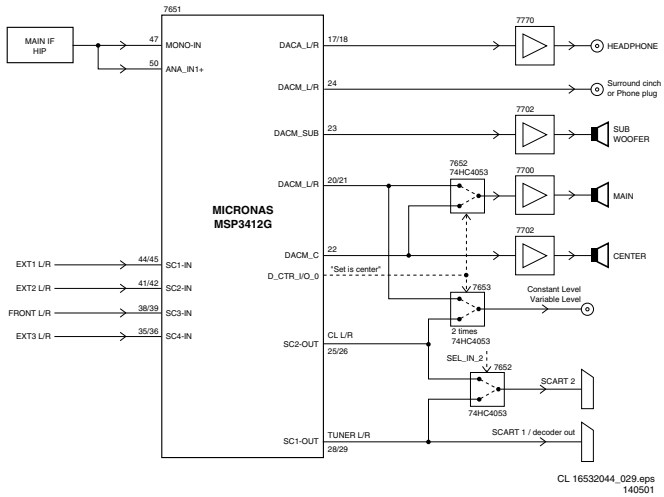


Figure 9-21 Dolby Pro Logic processing

The following amplifier configurations are possible:

- Virtual Dolby, L/R, 2 x 15 W (88XX-series and 8957-series with extra digital input).
- 3D Surround, L/R, Centre, Subwoofer, 4 x 15 W (95XX-series).

9.12.2 Inputs / Outputs

Both versions can cover four stereo inputs and one AM (mono) input. This means in practice: three SCART inputs, one side input, and one AM (mono) input.

Both versions have the following outputs: SCART1 (CVBS/ decoder out), SCART2 (record select/WYSIWYR out) and headphone.

9.12.3 Source Selection

The constant level output to SCART2 is connected via a so-called 'Régimbeau' switch (IC7652) (see also Figure 9-13). This switch is needed to prevent acoustic feedback ('Larsen' effect). This effect is caused, when EXT2 is chosen as input signal, and the output of SCART2 is selected. This means that the main picture is also EXT2, which will cause the 'Larsen' effect.
To prevent this, the record select must be switched to 'Tuner'. This is especially important when decoders are used, behind a 'transparent' VCR connected to EXT2.

To get a constant level output if the Tuner is selected, the SCART1 output ('Tuner' at any time) has to be fed back to the input selector and selected as input for the MSP (SCART1 input).

The MSP34XX has a separate headphone output, so sound control can be done separate from the speakers.

9.12.4 Audio Decoding

At the input, a choice can be made between two IF-signals; SIF and SIFM.
The selected signal is fed to the AGC. After this, an ADC converts the IF-signal to digital.
Two demodulation channels can process this digital signal. The first one is able to handle FM and NICAM signals. The second one can handle FM and AM signals.
Each channel contains a mixer to shift the incoming signal in the frequency domain. This shift is determined by the value of a DCO.
After the down-mix, the signal is fed, via a filter, to a discriminator. From here the AM, FM or NICAM demodulation can be performed.
Both channels contain an 'automatic carrier mute' function, which automatically mutes the output of the analogue section when no carrier is detected.
After demodulation, the FM-signals are subjected to a de-emphasis operation. After that, the matrix of the stereo system is applied.

9.12.5 Audio Processing

The sound processing in EM5E is completely done by the MSP:

- Volume control is done by the user via the SOUND menu.
- Tone control in 'Stereo' sets is done via the BASS/TREBLE control, in 'Virtual Dolby' sets via the 5-band equaliser.
- Headphone control, the MSP has a separate Headphone output so separate sound control is possible.

Automatic Volume Levelling (AVL)
One of the features of the MSP-family is Automatic Volume Limiting (AVL). If used, it limits the big volume differences in the

broadcast between e.g. news transmissions and commercials, or within a movie.
To be able to get a Dolby approval (for the Virtual Dolby sets), the AVL feature must be switchable. Therefore, the AVL feature is customer switchable via the menu.

9.12.6 Audio Amplifier (Diagram A6)

The audio amplifier is an integrated 'class-D' power amplifier IC, the TDA7490. It delivers an output of 2 x 15 W_{RMS} to two full range speakers. For the higher specified sets, a subwoofer and centre speaker are easy to implement, by adding a second amplifier.

Principle
Audio-power-amplifier systems have traditionally used linear amplifiers, which are well known for being inefficient. In fact, a linear Class AB amplifier is designed to act as a variable resistor network between the power supply and the load. The transistors operate in their linear region, and the voltage that is dropped across the transistors (in their role as variable resistors) is lost as heat, particularly in the output transistors. Class D amplifiers were developed as a way to increase the efficiency of audio-power-amplifier systems.

The Class D amplifier works by varying the duty cycle of a Pulse Width Modulated (PWM) signal.
By comparing the input voltage to a triangle wave, the amplifier increases duty cycle to increase output voltage, and decreases duty cycle to decrease output voltage.
The output transistors of a Class D amplifier switch from full 'off' to full 'on' (saturated) and then back again, spending very little time in the linear region in between. Therefore, very little power is lost to heat.
If the transistors have a low 'on' resistance $R_{DS(ON)}$, little voltage is dropped across them, further reducing losses.

The advantage of Class D is increased efficiency (= less heat dissipation). Class D amplifiers can drive the same output power as a Class AB amplifier using less supply current.
The disadvantage is the large output filter that drives up cost and size. The main reason for this filter is that the switching waveform results in maximum current flow. This causes more loss in the load, which causes lower efficiency.
An LC filter with a cut-off frequency less than the Class D switching frequency (200 kHz), allows the switching current to flow through the filter instead of the load. The filter is less lossy than the speaker, which causes less power dissipated at high output power and increases efficiency in most cases.

The supply voltage is a symmetrical voltage of +/- 16 V (or +/- 19 V depending on the set execution), generated by the main supply via L5512 (or L5506).

Mute
Sound-mute is done via the STBY-MUTE line connected to pin 6 (tri-state input) of the amplifier IC. This line is activated via the SOUND-ENABLE line (software controlled) and/or POR line (hardware controlled).
This signal is inverted by TS7701 and/or TS7703, as a result of which at a high level of the SOUND-ENABLE signal, current is sinked from pin 2 and the IC mutes.

Protection
A loudspeaker DC protection is implemented. The amplifier IC TDA7490 has a 'standby-mute-play' feature via the tri-state input pin 6. When the voltage on pin 6 is:
- 0 - 0.7 V, the IC is in 'standby' mode
- 1.7 - 2.5 V, the IC is in 'mute' mode
- 4 - 5 V, the IC is in 'play' mode (normal operation).

Note: this is a 'local' protection, not known to the microprocessor.

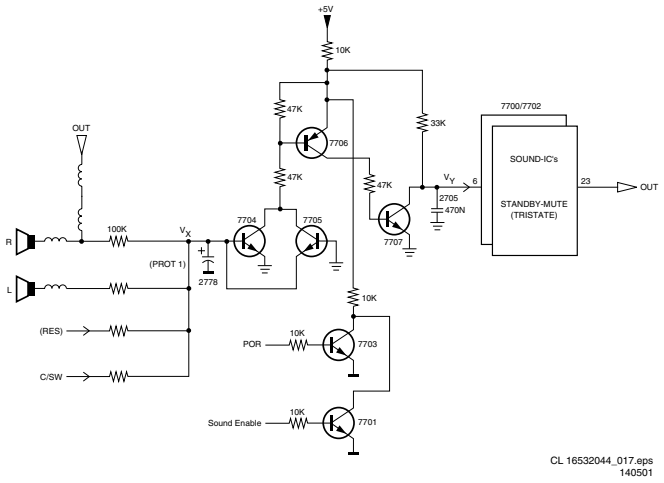


Figure 9-22 Loudspeaker DC-protection

This works as follows:
- During normal operation, V_X is 'low' (0 V) and V_Y is 'high' (+5 V).
- When a **positive** DC-voltage is detected on a loudspeaker output (= V_X), TS7704, TS7706, and TS7707 will conduct, making V_Y 'low'.
- When a **negative** DC-voltage is detected on a loudspeaker output (= V_X), TS7705, TS7706, and TS7707 will conduct, making V_Y also 'low'.
- When V_Y is '**low**' (read 0 V), the tri-state input (pin 6) puts the amplifier IC in 'standby' mode.

9.12.7 Headphone Amplifier (Diagram B10)

The headphone amplifier is a straightforward OpAmp amplifier (IC7681, NJM4556). It is supplied with +8 V.

9.12.8 Wireless Surround

A wireless surround-sound transmitter is obtainable as accessory. For diagrams and circuit description see Service Manual 'A10E-DPL' (order nr. 3122 785 10980).

9.13 Teletext and NexTView (Diagram B5)

9.13.1 Teletext

The TXT-decoder in the OTC gets its video signal directly on pin 5 (from the HIP).
The RGB-outputs are available on pins 77/78/79. Fast blanking is realised via pen 80.
The DRAM (IC7007) of the microprocessor is used for storage of the TXT pages.

9.13.2 NexTView

NexTView allows the user to display a program guide on the TV screen, which contains extensive information for each program (only when supported by the programs provider).

This information can be displayed in a number of different summaries:
- DAY: The daily summary shows, from the current moment, the program schedule for several stations for a short time ahead.
- CHANNEL: The channel summary shows the program schedule for one station.
- THEME: The theme summary shows, for each theme, the program schedule of the various stations. These themes

consist of sport, film, culture, etc. and are determined from the station side.

NexTView does not have to restrict itself to information about the station that is being viewed, but also offers information about other stations. In the various summaries, three different commands can be given for the various program overviews. These commands appear as follows:

- WATCH: The set immediately switches over to the station concerned.
- REMINDER: The start time and date and the station of the program concerned are stored in the TV reminder list. The TV will give an OSD-message with the program information, or switch on the set at the correct moment (provided the set is in Standby) and tune to the station concerned.
- RECORD: The timer of the video recorder with 'Easylink Plus' is programmed with the data of the program concerned. There has to be a video recorder (with Easylink Plus) connected to SCART2 otherwise the 'RECORD' function will not be highlighted. The connection is via pin 10 from SCART. This means that it has to be a full SCART or at least pin 10 has to be wired.

In order to be able to realise NexTView, two teletext type data flows, Data stream 1 and 2, are transmitted with various sub-code pages of information. This data flow can transport limited information (max. 40 pages). Data stream 1 is quick repeating with a repetition time of approximately 20 to 30 seconds. However, Data stream 2 has a much longer repetition time of approximately half an hour and has a large transport capacity.

- Data stream 1 contains information of the station that is being viewed.
- Data stream 2 contains up to one week of advance information from various stations that are covered by the provider.

9.14 CRT Panel / Rotation

9.14.1 RGB Amplifiers (Diagram F1)

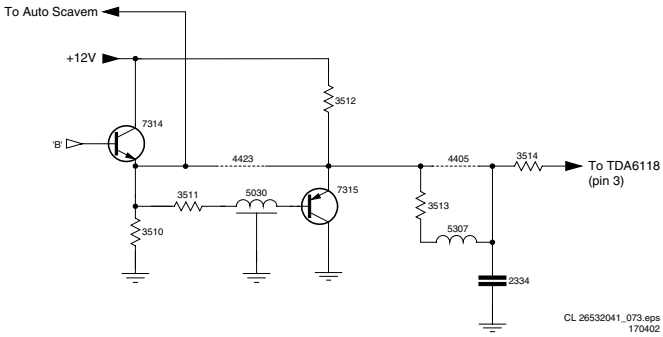


Figure 9-23 (RG)B signal path

The RGB signals from the HOP are fed to three identical amplifiers (TDA6118) on the CRT panel. We take one of them (B, connector 1940 pin 9) as example for the description. After emitter follower TS7314, the signal is fed to TS7315. This emitter follower sends the signal, with the same DC-voltage, to the RGB amplifier (IC7350, pin 3). In order to cope with the higher definition, this IC has a larger bandwidth as the ones used in the EM3E. Via outputs 5, the cathodes of the picture tube are driven.
The supply voltage for the amplifiers is 200 V and is derived from the LOT.

9.14.2 Rotation (Diagram A5)

In sets with a rotation coil (wide screen sets), the amount of frame rotation is adjusted with the 'Tilt' DAC-output of the HOP pin 25 (see also 'Vertical Deflection').

9.15 Auto Scavem (Diagrams SC1 and F2)

9.15.1 Introduction

To improve the sharpness, the Scan Velocity Modulation (Scavem) circuit modulates the deflection speed as a function of the picture contents. This feature uses a separate Scavem deflection coil.
Auto Scavem is introduced, to be able to display the high definition signal from the FBX7. As the Scavem circuit is now controlled by the Auto TV software, it is called Auto Scavem. The circuit, with the Scavem amplifier, is located on a separate PWB (parallel to the SSB), and is connected to the picture tube panel.

9.15.2 Normal Scavem

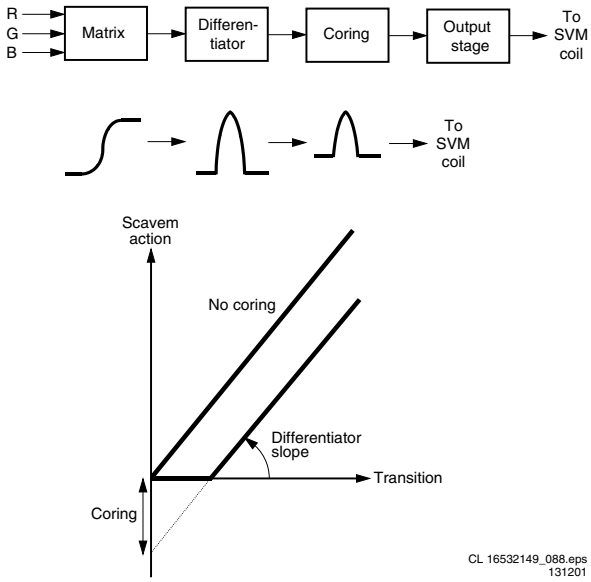


Figure 9-24 Normal Scavem

With normal Scavem (as used in the EM3E), the RGB signals are added together and differentiated before they drive the Scavem coil. The coring block prevents that Scavem processing is done on low signal levels.

9.15.3 Auto Scavem (Diagram SC)

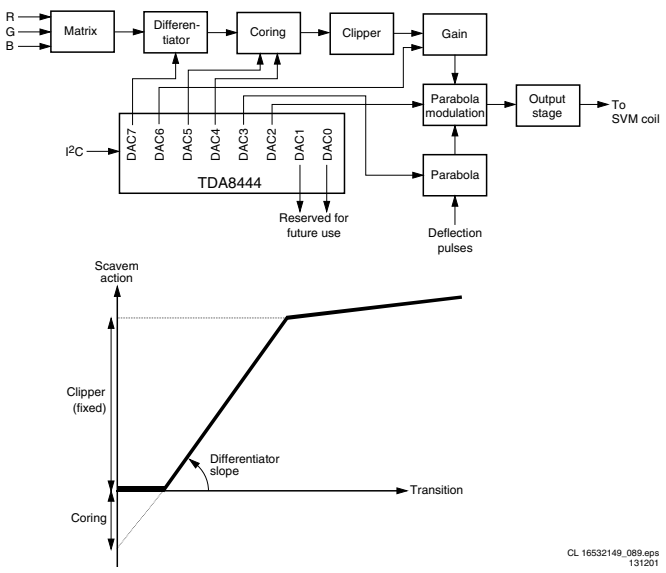


Figure 9-25 Auto Scavem

This new Auto Scavem circuit include some extra blocks:
- Clipper
- Parabola modulation

Auto Scavem is fully software controlled, by means of I²C. The speed, at which Auto Scavem is adapted, is controlled by the Auto TV algorithm. This adaptation takes place together with the FBX initialisation, and takes about 1 second. The different circuit stages are controlled via a DAC (item 7500, TDA8444). The new Auto Scavem circuitry also produces higher Scavem currents, which results in sharper pictures. For the circuit description, we splitted the circuit in eight stages.

Matrix and Differentiator

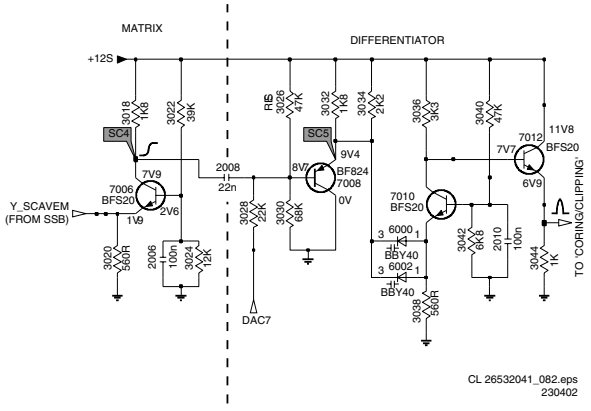


Figure 9-26 Auto Scavem: Stage 1 and 2

The 2fH RGB signals are added on the SSB (see diagram B4), and presented to the emitter of transistor 7006.

The next circuit is the differentiator. The combined signal enters this circuit at the base of transistor 7008. The DC-level of this transistor is controlled by the DAC7 line, which is dependent of the 'sharpness meter' reading in the Auto TV algorithm. By means of this control signal, the voltage and capacity of varicap diode 6000 is altered, which will adapt the differentiator.
The slope of the differentiator is controlled by this DC-level. The differentiation itself is done by varicap diode 6000. Output signal goes from the collector of transistor 7010 via emitter follower (= buffer) 7012, to the next stage.

Coring/Clipping and Gain

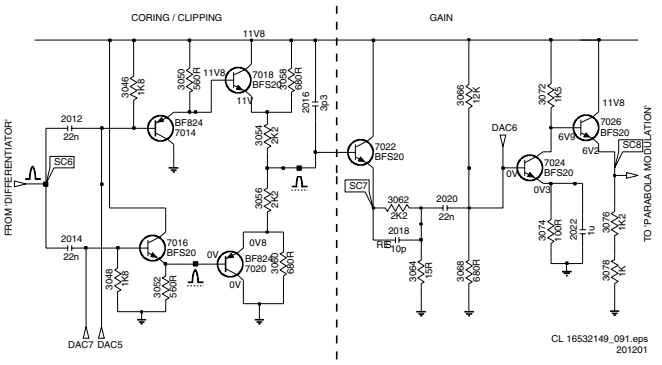


Figure 9-27 Auto Scavem: Stage 3 and 4

The coring circuit (items 7014 and 7016) prevent Auto Scavem on the lowest signal levels (= noise), while the clipper circuit (items 7018 and 7020) always give the same amount of Scavem above a certain level.
The levels at which this must happen, are controlled by the DAC4 and DAC5 lines, and are dependent of the 'noise meter' reading in the Auto TV program.

The input signal enters this circuit at emitter follower 7022, and is strongly attenuated via voltage divider R3062 and R3064. This, because the gain of transistor 7024 is set with the adjustable voltage divider of R3066, R3068 and R3070. The level at which this happen, is controlled by the DAC6 line, and is dependent of the 'sharpness meter' reading in the Auto TV program, the picture tube size, and the sharpness setting by the customer.

Parabola Generation(optional)

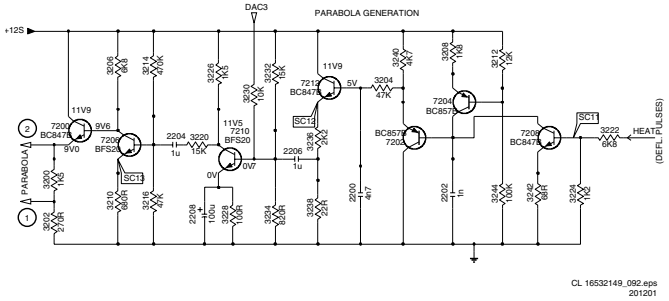


Figure 9-28 Auto Scavem: Stage 5

Optional (depending on the set execution), the Scavem signal is modulated with a parabola. This is necessary, because the picture tube is less sensitive for Scavem in the centre as on both sides.
On the CRT-panel, the 'heater' pulses are used to create a parabola on line frequency. This parabola is made with transistors 7204 and 7206. The DC-level of these transistors is controlled via the DAC3 line. In this way, you can control the parabola via software. The level is dependent of the 'sharpness meter' reading in the Auto TV program, the picture tube size, and the sharpness setting by the customer.

