

Service
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Service Manual

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1. Technical Specifications, Connections, and Chassis Overview

1.1 Technical Specifications

1.1.1 Reception

Tuning system	: PLL
Colour systems	: PAL B/G, : PAL D/K, : SECAM B/G, : SECAM D/K : SECAM L, : SECAM L1
Sound system	: 2CS BG, : NICAM B/G, : NICAM D/K, : NICAM I, : NICAM L,
Built-in radio type	: FM
Speakers	: Full range : 13": 2 x 3 W _{rms} : 15": 2 x 3 W _{rms} : 20": 2 x 5 W _{rms}
Frequency bands	: UVSH
IF Freq.	: 38.9 MHz
Channel selections	: 100 channels : Full cable, UVSH
Aerial input	: 75 ohm : Coax IEC-type
Pixel format	: 13": 640 x 480 (VGA) : 15": 1024 x 768 (XGA) : 20": 640 x 480 (VGA)
Viewing angle	: 13": 120 x 90 degrees : 15": 176 x 170 degrees : 17": 176 x 170 degrees

1.1.2 Miscellaneous

Mains voltage 13"/15"	: External power Supply : Input: 100-240 Vac, : 1.5 A : Output: 12V dc, : +/- 0.6 V, 60 W
Mains voltage 20"	: External power Supply : Input: 100-240 V ac, : 1.5 A : Output: 24V dc, : +/- 1.2 V, 120 W
Mains frequency	: 50/60 Hz
Operating temperature	: + 5 to + 35 deg. C
Storage temp.	: -20 to 60 deg. C.
Maximum humidity	: 90% R.H. max (< 40(°C))
Power dissipation	: 13": 35 W : 15": 50 W : 20": 60 W
Standby Power dissipation	: 1 W
Weight	: 13": 4.5 kg : 15": 5.0 kg : 20": 8.5 kg
Dim. 13" model (WxHxD)	: 344x322x65 mm
Dim. 15" model (WxHxD)	: 377x361x70 mm
Dim. 20" model (WxHxD)	: 477x435x81 mm

1.2 Controls

1.2.1 Front + Top Controls

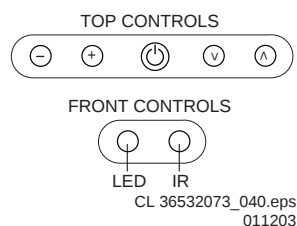


Figure 1-1 Front + Top Controls.

1.3 Connections

1.3.1 Left side Connections A/V

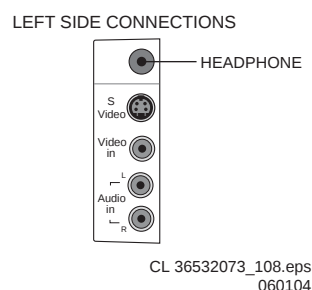


Figure 1-2 Left side connections.

Audio - Out

- Headphone, stereo 32 - 600 ohm/10 mW



S-VHS - In (Hosiden)

1 - Y	Ground
2 - C	Ground
3 - Y	1 Vpp/75 ohm
4 - C	0.3 Vpp/75 ohm



Video - In (Cinch)

- CVBS 1 Vpp/75 ohm



Audio - In (Cinch)

- Audio - L 0.5 Vrms/10 kohm
- Audio - R 0.5 Vrms/10 kohm



1.3.2 Bottom Connections

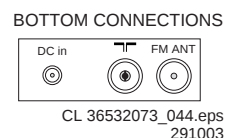


Figure 1-3 Bottom Connections

DC - In

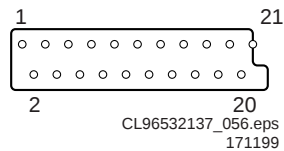
- 13"/15": 12 V_{dc}/5A/60 W
 20": 24V_{dc}/5A/60 W

**Aerial - In (IEC)**

- IEC type 75 ohm, coax

**FM Ant (IEC)**

- IEC type 75 ohm, coax

**1.3.3 Rear Connections****SCART EXT1 - In/Out (RGB/YUV and CVBS)****Figure 1-4 Rear connections**

1 - Audio - R	0.5 Vrms/1 kohm	
2 - Audio - R	0.5 Vrms/10 kohm	
3 - Audio - L	0.5 Vrms/1 kohm	
4 - Audio	Ground	
5 - Blue	Ground	
6 - Audio - L	0.5 Vrms/10 kohm	
7 - Blue	0.7 Vpp/75 ohm	
8 - CVBS-status	0 - 1.3 V: INT 4.5 - 7 V: EXT 16:9 9.5 - 12 V: EXT 4:3	
9 - Green	Ground	
10 - N.C.		
11 - Green	0.7 Vpp/75 ohm	
12 - N.C.		
13 - Red	Ground	
14 - Blanking	Ground	
15 - Red	0.7 Vpp/75 ohm	
16 - RGB-status/ FBL	0 - 0.4 V: INT 1 - 3 V: EXT/75 ohm	
17 - Video in/out	Ground	
18 - RGB sw. ctrl	Ground	
19 - CVBS-out	1 Vpp/75 ohm	
20 - CVBS-in	1 Vpp/75 ohm	
21 - Common	Ground	