Parabola Modulation and Pre-amplifier

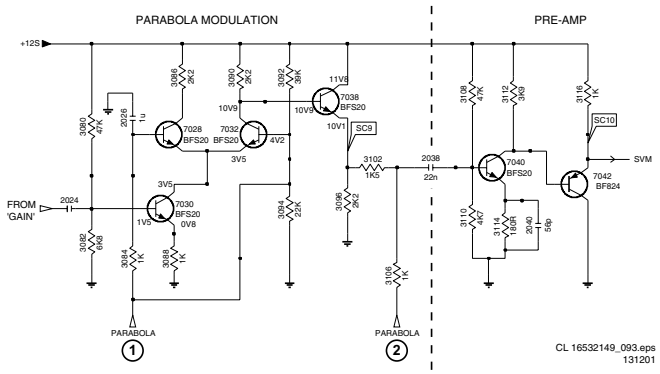


Figure 9-29 Auto Scavem: Stage 6 and 7

The Scavem signal enters at the base of transistor 7030. Transistors 7028 and 7032 are complementary. Normally, the same current goes through both components, but because on one of them (7028) the parabola signal is offered, the Scavem signal is now modulated and inverted.
After buffer 7038, the parabola signal is again added to the (now inverted) signal, so that only the modulated signal is available on the input of the pre-amplifier (items 7040 and 7042).

Pre-amplification is done via a voltage amplifier (7040) and an emitter follower (7042).

Final Amplifier (Diagram F2)

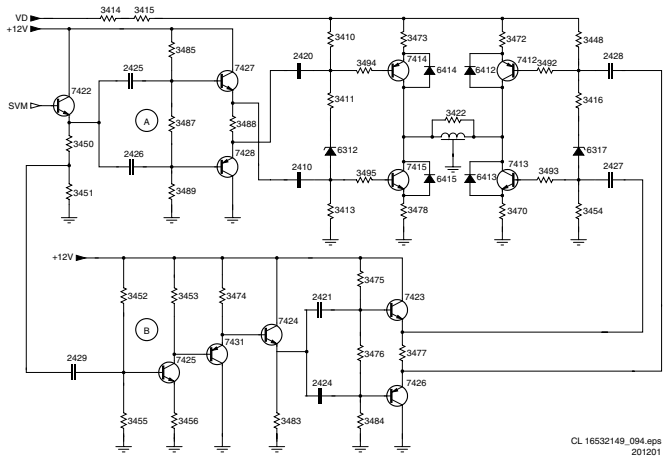


Figure 9-30 Auto Scavem: Stage 8

Note: Above figure is taken from the MG3.2E chassis manual, and so can deviate slightly from the EM5E execution. However the principle is for both chassis the same.

Finally, the Auto Scavem signal arrives, via emitter follower 7422, at stage [A] on the CRT panel. Transistors 7427 and 7428, together with power transistors 7414 and 7415, form the power amplifier, which can deliver the high Scavem currents. From the emitter of 7422, a signal is taken for stage [B]. This signal is **inverted** by transistor 7425 and buffered by 7431 and 7424. The next stage is identical to that of stage [A].
At a positive alteration of the Scavem signal, transistors 7427 and 7415 in stage [A] will conduct, while 7428 and 7414 are blocked. In stage 'B', the positive pulse is inverted, so transistors 7426 and 7412 will conduct, while both 7423 and 7413 are blocked. The Scavem current will flow now, via transistor 7412, through the Scavem coil and then through 7415.
During negative alterations, the current will flow through transistor 7414, the Scavem coil, and transistor 7413.

9.16 Software Related Features

Following features are described:
- Auto TV
- 'Switch On' Behaviour

9.16.1 AutoTV

The AutoTV (or 'Automatic Picture Control' or 'Active Control') aims at giving the customer the best possible picture performance at any time. It is a collection of algorithms that control the image processing parameters, depending on the picture properties retrieved from meters or information in the main software.

The following sub-systems are defined for Auto-TV. They are present or absent, according to the hardware configuration of the set.
- **Auto Noise Reduction.** This algorithm measures the amount of noise in the incoming video signal (this is done by the LIMERIC part of the PICNIC). As a result of this measurement, the amount of noise in the picture is corrected, starting from that noise level which is annoying for the customer. Which parameters exactly can be used is depending on the hardware.
- **Auto Sharpness.** This algorithm measures the amount of sharpness via the bandwidth of the incoming video signal and adapts the peaking frequency in the PICNIC according to this info. If the 'sharpness meter' sees the video content as 'sharp', high frequency peaking will be used. On the other hand, if the picture content is seen as 'not sharp', a low/mid frequency peaking is used.
- **Auto Ambient.** The picture performance is adapted to the ambient conditions (via the light sensor).
- **Auto Colour.** This is saturation control with colour features (TOPIC/Eagle).

Notes:
- There is a coupling between the Auto Noise and the Auto Sharpness algorithm: if noise is present in the video content, then in general the sharpness will be made less aggressive. Special care has to be taken to the interaction of the LIMERIC and the vertical peaking of the PICNIC: a too big amount of vertical peaking increases the visibility of the 2DNR artefacts.
- Most algorithms are located in the embedded processor of the PICNIC, because of time-critical calculations, and because most picture analysing and correction circuits are present in the PICNIC. Some parts of the algorithms are located in the main software, because the outcome needs to be send to other I^2C devices.

9.16.2 'Switch On' Behaviour

Below find the start up sequence:
1. After the power is applied, the 'Standby supply' starts oscillating, generating the +5V2 (and +3V3). A reset (POR) is generated and the OTC is awakened.
2. Next step is the check whether the set needs to be in 'Standby' mode or not. Therefore, the NVM content is read and the Standby-bit is checked. If the set is to stay in Standby, there is no further action.
3. If the set will switches 'on', first the degaussing will be activated (12 seconds).
4. Meanwhile the MSP is reset and the Standby line is pulled low, leading to a full semi standby mode (5 V and 8V switched on)
5. The OTC waits until the +5V and the +8 V are fully present. This is done by checking the AD-input of the OTC. The +5V, +8V, and I^2C protection-algorithms are activated.
6. The HOP is instructed via the I^2C-bus to start the drive.
7. Via the SUP-ENABLE signal, the main supply is activated. The Line Deflection circuitry is supplied now with the V_{BAT}, and the EHT generation can start.

8. During start-up of the deflection, I^2C traffic must be disabled for 250 ms to avoid data corruption. If flashes or spikes are generated during EHT start-up, I^2C data could be disturbed or corrupted.
9. After deflection is powered up completely, all the other protection-algorithms are activated.
10. The black current stabilisation loop in the HOP is switched on. Some extra checking is done to ensure that the loops are completely stabilised.
11. The OTC sets all the necessary parameters for a correct sound and image and unblanks the picture.

9.17 Abbreviation list

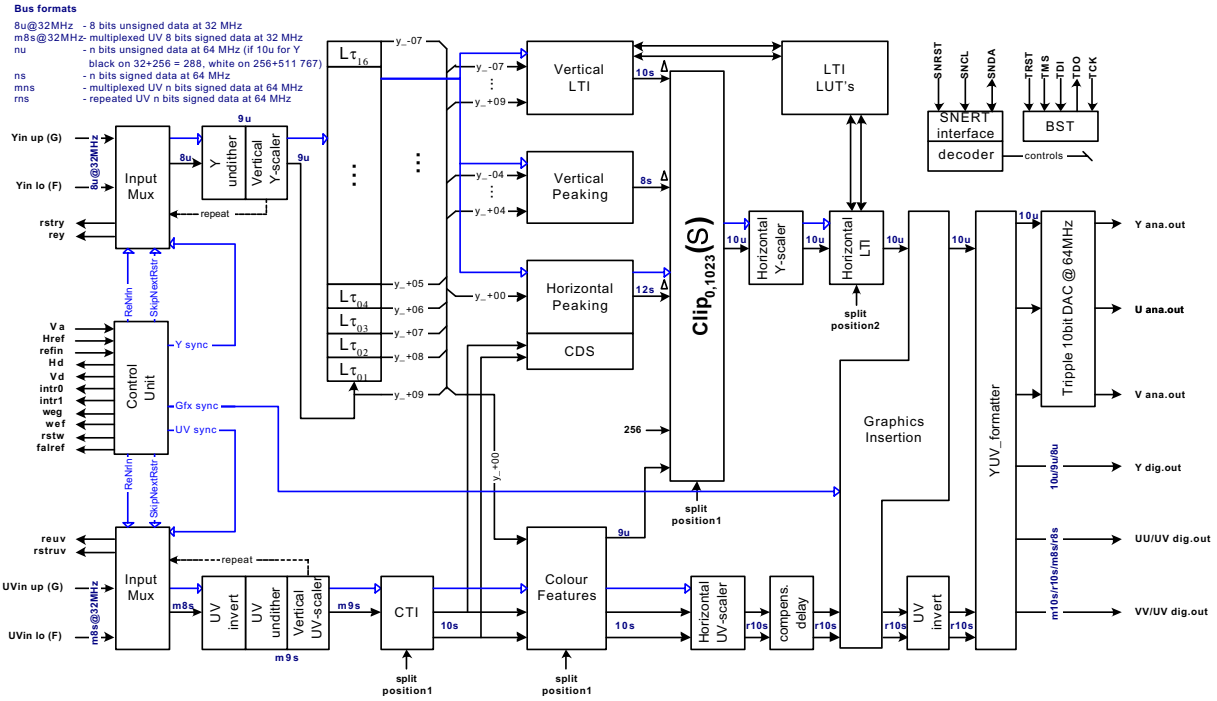
2DNR	Spatial (2D) Noise Reduction
3DNR	Temporal (3D) Noise Reduction
AARA	Automatic Aspect Ratio Adaptation: algorithm that adapts aspect ratio to remove horizontal black bars; keeping up the original aspect ratio
ACI	Automatic Channel Installation: algorithm that installs TV sets directly from cable network by means of a predefined TXT page
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AGC	Automatic Gain Control: algorithm that controls the video input of the feature-box
AM	Amplitude Modulation
ANR	Automatic Noise Reduction: one of the algorithms of Auto TV
AR	Aspect Ratio: 4 by 3 or 16 by 9
Artistic	see OTC 2.5: main processor
ASF	Auto Screen Fit: algorithm that adapts aspect ratio to remove horizontal black bars but without throwing away video information
ATV	See Auto TV
AUDIO_C	Audio Centre
AUDIO_L	Audio Left
AUDIO_R	Audio Right
AUDIO_SL	Audio Surround Left
AUDIO-SR	Audio surround right
AUDIO_SW	Audio Subwoofer
Auto TV	A hardware and software control system that measures picture content, and adapts image parameters in a dynamic way
BC-PROT	Protection signal to the uP for a too high Beam Current.
BG	System B and G
BLC-INFO	Black Current Info
B-SC1-IN	Blue SCART1 in
B-SC2-IN	Blue SCART2 in
B-TXT	Blue teletext
CL	Constant Level: audio output to connect with an external amplifier
ComPair	Computer aided rePair
CRT	Cathode Ray Tube or picture tube
CSM	Customer Service Mode
CTI	Colour Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronisation
CVBS-TER	CVBS terrestrial
DAC	Digital to Analogue Converter
DBE	Dynamic Bass Enhancement: extra low frequency amplification
DC-filament	Filament supply voltage
DFU	Direction For Use: description for the end user
DNR	Digital Noise Reduction: noise reduction feature of the box
DSP	Digital Signal Processing
DST	Dealer Service Tool: special remote control designed for dealers to enter e.g. service mode
DVD	Digital Versatile Disc
DYN-FASE-COR	Dynamic phase correction, to correct the phase of the H-drive
Eagle	Feature box IC performing peaking, zooming and sub pixel LTI in both horizontal and vertical direction, CTI and other colour features
EHT	Extra High Tension
EHT-INFO	Extra High Tension information, used for contrast reduction, vertical and horizontal amplitude correction, beam current protection, and flash detection.
EPG	Electronic Program Guide: system used by broadcasters to transmit TV guide information (= NexTView)
EW	East West, related to horizontal deflection of the set
EW-DRIVE	The drive signal for the EW-transistor
EXT	External (source), entering the set via SCART or via cinches
FALCONIC	SAA4992H, feature box IC performing Digital Natural Motion, 3DNR, and vertical zoom and vertical peaking
FBL	Fast Blanking: DC signal accompanying RGB signals
FBL-PIP	The fast blanking signal for PIP
FBL-TXT	The fast blanking signal for TXT. It has a higher priority than FBL-PIP
FBSCO	Fixed Beam Current Switch Off, a 140 V dip detection to activate the black switch off circuit
FBX	Feature Box: part of small signal / separate module which contains 100 Hz processing, extra featuring and AutoTV algorithms (FBX6= based on PICNIC, FBX7= based on PICNIC and Eagle)
FDS	Full Dual Screen
FILAMENT	Filament of CRT
FLASH	Flash memory
FM	Field Memory or Frequency Modulation
G-TXT	Green teletext
GND-DRIVE	A separate ground for the line-drive towards the line driver
H_{A50}	Horizontal Acquisition 1fh: horizontal sync pulse coming out of the HIP
H_{D100}	Horizontal Drive 2fh: horizontal sync pulse coming out of the feature-box
HD@HOME	A signal from the OTC, to switch the HOP to the Pixel Plus standard (75 Hz frame)
HFB	Horizontal Flyback Pulse: horizontal sync pulse from large signal deflection
HIP	High-end video Input Processor (TDA9320): video and chroma decoder of EM5E
HOP	High-end video Output Processor (TDA9330): video, sync, and geometry controller of EM5E
HP	Headphone
Interlaced	Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of lines. The fields are written in 'pairs', causing line flicker
I^2C	Integrated IC bus

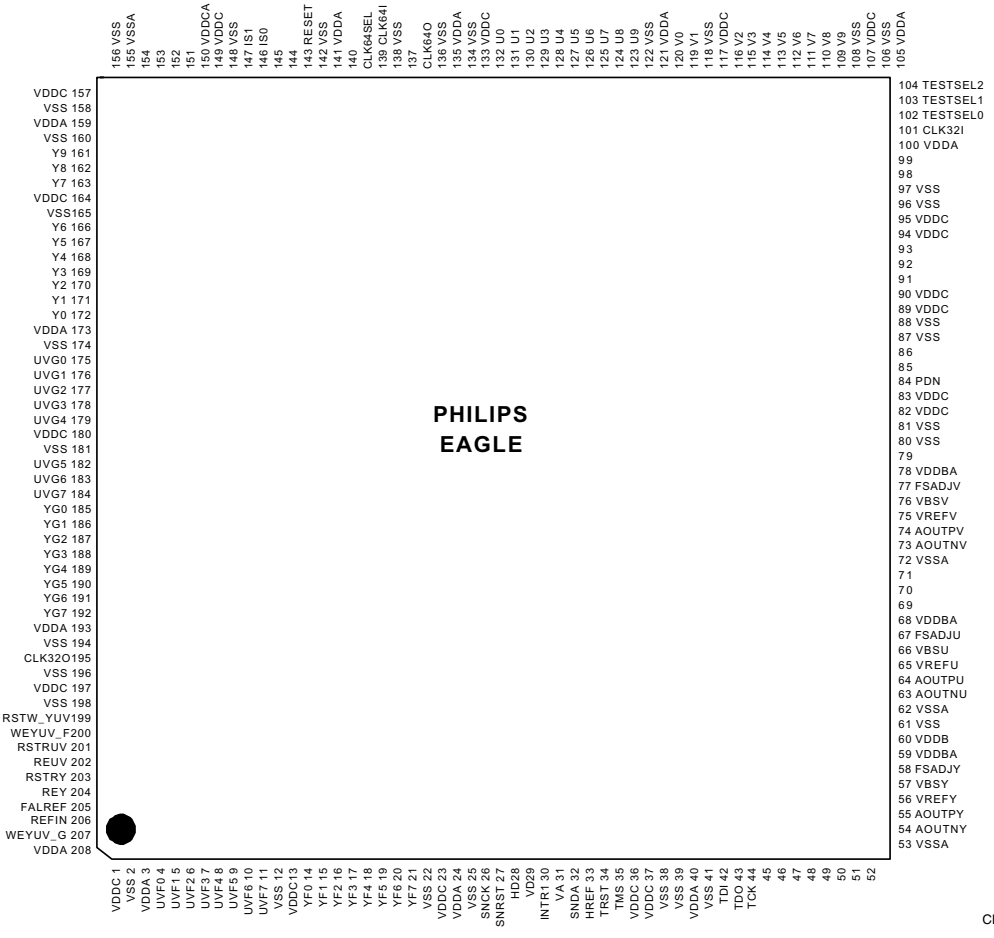
IF	Intermediate
I/O	Input/Output
Last Status	The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according the customers wishes
LDP	Line Deflection Protection signal, derived from the EW-current and voltage
LED	Light Emitting Diode
LINE-DRIVE	Line drive signal (for the Line transistor)
LNA	Low Noise Adapter
LSP	Large signal panel
MSP	Multi-standard Sound Processor: ITT sound decoder of EM5E
MUTE	Mute-Line
NC	Not Connected
NVM	Non Volatile Memory: IC containing TV related data e.g. alignments
O/C	Open Circuit
ON/OFF LED	On/Off control signal for the LED
OSD	On Screen Display
OTC	On screen display Teletext and Control; also named Artistic (SAA5800)
P50	Project 50 communication: protocol between TV and peripherals
PCB	Printed Circuit Board
PICNIC	Peripheral Integrated Combined Network IC (SAA4978): main IC for 100 Hz featuring and feature processing
PIP	Picture In Picture
Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.
PTP	Picture Tube Panel
RAM	Random Access Memory
R-TXT	Red teletext
RC	Remote Control
RC5 / RC6	Signal protocol from the remote control receiver
RESET	Reset signal
RGB-PIP	RGB-input for PIP
RGB-TXT	RGB-input for Teletext and OSD
RGB-VC	RGB-input to the Picture Tube Panel
ROM	Read Only Memory
SAM	Service Alignment Mode
SC	Sandcastle: two-level pulse derived from sync signals
S/C	Short Circuit
SCAVEM	Scan Velocity Modulation
SCL-F	Clock signal on fast I2C bus
SD	Standard Definition
SDA-F	Data signal on fast I2C bus
SIF	Sound Intermediate Frequency
SIMM	80-fold connector between LSP and SSB
SNERT	Synchronous No parity Eight bit Reception and Transmit
SSB	Small Signal Board
STBY	Standby
SW	Subwoofer
TXT	Teletext
TXT-DS	Teletext Dual Screen
TXT-KILL	To kill the TXT picture to insert a PIP. It has a higher priority than FBL-TXT.
µP	Microprocessor
U_{100}	U from Feature Box
V_{100}	V from Feature Box
V_{A50}	Vertical Acquisition 1Fh
V_{BAT}	Main supply for deflection (mostly 141 V)
V_{D100}	Vertical Drive 2fh: vertical sync pulse from deflection
VDPOS	One of the symmetrical drive signals for the DC frame output stage.
VDNEG	One of the symmetrical drive signals for the DC frame output stage.
VFB	Vertical Flyback Pulse: vertical sync pulse coming from the feature box
VL	Variable Level out: processed audio output towards external amplifier
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
X-RAY-PROT	A protection signal for too high X-ray radiation
XTAL	Quartz crystal
Y_{100}	Y from Feature Box
Y-OUT	Luminance-signal to HOP IC
YUV-Feat	The YUV input for the main picture, coming from the Feature box or the HIP

9.18 IC Data Sheets

In this paragraph, the internal block diagrams and pinning are given of ICs that are drawn as a 'black box' in the electrical diagrams (with the exception of 'memory' and 'logic' ICs).