1.4 Chassis Overview

1.4.1 13"/15" model

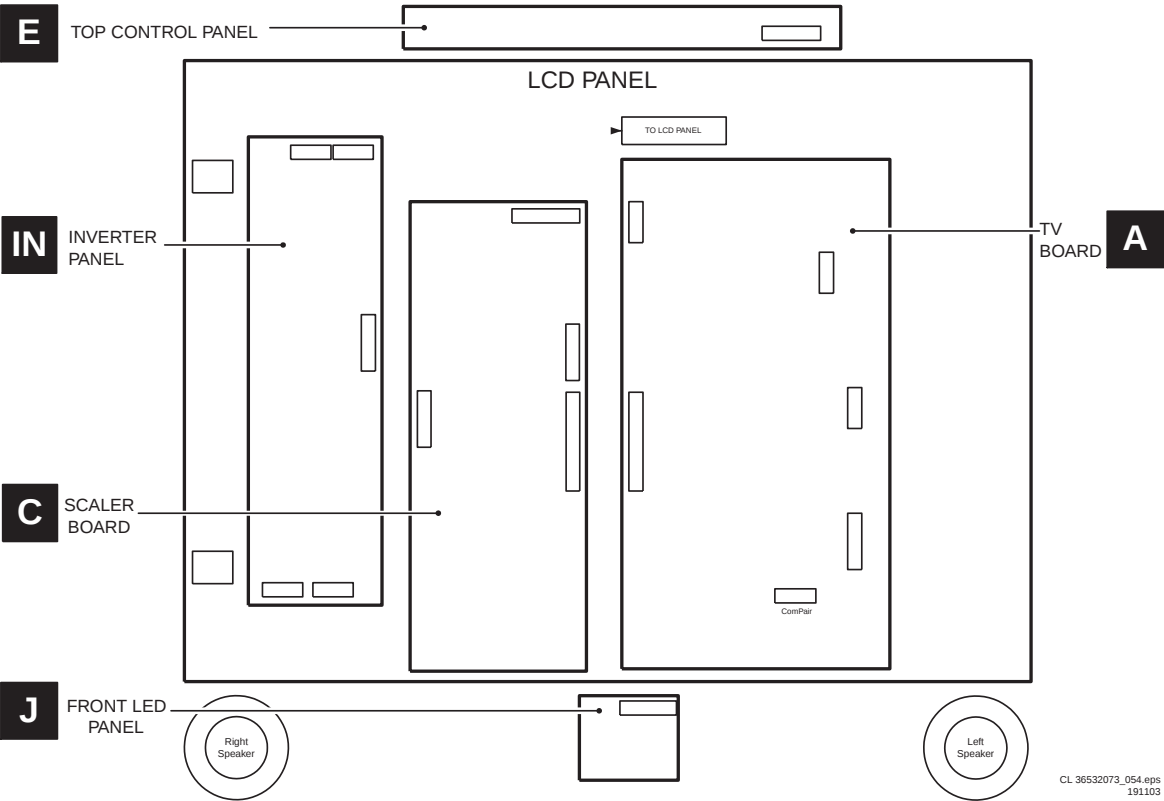


Figure 1-5 Chassis Overview 13"/15" model

1.4.2 20" model

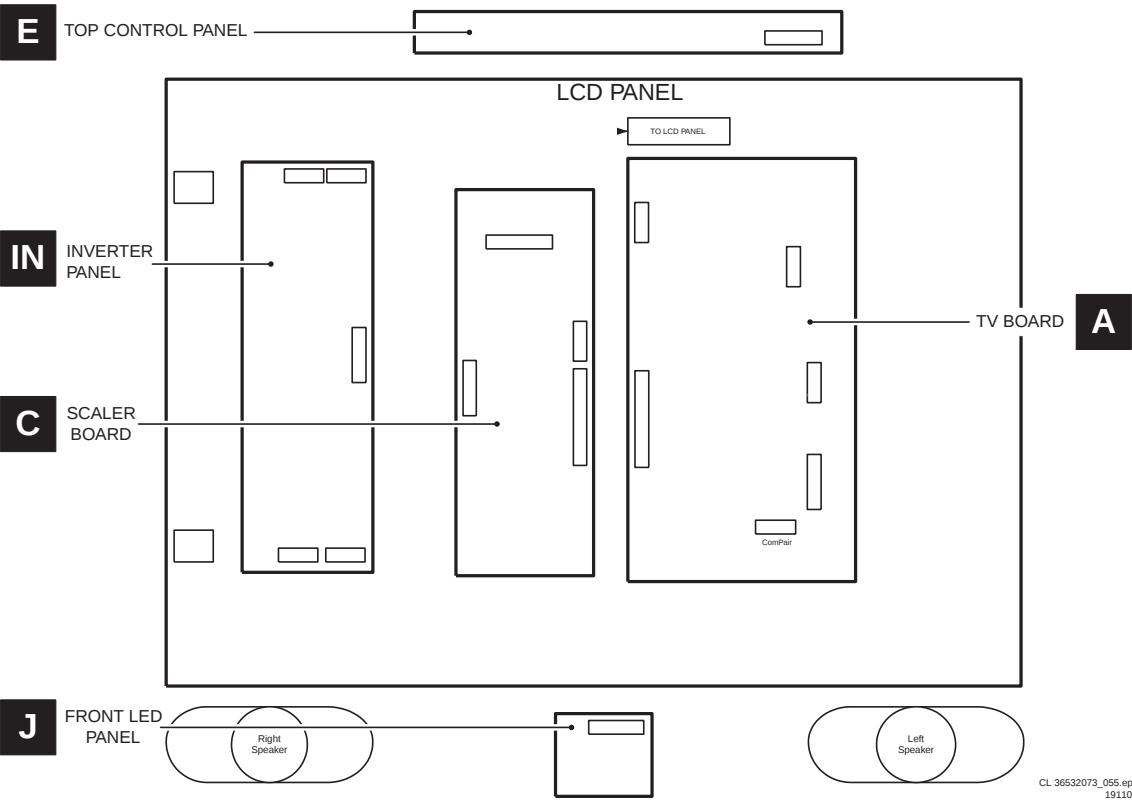


Figure 1-6 Chassis Overview 20" model

2. Safety Instructions, Warnings, and Notes

2.1 Safety Instructions

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

- Always connect the set to the mains via an isolation transformer (≥ 800 VA).
- Replace safety components, indicated by the symbol , only by components identical to the original ones.

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

- Route the wire trees and HT cables correctly and fix them with the mounted cable clamps.
- Check the insulation of the mains lead for external damage.
- Check the cabinet for defects, to avoid touching of any inner parts by the customer.

2.2 Warnings

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD ). 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 same potential. Available ESD protection equipment:
 - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
 - Wristband tester 4822 344 13999.
- Be careful during measurements in the high voltage section (on the inverter panel).
- Never replace modules or other components while the unit is switched '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.

2.3 Notes

2.3.1 General

- Clean the LCD display with a slightly humid cloth.
- Measure the direct voltages and oscillograms with regard to the chassis ground () or hot ground () as this is called.
- The direct voltages and oscillograms shown in the diagrams are indicative. Measure them in the Service Default Mode (see section "Service Modes").
- Where necessary, 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 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.

2.3.2 Schematic Notes

- All resistor values are in ohms and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kohm).
- Resistor values with no multiplier may be indicated with either an 'E' or an 'R' (e.g. 220E or 220R indicates 220 ohm).
- All Capacitor values are expressed in Micro-Farads ($\mu=$ $\times 10^{-6}$), Nano-Farads ($n=$ $\times 10^{-9}$), or Pico-Farads ($p=$ $\times 10^{-12}$).

- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An 'asterisk' (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Electrical Replacement Parts List. Therefore, always check this list when there is any doubt.

2.3.3 Rework on BGA ICs

General

Although (LF)BGA assembly yields are very high, there may still be a requirement for component rework. By rework, we mean the process of removing the component from the PWB and replacing it with a new component. If an (LF)BGA is removed from a PWB, the solder balls of the component are deformed drastically so the removed (LF) BGA has to be discarded.

Device Removal

As is the case with any component, it is essential when removing an (LF) BGA that the board, tracks, solder lands, or surrounding components are not damaged. To remove an (LF)BGA, the board must be uniformly heated to a temperature close to the reflow soldering temperature. A uniform temperature reduces the chance of warping the PWB. To do this, we recommend that the board is heated until it is certain that all the joints are molten. Then carefully pull the component off the board with a vacuum nozzle. For the appropriate temperature profiles, see the IC data sheet.

Area Preparation

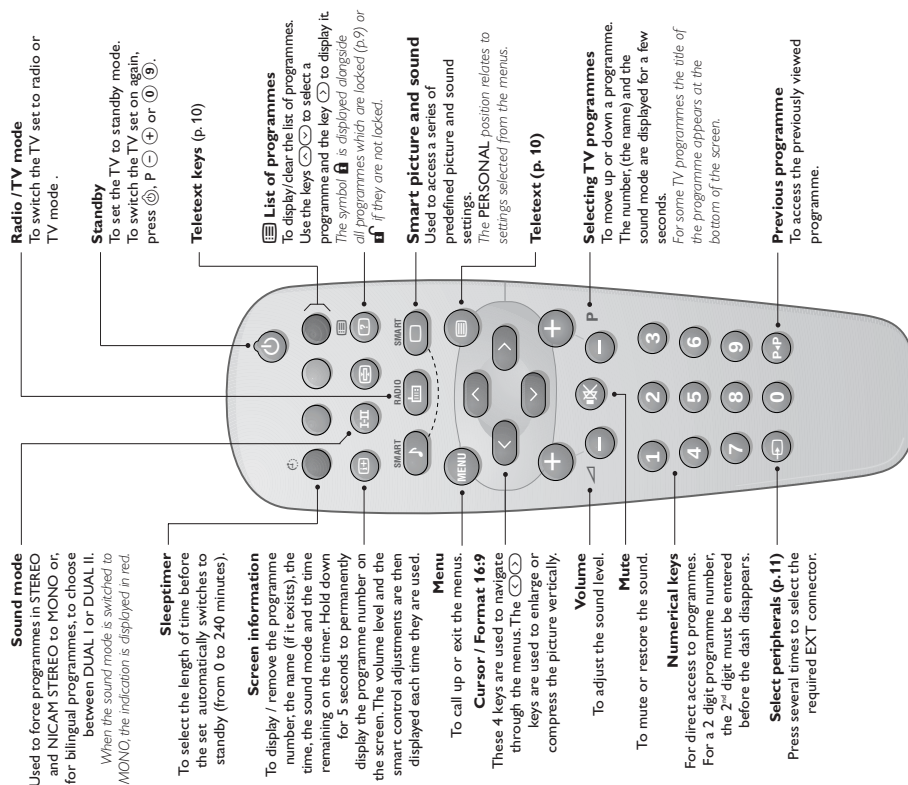
When the component has been removed, the vacant IC area must be cleaned before replacing the (LF)BGA. Removing an IC often leaves varying amounts of solder on the mounting lands. This excessive solder can be removed with either a solder sucker or solder wick. The remaining flux can be removed with a brush and cleaning agent. After the board is properly cleaned and inspected, apply flux on the solder lands and on the connection balls of the (LF) BGA. **Note:** Do not apply solder paste, as this has shown to result in problems during re-soldering.