9.18.1 Diagram B3c, T8F24EF (IC7724)





CL 16532149_110.eps
201201

Figure 9-31 Internal Block Diagram and Pinning T8F24EF (Eagle)

10. Spare Parts List

Large signal panel [A]

Various

	3122 785 90310	Mains supply repair kit
	3122 785 90460	Stanby supply repair kit
	3122 785 90330	Line deflection repair kit
0020	4822 492 70789	Fix transistor
0080	4822 492 70789	Fix transistor
0320	4822 255 41371	Line deflection spring
0341	4822 492 63524	Fix transistor
0342	4822 492 63524	Fix transistor
0395	4822 492 70789	Fix transistor
0396	4822 492 70789	Fix transistor
0505	3122 121 24785	Spring for bracket
1146	4822 267 10734	5p
1200	3139 147 17311	Tuner UV1316/A I U-3
1205	2422 025 17242	Simm connector 80p
1417	4822 265 20723	2p
1424	2422 025 11244	7p male
1491	4822 267 10973	1p
1492	4822 267 10735	3p
1495	4822 265 30734	4p
1498	2422 025 04849	2p
1499	2422 025 04849	2p
1501	4822 070 35002	Fuse 5A
1502	4822 267 10774	2p male (red)
1503	4822 070 12502	Fuse 2.5A
1505	2422 025 16374	2p male
1511	4822 265 11253	Fuse holder
1512	4822 265 11253	Fuse holder
1520	4822 492 63524	Fix transistor
1550	2422 132 07411	Relay G5PA-1
1590	4822 252 60151	Spark gap
1601	2422 086 10919	Fuse 125mA 65V
1620	4822 267 10735	3p
1625	2422 025 16382	3p male
1693	4822 267 10676	1p
1735	4822 267 10565	4p
1737	2422 025 16382	3p male
1738	2422 025 16383	3p
1901	4822 267 10771	42p female
1902	4822 267 10982	2p
1936	2422 025 12485	11p male
1937	4822 267 10557	10p
1940	2422 025 12485	11p male
1943	4822 267 10748	3p
1945	4822 267 10735	3p
1946	4822 265 41391	9p
1955	4822 267 10735	3p
8000	3104 311 03721	EHT cable
8193	4822 320 20216	Focus cable
8194	4822 320 20189	Focus cable
8400	2422 025 16691	3p
8417	3104 311 04561	2p 400mm
8424	3104 311 02991	7p 560mm
8492	3104 311 01731	3p 400mm
8495	3104 311 03041	4p 480mm
8498	3104 311 04531	2p 400mm
8625	3104 311 03101	3p 560mm
8625	3104 311 04741	3p 180mm
8737	3104 311 04682	2p 680mm
8937	3104 301 09841	10p 340mm
8940	3104 311 04651	11p 140mm
8955	3104 311 01211	3p 140mm

⊣⊢

2100	4822 126 13841	1nF 20% 250V
2101	5322 122 32818	2.2nF 10% 100V
2102	4822 124 40248	10µF% 63V
2103	2020 552 94427	100pF 5% 50V
2104	4822 123 14025	2200µF 20% 16V
2105	2020 552 94427	100pF 5% 50V
2106	4822 126 14472	1µF 10% 10V
2107	4822 121 43855	3.3nF 5% 400V
2108	4822 121 70162	10nF 5% 400V
2109	4822 126 14472	1µF 10% 10V
2110	4822 126 14472	1µF 10% 10V
2111	4822 121 43526	47nF 5% 250V
2112	5322 126 11583	10nF 10% 50V
2114	4822 121 10711	100nF 20% 275V
2115	4822 124 40764	22µF 100 V
2116	4822 126 13682	100pF 5% 1kV
2118	4822 124 80061	1000µF 20% 25V
2119	4822 123 14025	2200µF 20% 16V
2120	4822 126 11524	1.5nF 10% 1kV
2126	4822 123 14025	2200µF 20% 16V
2130	5322 126 11583	10nF 10% 50V
2131	5322 126 11578	1nF 10% 50V
2140	4822 124 40248	10µF 20% 63V
2141	4822 124 40248	10µF 20% 63V
2144	4822 126 14472	1µF 10% 10V
2145	4822 126 13881	470pF 5% 50V
2147	3198 017 31530	15nF 50V
2148	4822 126 10206	2.2nF 10% 500V
2149	4822 126 14472	1µF 10% 10V
2150	5322 126 11583	10nF 10% 50V
2152	4822 121 70162	10nF 5% 400V
2154	4822 126 14549	33nF 16V
2200	4822 124 40248	10µF 20% 63V
2201	4822 126 13879	220nF 20% 16V
2202	4822 126 13473	220nF 20-80% 50V
2203	4822 124 80195	470µF 20% 10V
2400	4822 124 11575	47µF 20% 160V
2401	4822 121 42077	6.8nF 10% 400V
2402	2020 012 93596	22µF 20%250V
2403	4822 126 14494	22nF 10% 25V
2404	4822 126 14494	22nF 10% 25V
2412	3198 024 44730	47nF 50V
2413	4822 124 12255	10µF 20% 50V
2414	3198 024 44730	47nF 50V
2415	4822 126 13883	220pF 5% 50V
2417	4822 126 14076	220nF 25V
2419	4822 126 14237	470pF 10% 2kV
2420	4822 121 70581	1.5nF 5% 2kV
2420	4822 121 70594	1nF 5% 2kV
2421	2038 301 00312	1.2µF 5% 250V
2425	4822 121 10526	9N1 5% 2kV
2425	4822 121 70435	10nF 5% 2kV
2426	4822 121 10551	27nF 5% 1600V
2426	4822 121 10653	22nF 5% 630V
2430	4822 126 10206	2.2nF 10% 500V
2431	4822 126 10206	2.2nF 10% 500V
2433	2022 333 00163	360nF 5% 250V
2433	2222 479 90022	0.43µF 250V
2433	4822 121 10518	390nF 5% 50V
2440	2020 552 96448	1µF 10% 16V
2441	5322 122 32654	22nF 10% 63V
2442	5322 122 31866	6.8nF 10% 63V
2443	5322 122 34099	470pF 10% 63V
2445	5322 122 32654	22nF 10% 63V
2448	5322 122 32268	470pF 5% 63V
2450	5322 121 42578	100nF 5% 250V
2451	2020 012 93757	1000µF 20% 10V
2454	3198 017 31530	15nF 50V
2455	5322 126 11578	1nF 10% 50V
2457	8204 000 75481	15nF 5% 25V
2458	4822 126 14241	330pF 50V
2460	4822 124 81144	1000µF 16V
2461	4822 122 31169	1.5nF 10% 500V
2462	4822 124 80061	1000µF 20% 25V
2463	4822 122 31177	470pF 10% 500V
2464	4822 124 80061	1000µF 20% 25V
2465	4822 122 31177	470pF 10% 500V
2466	2238 586 59812	100nF 50V
2468	4822 122 31177	470pF 10% 500V
2480	5322 126 11582	6.8nF 10% 63V
2482	3198 017 34730	47nF 16V
2490	4822 124 23432	100µF 20% 10V
2491	4822 124 81151	22µF 50V
2492	4822 124 23432	100µF 20% 10V
2493	4822 122 33891	3.3nF 10% 63V
2494	2238 780 15654	220nF 10% 16V
2495	2238 780 15654	220nF 10% 16V
2497	4822 126 12105	33nF 5% 50V
2498	2020 552 96448	1µF 10% 16V
2499	5322 126 11579	3.3nF 10% 63V
2501	4822 126 14053	1nF 10% 2kV
2503	5322 121 42489	33nF 5% 250V
2504	4822 126 14494	22nF 10% 25V
2505	2020 554 90173	2.2nF 250V
2506	5322 121 42386	100nF 5% 63V
2507	4822 126 13589	470nF 275V
2508	4822 124 11913	22nF 20% 275V
2509	4822 124 11913	22nF 20% 275V
2510	4822 126 14053	1nF 10% 2kV
2511	4822 124 12417	2200µF 20% 25V
2512	4822 124 12417	2200µF 20% 25V
2513	4822 126 13881	470pF 5% 50V
2514	4822 126 14238	2.2nF 50V
2515	4822 124 80096	47µF 200V
2516	4822 124 12415	220µF 20% 400V
2517	4822 121 70162	10nF 5% 400V
2518	4822 122 31211	100pF 10% 500V
2519	4822 126 10206	2.2nF 10% 500V
2520	4822 121 10711	100nF 20% 275V
2522	4822 126 10206	2.2nF 10% 500V
2525	4822 126 14247	1.5nF 50V
2528	4822 126 14472	1µF 10% 10V
2530	4822 126 14472	1µF 10% 10V
2531	4822 122 31177	470pF 10% 500V
2535	4822 126 13193	4.7nF 10% 63V
2537	4822 124 11913	22nF 20% 275V
2538	4822 122 33177	10nF 20% 50V
2540	4822 124 40248	10µF 20% 63V
2541	4822 122 31211	100pF 10% 500V
2542	4822 124 80061	1000µF 20% 25V
2543	4822 124 80061	1000µF 20% 25V
2544	4822 126 14238	2.2nF 50V
2601	2238 586 59812	100nF 50V
2603	4822 126 13883	220pF 5% 50V
2604	4822 126 13473	220nF 20-80% 50V
2605	4822 126 13883	220pF 5% 50V
2620	4822 126 13473	220nF 20-80% 50V
2621	2238 586 59812	100nF 50V
2622	4822 124 40255	100µF 20% 63V
2623	4822 126 14238	2.2nF 50V
2624	4822 121 51252	470nF 5% 63V
2625	4822 121 51252	470nF 5% 63V
2627	5322 124 40641	10µF 20% 100V
2628	4822 124 40255	100µF 20% 63V
2630	5322 126 14103	2.2µF 20% 10V
2631	5322 126 14103	2.2µF 20% 10V
2633	5322 126 11579	3.3nF 10% 63V
2635	2238 586 59812	100nF 50V
2642	4822 124 40255	100µF 20% 63V
2653	5322 126 11579	3.3nF 10% 63V
2656	4822 126 14494	22nF 10% 25V
2657	4822 126 14494	22nF 10% 25V
2659	4822 126 14494	22nF 10% 25V
2660	5322 126 11578	1nF 10% 50V
2702	3198 016 31020	1nF 25V
2704	3198 016 31020	1nF 25V
2705	4822 126 13482	470nF 20-80% 16V
2706	4822 126 14585	100nF 10% 50V
2707	4822 126 13879	220nF 20% 16V
2708	4822 126 14076	220nF 25V
2709	4822 126 13881	470pF 5% 50V
2710	4822 126 13881	470pF 5% 50V
2711	3198 016 31020	1nF 25V
2712	2020 552 96683	220nF 10% 50V
2713	4822 126 14076	220nF 25V
2714	4822 126 14549	33nF 16V
2715	3198 016 31020	1nF 25V
2716	4822 126 14241	330pF 50V
2717	5322 121 42498	680nF 5% 63V
2718	2238 861 18339	33pF 1% 50V
2719	3198 016 31020	1nF 25V
2720	4822 126 14076	220nF 25V
2721	4822 126 13881	470pF 5% 50V
2722	4822 126 13881	470pF 5% 50V
2723	3198 016 31020	1nF 25V
2724	2020 552 96683	220nF 10% 50V
2725	3198 016 31020	1nF 25V
2726	4822 126 14549	33nF 16V
2727	3198 016 31020	1nF 25V
2728	4822 126 14241	330pF 50V
2729	5322 121 42498	680nF 5% 63V
2740	4822 121 51252	470nF 5% 63V
2741	2238 861 18339	33pF 1% 50V
2742	4822 126 14241	330pF 50V
2743	4822 126 12105	33nF 5% 50V
2744	4822 126 12105	33nF 5% 50V
2745	4822 126 14241	330pF 50V
2746	3198 016 31020	1nF 25V
2747	4822 126 13881	470pF 5% 50V
2748	2020 552 96683	220nF 10% 50V
2749	5322 126 14103	2.2µF 20% 10V
2750	2238 586 59812	100nF 50V
2751	4822 126 14585	100nF 10% 50V
2753	4822 126 14076	220nF 25V
2754	5322 126 14103	2.2µF 20% 10V
2755	3198 016 31020	1nF 25V
2756	4822 126 13881	470pF 5% 50V
2757	2020 552 96683	220nF 10% 50V
2758	5322 121 42498	680nF 5% 63V
2759	5322 126 10511	1nF 5% 50V
2760	5322 122 32268	470pF 5% 63V
2761	4822 126 13881	470pF 5% 50V
2762	4822 126 14076	220nF 25V
2763	4822 126 13879	220nF 20% 16V
2777	2020 552 96684	470nF 10% 25V
2778	4822 124 41751	47µF 20% 50V
2779	2020 552 96684	470nF 10% 25V
2780	2020 552 96684	470nF 10% 25V

2781	2020 552 96684	470nF 10% 25V
2782	2020 552 96684	470nF 10% 25V
2783	2020 552 96684	470nF 10% 25V
2784	2020 552 96684	470nF 10% 25V
2785	2020 552 96684	470nF 10% 25V
2786	4822 126 14494	22nF 10% 25V
2787	4822 126 14494	22nF 10% 25V
2788	2020 552 94427	100pF 5% 50V
2789	2020 552 94427	100pF 5% 50V
2790	2020 552 94427	100pF 5% 50V
2794	2020 552 94427	100pF 5% 50V
2795	2020 552 94427	100pF 5% 50V
2796	2020 552 94427	100pF 5% 50V
2797	2020 552 94427	100pF 5% 50V
2798	2020 552 94427	100pF 5% 50V
2914	4822 124 40248	10µF 20% 63V
2915	4822 124 40248	10µF 20% 63V
2929	4822 126 13879	220nF 20% 16V
2940	4822 124 23432	100µF 20% 10V
2941	4822 126 14585	100nF 10% 50V
2942	4822 126 14585	100nF 10% 50V
2943	4822 126 14585	100nF 10% 50V
2945	5322 126 14103	2.2µF 20% 10V
2946	5322 126 14103	2.2µF 20% 10V
2947	2020 021 90141	4.7µF 20% 50V
2948	4822 124 23432	100µF 20% 10V
2949	4822 124 23432	100µF 20% 10V
2950	5322 126 11583	10nF 10% 50V
2951	5322 126 11583	10nF 10% 50V
2985	4822 126 14315	390pF 5% 50V
2987	5322 122 31863	330pF 5% 63V
2989	5322 122 31863	330pF 5% 63V
2990	5322 122 31863	330pF 5% 63V
2991	5322 122 32531	100pF 5% 50V
2992	5322 122 31863	330pF 5% 63V
2993	5322 122 32531	100pF 5% 50V
2994	5322 122 31863	330pF 5% 63V
2995	5322 122 31863	330pF 5% 63V
2996	5322 122 31863	330pF 5% 63V
2997	5322 122 31863	330pF 5% 63V
2998	5322 122 32531	100pF 5% 50V
2999	5322 122 32531	100pF 5% 50V