Device Replacement

The last step in the repair process is to solder the new component on the board. Ideally, the (LF)BGA should be aligned under a microscope or magnifying glass. If this is not possible, try to align the (LF)BGA with any board markers. To reflow the solder, apply a temperature profile according to the IC data sheet. So as not to damage neighbouring components, it may be necessary to reduce some temperatures and times

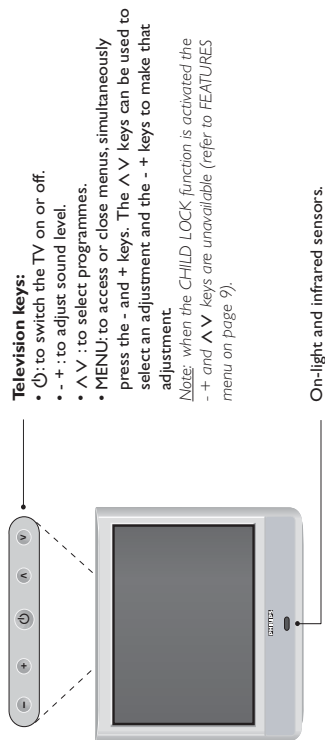
3. Directions for Use

Remote control keys



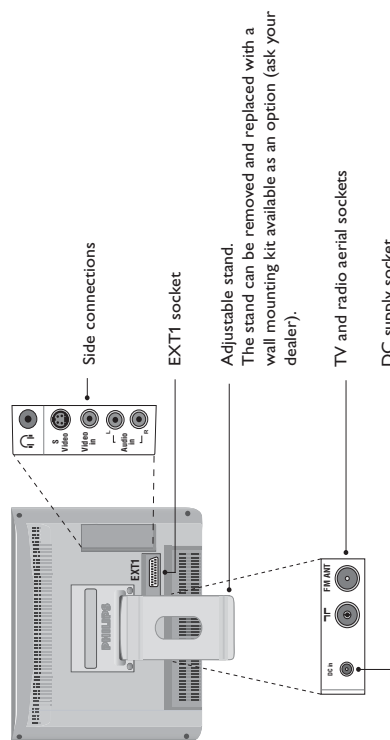
3

Presentation of the LCD Television



Rear of set :

The main connections are made at the bottom of the television.
For more details on connections see page 12.

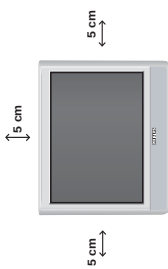


2

Installing your television set

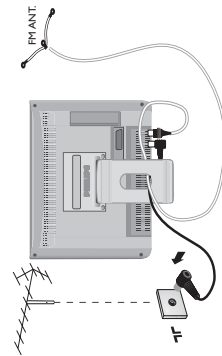
1 Positioning the television set

Place your TV on a solid stable surface. To avoid danger do not expose the TV to water, or a heat source (e.g. lamp, candle, radiator). Do not obstruct the ventilation grid at the rear:



2 Connecting the aerials

- Connect the **TV** socket situated at the bottom of the TV to your aerial socket.
- Insert the radio aerial lead supplied into the FM ANT socket located at the bottom of the TV.
- Arrange the leads by passing them through the television stand.

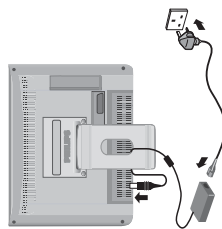


3 Power supply connections

The TV works with a DC supply (the voltage is indicated on the label). Only use the AC-DC adaptor supplied with the TV.

- Connect the DC plug of the adaptor to the TV DC socket. Leave a space round the adaptor for ventilation.
- Insert the adaptor power lead and insert the mains plug into the wall socket.

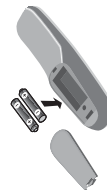
For connecting other appliances see page p.12.



4 Remote control

Insert the two R6-type batteries supplied, making sure they are the right way round.

The batteries supplied with the appliance do not contain mercury or nickel cadmium so as to protect the environment. Please do not discard your used batteries, but use the recycling methods available (consult your distributor).

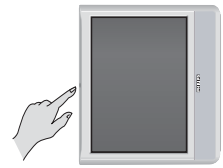


5 Switching on

To switch on the set, press the on/off key.

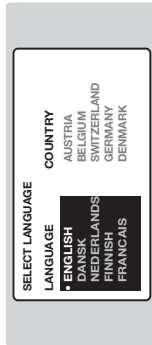
A green indicator comes on and the screen lights up. Go straight to the Quick Installation chapter on page 5. If the TV remains in standby mode (red indicator), press the P key on the remote control.

The indicator will flash when you use the remote control.



Quick installation

The first time you switch on the television, a menu appears on the screen. This menu asks you to choose the language of the menus :



If the menu does not appear, hold down the - and + keys on the set for 8 seconds to bring it up.

- 1 Use the **←** **→** keys on the remote control to choose your language then confirm with **↵**.
- 2 Then select your country using the **←** **→** keys and confirm with **↵**.

If your country does not appear in the list, select "...".

Sorting programmes

- 1 Press the **⏻** key. The main menu is displayed.
- 2 Select **INSTALL** (**↵**), then press **↵**.

The **INSTALL** menu appears.



- 3 Using the **←** **→** key, select **SORT** then press **↵**. The **SORT** menu appears. The **FROM** option is activated.

Note: this menu works as follows:

- Change "FROM" (enter the current programme number).
- "TO" (enter the new number).
- EXCHANGE numbers" (the operation is carried out).

Plug & Play

- 3 Tuning starts automatically. The operation takes several minutes. A display shows the search status and the number of programmes found. When it has finished the menu disappears.

To exit or interrupt the search, press the **⏻** key. If no programmes are found, refer to the chapter entitled *Tips* on p. 12.

- 4 If the transmitter or the cable network broadcasts the automatic sort signal, the programmes will be correctly numbered.

- 5 If not, the programmes found will be numbered in descending order starting at 99, 98, 97, etc. Use the **SORT** menu to renumber them. Some transmitters or cable networks broadcast their own sort parameters (region, language, etc.). Where this is the case, make your choice using the **←** **→** keys and confirm with **↵**.

- 4 Select the programme you wish to renumber using **←** **→** keys or **0** to **9**.

Example: to renumber programme 78 as

2 press **7** **8**.

- 5 Select **TO** (using **←** **→** key) and enter the new number with **←** **→** keys or **0** to **9** (for the example given, enter **2**).

- 6 Select **EXCHANGE** (**↵** key) and press **↵**. The message **EXCHANGED** appears, the exchange takes place. In our example, programme 78 is renumbered as 2 (and programme 2 as 78).

- 7 Select the option **FROM** (**←** key) and repeat stages **4** to **6** as many times as there are programmes to renumber.

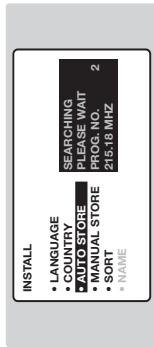
- 8 To exit from the menus, press **⏻**.

Choosing a language and country

- Press the **Menu** key to display the main menu.
 - Select **INSTALL** (⇨), then press **⇨**.
The **INSTALL** menu appears.
The **LANGUAGE** option is activated.
- 
- Press **⇨** to go into the **LANGUAGE** menu.
 - Select your language with the **⇨** (⇨) keys.
The menu will appear in the chosen language.
 - Press **⇨** to exit the **LANGUAGE** menu.
 - Select the option **COUNTRY** and press **⇨**.
 - Select your country with **⇨** (⇨) keys.
If your country does not appear in the list, select OTHER.
 - Press **⇨** to exit the **COUNTRY** menu.
 - To exit from the menu, press **Menu**.