3101	4822 053 20106	10MΩ 5% 0.25W
3102	4822 050 21002	1k 1% 0.6W
3103	4822 050 21002	1k 1% 0.6W
3104	4822 116 52195	47Ω 5% 0.5W
3105	4822 050 11002	1k 1% 0.4W
3106	4822 116 52256	2k2 5% 0.5W
3107	4822 116 52256	2k2 5% 0.5W
3108	4822 116 80676	1Ω5 5% 0.5W
3111	4822 053 10152	1k5 5% 1W
3113	4822 116 52186	22Ω 5% 0.5W
3114	4822 116 83872	220Ω 5% 0.5W
3115	4822 116 52257	22k 5% 0.5W
3116	4822 116 52257	22k 5% 0.5W
3117	4822 116 52195	47Ω 5% 0.5W
3118	4822 116 80676	1Ω5 5% 0.5W
3120	4822 051 20109	10Ω 5% 0.1W
3123	4822 051 30109	10Ω 5% 62mW
3124	4822 116 52199	68Ω 5% 0.5W
3125	4822 116 52182	15Ω 5% 0.5W
3126	4822 050 21003	10k 1% 0.6W
3127	4822 116 52289	5k6 5% 0.5W
3130	4822 051 30479	47Ω 5% 62mW
3131	4822 051 30471	470Ω 5% 62mW
3132	4822 051 20479	47Ω 5% 0.1W
3133	4822 117 10834	47k 1% 0.1W
3134	4822 051 30102	1k 5% 62mW
3135	4822 051 30101	100Ω 5% 62mW
3136	4822 051 30109	10Ω 5% 62mW
3137	4822 050 24702	4k7 1% 0.6W
3140	4822 117 10837	100k 1% 0.1W
3141	4822 116 52263	2k7 5% 0.5W
3142	4822 051 30332	3k3 5% 62mW
3143	4822 051 30101	100Ω 5% 62mW
3144	4822 116 83883	470Ω 5% 0.5W
3150	4822 117 11373	100Ω 1%
3151	4822 051 30101	100Ω 5% 62mW
3152	4822 051 30102	1k 5% 62mW
3153	4822 051 20472	4k7 5% 0.1W
3155	4822 051 30101	100Ω 5% 62mW
3156	5322 117 13017	100Ω 1% 63mW
3157	4822 051 30103	10k 5% 62mW
3158	5322 117 13021	47Ω 1% 63mW
3159	4822 051 30103	10k 5% 62mW
3160	4822 051 30102	1k 5% 62mW
3161	4822 052 10221	220Ω 5% 0.33W
3162	4822 116 83883	470Ω 5% 0.5W
3164	4822 117 13632	100k 1% 620mW
3165	4822 051 30331	330Ω 5% 62mW
3168	4822 051 20472	4k7 5% 0.1W
3170	4822 116 52291	56k 5% 0.5W
3171	4822 116 52244	15k 5% 0.5W
3200	4822 117 11373	100Ω 1%
3201	4822 117 11373	100Ω 1%
3250	4822 051 20223	22k 5% 0.1W
3261	4822 117 11373	100Ω 1%
3262	4822 117 11373	100Ω 1%
3400	4822 052 11108	1Ω 5% 0.5W
3401	2120 105 93473	27Ω 5% 3W
3402	4822 053 10121	120Ω 5% 1W
3403	4822 116 52175	100Ω 5% 0.5W
3404	4822 051 30471	470Ω 5% 62mW
3406	4822 117 11373	100Ω 1%
3407	4822 051 30103	10k 5% 62mW
3409	4822 050 11002	1k 1% 0.4W
3410	4822 051 20479	47Ω 5% 0.1W
3411	4822 116 52193	39Ω 5% 0.5W
3412	4822 117 11817	1k2 1% 62mW
3414	4822 051 30331	330Ω 5% 62mW
3415	3198 012 31590	15Ω 3W
3417	4822 116 52176	10Ω 5% 0.5W
3418	4822 050 25603	56k 1% 0.6W
3419	4822 051 30474	470k 5% 62mW
3420	4822 051 30332	3k3 5% 62mW
3421	4822 051 30474	470k 5% 62mW
3422	4822 051 30332	3k3 5% 62mW
3423	4822 053 10688	6Ω8 5% 1W
3425	4822 116 52176	10Ω 5% 0.5W
3426	4822 116 52176	10Ω 5% 0.5W
3431	2306 207 03151	150Ω 5%
3440	4822 051 30102	1k 5% 62mW
3441	4822 051 30223	22k 5% 62mW
3442	4822 051 30474	470k 5% 62mW
3443	4822 051 30684	680k 5% 62mW
3444	4822 051 20108	1Ω 5% 0.1W
3447	4822 117 11373	100Ω 1%
3449	4822 052 10101	100Ω 5% 0.33W
3450	4822 050 21003	10k 1% 0.6W
3451	4822 050 21003	10k 1% 0.6W
3454	4822 051 20108	1Ω 5% 0.1W
3455	4822 117 12902	8k2 1% 63mW
3456	4822 117 12903	1k8 1% 63mW
3457	4822 051 30152	1k5 5% 62mW
3458	4822 051 30471	470Ω 5% 62mW
3459	4822 051 30272	2k7 5% 62mW
3460	4822 052 10108	1Ω 5% 0.33W
3461	4822 052 10108	1Ω 5% 0.33W
3462	4822 052 11108	1Ω 5% 0.5W
3463	4822 052 11108	1Ω 5% 0.5W
3464	4822 052 11108	1Ω 5% 0.5W
3465	4822 052 11108	1Ω 5% 0.5W
3466	4822 051 30472	4k7 5% 62mW
3467	4822 117 13632	100k 1% 620mW
3472	4822 051 30393	39k 5% 62mW
3474	4822 051 30563	56k 5% 62mW
3475	4822 051 30472	4k7 5% 62mW
3476	4822 116 83874	220k 5% 0.5W
3478	4822 116 52175	100Ω 5% 0.5W
3479	4822 052 10478	4Ω7 5% 0.33W
3480	4822 052 10478	4Ω7 5% 0.33W
3480	4822 052 10688	6Ω8 5% 0.33W
3481	2322 750 61001	100Ω 5%
3482	4822 051 30221	220Ω 5% 62mW
3483	4822 117 12903	1k8 1% 63mW
3485	4822 051 30471	470Ω 5% 62mW
3486	2120 108 94004	7k5 1% 3W
3487	4822 117 12902	8k2 1% 63mW
3488	4822 050 21005	1M 1% 0.6W
3488	4822 050 26804	680k 1% 0.6W
3489	4822 051 30103	10k 5% 62mW
3490	4822 051 30332	3k3 5% 62mW
3491	4822 117 12925	47k 1% 63mW
3492	4822 116 52175	100Ω 5% 0.5W
3493	4822 050 21504	150k 1% 0.6W
3495	4822 050 21503	15k 1% 0.6W
3496	4822 051 30272	2k7 5% 62mW
3497	4822 051 30333	33k 5% 62mW
3498	4822 052 11568	5Ω6 5% 0.5W
3499	4822 052 11568	5Ω6 5% 0.5W
3501	4822 116 83872	220Ω 5% 0.5W
3504	4822 051 30222	2k2 5% 62mW
3505	4822 116 52257	22k 5% 0.5W
3506	4822 051 30562	5k6 5% 63mW
3507	4822 050 21604	160k 1% 0.6W
3508	4822 116 52182	15Ω 5% 0.5W
3509	2322 595 90022	VDR 1mA/612V
3510	4822 117 11454	820Ω 1% 0.1W
3511	4822 053 11222	2k2 5% 2W
3512	4822 117 12891	220k 1% 3W
3513	4822 116 52272	330k 5% 0.5W
3514	2322 193 53397	0Ω39 5%
3515	2322 193 53397	0Ω39 5%
3517	4822 117 10834	47k 1% 0.1W
3518	4822 116 52245	150k 5% 0.5W
3519	4822 051 30102	1k 5% 62mW
3520	4822 053 11333	33k 5% 2W
3521	4822 053 21475	4M7 5% 0.5W
3522	4822 117 11507	6k8 1% 0.1W
3523	4822 051 20105	1M 5% 0.1W
3524	4822 051 30333	33k 5% 62mW
3525	4822 051 30479	47Ω 5% 62mW
3526	4822 116 83303	0.1Ω 2W
3527	4822 117 11951	2k 1% 0.1W
3528	4822 051 30103	10k 5% 62mW
3529	4822 051 30472	4k7 5% 62mW
3530	4822 051 30102	1k 5% 62mW
3531	4822 117 11507	6k8 1% 0.1W
3532	4822 117 12925	47k 1% 63mW
3533	4822 116 52182	15Ω 5% 0.5W
3534	4822 117 12925	47k 1% 63mW
3535	4822 051 30479	47Ω 5% 62mW
3536	4822 052 10102	1k 5% 0.33W
3537	4822 116 52182	15Ω 5% 0.5W
3540	4822 050 23303	33k 1% 0.6W
3543	4822 050 24708	4Ω7 1% 0.6W
3547	4822 051 30008	ϑumper
3549	5322 117 13039	220k 1% 63mW
3550	2322 662 96858	4Ω5 2% 276V
3551	4822 116 83872	220Ω 5% 0.5W
3552	4822 051 30222	2k2 5% 62mW
3553	4822 051 30103	10k 5% 62mW
3610	4822 051 30223	22k 5% 62mW
3611	4822 051 30222	2k2 5% 62mW
3620	4822 116 80176	1Ω 5% 0.5W
3621	4822 116 80176	1Ω 5% 0.5W
3621	4822 116 80676	1Ω5 5% 0.5W
3622	4822 116 80176	1Ω 5% 0.5W
3622	4822 116 80676	1Ω5 5% 0.5W
3622	4822 116 81039	1Ω8 5% 0.5W
3623	4822 116 52251	18k 5% 0.5W
3624	4822 052 10158	1Ω5 5% 0.33W
3625	4822 050 15609	56Ω 1% 0.4W
3625	4822 116 52206	120Ω 5% 0.5W
3625	4822 116 83872	220Ω 5% 0.5W
3626	4822 050 15609	56Ω 1% 0.4W
3626	4822 116 52175	100Ω 5% 0.5W
3626	4822 116 83872	220Ω 5% 0.5W
3627	4822 051 20223	22k 5% 0.1W
3630	4822 051 30333	33k 5% 62mW
3631	4822 051 30222	2k2 5% 62mW
3632	4822 051 30393	39k 5% 62mW
3633	4822 051 30563	56k 5% 62mW
3634	4822 116 83882	39k 5% 0.5W
3635	4822 116 52219	330Ω 5% 0.5W
3636	4822 051 30223	22k 5% 62mW
3637	4822 051 30103	10k 5% 62mW
3638	4822 051 30474	470k 5% 62mW
3639	4822 051 30563	56k 5% 62mW
3640	4822 051 30222	2k2 5% 62mW
3641	4822 116 83883	470Ω 5% 0.5W
3642	4822 101 11193	47k 30%0.1W
3643	4822 051 30334	330k 5% 62mW
3644	4822 051 30221	220Ω 5% 62mW
3645	4822 116 52245	150k 5% 0.5W
3646	4822 117 12925	47k 1% 63mW
3647	4822 051 20228	2Ω2 5% 0.1W
3652	4822 051 20479	47Ω 5% 0.1W
3653	4822 051 20223	22k 5% 0.1W
3654	4822 051 20472	4k7 5% 0.1W
3655	4822 051 30123	12k 5% 62mW
3656	4822 117 11817	1k2 1% 62mW
3657	4822 051 30223	22k 5% 62mW
3658	4822 051 30223	22k 5% 62mW
3659	4822 051 30222	2k2 5% 62mW
3660	4822 051 30562	5k6 5% 63mW
3661	4822 116 52206	120Ω 5% 0.5W
3661	4822 116 83872	220Ω 5% 0.5W
3661	4822 116 83883	470Ω 5% 0.5W
3662	4822 051 30152	1k5 5% 62mW
3663	4822 116 52213	180Ω 5% 0.5W
3663	4822 116 52226	560Ω 5% 0.5W
3681	4822 116 52207	1k2 5% 0.5W
3682	4822 117 13632	100k 1% 620mW
3683	4822 051 30103	10k 5% 62mW
3684	4822 051 30682	6k8 5% 62mW
3685	4822 051 30273	27k 5% 62mW
3686	4822 051 30563	56k 5% 62mW
3687	4822 116 52207	1k2 5% 0.5W
3688	4822 051 20684	680k 5% 0.1W
3701	4822 051 30103	10k 5% 62mW
3702	4822 051 30103	10k 5% 62mW
3703	4822 051 30333	33k 5% 62mW
3704	4822 117 10833	10k 1% 0.1W
3705	4822 051 20828	8Ω2 5% 0.1W
3706	4822 051 30472	4k7 5% 62mW
3707	4822 051 30683	68k 5% 62mW
3708	4822 051 30563	56k 5% 62mW

3709	4822 117 11503	220Ω 1% 0.1W
3710	4822 051 30223	22k 5% 62mW
3711	4822 050 11204	120k 1% 0.4W
3712	4822 117 12706	10k 1% 63mW
3713	4822 116 83884	47k 5% 0.5W
3714	4822 117 12925	47k 1% 63mW
3715	4822 117 12925	47k 1% 63mW
3716	4822 117 12925	47k 1% 63mW
3717	4822 117 13632	100k 1% 620mW
3718	4822 117 13632	100k 1% 620mW
3719	4822 117 11503	220Ω 1% 0.1W
3720	4822 117 11503	220Ω 1% 0.1W
3721	4822 051 30472	4k7 5% 62mW
3722	4822 051 30683	68k 5% 62mW
3723	4822 051 30563	56k 5% 62mW
3724	4822 117 11503	220Ω 1% 0.1W
3725	4822 051 30223	22k 5% 62mW
3726	4822 117 11503	220Ω 1% 0.1W
3727	4822 117 11503	220Ω 1% 0.1W
3728	4822 116 52234	100k 5% 0.5W
3729	4822 117 10837	100k 1% 0.1W
3730	4822 117 11503	220Ω 1% 0.1W
3731	4822 117 11503	220Ω 1% 0.1W
3732	4822 051 30223	22k 5% 62mW
3733	4822 051 30223	22k 5% 62mW
3734	4822 051 20124	120k 5% 0.1W
3735	4822 051 30683	68k 5% 62mW
3736	4822 051 30563	56k 5% 62mW
3737	4822 051 30472	4k7 5% 62mW
3738	4822 051 20828	8Ω2 5% 0.1W
3739	4822 051 30683	68k 5% 62mW
3740	4822 051 30472	4k7 5% 62mW
3741	2322 704 61243	12k4 1%
3742	4822 051 30563	56k 5% 62mW
3743	4822 117 11449	2k2 5% 0.1W
3745	4822 051 30102	1k 5% 62mW
3746	4822 051 30223	22k 5% 62mW
3748	4822 051 30008	Jumper
3749	4822 050 11002	1k 1% 0.4W
3750	4822 117 11449	2k2 5% 0.1W
3751	4822 117 11449	2k2 5% 0.1W
3752	4822 117 11449	2k2 5% 0.1W
3790	4822 051 30272	2k7 5% 62mW
3791	4822 051 30272	2k7 5% 62mW
3792	4822 051 30103	10k 5% 62mW
3793	4822 051 30103	10k 5% 62mW
3794	4822 051 30103	10k 5% 62mW
3795	4822 051 30103	10k 5% 62mW
3796	4822 051 30272	2k7 5% 62mW
3797	4822 051 30272	2k7 5% 62mW
3798	4822 051 30153	15k 5% 62mW
3903	4822 051 20561	560Ω 5% 0.1W
3904	4822 052 10688	6Ω8 5% 0.33W
3907	4822 051 20479	47Ω 5% 0.1W
3910	4822 117 12521	68Ω 1% 0.1W
3928	4822 051 30008	Jumper
3938	4822 117 11373	100Ω 1%
3939	4822 051 30103	10k 5% 62mW
3940	4822 051 20561	560Ω 5% 0.1W
3941	4822 052 10688	6Ω8 5% 0.33W
3942	4822 117 11373	100Ω 1%
3943	4822 051 30103	10k 5% 62mW
3945	4822 117 12955	2k7 1% 0.1W
3959	4822 117 10353	150Ω 1% 0.1W
3960	4822 117 10353	150Ω 1% 0.1W
3961	4822 117 10353	150Ω 1% 0.1W
3962	4822 117 10353	150Ω 1% 0.1W
3965	4822 117 10353	150Ω 1% 0.1W
3966	4822 117 10353	150Ω 1% 0.1W
3967	4822 116 52201	75Ω 5% 0.5W
3968	4822 116 52201	75Ω 5% 0.5W
3969	4822 051 20008	Jumper
3970	4822 051 20008	Jumper
3971	4822 116 52201	75Ω 5% 0.5W
3972	4822 116 52202	82Ω 5% 0.5W
3973	4822 116 52201	75Ω 5% 0.5W
3974	4822 116 52201	75Ω 5% 0.5W
3975	4822 116 52201	75Ω 5% 0.5W
3976	4822 117 11373	100Ω 1%
3977	4822 117 11373	100Ω 1%
3978	4822 117 11373	100Ω 1%
3979	4822 116 52201	75Ω 5% 0.5W
3980	4822 117 11373	100Ω 1%
3981	4822 051 20822	8k2 5% 0.1W
3982	4822 051 20392	3k9 5% 0.1W
3983	4822 116 52175	100Ω 5% 0.5W
3984	4822 051 20822	8k2 5% 0.1W
3985	4822 116 52201	75Ω 5% 0.5W
3986	4822 116 52276	3k9 5% 0.5W
3987	4822 116 52175	100Ω 5% 0.5W
3988	4822 051 10102	1k 2% 0.25W
3989	4822 050 11002	1k 1% 0.4W
3990	4822 117 10353	150Ω 1% 0.1W
3991	4822 117 10353	150Ω 1% 0.1W
3992	4822 117 10353	150Ω 1% 0.1W
3993	4822 116 83868	150Ω 5% 0.5W
3994	4822 051 10102	1k 2% 0.25W
3995	4822 051 10102	1k 2% 0.25W
3996	4822 117 10353	150Ω 1% 0.1W
3997	4822 117 10353	150Ω 1% 0.1W
9103	4822 051 20008	Jumper
9105	4822 051 20008	Jumper
9200	4822 051 20008	Jumper
9203	4822 051 30008	Jumper
9204	4822 051 20008	Jumper
9207	4822 051 30008	Jumper
9208	4822 051 20008	Jumper
9209	4822 051 20008	Jumper
9210	4822 051 30008	Jumper
9211	4822 051 30008	Jumper
9212	4822 051 20008	Jumper
9214	4822 051 20008	Jumper
9215	4822 051 20008	Jumper
9216	4822 051 20008	Jumper
9217	4822 051 20008	Jumper
9218	4822 051 20008	Jumper
9219	4822 051 20008	Jumper
9221	4822 051 20008	Jumper
9222	4822 051 20008	Jumper
9251	4822 051 30008	Jumper
9261	4822 051 20008	Jumper
9262	4822 051 20008	Jumper
9263	4822 051 20008	Jumper
9264	4822 051 20008	Jumper
9418	4822 051 20008	Jumper
9421	4822 051 20008	Jumper
9422	4822 051 30008	Jumper
9424	4822 051 30008	Jumper
9427	4822 051 30008	Jumper
9428	4822 051 30008	Jumper
9429	4822 051 30008	Jumper
9430	4822 051 30008	Jumper
9431	4822 051 30008	Jumper
9432	4822 051 30008	Jumper
9433	4822 051 30008	Jumper
9434	4822 051 30008	Jumper
9435	4822 051 30008	Jumper
9436	4822 051 30008	Jumper
9437	4822 051 30008	Jumper
9438	4822 051 30008	Jumper
9440	4822 051 30008	Jumper
9441	4822 051 30008	Jumper
9443	4822 051 30008	Jumper
9481	4822 051 30008	Jumper
9483	4822 051 30008	Jumper
9499	4822 051 30008	Jumper
9505	4822 051 20008	Jumper
9560	4822 051 30008	Jumper
9561	4822 051 20008	Jumper
9621	4822 051 30008	Jumper
9624	4822 051 30008	Jumper
9676	4822 051 30008	Jumper
9677	4822 051 20008	Jumper
9702	4822 051 30008	Jumper
9705	4822 051 20008	Jumper
9706	4822 050 11002	1k 1% 0,4W
9707	4822 051 30008	Jumper
9709	4822 051 20008	Jumper
9711	4822 051 30008	Jumper
9713	4822 051 30008	Jumper
9714	4822 051 20008	Jumper
9716	4822 051 20008	Jumper
9717	4822 051 30008	Jumper
9908	4822 051 30008	Jumper
9927	4822 051 20008	Jumper
9928	4822 051 20008	Jumper
9960	4822 051 30008	Jumper
9962	4822 051 30008	Jumper
9966	4822 051 30008	Jumper
9979	4822 051 20008	Jumper
9981	4822 051 20008	Jumper
9984	4822 126 13879	220nF 20-80% 16V
9985	4822 051 30008	Jumper
9986	4822 051 20008	Jumper
9987	4822 051 20008	Jumper
9988	4822 051 20008	Jumper
9989	4822 051 20008	Jumper
9990	4822 051 20008	Jumper
9991	4822 051 20008	Jumper
9992	4822 051 20008	Jumper
9993	4822 051 20008	Jumper
9994	4822 051 20008	Jumper
9995	4822 051 20008	Jumper
9997	4822 051 20008	Jumper

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5100	3104 308 20431	Transformer BS25126-03
5102	2422 535 94639	10µH 20%
5103	4822 526 10704	Bead 100MHz
5104	4822 157 11411	Bead 100MHz
5105	2422 535 94632	1µH 30%
5106	4822 526 10704	Bead 100MHz
5111	4822 157 11411	Bead 100MHz
5113	4822 157 11411	Bead 100MHz
5130	4822 157 11411	Bead 100MHz
5400	4822 157 11869	33µH 10%
5401	2422 536 00059	12µH 10%
5402	3198 018 21510	150µH 10%
5410	3128 138 39091	Transformer CE165T
5411	4822 157 71097	0.56µH
5421	3128 138 56152	Lin. cor. coil 28”
5421	3128 138 57871	Lin. cor. coil 32”
5421	4822 157 11839	Lin. cor. coil 36”
5422	3128 138 39981	Bridge coil 28”
5422	4822 146 11137	Bridge coil 32”/36”
5423	4822 157 71097	0.56µH
5425	4822 157 11411	Bead 100MHz
5426	4822 157 70826	2.4µH
5430	2422 531 02532	LOT 32”
5430	8204 000 75231	LOT 32”
5430	8204 000 75241	LOT 28”
5461	4822 157 11411	Bead 100MHz
5463	4822 157 11411	Bead 100MHz
5465	4822 157 11411	Bead 100MHz
5467	4822 157 11411	Bead 100MHz
5469	4822 157 11411	Bead 100MHz
5503	2422 549 44877	Mainsfilter 45mH 1.5A DMF2845H
5505	4822 157 11411	Bead 100MHz
5507	4822 157 11411	Bead 100MHz
5509	4822 157 11411	Bead 100MHz
5511	2422 549 44873	Mains harmonic filter 56mH
5512	2422 531 02501	Transformer S30940-04
5513	4822 157 11869	33µH 10%
5514	4822 157 11869	33µH 10%
5515	4822 157 11869	33µH 10%
5620	4822 157 11771	0.09µH 10% 3.5X11
5621	2422 531 02528	Transformer S13974-02 Y
5701	2422 536 00385	68µH 10%
5702	2422 536 00385	68µH 10%
5703	4822 157 11716	BLM21P300SPT
5707	4822 157 11411	Bead 100MHz
5708	4822 157 11411	Bead 100MHz
5711	4822 157 11411	Bead 100MHz
5712	4822 157 11411	Bead 100MHz
5715	4822 157 11411	Bead 100MHz
5716	4822 157 11411	Bead 100MHz
5720	2422 536 00385	68µH 10%
5721	2422 536 00385	68µH 10%
5722	4822 157 11411	Bead 100MHz
5723	4822 157 11411	Bead 100MHz
5725	4822 157 11411	Bead 100MHz
5901	4822 157 11299	EL0305RA-100J
5902	4822 157 11869	33µH 10%
5903	4822 157 10359	33µH

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6080	4822 130 11397	BAS316
6082	4822 130 11528	1PS76SB10
6103	4822 130 42488	BYD33D
6105	4822 130 34281	BZX79-B15
6106	3198 010 52290	BZX79-B22
6108	4822 130 11528	1PS76SB10
6109	4822 130 31083	BYW55
6110	9340 418 70133	BYV27-600 A
6111	9322 161 78682	SB360L-7024
6112	4822 130 11551	UDZS10B
6115	4822 130 11528	1PS76SB10
6120	4822 130 30621	1N4148
6121	4822 130 30621	1N4148
6122	3198 010 53980	BZX79-B3V9
6130	4822 130 11572	STPS8H100F
6132	9322 171 80685	BZX384-B6V8
6133	4822 130 11397	BAS316
6134	4822 130 11397	BAS316
6141	9322 129 42685	BZM55-C15
6142	4822 130 11528	1PS76SB10
6144	4822 130 11397	BAS316
6147	4822 130 34278	BZX79-B6V8
6148	5322 130 31938	BYV27-200
6149	4822 130 11397	BAS316
6200	9340 548 71115	PDZ33B
6201	9340 255 30135	BAS216
6202	9340 255 30135	BAS216
6400	4822 130 70055	BYV27-400