Automatic tuning

- This menu allows you to automatically search for all the programmes available in your region (or on your cable network).
- First carry out operations 1 to 6 above, then:
 - Press **⇨** once to select **AUTO STORE** then press **⇨**. The search begins.
- After several minutes, the **INSTALL** menu reappears automatically.



Programme name

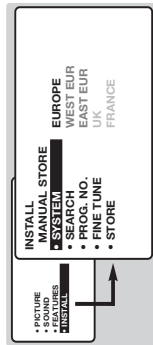
You may, if you wish, give a name to the first 40 programmes (from 1 to 40).

- Press **Menu**.
- Select **INSTALL** (⇨), then press **⇨**.
The **INSTALL** menu appears.
- Press **⇨** 5 times to select **NAME** (concealed at the bottom of the screen), then press **⇨**.
The menu appears :



Manual tuning

- This menu allows you to store the programmes one by one.
- Press **Menu**.
 - Select **INSTALL** (⇨), then press **⇨**.
The **INSTALL** menu appears.
 - Select **MANUAL STORE** (⇨) then press **⇨**.
The menu appears :



- Press **⇨** to go to the **SYSTEM** menu.
Use **⇨** (⇨) to choose **EUROPE** (automatic detection*) or manual detection with **WEST EUR** (standard BG reception), **EAST EUR** (standard DK reception), **UK** (standard I reception) or **FRANCE** (standard LL').
Then press **⇨** to exit from the menu.
* Except for France (standard LL') select the option **FRANCE**.

Using the radio

Choosing radio mode

Press the **Menu** key on the remote control to switch the TV to radio mode.
In radio mode the number and name of the station (if available), its frequency and the sound mode are indicated on the screen.
To enter the name of the stations use the **NAME** menu. (p. 7)

Selecting programmes

Use the **0** **9** or **⇨** **P** **+** keys to select the FM stations (from 1 to 40).

List of radio stations

Press the **Menu** key to display / hide the list of radio stations. Then use the cursor to select a station.

Using the radio menus

Use the **Menu** key to access the specific radio settings.

Searching radio stations

If you have used the quick installation all the available FM stations will be stored. To start a new search use the **INSTALL** menu :

AUTO STORE (for a complete search) or **MANUAL STORE** (for a station by station search).

The **SORT** and **NAME** menus let you classify or name the radio stations. These menus work in exactly the same way as the TV menus.

Screen saver

In the **FEATURES** menu you can activate / close the screen saver. The time, the frequency of the station and its name (if available) move across the screen.

Adjusting the picture

- 1 Press **Menu** then **Picture**.
The PICTURE menu appears :



- 2 Use **Left/Right** keys to select a setting and **Up/Down** keys to adjust.

*Note: the menu is a scroll-down menu. Keep the key **Down** held down to access the settings hidden at the bottom of the screen.*

- 3 Once the necessary adjustments have been made select the option STORE and press **Enter** to store them.

- 4 To exit from the menus, press **Exit**.

Description of the settings:

- BRIGHTNESS: alters the brightness of the image.
- COLOUR: alters the colour intensity.
- CONTRAST: alters the variation between light and dark tones.
- SHARPNESS: alters the crispness of the image.
- STORE: stores the picture settings.
- NR: attenuates picture noise (snow) in difficult reception conditions.
- CONTRAST + : To activate / de-activate the automatic contrast adjustment system (the dark areas are made darker whilst maintaining the detail).

Adjusting the sound

- 1 Press **Menu**, select the SOUND option **Sound** and press **Enter**. The SOUND menu appears :



- 2 Use **Left/Right** keys to select a setting and keys **Up/Down** to adjust.
- 3 Once the necessary adjustments have been made, select the option STORE and press **Enter** to store them.
- 4 To exit from the menus, press **Exit**.

Description of the settings:

- EQUALIZER: to adjust the sound tone (from bass: 120 Hz to treble: 10 kHz).
- BALANCE: to balance the sound between the left and right speakers.
- DELTA VOLUME (volume difference): allows you to compensate for the volume differences between the different programmes or the EXT sockets. This setting is available for programmes 1 - 40 and the EXT sockets.
- Use the **Left/Right** keys to compare the level of different programmes.
- STORE: stores the sound settings.
- AVL: automatic volume control used to avoid sudden increases in volume, particularly when changing programmes or during advertisements.
- INCR. SURROUND: To activate / deactivate the surround sound effect. In stereo, this gives the impression that the speakers are further apart. In mono, a stereo spatial effect is simulated.

Feature settings

- 1 Press **Menu**, select FEATURES **Features** and press **Enter**. You can adjust:
- 2 TIMER, PARENTAL CONT. and CHILD LOCK : see next page

- 3 MODE SELECT: to switch the TV in radio or TV.
- 4 To quit the menus, press **Exit**.

Timer function

This menu allows you to use your TV as an alarm clock.

- 1 Press **Menu**.
- 2 Select FEATURES **Features** and press **Enter** twice. The TIMER menu appears :



- 3 Press **Enter** to enter and exit the sub-menus and use keys **Left/Right** to adjust:
- 4 TIME: enter current time.

Note: the time is updated automatically each time the set is switched on using teletext information taken from programme 1. If programme 1 does not have teletext, the update will not take place.

- 5 START TIME: enter the start time.

- 6 STOP TIME: enter the stop time.
- 7 PROG. NO.: enter the number of the programme for the wake-up alarm. For models equipped with a radio, you can select an FM station by using the **Left/Right** keys (the **0-9** keys are only used to select TV programmes).
- 8 ACTIVATE: you can set the alarm to be activated:
 - ONCE ONLY for a one-off alarm,
 - DAILY for a daily alarm or
 - OFF to cancel.
- 9 Press **Enter** to set the TV to standby. It will automatically switch on at the time programmed. If you leave the TV switched on, it will only change programme at the time indicated.

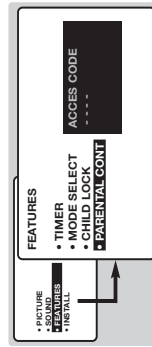
The combination of the CHILD LOCK and TIMER functions may be used to limit the length of time your television is in use, for example, by your children.

Locking the set

You can bar access to certain programmes or completely lock the set by locking the keys.

Locking programmes

- 1 Press **Menu**.



- 2 Select **Parental Cont.** **Parental Cont.** and press **Enter**.
- 3 Select PARENTAL CONT. **Parental Cont.** and press **Enter**. Enter your confidential access code. The first time, enter the code 0711 then confirm by re-entering 0711. The menu appears.
- 5 Press **Enter** to go into the menu.
- 6 Use keys **Left/Right** to select the required programme and confirm with **Enter**. The symbol **Parental Cont.** is displayed alongside the programmes or sockets that have been locked.
- 7 Press **Exit** to exit.
To watch a programme which has been locked you will now need to enter the confidential

code; otherwise the screen will remain blank. The INSTALL menu access is also locked.
Caution: in the case of encrypted programmes which use an external decoder, it is necessary to lock the corresponding EXT socket.

To unlock all programmes

Repeat stages 1 to 4 above, then select CLEAR ALL and press **Enter**.

To change the confidential code

Repeat stages 1 to 4 above, then:

- 5 Select CHANGE CODE and enter your own 4-digit number.
 - 6 Confirm by entering it again.
 - 7 Your new code will be stored.
- If you have forgotten your confidential code, enter the universal code 0711 twice.*

Locking the keys

- 1 Press **Menu**, select FEATURES **Features** and press **Enter**.
- 2 Select CHILD LOCK **Child Lock** and press **Enter** to set the lock to ON.
- 3 Switch off the set and put the remote control out of sight. The set cannot be used (it can only be switched on using the remote control).
- 4 To cancel: switch CHILD LOCK to OFF.

Teletext

Teletext is an information system broadcast by certain channels which can be consulted like a newspaper. It also offers access to subtitles for viewers with hearing problems or who are not familiar with the transmission language (cable networks, satellite channels, etc.).