6405	4822 130 34383	BZX79-B47
6406	4822 130 11397	BAS316
6407	4822 130 11397	BAS316
6408	4822 130 42488	BYD33D
6421	4822 130 10753	BY359X-1500
6422	4822 130 10218	BY229X-800
6442	9322 129 42685	BZM55-C15
6455	4822 130 11397	BAS316
6456	5322 130 34337	BAV99
6457	9322 102 64685	UDZ2.7B
6458	3198 020 55680	BZX384-C5V6
6460	4822 130 41487	BYV95C
6462	9322 127 32682	BYW76-RAS15/10
6464	9322 127 32682	BYW76-RAS15/10
6480	4822 130 42488	BYD33D
6481	9322 129 42685	BZM55-C15
6482	4822 130 11397	BAS316
6483	4822 130 11528	1PS76SB10
6493	4822 130 11528	1PS76SB10
6499	4822 130 11551	UDZS10B
6499	9340 548 58115	PDZ9.1B
6505	4822 130 34281	BZX79-B15
6506	4822 130 10654	BAT254
6509	4822 130 11397	BAS316
6510	4822 130 61219	BZX79-B10
6511	4822 130 11397	BAS316
6512	4822 130 11397	BAS316
6514	5322 130 31932	BZT03-C200
6515	4822 130 33657	BZV85-C6V8
6516	4822 130 11397	BAS316
6517	4822 130 11528	1PS76SB10
6525	3198 010 10640	GBU4K
6530	4822 130 41487	BYV95C
6534	9322 165 72687	DTV1500MFP
6535	4822 130 11572	STPS8H100F
6536	4822 130 11572	STPS8H100F
6537	4822 130 11397	BAS316
6550	4822 130 10218	BY229X-800
6614	4822 130 11528	1PS76SB10
6615	4822 130 11397	BAS316
6616	4822 130 11397	BAS316
6617	4822 130 11397	BAS316
6618	4822 130 11397	BAS316
6619	4822 130 42488	BYD33D
6620	5322 130 31938	BYV27-200
6621	4822 130 42488	BYD33D
6622	5322 130 32296	BZV85-C10
6623	4822 130 11397	BAS316
6624	4822 130 11397	BAS316
6625	4822 130 11397	BAS316
6626	4822 130 11397	BAS316
6627	4822 130 11397	BAS316
6628	4822 130 11397	BAS316
6701	4822 130 11397	BAS316
6745	4822 130 11551	UDZS10B
6950	4822 130 11416	PDZ6.8B
6951	4822 130 11416	PDZ6.8B
6953	4822 130 11416	PDZ6.8B
6954	4822 130 11416	PDZ6.8B
6955	4822 130 11416	PDZ6.8B
6956	4822 130 11416	PDZ6.8B
6957	4822 130 11416	PDZ6.8B
6958	4822 130 11416	PDZ6.8B
6959	4822 130 11416	PDZ6.8B
6960	9340 548 61115	PDZ12B
6961	4822 130 11416	PDZ6.8B
6962	4822 130 11416	PDZ6.8B

7100	4822 130 44568	BC557B
7101	4822 130 40981	BC337-25
7102	4822 130 11417	STP3NB60FP
7103	9322 149 04682	TCET1102
7130	5322 130 60159	BC846B
7131	4822 130 11336	STP16NE06FP
7132	5322 130 60159	BC846B
7133	4822 130 60373	BC856B
7140	5322 130 60159	BC846B
7141	4822 130 11336	STP16NE06FP
7408	5322 130 44647	BC368
7409	5322 130 60159	BC846B
7421	9340 210 30127	BU2520DX
7440	4822 209 70672	LM358N
7441	4822 130 60373	BC856B
7442	4822 130 60373	BC856B
7443	5322 130 60159	BC846B
7445	5322 130 60159	BC846B
7450	5322 209 61472	LM393M
7455	4822 209 73852	PMBT2369
7480	4822 130 11417	STP3NB60FP
7482	4822 130 11418	TCDT1102G
7486	5322 130 60159	BC846B
7487	5322 130 60159	BC846B
7501	5322 130 60159	BC846B
7502	4822 130 40959	BC547B
7504	9322 126 65687	STP5NB60FP
7506	4822 209 14933	TL431IZ
7507	9322 149 04682	TCET1102
7528	4822 130 40981	BC337-25
7529	4822 130 44461	BC546B
7530	5322 130 60159	BC846B
7611	5322 130 60159	BC846B
7612	5322 130 60159	BC846B
7613	4822 209 81397	TL431CLPST
7614	5322 130 60159	BC846B
7620	4822 209 90009	TDA8177
7641	5322 130 60159	BC846B
7652	5322 130 60159	BC846B
7653	5322 130 60159	BC846B
7654	4822 130 60373	BC856B
7680	4822 209 60956	TDA7052
7681	5322 130 60159	BC846B
7682	5322 130 44647	BC368
7700	9322 163 86682	TDA7490L
7701	5322 130 60159	BC846B
7702	9322 163 86682	TDA7490L
7703	5322 130 60159	BC846B
7704	5322 130 60159	BC846B
7705	5322 130 60159	BC846B
7706	4822 130 60373	BC856B
7707	5322 130 60159	BC846B
7902	5322 130 60159	BC846B
7908	5322 130 60159	BC846B
7910	9322 166 03682	LD1085V36
7911	4822 209 72042	L78L05ACZ
7912	5322 209 86445	LM7805CT
8000	3104 311 03272	EHT cable

Small signal board [B]

Various

1001	2422 543 89022	Crystal 6MHz CX-5F
1301	2422 540 98456	Crystal 12MHz CSTCV12.MTJ
1305	2422 543 01184	Crystal 4.433MHz HC49/U A
1308	2422 543 01183	Crystal 3.579MHz HC49/U A
1402	2422 025 16966	5p male
1403	2422 086 11031	Fuse 500mA 63V
1407	2422 549 44324	Filter 5.74MHz TPWCC04BS
1408	2422 549 44372	Saw filter 38.9MHz OFWK3953L
1409	2422 549 44369	Saw filter 38MHz 9 OFWK9656L
1651	2422 543 89019	Crystal 18.432MHz CX-5F
1680	2422 025 16961	6p male
1702	2422 540 98456	Crystal 12MHz CSTCV12
8402	3104 311 04711	5p 180mm
8680	3104 311 04991	6p 400mm

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2001	2222 867 15339	33pF 5% 50V
2002	4822 126 11669	27pF
2003	4822 126 13879	220nF 20% 16V
2004	4822 126 13879	220nF 20% 16V
2005	2238 586 59812	100nF 50V
2006	2238 586 59812	100nF 50V
2007	2238 586 59812	100nF 50V
2008	2238 586 59812	100nF 50V
2010	4822 126 11785	47pF 5% 50V
2011	4822 126 11785	47pF 5% 50V
2012	4822 126 11785	47pF 5% 50V
2013	4822 124 12095	100µF 20% 16V
2016	4822 124 12095	100µF 20% 16V
2017	2238 586 59812	100nF 50V
2019	2238 586 59812	100nF 50V
2020	4822 126 13883	220pF 5% 50V
2022	2238 586 59812	100nF 50V
2023	2238 586 59812	100nF 50V
2024	2238 586 59812	100nF 50V
2025	2238 586 59812	100nF 50V
2026	2238 586 59812	100nF 50V
2027	2238 586 59812	100nF 50V
2028	2238 586 59812	100nF 50V
2029	2238 586 59812	100nF 50V
2031	2238 586 59812	100nF 50V
2033	4822 126 14226	82pF 5% 50V
2034	4822 126 14226	82pF 5% 50V
2035	4822 126 14226	82pF 5% 50V
2036	4822 126 14226	82pF 5% 50V
2037	4822 126 14226	82pF 5% 50V
2038	2238 586 59812	100nF 50V
2039	2238 586 59812	100nF 50V
2040	2238 586 59812	100nF 50V
2302	2238 586 59812	100nF 50V
2303	2020 552 96448	16V 1µF 10%
2304	4822 122 33741	10pF 10% 50V
2305	2238 586 59812	100nF 50V
2306	4822 126 13881	470pF 5% 50V
2307	2238 586 59812	100nF 50V
2308	4822 122 33741	10pF 10% 50V
2312	2020 552 96659	1206 33nF 5% 50V
2313	4822 121 70159	0.1µF 16V
2314	4822 124 12095	100µF 20% 16V
2315	2238 586 59812	100nF 50V
2316	2238 586 59812	100nF 50V
2317	2020 552 96448	16V 1µF 10%
2318	4822 126 14494	22nF 10% 25V
2319	4822 126 14247	1.5nF 50V
2320	4822 122 33741	10pF 10% 50V
2321	2238 586 59812	100nF 50V
2322	2238 586 59812	100nF 50V
2323	2238 586 59812	100nF 50V
2324	5322 126 11583	10nF 10% 50V
2325	2238 586 59812	100nF 50V
2326	5322 126 11583	10nF 10% 50V
2328	4822 122 33761	22pF 5% 50V
2329	2238 586 59812	100nF 50V
2330	2238 586 59812	100nF 50V
2331	2238 586 59812	100nF 50V
2332	2238 586 59812	100nF 50V
2333	5322 126 14103	2.2µF 20% 10V
2334	5322 126 14103	2.2µF 20% 10V
2336	5322 126 14103	2.2µF 20% 10V
2340	4822 124 12095	100µF 20% 16V
2343	2238 586 59812	100nF 50V
2350	2238 586 59812	100nF 50V
2351	2238 586 59812	100nF 50V
2352	2238 586 59812	100nF 50V
2353	2238 586 59812	100nF 50V
2354	2238 586 59812	100nF 50V
2356	2238 586 59812	100nF 50V
2357	2238 586 59812	100nF 50V
2358	5322 126 11579	3.3nF 10% 63V
2359	4822 122 33752	15pF 5% 50V
2360	3198 016 31280	1.2pF 50V
2361	3198 016 31280	1.2pF 50V
2362	4822 126 11663	12pF
2363	4822 126 13881	470pF 5% 50V
2365	2238 586 59812	100nF 50V
2366	2238 586 59812	100nF 50V
2367	2238 586 59812	100nF 50V
2368	2238 586 59812	100nF 50V
2369	2238 586 59812	100nF 50V
2370	2238 586 59812	100nF 50V
2371	4822 126 13193	4.7nF 10% 63V
2372	4822 126 14043	1µF 20% 16V
2373	2238 586 59812	100nF 50V
2374	5322 126 14103	2.2µF 20% 10V
2375	4822 126 14494	22nF 10% 25V
2376	2238 586 59812	100nF 50V
2377	4822 124 12095	100µF 20% 16V
2378	2238 586 59812	100nF 50V
2384	2238 586 59812	100nF 50V
2385	2238 586 59812	100nF 50V
2386	4822 126 13883	220pF 5% 50V
2390	2238 586 59812	100nF 50V
2391	2238 586 59812	100nF 50V
2392	4822 126 13193	4.7nF 10% 63V
2394	5322 126 14103	2.2µF 20% 10V
2404	4822 126 14043	1µF 20% 16V
2405	4822 126 13193	4.7nF 10% 63V
2406	4822 126 13883	220pF 5% 50V
2407	4822 126 13956	68pF 5% 63V
2408	3198 016 32780	2.7pF 50V
2409	5322 126 14103	2.2µF 20% 10V
2411	2238 586 59812	100nF 50V
2412	4822 126 13193	4.7nF 10% 63V
2417	3198 017 44740	470nF 10V
2418	3198 016 35680	5.6pF 50V
2420	4822 122 33753	150pF 5% 50V
2422	2238 586 59812	100nF 50V
2424	2238 586 59812	100nF 50V
2425	4822 124 12095	100µF 20% 16V
2429	2238 586 59812	100nF 50V
2431	2238 586 59812	100nF 50V
2501	4822 126 11785	47pF 5% 50V
2502	4822 126 14107	330nF 20-80% 25V
2503	4822 126 14107	330nF 20-80% 25V
2504	4822 126 14107	330nF 20-80% 25V
2505	4822 126 14107	330nF 20-80% 25V
2506	4822 126 14107	330nF 20-80% 25V
2507	4822 126 14107	330nF 20-80% 25V
2508	4822 124 12095	100µF 20% 16V
2509	4822 124 23002	10µF 16V
2510	2020 552 96448	16V 1µF 10%

2511	2020 552 96448	16V 1µF 10%
2512	4822 126 13879	220nF 20% 16V
2515	2020 552 94427	100pF 5% 50V
2520	2238 586 59812	100nF 50V
2521	2238 586 59812	100nF 50V
2522	4822 126 13881	470pF 5% 50V
2523	3198 016 31020	1nF 25V
2524	2238 586 59812	100nF 50V
2525	4822 126 13881	470pF 5% 50V
2526	3198 016 31020	1nF 25V
2528	5322 126 14103	2.2µF 20% 10V
2529	4822 126 14472	1µF 10% 10V
2530	4822 126 14472	1µF 10% 10V
2531	2020 552 94427	100pF 5% 50V
2532	2020 552 94427	100pF 5% 50V
2546	4822 124 23002	10µF 16V
2547	4822 124 23002	10µF 16V
2548	4822 124 23002	10µF 16V
2549	4822 124 23002	10µF 16V
2550	4822 126 14241	330pF 50V
2551	5322 126 11579	3.3nF 10% 63V
2552	4822 126 13881	470pF 5% 50V
2553	4822 126 13881	470pF 5% 50V
2554	4822 126 13881	470pF 5% 50V
2555	4822 126 13881	470pF 5% 50V
2562	3198 016 31020	1nF 25V
2563	3198 016 31020	1nF 25V
2564	3198 016 31020	1nF 25V
2565	3198 016 31020	1nF 25V
2566	3198 016 31020	1nF 25V
2567	3198 016 31020	1nF 25V
2568	3198 016 31020	1nF 25V
2569	3198 016 31020	1nF 25V
2570	3198 016 31020	1nF 25V
2571	2020 552 94427	100pF 5% 50V
2572	3198 016 31020	1nF 25V
2573	3198 016 31020	1nF 25V
2574	3198 016 31020	1nF 25V
2575	3198 016 31020	1nF 25V
2576	3198 016 31020	1nF 25V
2577	3198 016 31020	1nF 25V
2578	3198 016 31020	1nF 25V
2579	3198 016 31020	1nF 25V
2580	3198 016 31020	1nF 25V
2581	3198 016 31020	1nF 25V
2582	3198 016 31020	1nF 25V
2583	3198 016 31020	1nF 25V
2592	5322 126 11578	1nF 10% 50V
2593	3198 016 31020	1nF 25V
2594	3198 016 31020	1nF 25V
2595	3198 016 31020	1nF 25V
2600	2020 552 96448	16V 1µF 10%
2601	2020 552 96448	16V 1µF 10%
2602	2020 552 96448	16V 1µF 10%
2603	2020 552 96448	16V 1µF 10%
2604	2020 552 96448	16V 1µF 10%
2609	3198 016 31020	1nF 25V
2610	4822 126 14238	2.2nF 50V
2611	3198 016 31020	1nF 25V
2629	4822 126 14107	330nF 20-80% 25V
2630	5322 126 14103	2.2µF 20% 10V
2632	4822 126 14107	330nF 20-80% 25V
2634	3198 016 31020	1nF 25V
2637	4822 126 14107	330nF 20-80% 25V
2640	4822 126 13879	220nF 20% 16V
2643	4822 126 14107	330nF 20-80% 25V
2644	3198 016 31020	1nF 25V
2645	4822 126 14107	330nF 20-80% 25V
2646	5322 126 14103	2.2µF 20% 10V
2649	5322 126 14103	2.2µF 20% 10V
2651	2238 586 59812	100nF 50V
2652	4822 126 11785	47pF 5% 50V
2653	4822 126 14107	330nF 20-80% 25V
2654	4822 126 13881	470pF 5% 50V
2659	4822 126 13881	470pF 5% 50V
2660	4822 126 13881	470pF 5% 50V
2661	4822 126 14107	330nF 20-80% 25V
2662	4822 126 14107	330nF 20-80% 25V
2663	4822 126 13881	470pF 5% 50V
2664	4822 126 13881	470pF 5% 50V
2665	4822 124 12095	100µF 20% 16V
2666	4822 124 12095	100µF 20% 16V
2667	3198 016 33380	3.3pF 50V
2668	3198 016 33380	3.3pF 50V
2670	2238 586 59812	100nF 50V
2673	3198 016 31020	1nF 25V
2674	3198 016 31020	1nF 25V
2677	4822 124 23002	10µF 16V
2678	4822 124 23002	10µF 16V
2679	2238 586 59812	100nF 50V
2680	4822 124 23002	10µF 16V
2681	2238 586 59812	100nF 50V
2682	4822 124 23002	10µF 16V
2686	3198 016 31020	1nF 25V
2687	3198 016 31020	1nF 25V
2690	2238 586 59812	100nF 50V
2691	2238 586 59812	100nF 50V
2693	4822 126 13883	220pF 5% 50V
2694	3198 016 31020	1nF 25V
2695	4822 124 12095	100µF 20% 16V
2697	2238 586 59812	100nF 50V
2698	5322 126 14103	2.2µF 20% 10V
2699	5322 126 14103	2.2µF 20% 10V
2701	4822 126 11663	12pF
2704	4822 126 11663	12pF
2707	4822 126 11663	12pF
2709	2238 586 59812	100nF 50V
2710	2238 586 59812	100nF 50V
2711	2238 586 59812	100nF 50V
2712	2238 586 59812	100nF 50V
2713	4822 122 33761	22pF 5% 50V
2714	4822 122 33761	22pF 5% 50V
2716	2238 586 59812	100nF 50V
2717	4822 126 11663	12pF
2718	4822 122 33752	15pF 5% 50V
2719	4822 122 33752	15pF 5% 50V
2720	4822 122 33752	15pF 5% 50V
2721	2020 552 94427	100pF 5% 50V
2722	2020 552 94427	100pF 5% 50V
2723	4822 126 14225	56pF 5% 50V
2724	2020 552 94427	100pF 5% 50V
2725	4822 126 11663	12pF
2726	4822 126 11669	27pF
2727	4822 126 11663	12pF
2728	2020 021 91554	10µF 20% 16V
2729	2238 586 59812	100nF 50V
2730	2020 021 91557	100µF 20% 16V
2731	2238 586 59812	100nF 50V
2732	2238 586 59812	100nF 50V
2733	2238 586 59812	100nF 50V
2734	2238 586 59812	100nF 50V
2735	2238 586 59812	100nF 50V
2736	4822 126 11669	27pF
2737	4822 126 11663	12pF
2738	4822 126 11663	12pF
2739	4822 126 11669	27pF
2740	4822 126 14494	22nF 10% 25V
2741	4822 126 14494	22nF 10% 25V
2742	4822 126 14494	22nF 10% 25V
2743	2238 586 59812	100nF 50V
2744	2238 586 59812	100nF 50V
2745	2238 586 59812	100nF 50V
2746	2238 586 59812	100nF 50V
2747	2238 586 59812	100nF 50V
2748	2238 586 59812	100nF 50V
2749	2020 021 91554	10µF 20% 16V
2750	2238 586 59812	100nF 50V
2751	2238 586 59812	100nF 50V
2752	2238 586 59812	100nF 50V
2753	2238 586 59812	100nF 50V
2754	2238 586 59812	100nF 50V
2755	2238 586 59812	100nF 50V
2756	2238 586 59812	100nF 50V
2757	4822 126 14494	22nF 10% 25V
2760	2238 586 59812	100nF 50V
2761	2238 586 59812	100nF 50V
2762	2238 586 59812	100nF 50V
2763	2238 586 59812	100nF 50V
2764	2238 586 59812	100nF 50V
2765	2238 586 59812	100nF 50V
2766	2238 586 59812	100nF 50V
2767	2238 586 59812	100nF 50V
2768	2238 586 59812	100nF 50V
2769	2238 586 59812	100nF 50V
2770	2020 021 91554	10µF 20% 16V
2771	2238 586 59812	100nF 50V
2772	2020 021 91557	100µF 20% 16V
2773	2238 586 59812	100nF 50V
2774	2238 586 59812	100nF 50V
2775	2238 586 59812	100nF 50V
2776	2238 586 59812	100nF 50V
2777	2238 586 59812	100nF 50V
2778	2238 586 59812	100nF 50V
2779	2238 586 59812	100nF 50V
2780	2238 586 59812	100nF 50V
2781	2238 586 59812	100nF 50V
2782	2238 586 59812	100nF 50V
2783	2238 586 59812	100nF 50V
2784	2238 586 59812	100nF 50V
2785	2238 586 59812	100nF 50V
2786	2238 586 59812	100nF 50V
2787	2238 586 59812	100nF 50V
2788	2238 586 59812	100nF 50V
2789	2238 586 59812	100nF 50V
2790	2238 586 59812	100nF 50V
2791	2238 586 59812	100nF 50V
2792	2020 021 91554	10µF 20% 16V
2793	2238 586 59812	100nF 50V
2794	2020 021 91554	10µF 20% 16V
2795	2238 586 59812	100nF 50V
2796	2238 586 59812	100nF 50V
2797	2238 586 59812	100nF 50V
2798	2238 586 59812	100nF 50V
2799	2238 586 59812	100nF 50V
2800	2238 586 59812	100nF 50V
2801	2238 586 59812	100nF 50V
2802	2238 586 59812	100nF 50V
2803	2238 586 59812	100nF 50V
2804	2238 586 59812	100nF 50V
2805	2238 586 59812	100nF 50V
2807	2238 586 59812	100nF 50V
2808	2020 021 91554	10µF 20% 16V
2809	2238 586 59812	100nF 50V
2810	2238 586 59812	100nF 50V
2811	2238 586 59812	100nF 50V
2812	2238 586 59812	100nF 50V
2813	2238 586 59812	100nF 50V
2814	2238 586 59812	100nF 50V
2815	4822 126 14223	2.2pF 50V
2816	4822 126 14223	2.2pF 50V
2817	2238 586 59812	100nF 50V
2818	4822 126 14223	2.2pF 50V
2819	2238 586 59812	100nF 50V
2820	2238 586 59812	100nF 50V
2821	2238 586 59812	100nF 50V
2822	2238 586 59812	100nF 50V
2823	5322 126 11578	1nF 10% 50V
2824	5322 126 11578	1nF 10% 50V
2825	2238 586 59812	100nF 50V
2826	2238 586 59812	100nF 50V
2827	2238 586 59812	100nF 50V
2828	2238 586 59812	100nF 50V
2829	2238 586 59812	100nF 50V
2830	2238 586 59812	100nF 50V
2831	4822 126 13956	68pF 5% 63V
2832	2238 586 59812	100nF 50V
2833	2238 586 59812	100nF 50V
2835	2238 586 59812	100nF 50V
2838	2238 586 59812	100nF 50V
2843	2238 586 59812	100nF 50V
2845	2238 586 59812	100nF 50V
2846	2238 586 59812	100nF 50V
2847	2238 586 59812	100nF 50V
2848	2238 586 59812	100nF 50V
2851	2238 586 59812	100nF 50V
2853	2238 586 59812	100nF 50V
2854	2238 586 59812	100nF 50V
2855	2238 586 59812	100nF 50V
2857	2238 586 59812	100nF 50V
2859	2238 586 59812	100nF 50V
2860	2238 586 59812	100nF 50V
2861	2238 586 59812	100nF 50V
2864	2238 586 59812	100nF 50V
2865	2238 586 59812	100nF 50V
2866	2238 586 59812	100nF 50V
2867	2238 586 59812	100nF 50V
2870	2020 021 91554	10µF 20% 16V
2871	2020 021 91554	10µF 20% 16V
2872	2238 586 59812	100nF 50V
2874	2020 021 91554	10µF 20% 16V
2875	2020 021 91554	10µF 20% 16V
2876	2238 586 59812	100nF 50V
2880	2020 021 91557	100µF 20% 16V
2881	4822 126 11669	27pF
2884	2238 586 59812	100nF 50V
2885	4822 126 11663	12pF
2886	2238 586 59812	100nF 50V
2887	2238 586 59812	100nF 50V
2888	2238 586 59812	100nF 50V
2889	2238 586 59812	100nF 50V
2890	2238 586 59812	100nF 50V
2891	2238 586 59812	100nF 50V
2892	2238 586 59812	100nF 50V
2893	2238 586 59812	100nF 50V
2894	2238 586 59812	100nF 50V
2895	2238 586 59812	100nF 50V
2896	2238 586 59812	100nF 50V
2897	2238 586 59812	100nF 50V
2898	2238 586 59812	100nF 50V
2899	2238 586 59812	100nF 50V
2908	2238 586 59812	100nF 50V
2909	2238 586 59812	100nF 50V
2910	2238 586 59812	100nF 50V
2911	2238 586 59812	100nF 50V
2912	2238 586 59812	100nF 50V