Press :

Teletext
on/off

You will obtain:



This is used to call teletext, change to transparent mode and then exit. The summary appears with a list of items that can be accessed. Each item has a corresponding 3 digit page number. If the channel selected does not broadcast teletext, the indication 100 will be displayed and the screen will remain blank (in this case, exit teletext and select another channel).

Selecting
a page

Enter the number of the page required using the 0 to 9 or P + keys. Example: page 120, enter 1 2 0. The number is displayed top left, the counter turns and then the page is displayed. Repeat this operation to view another page. If the counter continues to search, this means that the page is not transmitted. Select another number.

Direct
access to
the items

Coloured areas are displayed at the bottom of the screen. The 4 coloured keys are used to access the items or corresponding pages. The coloured areas flash when the item or the page is not yet available.

Contents

This returns you to the contents page (usually page 100).

Enlarge
a page

This allows you to display the top or bottom part of the page and then return to normal size.

Stop sub-page
acquisition

Certain pages contain sub-pages which are automatically displayed successively. This key is used to stop or resume sub-page acquisition. The indication appears top left.

Hidden
information

To display or hide the concealed information (games solutions).

Favourite
pages

Instead of the standard coloured areas displayed at the bottom of the screen, you can store 4 favourite pages on the first 40 channels which can then be accessed using the coloured keys (red, green, yellow, blue). Once set, these favourite pages will become the default every time teletext is selected.

- Press the key to change to favourite pages mode.
 - Display the teletext page that you want to store.
 - Press then the coloured key of your choice. The page is stored.
 - Repeat steps 2 and 3 for the other coloured keys.
 - Now when you consult teletext, your favourite pages will appear in colour at the bottom of the screen.
- To temporarily retrieve the standard items, press . To clear everything, and return the standard items as the default, press for 5 seconds.

Connecting peripheral equipment

The EXT1 socket has audio, CVBS/RGB inputs and audio, CVBS outputs.

Video recorder

Video recorder (or DVD recorder)
Carry out the connections shown opposite, using a good quality euroconnector cable.

If your video recorder does not have a euroconnector socket, the only connection possible is via the aerial cable. You will therefore need to tune in your video recorder's test signal and assign it programme number 0 (refer to manual store, p. 7).

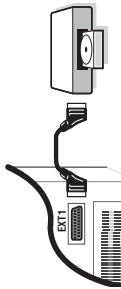
To reproduce the video recorder picture, press .

Video recorder with decoder

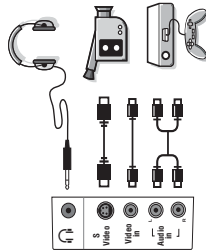
Connect the decoder to the second euroconnector socket of the video recorder. You will then be able to record scrambled transmissions.

Other equipment

Satellite receiver, decoder, DVD, games, etc.
Make the connections as shown opposite.



Side connections



Make the connections as shown opposite. With the key, select EXT3.

For a monophonic device, connect the audio signal to the AUDIO L input. The sound automatically comes out of the left and right speakers of the set.

Headphones

When headphones are connected, the sound on the TV set will be cut. The P keys are used to adjust the volume level. The headphone impedance must be between 32 and 600 Ohms.

To select connected equipment

Press the key to select EXT1 and EXT3.
Most equipment (decoder, video recorder) carries out the switching itself.



4. Mechanical Instructions

Index of this chapter:

1. Service Position
2. Rear Cover Removal
3. I/O Cover Removal
4. LED/Remote Control Board Removal
5. TV Board Removal
6. Scaler Board Removal
7. Inverter Board Removal
8. Top Control Assy Removal
9. LCD Panel Removal
10. Re-assembly

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

4.1 Service Position

First, put the TV in its service position. Therefore, place it upside down on a tabletop, use a protection sheet or a foam cushion. Take care that this is flat and free from obstacles like screws, to prevent damaging the fragile LCD screen. ESD protective service buffers, as shown below, can be used (3122 785 90580).



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Figure 4-1 Service position with ESD protective service buffers

4.2 Rear Cover Removal

1. Use a Torx (T10) screwdriver to remove the rear cover by unscrewing and removing the screws as indicated by the figures: Rear cover removal 13-inch and 20-inch.
2. Make sure all power-, audio-, video-, coax-, cinch- and SCART cables are unplugged.
3. The number of Torx screws to be removed are: six for the 13- and 15-inch version and seven for the 20-inch.
4. Carefully remove the rear cover and store it on a safe place.



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Figure 4-2 Rear cover removal 13- and 15-inch



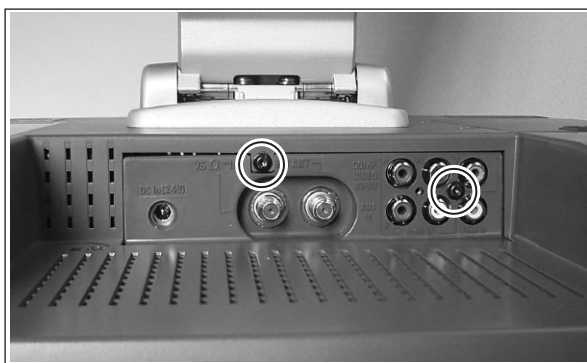
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Figure 4-3 Rear cover removal 20-inch



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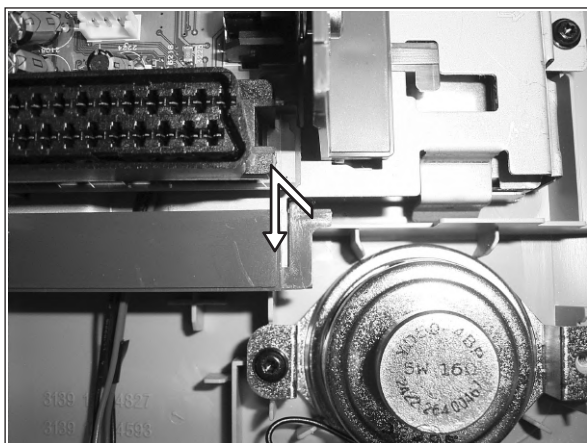
Figure 4-4 Rear cover removal hidden screw EU version



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Figure 4-5 Rear cover removal hidden screws US version

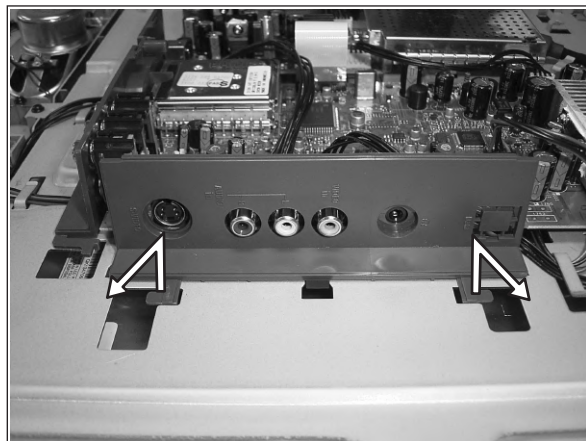
4.3 I/O Cover Removal



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Figure 4-6 IO cover bottom

1. Lift up the tag (securing clip) at the right side of the IO cover and at the same time pull it away from the TV board.



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Figure 4-7 IO cover side

1. Lift up both tags (securing clips) and at the same time pull it away from the TV board.

4.4 LED/Remote Control Board Removal

1. Unlock the securing clip, which holds the PWB in place, and take out the LED/Remote control PWB.

4.5 TV Board Removal

1. Disconnect all four PWB connectors out of the regarding sockets 1231, 1234, 1732 and 1902.
2. Pull the thin flat cable out of its special shaped connector, 1010.
3. Unscrew and remove the two PWB mounting screws.
4. Take out the TV board in the indicated direction.



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Figure 4-8 TV board

Note: Sometimes it is necessary to place the Scaler board in a service position. In this case, it is necessary to use the specific "Repair kit scaler board" including two extra long cables (order nr. 3122 785 90490).

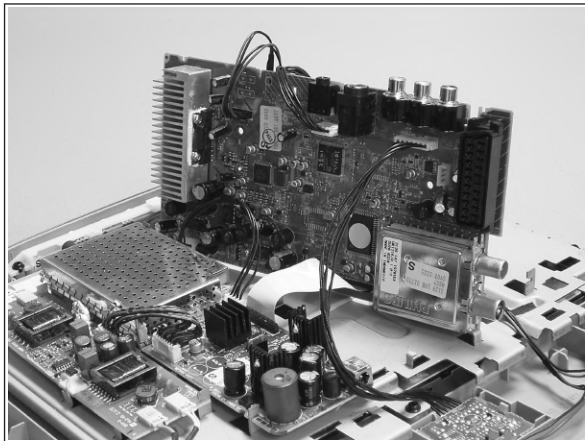
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Figure 4-9 Service position TV board

4.6 Scaler Board Removal

4.6.1 13 and 20 inch versions

1. Carefully remove the shielding covering the top part of the Scaler board.
2. Carefully disconnect the TTL cable connector in the centre of the board (1501). Take care not to damage the fragile cables.
3. Disconnect the cable connectors at the edge of the board (1342 and 1003).
4. Pull the thin flat cable out of its special shaped connector (1681).
5. Unscrew and remove both PWB mounting screws.
6. Take out the Scaler PWB.

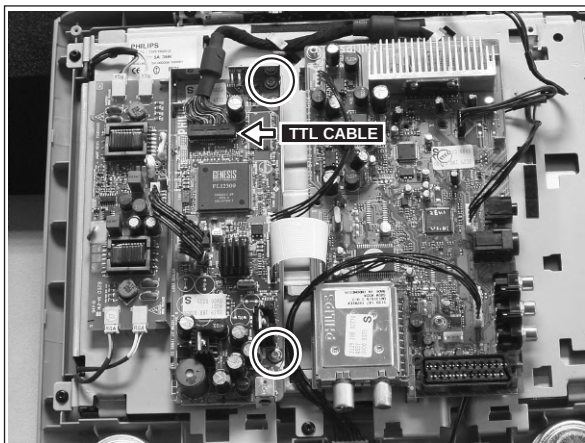
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Figure 4-10 Scaler PWB

4.6.2 15 inch version

1. Carefully disconnect the LVSD cable connector at the top of the board (1506). Take care not to damage the fragile cables.
2. Disconnect the cable connectors at the edge of the board (1342 and 1003).
3. Pull the thin flat cable out of its special shaped connector (1681).
4. Unscrew and remove both PWB mounting screws.
5. Take out the Scaler PWB.

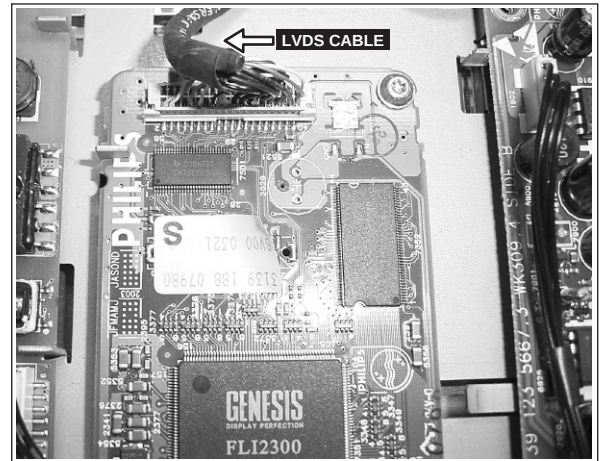
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Figure 4-11 Scaler PWB

Note: Sometimes it is necessary to place the Scaler board in a service position. In this case, it is necessary to use the specific "Repair kit scaler board" including two extra long cables (order nr. 3122 785 90490).

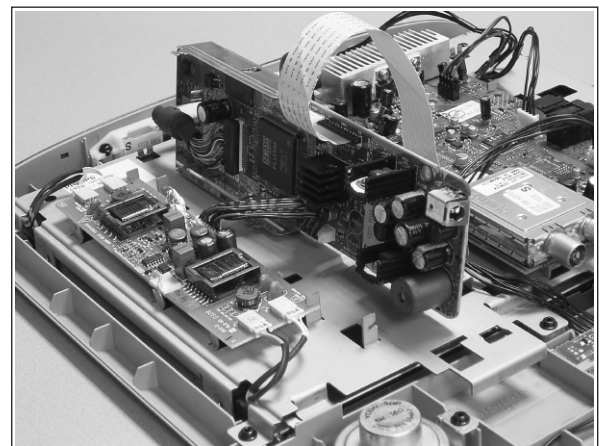
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Figure 4-12 Service position Scaler Board

Important: Video converter chip heat sink.

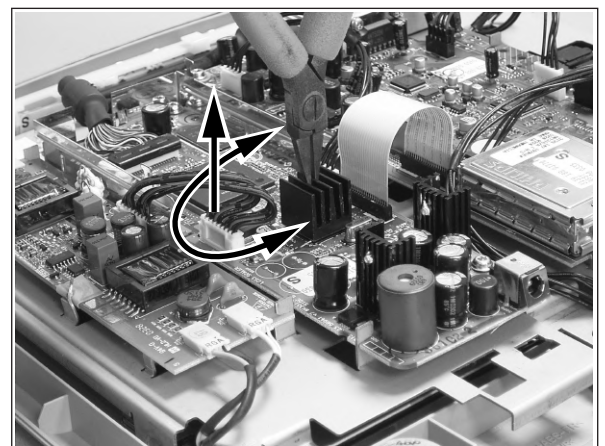
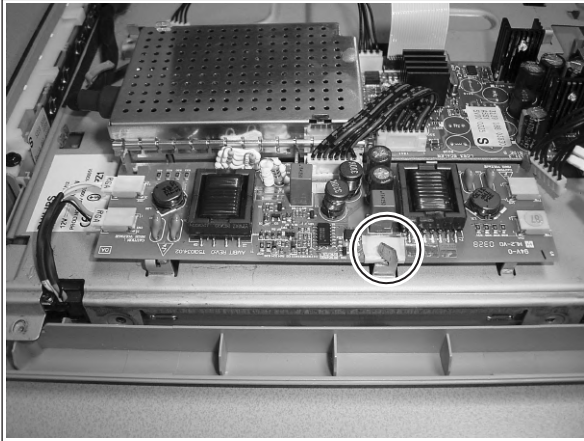
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Figure 4-13 Heat sink removal

1. Use a pair of pliers to take off the heat sink by means of a twist- and pull movement (see figure), before you de-solder the video converter chip SAA7118 from the board. Store the heat sink on a safe place, adhesive side up!
2. Place the self-adhesive heat sink back in place after the chip exchange action has been finished.

4.7 Inverter Panel Removal

1. Disconnect the 8-pole cable from the PWB.
2. Disconnect at top and bottom side all cable connectors.
3. Use a pair of pliers to bend the metal securing clamp in such a way that the PWB can be taken out.
4. Remove the Inverter PWB and store it on a safe place.

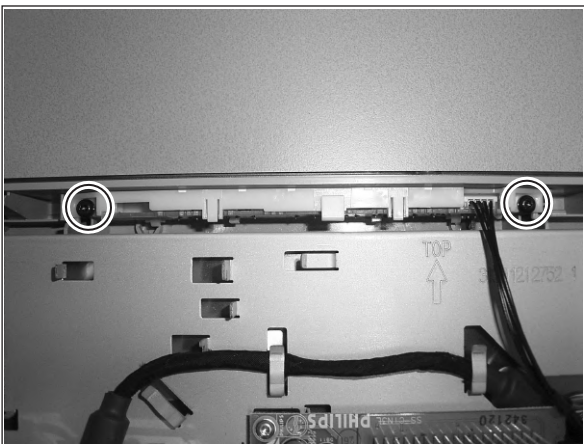


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Figure 4-14 Inverter PWB

4.8 Top Control Assy Removal

1. Remove the cable from the Top control assy (1500).
2. Remove both mounting screws that secure the unit to the monitor frame.
3. Take out the Top control assy.