3001	4822 051 30472	4k7 5% 62mW
3002	4822 051 30472	4k7 5% 62mW
3003	4822 117 13525	24k 1% 620mW

3006	4822 051 30471	470Ω 5% 62mW
3007	3198 031 14710	4X470Ω
3008	4822 117 13526	150Ω 5% 630mW
3009	4822 051 30689	68Ω 5% 63mW
3011	4822 051 30471	470Ω 5% 62mW
3012	3198 031 11010	4X100Ω
3013	4822 051 30103	10k 5% 62mW
3014	4822 051 30682	6k8 5% 62mW
3015	4822 051 30474	470k 5% 62mW
3016	4822 051 30152	1k5 5% 62mW
3017	4822 051 30472	4k7 5% 62mW
3018	4822 051 30103	10k 5% 62mW
3019	4822 051 30472	4k7 5% 62mW
3020	4822 051 30103	10k 5% 62mW
3021	4822 051 30103	10k 5% 62mW
3024	4822 051 30273	27k 5% 62mW
3025	4822 051 30221	220Ω 5% 62mW
3026	4822 051 30472	4k7 5% 62mW
3027	4822 117 12925	47k 1% 63mW
3029	4822 051 30103	10k 5% 62mW
3031	4822 051 30103	10k 5% 62mW
3033	4822 051 30103	10k 5% 62mW
3034	3198 031 11010	4X100Ω
3035	3198 031 11010	4X100Ω
3039	4822 051 30181	180Ω 5% 62mW
3040	4822 051 30472	4k7 5% 62mW
3041	4822 051 30472	4k7 5% 62mW
3042	4822 051 30472	4k7 5% 62mW
3044	4822 051 30272	2k7 5% 62mW
3048	3198 031 11010	4X100Ω
3049	3198 031 11010	4X100Ω 5%
3050	3198 031 11010	4X100Ω 5%
3051	3198 031 11010	4X100Ω 5%
3052	3198 031 11010	4X100Ω 5%
3053	4822 051 30101	100Ω 5% 62mW
3054	3198 031 11010	4X100Ω 5%
3055	3198 031 11010	4X100Ω 5%
3056	3198 031 11010	4X100Ω 5%
3057	3198 031 11010	4X100Ω 5%
3059	2322 704 66201	RST 620Ω 1%
3061	4822 051 30103	10k 5% 62mW
3062	4822 051 30103	10k 5% 62mW
3064	3198 031 11010	4X100Ω
3065	4822 051 30472	4k7 5% 62mW
3066	4822 117 12925	47k 1% 63mW
3067	4822 051 30474	470k 5% 62mW
3068	4822 051 30272	2k7 5% 62mW
3069	4822 051 30272	2k7 5% 62mW
3073	3198 031 14710	4X470Ω
3074	3198 031 14710	4X470Ω
3076	3198 031 14710	4X470Ω
3078	3198 031 14710	4X470Ω
3079	4822 051 30472	4k7 5% 62mW
3080	4822 051 30472	4k7 5% 62mW
3081	4822 051 30008	Jumper
3088	4822 051 30472	4k7 5% 62mW
3090	3198 031 14710	4X470Ω
3093	4822 051 30103	10k 5% 62mW
3094	4822 117 12925	47k 1% 63mW
3095	4822 117 12925	47k 1% 63mW
3096	4822 117 12925	47k 1% 63mW
3097	4822 051 30008	Jumper
3099	3198 031 14710	4X470Ω
3301	4822 117 13632	100k 1% 620mW
3302	4822 051 30102	1k 5% 62mW
3303	4822 117 13632	100k 1% 620mW
3304	2322 750 63908	3Ω9 5%
3306	4822 051 30221	220Ω 5% 62mW
3307	4822 051 30183	18k 5% 62mW
3308	4822 051 20154	150k 5% 0.1W
3310	4822 051 30563	56k 5% 62mW
3311	4822 117 13632	100k 1% 620mW
3312	4822 117 13632	100k 1% 620mW
3313	4822 117 13632	100k 1% 620mW
3314	4822 051 30103	10k 5% 62mW
3315	4822 051 30102	1k 5% 62mW
3316	4822 117 10834	47k 1% 0.1W
3317	4822 051 30221	220Ω 5% 62mW
3318	4822 051 30102	1k 5% 62mW
3319	4822 051 30221	220Ω 5% 62mW
3320	4822 051 30101	100Ω 5% 62mW
3321	4822 051 30101	100Ω 5% 62mW
3322	4822 051 10102	1k 2% 0.25W
3324	4822 051 30472	4k7 5% 62mW
3325	4822 117 13632	100k 1% 620mW
3327	4822 117 13632	100k 1% 620mW
3328	4822 051 30393	39k 5% 62mW
3329	4822 117 13568	6Ω8 5%
3331	4822 051 30102	1k 5% 62mW
3333	4822 051 30102	1k 5% 62mW
3334	4822 051 30102	1k 5% 62mW
3336	4822 051 30102	1k 5% 62mW
3340	4822 051 30101	100Ω 5% 62mW
3341	4822 051 30101	100Ω 5% 62mW
3342	4822 051 30101	100Ω 5% 62mW
3343	4822 051 20683	68k 5% 0.1W
3344	4822 051 30222	2k2 5% 62mW
3345	4822 051 30103	10k 5% 62mW
3346	4822 051 30333	33k 5% 62mW
3347	4822 051 30223	22k 5% 62mW
3348	4822 051 30222	2k2 5% 62mW
3349	4822 051 30472	4k7 5% 62mW
3350	4822 051 30102	1k 5% 62mW
3351	4822 051 30103	10k 5% 62mW
3352	4822 117 13632	100k 1% 620mW
3353	4822 051 30103	10k 5% 62mW
3354	4822 051 30222	2k2 5% 62mW
3358	4822 117 12903	1k8 1% 63mW
3359	4822 117 13632	100k 1% 620mW
3362	4822 051 30684	680k 5% 62mW
3363	4822 051 30102	1k 5% 62mW
3364	4822 051 30103	10k 5% 62mW
3365	4822 051 30103	10k 5% 62mW
3366	4822 051 30221	220Ω 5% 62mW
3367	4822 051 30221	220Ω 5% 62mW
3368	3198 021 32250	RST 2.2M 5%
3370	4822 051 30101	100Ω 5% 62mW
3371	4822 051 30479	47Ω 5% 62mW
3372	4822 051 30471	470Ω 5% 62mW
3373	4822 051 30008	Jumper
3374	4822 051 30008	Jumper
3375	4822 051 30008	Jumper
3376	4822 051 30101	100Ω 5% 62mW
3377	4822 051 30101	100Ω 5% 62mW
3378	4822 051 30153	15k 5% 62mW
3379	4822 051 30008	Jumper
3380	4822 051 30101	100Ω 5% 62mW
3382	4822 051 30561	560Ω 5% 62mW
3385	4822 051 30471	470Ω 5% 62mW
3386	4822 051 30223	22k 5% 62mW
3390	4822 051 30221	220Ω 5% 62mW
3391	4822 051 30472	4k7 5% 62mW
3393	4822 117 13632	100k 1% 620mW
3394	4822 051 30472	4k7 5% 62mW
3400	4822 117 11152	4Ω7 5%
3402	2322 750 63908	3Ω9 5%
3403	4822 051 30101	100Ω 5% 62mW
3404	4822 051 30561	560Ω 5% 62mW
3405	4822 051 30102	1k 5% 62mW
3406	2322 702 60279	27Ω 5%
3408	4822 051 30101	100Ω 5% 62mW
3411	4822 051 30272	2k7 5% 62mW
3412	4822 051 30102	1k 5% 62mW
3414	4822 051 30472	4k7 5% 62mW
3415	4822 051 30222	2k2 5% 62mW
3418	4822 051 30391	390Ω 5% 62mW
3419	4822 051 30339	33Ω 5% 62mW
3435	4822 051 30472	4k7 5% 62mW
3436	4822 051 30221	220Ω 5% 62mW
3437	4822 051 30471	470Ω 5% 62mW
3439	4822 051 30471	470Ω 5% 62mW
3441	4822 051 30562	5k6 5% 63mW
3445	4822 051 30271	270Ω 5% 62mW
3446	4822 051 30101	100Ω 5% 62mW
3459	4822 051 30222	2k2 5% 62mW
3460	4822 051 30332	3k3 5% 62mW
3461	4822 117 12903	1k8 1% 63mW
3462	4822 117 11817	1k2 1% 62mW
3463	4822 051 30472	4k7 5% 62mW
3465	4822 051 30333	33k 5% 62mW
3468	4822 117 13632	100k 1% 620mW
3472	4822 051 30223	22k 5% 62mW
3500	4822 051 30153	15k 5% 62mW
3501	4822 051 20121	120Ω 5% 0.1W
3502	4822 051 20121	120Ω 5% 0.1W
3504	4822 051 30333	33k 5% 62mW
3505	4822 051 30153	15k 5% 62mW
3506	4822 051 20121	120Ω 5% 0.1W
3507	4822 051 20121	120Ω 5% 0.1W
3509	4822 051 30333	33k 5% 62mW
3510	4822 117 12925	47k 1% 63mW
3511	4822 117 13632	100k 1% 620mW
3512	4822 051 30154	150k 5% 62mW
3513	4822 117 12889	270k 1% 63mW
3514	4822 117 12925	47k 1% 63mW
3515	4822 117 13632	100k 1% 620mW
3516	4822 051 30392	3k9 5% 63mW
3519	4822 051 30103	10k 5% 62mW
3520	4822 117 12925	47k 1% 63mW
3521	4822 117 13632	100k 1% 620mW
3522	4822 117 13632	100k 1% 620mW
3523	4822 117 13632	100k 1% 620mW
3524	4822 117 13632	100k 1% 620mW
3525	4822 051 30684	680k 5% 62mW
3526	4822 051 30105	1M 5% 62mW
3527	4822 051 30221	220Ω 5% 62mW
3528	4822 051 30103	10k 5% 62mW
3529	4822 051 30103	10k 5% 62mW
3530	4822 051 30103	10k 5% 62mW
3531	4822 117 12902	8k2 1% 63mW
3532	4822 051 30102	1k 5% 62mW
3533	4822 051 30103	10k 5% 62mW
3540	4822 051 30103	10k 5% 62mW
3544	4822 117 12925	47k 1% 63mW
3545	4822 117 11817	1k2 1% 62mW
3546	4822 051 30102	1k 5% 62mW
3547	4822 117 12925	47k 1% 63mW
3551	4822 051 30102	1k 5% 62mW
3552	4822 051 30103	10k 5% 62mW
3553	4822 051 30223	22k 5% 62mW
3554	4822 051 30223	22k 5% 62mW
3555	4822 051 30223	22k 5% 62mW
3556	4822 051 30101	100Ω 5% 62mW
3557	4822 051 30101	100Ω 5% 62mW
3558	4822 051 30101	100Ω 5% 62mW
3559	4822 051 30101	100Ω 5% 62mW
3560	4822 051 30101	100Ω 5% 62mW
3561	4822 051 30101	100Ω 5% 62mW
3562	4822 051 30101	100Ω 5% 62mW
3563	4822 051 30101	100Ω 5% 62mW
3564	4822 051 30101	100Ω 5% 62mW
3567	4822 051 30101	100Ω 5% 62mW
3568	4822 051 30101	100Ω 5% 62mW
3569	4822 051 30101	100Ω 5% 62mW
3570	4822 051 30101	100Ω 5% 62mW
3571	4822 051 30101	100Ω 5% 62mW
3572	4822 051 30101	100Ω 5% 62mW
3573	4822 051 30101	100Ω 5% 62mW
3574	4822 051 30101	100Ω 5% 62mW
3575	4822 051 30101	100Ω 5% 62mW
3576	4822 051 30272	2k7 5% 62mW
3577	4822 051 30101	100Ω 5% 62mW
3578	4822 051 30103	10k 5% 62mW
3579	4822 051 30103	10k 5% 62mW
3601	4822 051 30223	22k 5% 62mW
3602	4822 051 30124	120k 5% 62mW
3603	4822 117 12891	220k 1%
3604	4822 051 30124	120k 5% 62mW
3605	4822 117 12891	220k 1%
3606	4822 051 30124	120k 5% 62mW
3607	4822 117 12891	220k 1%
3608	4822 051 30124	120k 5% 62mW
3609	4822 117 12891	220k 1%
3612	4822 117 12925	47k 1% 63mW
3613	4822 117 12925	47k 1% 63mW
3614	4822 117 12925	47k 1% 63mW
3615	4822 117 12925	47k 1% 63mW
3616	4822 051 30272	2k7 5% 62mW
3624	4822 117 11817	1k2 1% 62mW
3626	4822 051 30154	150k 5% 62mW
3627	4822 051 30103	10k 5% 62mW
3628	4822 051 30223	22k 5% 62mW
3630	4822 051 30563	56k 5% 62mW
3634	4822 051 30121	120Ω 5% 62mW
3636	4822 051 30271	270Ω 5% 62mW
3637	4822 117 12864	82k 5% 0.6W
3639	4822 051 30102	1k 5% 62mW
3640	4822 051 30101	100Ω 5% 62mW
3641	4822 051 30101	100Ω 5% 62mW
3642	4822 051 30101	100Ω 5% 62mW
3643	4822 051 30101	100Ω 5% 62mW
3644	4822 117 11152	4Ω7 5%
3653	4822 051 30008	Jumper
3654	4822 051 30008	Jumper
3655	4822 051 30101	100Ω 5% 62mW
3656	4822 051 30101	100Ω 5% 62mW
3657	4822 051 30563	56k 5% 62mW
3658	4822 051 30154	150k 5% 62mW
3659	4822 051 30154	150k 5% 62mW
3663	4822 051 30181	180Ω 5% 62mW
3664	4822 051 30102	1k 5% 62mW
3666	4822 051 30154	150k 5% 62mW
3667	4822 117 12864	82k 5% 0.6W
3668	4822 051 30563	56k 5% 62mW
3669	4822 051 30271	270Ω 5% 62mW
3670	4822 051 30102	1k 5% 62mW
3671	4822 117 11817	1k2 1% 62mW
3673	4822 051 30103	10k 5% 62mW
3675	4822 051 30181	180Ω 5% 62mW
3676	4822 117 13632	100k 1% 620mW
3677	4822 117 13632	100k 1% 620mW
3680	4822 117 11817	1k2 1% 62mW
3681	4822 051 30154	150k 5% 62mW
3682	4822 051 30102	5% 62mW
3683	4822 051 30223	22k 5% 62mW
3684	4822 051 30008	Jumper
3685	4822 051 30008	Jumper
3688	4822 051 30008	Jumper
3689	4822 051 30008	Jumper
3692	4822 051 30008	Jumper
3693	4822 051 30008	Jumper
3698	4822 117 11817	1k2 1% 62mW

3699	2322 702 60184	180k 5%
3703	5322 117 13047	330Ω 1% 63mW
3704	5322 117 13047	330Ω 1% 63mW
3705	5322 117 13047	330Ω 1% 63mW
3709	4822 051 30101	100Ω 5% 62mW
3710	4822 051 30101	100Ω 5% 62mW
3711	4822 117 12925	47k 1% 63mW
3712	4822 117 12925	47k 1% 63mW
3713	4822 051 30181	180Ω 5% 62mW
3714	4822 051 30181	180Ω 5% 62mW
3715	4822 051 30181	180Ω 5% 62mW
3716	4822 117 13632	100k 1% 620mW
3717	4822 117 13632	100k 1% 620mW
3718	4822 117 13632	100k 1% 620mW
3719	4822 051 30332	3k3 5% 62mW
3720	4822 051 30103	10k 5% 62mW
3721	4822 117 12917	1Ω 5% 62mW
3725	4822 051 30332	3k3 5% 62mW
3726	4822 117 11817	1k2 1% 62mW
3727	4822 051 30151	150Ω 5% 62mW
3728	4822 051 30151	150Ω 5% 62mW
3729	4822 051 30689	68Ω 5% 63mW
3730	4822 051 30681	680Ω 5% 62mW
3731	4822 051 30472	4k7 5% 62mW
3733	4822 051 30472	4k7 5% 62mW
3735	4822 117 12917	1Ω 5% 62mW
3736	4822 051 30101	100Ω 5% 62mW
3737	4822 051 30102	1k 5% 62mW
3738	4822 051 30102	1k 5% 62mW
3739	4822 051 30153	15k 5% 62mW
3740	4822 051 30102	1k 5% 62mW
3741	4822 051 30183	18k 5% 62mW
3742	4822 051 30183	18k 5% 62mW
3744	4822 051 30222	2k2 5% 62mW
3745	4822 051 30102	1k 5% 62mW
3746	4822 051 30392	3k9 5% 63mW
3747	4822 051 30154	150k 5% 62mW
3748	4822 117 12891	220k 1%
3749	4822 051 30392	3k9 5% 63mW
3750	4822 051 30332	3k3 5% 62mW
3751	4822 051 30472	4k7 5% 62mW
3752	4822 117 12917	1Ω 5% 62mW
3753	4822 117 12917	1Ω 5% 62mW
3754	4822 051 30101	100Ω 5% 62mW
3755	4822 051 30472	4k7 5% 62mW
3756	4822 117 12902	8k2 1% 63mW
3757	4822 051 30479	47Ω 5% 62mW
3758	4822 051 30472	4k7 5% 62mW
3759	4822 051 30221	220Ω 5% 62mW
3762	4822 051 30101	100Ω 5% 62mW
3763	4822 117 12139	22Ω 5% 62mW
3764	4822 051 30109	10Ω 5% 62mW
3771	4822 117 12971	15Ω 5% 620mW
3772	4822 117 12971	15Ω 5% 620mW
3773	4822 117 12925	47k 1% 63mW
3774	4822 117 12925	47k 1% 63mW
3781	4822 117 12925	47k 1% 63mW
3782	4822 117 12925	47k 1% 63mW
3783	4822 117 12925	47k 1% 63mW
3785	4822 117 13577	330Ω 1% 1.25W
3786	4822 117 13577	330Ω 1% 1.25W
3787	4822 117 13577	330Ω 1% 1.25W
3788	5322 117 13034	1k5 1% 63mW
3789	5322 117 13043	220Ω 1% 63mW
3790	5322 117 13059	560Ω 1% 63mW
3791	5322 117 13049	470Ω 1% 63mW
3792	4822 051 30102	1k 5% 62mW
3793	4822 051 30222	2k2 5% 62mW
3794	4822 117 12971	15Ω 5% 620mW
3795	4822 051 30339	33Ω 5% 62mW
3800	5322 117 13058	150Ω 1% 63mW
3801	4822 051 30102	1k 5% 62mW
3802	5322 117 13058	150Ω 1% 63mW
3803	5322 117 13058	150Ω 1% 63mW
3804	4822 051 30102	1k 5% 62mW
3805	5322 117 13049	470Ω 1% 63mW
3806	5322 117 13049	470Ω 1% 63mW
3807	5322 117 13068	82Ω 1% 63mW
3808	5322 117 13057	820Ω 1% 63mW
3809	5322 117 13043	220Ω 1% 63mW
3810	4822 051 30391	390Ω 5% 62mW
3811	4822 051 30759	75Ω 5% 62mW
3812	4822 051 30759	75Ω 5% 62mW
3813	4822 051 30391	390Ω 5% 62mW
3814	4822 051 30759	75Ω 5% 62mW
3815	4822 051 30759	75Ω 5% 62mW
3816	4822 051 30391	390Ω 5% 62mW
3817	4822 051 30759	75Ω 5% 62mW
3818	4822 051 30759	75Ω 5% 62mW
3819	4822 051 30759	75Ω 5% 62mW
3820	4822 051 30759	75Ω 5% 62mW
3821	4822 051 30759	75Ω 5% 62mW
3822	4822 051 30759	75Ω 5% 62mW
3823	4822 051 30759	75Ω 5% 62mW
3824	4822 051 30759	75Ω 5% 62mW
3825	5322 117 13058	150Ω 1% 63mW
3826	5322 117 13058	150Ω 1% 63mW
3827	5322 117 13058	150Ω 1% 63mW
9015	4822 051 30008	Jumper
9302	4822 051 30008	Jumper
9303	4822 051 30008	Jumper
9304	4822 051 30008	Jumper
9318	4822 051 30008	Jumper
9322	4822 051 30008	Jumper
9406	4822 051 30008	Jumper
9410	4822 051 30008	Jumper
9413	4822 051 30008	Jumper
9416	4822 051 30008	Jumper
9417	4822 051 30008	Jumper
9418	4822 051 30008	Jumper
9419	4822 051 30008	Jumper
9420	4822 051 30008	Jumper
9520	4822 051 30008	Jumper
9522	4822 051 30008	Jumper
9603	4822 051 30008	Jumper
9604	4822 051 30008	Jumper
9607	4822 051 30008	Jumper
9608	4822 051 30008	Jumper
9609	4822 051 30008	Jumper
9688	4822 051 30008	Jumper
9689	4822 051 30008	Jumper
9691	4822 051 30008	Jumper
9692	4822 051 30008	Jumper
9702	4822 051 30008	Jumper
9704	4822 051 30008	Jumper
9713	4822 051 30008	Jumper
9715	4822 051 30008	Jumper
9716	4822 051 30008	Jumper
9717	4822 051 30008	Jumper
9718	4822 051 30008	Jumper
9719	4822 051 30008	Jumper
9722	4822 051 30008	Jumper
9724	4822 051 30008	Jumper
9725	4822 051 30008	Jumper
9731	4822 051 30008	Jumper
9733	4822 051 30008	Jumper
9735	4822 051 30008	Jumper
9736	4822 051 30008	Jumper
9737	4822 051 30008	Jumper
9738	4822 051 30008	Jumper
9739	4822 051 30008	Jumper
9740	4822 051 30008	Jumper
9741	4822 117 12662	4X10Ω 5%
9744	4822 051 30008	Jumper
9747	4822 051 30008	Jumper
9754	4822 051 30008	Jumper
9760	4822 051 30008	Jumper
9761	4822 051 30008	Jumper
9762	4822 051 30008	Jumper
9763	4822 051 30008	Jumper
9764	4822 051 30008	Jumper
9765	4822 051 30008	Jumper
9768	4822 051 30008	Jumper
9769	4822 051 30008	Jumper
9901	4822 051 30008	Jumper
9902	4822 051 30008	Jumper
9903	4822 051 30008	Jumper
9904	4822 051 30008	Jumper
9905	4822 051 30008	Jumper
9906	4822 051 30008	Jumper
9907	4822 051 30008	Jumper
9908	4822 051 30008	Jumper
9909	4822 051 30008	Jumper
9919	4822 051 30008	Jumper
9920	4822 051 30008	Jumper
9921	4822 051 30008	Jumper
9925	4822 051 30008	Jumper
9927	4822 051 30008	Jumper
9928	4822 051 30008	Jumper
9929	4822 051 30008	Jumper
9935	4822 051 30008	Jumper
9937	4822 051 30008	Jumper
9938	4822 051 30008	Jumper
9939	4822 051 30008	Jumper
9944	4822 051 30008	Jumper
9945	4822 051 30008	Jumper
9946	4822 051 30008	Jumper
9947	4822 051 30008	Jumper
9948	4822 051 30008	Jumper
9949	4822 051 30008	Jumper
9950	4822 051 30008	Jumper
9951	4822 051 30008	Jumper
9952	4822 051 30008	Jumper
9953	4822 051 30008	Jumper
9954	4822 051 30008	Jumper

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5301	4822 157 11876	6.8µH 10%
5302	4822 157 11876	6.8µH 10%
5401	4822 157 11876	6.8µH 10%
5403	2422 549 44461	5CCE
5404	2422 535 95427	IND FXD EMI Bead 100MHz 120R
5405	2422 535 95427	IND FXD EMI Bead 100MHz 120R
5406	4822 157 10586	2.2µH 10%
5408	2422 549 44983	IND VAR 5CCB 78mH z PM
5409	2422 535 95427	IND FXD EMI Bead 100MHz 120R
5411	3198 018 32770	0U27 10%
5415	4822 157 11716	BLM21P300SPT
5416	4822 157 11716	BLM21P300SPT
5651	2422 549 43769	IND FXD EMI Bead 100MHz 30R
5652	2422 549 43769	IND FXD EMI Bead 100MHz 30R
5653	2422 549 43769	IND FXD EMI Bead 100MHz 30R
5654	4822 157 11716	BLM21P300SPT
5655	4822 157 11828	22µH 20%
5656	4822 157 11876	6.8µH 10%
5663	2422 549 43769	IND FXD EMI Bead 100MHz 30R
5671	4822 157 11716	BLM21P300SPT
5672	4822 157 11716	BLM21P300SPT
5700	4822 157 10586	2.2µH 10%
5701	4822 157 71304	1µH
5702	4822 157 71304	1µH
5705	4822 156 21729	BK2125HM102-T
5706	4822 157 11716	BLM21P300SPT
5710	4822 156 21729	BK2125HM102-T
5711	4822 156 21729	BK2125HM102-T
5712	4822 156 21729	BK2125HM102-T
5713	4822 157 11716	BLM21P300SPT
5714	4822 157 71206	BLM21A601SPT
5716	4822 156 21729	BK2125HM102-T
5717	4822 156 21729	BK2125HM102-T
5718	4822 157 11716	BLM21P300SPT
5719	4822 156 21729	BK2125HM102-T
5721	4822 157 71206	BLM21A601SPT
5722	4822 156 21729	BK2125HM102-T
5724	4822 156 21729	BK2125HM102-T
5725	4822 157 71206	BLM21A601SPT
5726	4822 156 21729	BK2125HM102-T
5727	4822 156 21729	BK2125HM102-T
5728	4822 157 11716	BLM21P300SPT
5729	4822 157 11716	BLM21P300SPT
5731	4822 156 21729	BK2125HM102-T
5736	4822 157 11876	6.8µH 10%
5737	4822 156 21729	BK2125HM102-T
5738	4822 157 11716	BLM21P300SPT
5739	4822 157 10586	2.2µH 10%
5740	4822 157 10586	2.2µH 10%
5741	4822 157 10586	2.2µH 10%
5742	4822 157 11716	BLM21P300SPT
5743	4822 156 21729	BK2125HM102-T
5744	4822 157 11716	BLM21P300SPT
5900	4822 157 11716	BLM21P300SPT
5901	4822 157 11716	BLM21P300SPT
5902	4822 157 11716	BLM21P300SPT
5903	4822 157 11716	BLM21P300SPT
5904	4822 157 11716	BLM21P300SPT
5910	4822 157 11074	100µH
5911	4822 157 11074	100µH
5912	4822 157 11074	100µH
5913	4822 157 11074	100µH
5914	4822 157 11074	100µH
5915	4822 157 11074	100µH
5917	4822 157 11074	100µH
5918	4822 157 11074	100µH
5919	4822 157 11074	100µH
5920	4822 157 11074	100µH

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6001	4822 130 80622	BAT54
6002	4822 130 11397	BAS316
6003	4822 130 80622	BAT54
6004	4822 130 80622	BAT54
6005	4822 130 11422	PLVA2650A
6303	4822 130 11594	BZX284-C47
6304	4822 130 11397	BAS316
6306	3198 020 55680	BZX384-C5V6
6307	4822 130 11528	1PS76SB10
6309	4822 130 11397	BAS316
6310	4822 130 11416	PDZ6.8B
6311	9340 548 67115	PDZ22B

6312	4822 130 11397	BAS316
6313	9322 149 08685	BZM55-C22
6314	4822 130 11397	BAS316
6317	4822 130 11397	BAS316
6319	4822 130 11397	BAS316
6334	4822 130 11397	BAS316
6403	9340 552 30115	BA591
6652	9322 129 40685	BZM55-C10
6657	9322 102 64685	UDZ2.7B
6658	4822 130 11397	BAS316
6926	4822 130 10837	UDZS8.2B
6956	4822 130 10837	UDZS8.2B
6957	4822 130 10837	UDZS8.2B

7001	9352 684 81557	SAA5801H/015
7002	3198 010 42320	BC857BW
7003	3198 010 42310	BC847BW
7004	3198 010 42310	BC847BW
7005	9322 116 74668	LD1117D33
7006	9322 170 36702	LH28F320BJE
7007	9322 157 20668	MSM51V18165F-60J
7008	3198 010 42310	BC847BW
7009	3198 010 42310	BC847BW
7010	3198 010 42320	BC857BW
7011	9322 156 81668	M24C32-WMN6TNKSA
7012	9322 156 72668	M29W400BT-90N1
7013	3198 010 42310	BC847BW
7014	3198 010 42320	BC857BW
7015	4822 209 73852	PMBT2369
7016	4822 209 73852	PMBT2369
7301	9352 681 65518	TDA9330N3
7303	3198 010 42320	BC857BW
7304	9340 310 30215	PDTC144ET
7306	3198 010 42310	BC847BW
7307	9352 630 99118	TDA9181T
7310	3198 010 42310	BC847BW
7311	3198 010 42320	BC857BW
7312	9340 310 30215	PDTC144ET
7313	4822 209 73852	PMBT2369
7314	3198 010 42310	BC847BW
7315	4822 209 73852	PMBT2369
7318	3198 010 42320	BC857BW
7320	3198 010 42310	BC847BW
7322	3198 010 42310	BC847BW
7323	9352 625 24518	TDA9321H
7402	3198 010 42310	BC847BW
7403	5322 130 60159	BC846B
7404	3198 010 42310	BC847BW
7407	4822 130 60373	BC856B
7410	3198 010 42310	BC847BW
7411	5322 130 60159	BC846B
7413	5322 130 42718	BFS20
7651	9322 183 28702	MSP3412G
7652	9351 869 40118	74HC4053PW
7653	9351 869 40118	74HC4053PW
7654	9340 425 20115	BC847BS
7656	9340 425 30115	BC847BPN
7663	9340 425 30115	BC847BPN
7664	9340 425 30115	BC847BPN
7665	9340 425 30115	BC847BPN
7666	9340 425 30115	BC847BPN
7667	3198 010 42310	BC847BW
7668	3198 010 42320	BC857BW
7674	3198 010 42310	BC847BW
7675	9340 425 20115	BC847BS
7677	3198 010 42310	BC847BW
7678	9340 425 20115	BC847BS
7679	9340 425 20115	BC847BS
7680	3198 010 42310	BC847BW
7681	4822 209 31378	NJM4556MB
7682	5322 130 60159	BC846B
7703	4822 209 73852	PMBT2369
7706	9322 142 88668	LF25CDT
7707	5322 130 60159	BC846B
7708	5322 130 60159	BC846B
7709	5322 130 60159	BC846B
7710	5322 130 60159	BC846B
7711	2422 486 80938	32p female
7712	9351 870 00118	74HC573PW
7713	9352 688 09557	SAA4978H/V204
7714	9965 000 02179	MS81V04160-25TB
7715	4822 209 73852	PMBT2369
7717	9352 498 00518	SAA4955TJ/V1
7718	9352 695 58557	SAA4993H/V1
7719	9352 498 00518	SAA4955TJ/V1
7722	9965 000 02179	MS81V04160-25TB
7723	9965 000 02179	MS81V04160-25TB
7724	9322 174 33702	T8F24EF
7725	4822 209 73852	PMBT2369
7726	4822 209 17398	LD1117DT33
7727	9322 170 14668	LF15ABDT
7728	5322 130 42718	BFS20
7729	5322 130 42718	BFS20
7730	5322 130 42718	BFS20
7731	5322 130 42718	BFS20
7732	5322 130 42718	BFS20
7733	5322 130 42718	BFS20

Mainsswitch panel [E]

Various

0001	3104 303 37365	Mains switch
0151	4822 256 10336	LED holder
0151	4822 256 91766	LED holder
0170	4822 256 10562	Photo diode holder
0201	2422 025 16268	2p male
0202	2422 025 16268	2p male
0241	2422 025 06354	9p male
1050	9322 154 48667	TSOP2236UH1
1051	2422 128 02924	Power switch
1051	2422 128 02972	Power switch
8202	3104 311 02571	680 2P3
8946	3104 311 04981	9p 820mm

2051	4822 124 41584	100µF 10V
2070	4822 126 13879	220nF 16V
2071	4822 124 40248	10µF 50V

3050	4822 117 13577	330Ω 5%
3051	4822 051 30471	470Ω 5%
3054	4822 051 20471	470Ω 5%
3057	4822 053 21335	3.3MΩ 5%
3066	4822 053 21335	3.3MΩ 5%
3070	4822 051 30334	330kΩ 5%
3071	4822 051 30334	330kΩ 5%
3072	4822 051 30102	1kΩ 5%
3073	4822 051 30103	10kΩ 5%
3074	4822 051 30472	4.7kΩ 5%
3075	4822 051 30472	4.7kΩ 5%
3076	4822 051 30682	6.8kΩ 5%
3077	4822 051 30103	10kΩ 5%
3078	4822 051 30102	1kΩ 5%
3079	4822 051 30332	3kΩ3 5%
3082	4822 051 30008	Jumper
3998	4822 116 52213	180Ω 5% 62mW

6051	4822 209 72895	TLUV5300
6070	4822 130 11595	BPW46

7070	4822 209 70672	LM358N
7070	4822 209 70672	LM358N

CRT panel [F]

Various

0032	4822 492 70788	Fix IC
0034	4822 492 70788	Fix IC
0036	4822 492 70788	Fix IC
1298	2422 500 80063	10P female
1298	2422 500 80078	CRT socket 11P female
1424	2422 025 11244	7p male
1483	2422 025 16382	3 male
8483	3104 311 03111	3p 340mm

2312	4822 126 14585	100nF 10% 50V
2313	4822 124 12373	47µF 20% 250V
2318	4822 126 14494	22nF 10% 25V
2319	4822 122 30043	10nF 80% 63V
2324	4822 121 70581	1.5nF 5% 2kV
2324	4822 121 70594	1nF 5% 2kV
2324	5322 121 44356	4.7nF 5% 2kV
2338	4822 121 40518	100nF 10% 250V
2339	4822 121 40518	100nF 10% 250V
2340	4822 121 40518	100nF 10% 250V
2341	2238 586 59812	100nF 50V
2342	4822 126 14241	330pF 50V
2347	4822 124 80791	470µF 20% 16V
2348	5322 126 11583	10nF 10% 50V
2358	4822 124 80791	470µF 20% 16V
2359	5322 126 11583	10nF 10% 50V
2403	4822 124 41584	100µF 20% 10V
2404	4822 124 41584	100µF 20% 10V
2405	4822 122 31177	470pF 10% 500V
2409	5322 126 11583	10nF 10% 50V
2411	4822 126 14494	22nF 10% 25V
2420	4822 126 14238	2.2nF 50V
2427	5322 126 11578	1nF 10% 50V
2428	4822 126 14238	2.2nF 50V
2436	4822 124 40764	22µF 100 V
2437	5322 126 11578	1nF 10% 50V
2438	4822 126 14238	2.2nF 50V
2439	4822 126 14238	2.2nF 50V
2501	2238 586 59812	100nF 50V
2503	2238 586 59812	100nF 50V
2505	2238 586 59812	100nF 50V
2510	4822 126 14585	100nF 10% 50V
2511	4822 126 14585	100nF 10% 50V

3301	4822 117 12517	5k6 5% 5W
3304	4822 052 10102	1k 5% 0.33W
3305	4822 052 10108	1Ω 5% 0.33W
3310	4822 051 30102	1k 5% 62mW
3334	4822 050 11002	1k 1% 0.4W
3338	4822 116 83872	220Ω 5% 0.5W
3339	4822 116 83872	220Ω 5% 0.5W
3340	4822 116 83872	220Ω 5% 0.5W
3341	4822 052 11479	47Ω 5% 0.5W
3345	4822 116 52191	33Ω 5% 0.5W
3347	3198 013 01520	1k5 2% 0.5W
3348	4822 117 13016	VDR 1mA/50V
3349	3198 013 01020	1k 2% 0.5W
3350	4822 116 52175	100Ω 5% 0.5W
3351	4822 116 52175	100Ω 5% 0.5W
3352	4822 116 52175	100Ω 5% 0.5W
3356	4822 051 30102	1k 5% 62mW
3401	4822 053 11101	100Ω 5% 2W
3402	4822 116 52176	10Ω 5% 0.5W
3403	4822 052 10108	1Ω 5% 0.33W
3403	4822 052 11108	1Ω 5% 0.5W
3404	4822 052 10108	1Ω 5% 0.33W
3410	4822 117 12968	820Ω 5% 620mW
3411	4822 117 13632	100k 1% 620mW
3412	4822 051 30008	Jumper
3413	4822 117 12968	820Ω 5% 620mW
3416	4822 117 13632	100k 1% 620mW
3417	4822 051 30008	Jumper
3422	4822 051 30008	Jumper
3423	4822 051 30008	Jumper
3424	3198 021 32250	2.2M 5%
3425	3198 021 32250	2.2M 5%
3426	3198 021 32250	2.2M 5%
3427	3198 021 32250	2.2M 5%
3429	4822 051 30102	1k 5% 62mW
3448	4822 117 12968	820Ω 5% 620mW
3449	2120 108 91909	39Ω 5%
3450	4822 051 30102	1k 5% 62mW
3451	4822 051 30479	47Ω 5% 62mW
3452	4822 051 30393	39k 5% 62mW
3453	4822 051 30392	3k9 5% 63mW
3454	4822 117 12968	820Ω 5% 620mW
3455	4822 051 30472	4k7 5% 62mW
3456	4822 051 30101	100Ω 5% 62mW
3458	2120 108 91909	39Ω 5%
3460	4822 051 30101	100Ω 5% 62mW
3470	4822 116 80176	1Ω 5% 0.5W
3471	4822 051 30101	100Ω 5% 62mW
3472	4822 116 80176	1Ω 5% 0.5W
3473	4822 116 80176	1Ω 5% 0.5W
3474	4822 051 30102	1k 5% 62mW
3477	4822 051 30109	10Ω 5% 62mW
3478	4822 116 80176	1Ω 5% 0.5W
3488	4822 051 30109	10Ω 5% 62mW
3501	4822 051 20471	470Ω 5% 0.1W
3502	4822 051 30331	330Ω 5% 62mW
3506	4822 051 30008	Jumper
3508	4822 051 30008	Jumper
3509	4822 051 30471	470Ω 5% 62mW
3510	4822 116 52175	100Ω 5% 0.5W
3510	4822 116 83868	150Ω 5% 0.5W
3511	4822 051 20471	470Ω 5% 0.1W
3512	4822 051 30331	330Ω 5% 62mW
3516	4822 117 13632	100k 1% 620mW
3517	4822 051 30102	1k 5% 62mW
3519	4822 051 30471	470Ω 5% 62mW
3520	4822 116 83868	150Ω 5% 0.5W
3520	4822 116 83881	390Ω 5% 0.5W
3521	4822 051 20471	470Ω 5% 0.1W
3522	4822 051 30331	330Ω 5% 62mW