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Figure 4-15 Top control assy

4.9 LCD Panel Removal

In order to remove the LCD panel make sure that the TV board is removed. See previous paragraph(s).

1. Carefully disconnect the LVDS or TTL cable connector, which is revealed now, from LCD panel (CN1). Take care not to damage the fragile cables.
2. Unscrew and remove all five screws of the panel frame, which secure the frame to the monitor front.
3. Take care that the tape securing the speaker cable assy is removed, or loosened.
4. Remove the LCD panel metal cover frame, the LCD panel can be removed now.



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Figure 4-16 LCD panel frame screws

4.10 Re-Assembly

To re-assemble the whole set, do all processes in reverse order.

Notes:

- Take extra care when reconnecting the inverter PWB backlight connectors (black/white/pink). Connect them properly to avoid "high voltage sparking".

5. Service Modes, Error Messages, and Repair Tips

Index of this chapter:

1. Test Points
2. Service Modes
3. Errors
4. The "Blinking LED" Procedure
5. ComPair
6. Trouble Shooting Tips

5.1 Test Points

This chassis is equipped with test points in the service printing. In the schematics test points are identified with a rectangle box around Fxxx or Ixxx. On the PCB, test points are specifically mentioned in the service manual as "half moons" with a dot in the centre.

Measurements are performed under the following conditions:

- Video: colour bar signal.
- Audio: 3kHz left, 1kHz right.

5.2 Service Modes

5.2.1 Limited DST Support

This chassis does still have some limited Dealer Service Tool (DST) support. The set can be put in two service modes via the DST (RC7150, this remote is not available anymore). These are the Service Default Mode (SDM) and the Service Alignment Mode (SAM).

Installation Features Dealer

For easy installation and diagnosis, the DTS can be used. When there is no picture (to access the error code buffer via the OSD), DST can enable the functionality of displaying the contents of the entire error code buffer via the blinking LED procedure.

The dealer can use the RC7150 for programming the TV-set with presets. Ten different program tables can be programmed into the DST via a GFL or MG TV-set (downloading from the GFL or MG to the DST; see GFL or MG service manuals) or by the DST-I. For explanation of the installation features of the DST, the directions for use of the DST are recommended.

5.2.2 Service Default Mode (SDM)

Purpose of SDM:

- To provide a situation with predefined settings to get the same measurements as in this manual.
- To start the "Blinking LED" procedure.
- To have the possibility to override the 5V protection

Activating SDM:

- By transmitting the "DEFAULT" command with the RC7150 Dealer Service Tool (this works both while the set is in normal operation mode or in the SAM).
- Standard RC sequence **0-6-2-5-9-6** followed by pressing the "MENU"-button (this works both while the set is in normal operation mode or in the SAM).
- By shorting pins 5 and 6 of connector 1170 of LED/RC panel. Then apply DC supply from the AC-DC adaptor (not required to remove the metal shielding).

Note: By temporarily shorting pins 5 and 6 of connector 1170 and then applying DC supply from the AC-DC adaptor, the 5V protection is disabled.

Caution: Overriding the 5V protection should only be used for a short period of time. In case of S/W protections (error 4) the set will shutdown after 15 sec.

For recognition, "SDM" is displayed at the upper right corner of the screen.

SDM Menu

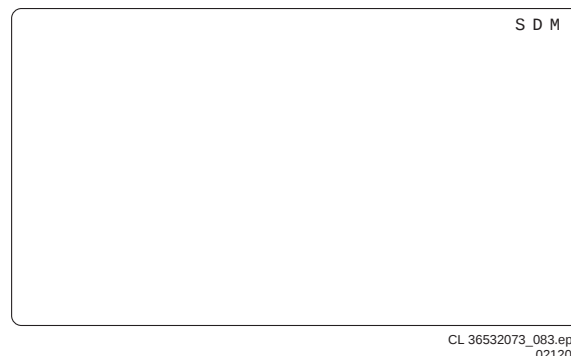


Figure 5-1 SDM Menu

Deactivating SDM:

- Press the "EXIT"-button on the DST, or
- Press 0-0 on the standard RC, or
- Switch the set to Standby (the error buffer is NOT cleared).

Note: When the mains power is switched off while the set is in SDM, the set will switch to SDM immediately when the mains is switched on again.

The SDM sets the following pre-defined conditions:

- PAL/SECAM sets: tuning at 475.25 MHz PAL.
- Volume level is set to 25% (of the maximum volume level). Other picture and sound settings are set to 50%.

The following functions are switched off in SDM (and after leaving SDM):

- Timer.
- Sleep timer.

The following functions are disabled during SDM (and enabled after leaving SDM)

- Parental lock.
- Blue mute.
- Hospitality Mode.
- No-ident Timer (normally the set is automatically switched off when no video signal (IDENT) was received for 15 minutes).

All other controls operate normally.

Special Functions SDM

Access to normal user menu

Pressing the "MENU" button on the remote control switches between the SDM and the normal user menus (with the SDM mode still active in the background).

Channel search

Pressing the "P+" button of the remote control will select the next available channel in the preset list.

Type nr, Error buffer, etc

Pressing the "OSD" or "info+" button of the remote control shows/hides the type nr, error buffer, SW ID, Hours and option codes. OSD can be hidden to prevent interference with waveform measurements.

Access to SAM

By pressing **0-6-2-5-9-6** “info+” (or OSD) in sequence on the standard RC will switch from SDM to SAM.

5.2.3 Service Alignment Mode (SAM)

Purpose of SAM:

- To do alignments.
- To change option settings.
- To display/clear the error code buffer values.
- To store data in NVM

Note: to store the data in SAM mode main menu.

Activating SAM:

- By transmitting the “ALIGN” command with the RC7150 Dealer Service Tool (this works both while the set is in normal operation mode or in the SDM).
- Standard RC sequence **0-6-2-5-9-6** followed by pressing the “info+”-button (this works both while the set is in normal operation mode or in the SDM).

Deactivating SAM:

- Press the “EXIT”-button on the DST, or
- Press 0-0 on the standard RC, or
- Switch the set to Standby (the error buffer is NOT cleared).

Note: When the AC-DC adaptor power is switched off while the set is in SAM, the set will go back to normal mode of operation when the AC-DC adaptor is switched on again.

In SAM the following information is displayed on the screen:

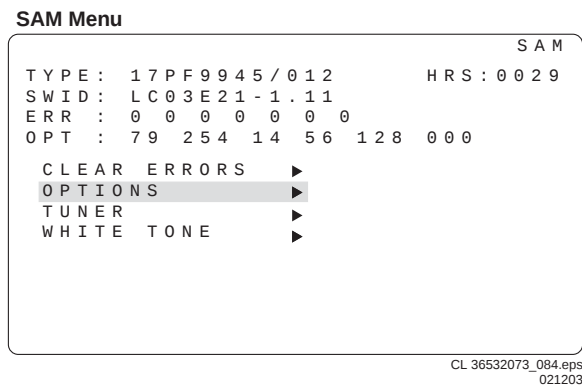


Figure 5-2 SAM Menu

- Operation hours timer (hexadecimal).
- Software identification of the main micro controller of TV-board (LC03BBC-X.YY).
 - LC13 is the chassis name for 4 x 3 format LCD-TV.
 - BBC is 1 letter and 2-digit combination to indicate the regional software type and the supported languages.
 - X = main version number.
 - YY= subversion number.
- Error buffer (7 errors possible).
- Option bytes (8 codes possible), summary of options are explained below.
- Sub menus are listed in a scroll-menu.

SAM Menu Control

All Menu items are:

- CLEAR ERRORS
- OPTIONS
- TUNER
- WHITE TONE
- GEOMETRY
- SOUND
- SMART SETTING

Menu items can be selected with the cursor UP/DOWN key.

The selected item will be highlighted. When not all menu items fit on the screen, moving the cursor UP/DOWN will display the next/previous menu items.