3526	4822 051 30008	Jumper
3528	4822 051 30008	Jumper
3529	4822 051 30471	470Ω 5% 62mW
3530	4822 116 83868	150Ω 5% 0.5W
3530	4822 116 83876	270Ω 5% 0.5W
3530	4822 116 83881	390Ω 5% 0.5W
3532	4822 051 30008	Jumper
3534	4822 051 30008	Jumper
3535	4822 117 11503	220Ω 1% 0.1W
3536	4822 117 11503	220Ω 1% 0.1W
3537	4822 117 11503	220Ω 1% 0.1W
3538	4822 117 11503	220Ω 1% 0.1W
3539	4822 051 20471	470Ω 5% 0.1W
3540	4822 117 11503	220Ω 1% 0.1W
3541	4822 051 20471	470Ω 5% 0.1W
3542	4822 117 11503	220Ω 1% 0.1W
3543	4822 051 20471	470Ω 5% 0.1W
3544	4822 116 52285	470k 5% 0.5W
3999	4822 117 11817	1k2 1% 62mW
9301	4822 051 30008	Jumper
9302	4822 051 30008	Jumper
9303	4822 051 30008	Jumper
9305	4822 051 30008	Jumper
9306	4822 051 30008	Jumper
9308	4822 051 30008	Jumper
9314	4822 051 30008	Jumper
9401	4822 051 20008	Jumper
9402	4822 051 30008	Jumper
9403	4822 051 30008	Jumper
9427	4822 051 30008	Jumper
9428	4822 051 30008	Jumper
9432	4822 051 30008	Jumper
9433	4822 051 30008	Jumper
9437	4822 051 30008	Jumper
9450	4822 051 20008	Jumper
9452	4822 051 20008	Jumper
9453	4822 051 20008	Jumper
9501	4822 051 30008	Jumper
9502	4822 051 30008	Jumper
9503	4822 051 30008	Jumper

5300	2422 531 98035	Transformer S13974-01
5304	4822 526 10704	Bead 100MHz
5308	4822 157 11867	5.6µH 5%
5309	4822 157 11867	5.6µH 5%
5310	4822 157 50964	100µH
5400	4822 157 11869	33µH 10%
5400	4822 157 71467	39µH 10%
5500	2722 122 00332	Delay line 40ns SDL-4693
5501	2722 122 00332	Delay line 40ns SDL-4693
5502	2722 122 00332	Delay line 40ns SDL-4693

6301	9340 553 52115	BAS321
6302	9340 553 52115	BAS321
6303	9340 553 52115	BAS321
6305	9340 553 52115	BAS321
6306	9340 553 52115	BAS321
6307	9340 553 52115	BAS321
6401	4822 130 11397	BAS316
6402	4822 130 11397	BAS316
6403	4822 130 11397	BAS316
6404	4822 130 11397	BAS316
6405	3139 120 52021	BYV29X-500
6408	4822 117 11373	100Ω 1%
6409	4822 130 11397	BAS316
6410	4822 117 11373	100Ω 1%
6411	4822 130 11397	BAS316
6420	5322 130 34337	BAV99
6421	5322 130 34337	BAV99
6422	5322 130 34337	BAV99
6426	4822 130 30613	BAW62
6427	4822 130 30613	BAW62
6428	4822 130 30613	BAW62
6430	9340 548 61115	PDZ12B

7330	9352 694 46112	TDA6118JF
7340	9352 694 46112	TDA6118JF
7350	9352 694 46112	TDA6118JF
7414	5322 130 62804	BCP53
7415	5322 130 63033	BCP56
7422	5322 130 42718	BFS20
7423	5322 130 60159	BC846B
7425	5322 130 42718	BFS20
7426	4822 130 60373	BC856B
7427	5322 130 60159	BC846B
7428	4822 130 60373	BC856B
7429	5322 130 63033	BCP56
7430	5322 130 62804	BCP53
7431	4822 130 60383	BF824
7432	5322 130 42718	BFS20
7500	5322 130 42718	BFS20
7502	4822 130 60373	BC856B
7503	5322 130 42718	BFS20
7505	4822 130 60373	BC856B
7506	5322 130 42718	BFS20
7508	4822 130 60373	BC856B

DC shift panel [G]

Various

0317	4822 265 20723	2p
0318	4822 265 20723	2p
1430	2422 086 10581	Fuse 400mA 65V
8317	3104 311 01421	2p 220mm

2430	4822 122 31177	470pF 10% 500V
2431	4822 122 31177	470pF 10% 500V

5430	3128 138 38911	DC shift coil

6432	9340 317 00133	BYD33V
6433	9340 317 00133	BYD33V

I/O 3rd scart [H]

Various

1402	4822 267 10596	5p
1680	4822 265 31067	6p
1690	2422 025 16809	8p female
1937	2422 025 12493	10p male
1992	2422 025 16725	21p female
9502	4822 051 20008	Jumper
9503	4822 051 20008	Jumper
9506	4822 051 20008	Jumper
9507	4822 051 20008	Jumper
9508	4822 051 20008	Jumper
9514	4822 051 20008	Jumper
9515	4822 051 20008	Jumper
9523	4822 051 20008	Jumper
9531	4822 051 20008	Jumper

2500	2020 552 95344	680nF 16V
2501	4822 124 41643	100µF 20% 16V
2502	4822 126 14585	100nF 10% 50V
2503	5322 126 10511	1nF 5% 50V
2504	5322 122 32531	100pF 5% 50V
2505	4822 124 41643	100µF 20% 16V
2506	4822 126 14585	100nF 10% 50V
2507	5322 126 10511	1nF 5% 50V
2508	2020 552 95344	680nF 16V
2509	5322 122 32531	100pF 5% 50V
2513	4822 122 33575	220pF 5% 63V
2514	4822 126 14585	100nF 10% 50V
2517	4822 122 33575	220pF 5% 63V

3500	4822 117 13574	1Ω5 5%
3501	4822 051 10102	1k 2% 0.25W
3502	4822 051 20008	Jumper
3503	4822 117 10833	10k 1% 0.1W
3505	4822 117 13574	1Ω5 5%
3506	4822 117 10833	10k 1% 0.1W
3507	4822 051 10102	1k 2% 0.25W
3508	4822 051 20008	Jumper
3512	4822 117 11373	100Ω 1%
3515	4822 117 10837	100k 1% 0.1W
3516	4822 117 10837	100k 1% 0.1W
3517	4822 117 10353	150Ω 1% 0.1W
3518	4822 117 10353	150Ω 1% 0.1W
3519	4822 117 10833	10k 1% 0.1W
3520	4822 117 11373	100Ω 1%
3521	4822 117 11373	100Ω 1%
3522	4822 117 10833	10k 1% 0.1W
3523	4822 051 20472	4k7 5% 0.1W
3524	4822 117 10837	100k 1% 0.1W
3526	4822 117 11373	100Ω 1%
3527	4822 051 10102	1k 2% 0.25W
3528	4822 051 20471	470Ω 5% 0.1W
3533	4822 117 11927	75Ω 1% 0.1W
3538	4822 117 11373	100Ω 1%
3539	4822 117 11927	75Ω 1% 0.1W
3540	4822 117 11373	100Ω 1%
3541	4822 117 11927	75Ω 1% 0.1W
3542	4822 117 11373	100Ω 1%
3543	4822 117 11927	75Ω 1% 0.1W
3544	4822 117 11373	100Ω 1%
3545	4822 117 11927	75Ω 1% 0.1W
3546	4822 051 10102	1k 2% 0.25W
3999	4822 051 10102	1k 2% 0.25W

6500	4822 130 11416	PDZ6.8B
6501	4822 130 11416	PDZ6.8B
6502	4822 130 11416	PDZ6.8B
6503	4822 130 11416	PDZ6.8B
6504	4822 130 11416	PDZ6.8B
6505	4822 130 11416	PDZ6.8B
6506	4822 130 11416	PDZ6.8B
6507	9340 548 61115	PDZ12B
6509	4822 130 11416	PDZ6.8B
6510	4822 130 11416	PDZ6.8B
6511	4822 130 11416	PDZ6.8B
6512	4822 130 11416	PDZ6.8B

7501	5322 209 11578	PCF8574T
7502	5322 130 60159	BC846B
7503	5322 130 60159	BC846B
7505	5322 130 60159	BC846B
7506	4822 130 41246	BC327-25
7507	9340 217 80115	BC847CW

DAF panel [I]

Various

1417	4822 265 20723	2p male
1417	4822 265 20723	2p male
1418	2422 025 16374	2p male
1418	2422 025 16374	2p male
1419	4822 265 20723	2p male
1419	4822 265 20723	2p male
1492	4822 267 10735	3p male
1497	4822 267 10973	1p male
1497	4822 267 10973	1p male
1693	4822 267 10676	1p male
8418	3104 311 01951	2p 560mm

2800	2222 375 90188	390pF 5% 2kV
2800	2222 375 90498	470pF 5% 2kV
2809	4822 124 40207	100µF 25V
2812	4822 121 70435	10nF 5% 2kV
2813	4822 124 40248	10µF 50V
2814	4822 121 70594	1nF 5% 2kV
2821	2222 479 90166	68nF 5% 400V
2822	4822 121 43856	4nF7 10% 50V
2824	4822 124 40248	10µF 50V
2825	4822 121 51319	1µF 10% 50V
2890	2222 375 90276	220pF 5% 2kV
2890	2222 375 90188	390pF 5% 2kV

3807	4822 052 10159	15Ω 5%
3808	4822 052 10159	15Ω 5%
3809	4822 052 10109	10Ω 5%
3810	4822 053 21474	470kΩ 5%
3811	4822 053 20475	4.7MΩ 5%
3812	4822 116 52264	27kΩ 5% 62mW
3813	4822 116 52285	470kΩ 5% 62mW
3814	4822 050 21004	100kΩ 5%
3815	4822 050 11002	1kΩ 5% 62mW
3816	4822 116 52256	2.2kΩ 5% 62mW
3818	4822 051 20333	33kΩ 5%
3820	4822 051 20008	Jumper
3821	4822 051 20008	Jumper
3822	4822 051 20008	Jumper
3823	4822 117 11139	1.5kΩ 5%
3824	4822 051 20333	33kΩ 5%

3826	4822 051 20332	3.3kΩ 5%
3827	4822 051 20562	5.6kΩ 5%
3828	4822 117 10837	100kΩ 5%
3830	4822 117 10834	47kΩ 5%
3831	4822 051 20472	4.7kΩ 5%
3832	4822 051 20182	1.8kΩ 5%
3833	4822 051 20472	4.7kΩ 5%
3898	4822 116 21239	VDR 1mA/612V
3898	4822 116 21239	VDR 1mA/612V
3899	4822 116 21239	VDR 1mA/612V
3899	4822 116 21239	VDR 1mA/612V
3998	4822 116 52213	180Ω 5% 62mW

5800	4822 148 81242	Coil CU20C2
5800	2422 531 02437	Transformer
5800	2422 531 02437	Transformer
5801	8228 001 34391	Transformer
5810	3128 138 40041	Bridge coil CU15

6810	9340 317 00133	BYD33V
6812	4822 130 34441	BZX79-C22

7810	9322 136 03687	STP3NB80FP
7818	5322 130 60159	BC847B
7822	5322 130 60159	BC847B
7823	4822 130 60373	BC857B

Side I/O panel [O]

Various

1326	4822 267 10975	Cinch 3p female
1327	4822 267 31014	SOC PHONE 1p female
1328	2422 026 05133	MDIN 4P female
1936	2422 025 12485	11p male
8936	3104 311 05081	11p 720mm

2803	5322 126 10733	680pF 50V
2804	5322 122 32531	100pF 50V
2805	5322 122 32531	100pF 50V
2806	5322 126 10733	680pF 50V
2807	4822 126 14076	220nF 25V
2813	4822 124 22652	2µF2 50V
2832	4822 122 33177	10nF 50V
2834	4822 122 33177	10nF 50V
2840	5322 126 10733	680pF 50V
2841	5322 126 10733	680pF 50V

3801	4822 117 11927	75Ω 5%
3802	4822 116 52201	75Ω 5% 62mW
3803	4822 050 11002	1kΩ 5% 62mW
3804	4822 050 11002	1kΩ 5% 62mW
3808	4822 051 20008	Jumper
3809	4822 051 20008	Jumper
3814	4822 117 10833	10kΩ 5%
3816	4822 051 20008	Jumper
3826	4822 116 52206	120Ω 5% 62mW
3827	4822 116 52206	120Ω 5% 62mW
3828	4822 116 52206	120Ω 5% 62mW
3829	4822 116 52206	120Ω 5% 62mW
3830	4822 050 21003	10kΩ 5% 62mW
3835	4822 116 52175	100Ω 5% 62mW
3842	4822 050 21003	10kΩ 5% 62mW

6801	9322 129 38685	BZM55-C6V8
6801	4822 130 10852	BZX284-C6V8
6801	4822 130 10794	PDZ6.8B
6802	9322 129 38685	BZM55-C6V8
6802	4822 130 10852	BZX284-C6V8
6802	4822 130 10794	PDZ6.8B
6803	9322 129 38685	BZM55-C10
6803	4822 130 10794	BZX284-C10
6803	4822 130 10794	PDZ10B
6804	9322 129 38685	BZM55-C10
6804	4822 130 10794	BZX284-C10
6804	4822 130 10794	PDZ10B
6805	9322 129 38685	BZM55-C10
6805	4822 130 10794	BZX284-C10
6805	4822 130 10794	PDZ10B
6806	9322 129 38685	BZM55-C10
6806	4822 130 10794	BZX284-C10
6806	4822 130 10794	PDZ10B
6807	9322 129 38685	BZM55-C6V8
6807	4822 130 10852	BZX284-C6V8
6807	4822 130 10794	PDZ6.8B
6808	9322 129 38685	BZM55-C6V8
6808	4822 130 10852	BZX284-C6V8
6808	4822 130 10794	PDZ6.8B

Top control panel [P]

Various

0346	4822 267 10748	3p male
1701	4822 276 13775	Tact switch
1702	4822 276 13775	Tact switch
1703	4822 276 13775	Tact switch
1704	4822 276 13775	Tact switch
1705	4822 276 13775	Tact switch
8346	3104 301 07771	3p 1200mm
8346	3104 311 01401	3p 1500mm

3001	4822 051 20391	390Ω 5%
3003	4822 117 13528	200Ω 1%
3005	4822 117 11951	2kΩ 1%
3009	4822 117 11534	1.1kΩ 1%
3011	4822 117 10845	620Ω 1%
3999	4822 051 20471	470Ω 5%

Autoscavem panel [SC]

Various

1440	2422 025 12485	11p male
1940	2422 025 12485	11p male
1955	4822 267 10735	3p
8440	3104 311 05011	11p 340mm

2006	2238 586 59812	100nF 50V
2008	4822 126 14494	22nF 10% 25V
2010	2238 586 59812	100nF 50V
2012	4822 126 14494	22nF 10% 25V
2014	4822 126 14494	22nF 10% 25V
2016	4822 122 33741	10pF 10% 50V
2020	4822 126 14494	22nF 10% 25V
2038	4822 126 14494	22nF 10% 25V
2040	4822 126 14225	56pF 5% 50V
2208	4822 124 41584	100µF 20% 10V
2210	2238 586 59812	100nF 50V
2212	4822 122 33741	10pF 10% 50V
2600	4822 124 80791	470µF 20% 16V
2602	5322 122 32654	22nF 10% 63V
2605	3198 017 41050	1µF 10V
2607	5322 122 32654	22nF 10% 63V

3018	4822 051 30102	1k 5% 62mW
3020	4822 051 30471	470Ω 5% 62mW
3022	4822 051 30393	39k 5% 62mW
3024	4822 051 30103	10k 5% 62mW
3028	4822 051 30223	22k 5% 62mW
3030	4822 051 30683	68k 5% 62mW
3032	4822 117 12903	1k8 1% 63mW
3034	4822 051 30222	2k2 5% 62mW
3036	4822 051 30332	3k3 5% 62mW
3038	4822 051 30561	560Ω 5% 62mW
3040	4822 117 12925	47k 1% 63mW
3042	4822 051 30682	6k8 5% 62mW
3044	4822 051 30102	1k 5% 62mW
3046	4822 051 30102	1k 5% 62mW
3048	4822 051 30102	1k 5% 62mW
3050	4822 051 30561	560Ω 5% 62mW
3052	4822 051 30561	560Ω 5% 62mW
3054	4822 051 30102	1k 5% 62mW
3056	4822 051 30102	1k 5% 62mW
3058	4822 051 30471	470Ω 5% 62mW
3060	4822 051 30471	470Ω 5% 62mW
3062	4822 051 30222	2k2 5% 62mW
3064	4822 117 12971	15Ω 5% 620mW
3066	4822 117 12902	8k2 1% 63mW
3068	4822 051 30681	680Ω 5% 62mW
3070	4822 117 12902	8k2 1% 63mW
3072	4822 051 30152	1k5 5% 62mW
3074	4822 051 30101	100Ω 5% 62mW
3076	4822 117 11817	1k2 1% 62mW
3078	4822 051 30102	1k 5% 62mW
3093	4822 051 30152	1k5 5% 62mW
3106	4822 051 30472	4k7 5% 62mW
3108	4822 051 30273	27k 5% 62mW
3110	4822 051 30392	3k9 5% 63mW
3112	4822 051 30222	2k2 5% 62mW
3114	4822 051 30101	100Ω 5% 62mW
3116	4822 051 30102	1k 5% 62mW
3118	4822 051 30103	10k 5% 62mW
3120	4822 051 30103	10k 5% 62mW
3254	4822 051 30471	470Ω 5% 62mW
3500	4822 051 30101	100Ω 5% 62mW
3502	4822 051 30101	100Ω 5% 62mW
3600	4822 117 11151	1Ω 5%
3999	4822 051 30102	1k 5% 62mW
9000	4822 051 30008	Jumper
9002	4822 051 30008	Jumper
9020	4822 051 30008	Jumper
9045	4822 051 30008	Jumper
9046	4822 051 30008	Jumper

5600	4822 157 11867	5.6µH 5%
5601	4822 157 11867	5.6µH 5%

6000	5322 130 80119	BBY40

7006	5322 130 42718	BFS20
7008	4822 130 60373	BC856B
7010	5322 130 42718	BFS20
7012	5322 130 60159	BC846B
7014	4822 130 60383	BF824
7016	5322 130 42718	BFS20
7018	5322 130 42718	BFS20
7020	4822 130 60383	BF824
7022	5322 130 42718	BFS20
7024	5322 130 42718	BFS20
7026	5322 130 42718	BFS20
7040	5322 130 42718	BFS20
7042	4822 130 60383	BF824
7500	5322 209 90559	TDA8444T