With the cursor LEFT “<” / RIGHT “>” keys, it is possible to:

- Activate the selected menu item (e.g. GEOMETRY).
- Change the value of the selected menu item (e.g. HOR.SHIFT).
- Activate the selected submenu (e.g. ASBY ON/OFF).
- To return to the main menu / previous menu, press “MENU” keys on the remote control

Access to Normal User Menu

Pressing the “MENU” button on the remote control switches between the SAM and the normal user menus (with the SAM mode still active in the background). Pressing the “MENU” key in a submenu will go to the previous menu.

Menus and Submenus

CLEAR ERRORS: Erasing the contents of the error buffer. Select the CLEAR ERRORS menu item and press the MENU RIGHT key. The content of the error buffer is cleared.

The functionality of the OPTIONS and ALIGNMENTS (TUNER, WHITE TONE, GEOMETRY, SOUND and SMART SETTING) sub menus are described in chapter 8.

5.2.4 Customer Service Mode (CSM)

This chassis is equipped with the “Customer Service Mode”. CSM is a special service mode that can be activated and deactivated by the customer, upon request of the service technician/dealer during a telephone conversation in order to identify the status of the set. This CSM is a ‘read only’ mode therefore modifications in this mode are not possible.

Activating Customer Service Mode.

The Customer Service Mode can be switched on:

- By pressing RC button is sequence “**1-2-3-6-5-4**” or,
- By pressing simultaneously the MUTE button on the remote control and any key on the TV control buttons (P+, P-, VOL +, VOL -) for at least 4 seconds.

When the CSM is activated:

- Picture and sound settings are set to nominal levels.
- Modes that interfere with the behaviour of the set are switched off (sleep timer, auto standby, etc.).
- Pressing cursor DOWN “v” on the RC will switch to CSM2 screen if it is in CSM1 screen. Likewise pressing cursor UP “^” will switch to previous CSM1 screen.
- Pressing “P+” or “P-” on RC will select next available channel to be displayed.
- Pressing channel numeric keys on RC will select the desired channel to be displayed.

Deactivating Customer Service Mode.

The Customer Service Mode will be switched off after:

- Pressing any key on the remote control handset (except numeric keys, “P+”, “P-” and cursor up/down)
- Switching off the TV set with the mains switch.

All settings that were changed during activation of CSM are restored to the initial values.

Customer Service Mode Information Screen

After activating the Customer Service Mode the following screen will appear.

```

1 TYPE: 17PF9945/012 HRS:0029 CSM1
2 SWID: LC03E21-1.11
3 ERR : 0 0 0 0 0 0 0
4 OPT : 79 254 14 56 128 000
5
6 SYSTEM: WEST EUR      11 SOURCE : 5
7 NO SIGNAL             12 SOUND  : MONO
8                       13 VOLUME : 26
9                       14 BALANCE: 1
10                      15 COLOUR : 50

```

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Figure 5-3 CSM 1

The Customer Service Menu (CSM1) shows the following information:

- **Line 1: "TYPE: 99XX9999/99XHRS: nnnn"**. TYPE: type-version/model of the set (i.e. 17PF9945/12). HRS: Hexadecimal counter of operating hours. (Standby hours are counted as operating hours).
 - **Line 2: "SWID: AAAABBC-X.YY"**: (Software identification of the main micro controller on TV-Board) See paragraph "Service Alignment Mode (SAM)". Details on available software versions can be found in the chapter "Software Survey" of the publication "Product Survey - Colour Television".
 - **Line 3: "CODES: xx xx xx xx xx xx xx"**. Error code buffer (see paragraph "Errors"). Displays the last 7 errors of the error code buffer.
 - **Line 4: "OPT xxx xxx xxx xxx xxx xxx xxx"**. Option bytes. Option bits control the software and hardware functionality of the chassis. An option byte or option number represents 8 of those bits. Each option number is displayed as a decimal number between 0 and 255. The set may not work correctly when an incorrect option code is set. See chapter 8 for more information on correct option settings
 - **Line 6: "SYSTEM: EUROPE/WEST EUR/EAST EUR/UK/FRANCE"**. Indicates which colour and sound system is installed for this preset as defined in the Manual INSTALL menu:
 - PAL BG
 - PAL I
 - PAL DK
 - SECAM BG
 - SECAM DK
 - SECAM LL'
 - **Line 7: "NO SIGNAL"**. Indicates that the set is not receiving an "ident" signal on the selected source.
 - No or bad antenna signal; connect a proper antenna signal
 - Antenna not connected; connect the antenna
 - No channel / preset is stored at this program number; go to the INSTALL menu and store a proper channel at this program number
 - The tuner is faulty (in this case the CODES line will contain number 13); check the tuner and replace/repair if necessary
- Note:** On some models, BLUE MUTE is displayed (if the BM option is ON) when no signal is received.
- **Line 11: "SOURCE"**. Indicates which SOURCE is installed for this preset: EXT1, SVHS2, EXT2, or Tuner.
 - **Line 12: "SOUND"**: Indicates which sound mode is installed for this preset: Mono, NICAM, Stereo, L1, L2, SAP, Virtual, or Digital.
 - **Line 13: "VOLUME"**: Value indicates level at entry CSM.
 - **Line 14: "BALANCE"**: Value indicates level at entry CSM.
 - **Line 15: "COLOUR"**: Value indicates level at entry CSM.

```

1 TYPE: 17PF9945/012 HRS:0029 CSM2
2 SWID: LC03E21-1.11
3 ERR : 0 0 0 0 0 0 0
4 OPT : 79 254 14 56 128 000
5
6 BRIGHTNESS: 50      11
7 CONTRAST   : 56      12
8 HUE        : 50      13
9            :          14
10           :          15

```

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Figure 5-4 CSM 2

The next Customer Service Menu (CSM2) shows the following information:

- Line 6: **"BRIGHTNESS"**: Value indicates level at entry CSM.
- Line 7: **"CONTRAST"**: Value indicates level at entry CSM.
- Line 8: **"HUE"**: Value indicates level at entry CSM.

5.3 Errors

5.3.1 Error code buffer

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, the error is written at the left side and all other errors shift one position to the right.

The error code buffer will be cleared in the following cases:

- By activating the CLEAR ERRORS function in SAM menu.
- By transmitting 0-6-2-5-9-9 with the normal RC.
- By transmitting the commands "DIAGNOSE 99 OK" with the DST (RC7150) or with ComPair.
- Automatically reset if its contents has not changed for 50 hours.

By leaving SDM or SAM with the mains switch, the error buffer is not reset.

Examples:

ERROR: 0 0 0 0 0 0 0 : No errors detected

ERROR: 6 0 0 0 0 0 0 : Error code 6 is the last and only detected error

ERROR: 9 6 0 0 0 0 0 : Error code 6 was first detected and error code 9 is the last detected (newest) error

The contents of the error buffer can also be made visible through the "blinking LED" procedure. This is especially useful when there is no picture. See paragraph 5.4 "The blinking LED procedure".

5.3.2 Error codes

In case of non-intermittent faults, clear the error buffer before starting the repair, to prevent that "old" error codes are present (it is wise to write down the content of the error buffer before you clear it). If possible check the entire content of the error buffers. In some situations an error code is only the result of another error code (and not the actual cause).

Note: a fault in the protection detection circuitry can also lead to a protection.

Table 5-1 Error Codes

Error code	Error description	Possible defective components	Diagram
0	No error detected	-	----
1	Reserved		
2	Reserved		
3	Reserved		
4	5V protection active	IC7620 & 1100 I2C devices(MSP34XX & Tuner)	A3, A8, A10
5	Reserved		
6	General I2C bus error	I2C bus s/c or o/c	
7	Reserved		
8	BOCMA I2C error	IC 7301 (IF Video TDA888XX)	A4
9	BOCMA 8V supply failure	IC 7910 or IC7301(MC34063A or TDA888XX)	A4, A10
10	NVM I2C error	IC 7066 (NVM M24CXX)	A1
11	NVM identification failure	IC 7066 (NVM M24CXX)	A1
12	uProcessor internal RAM test failure	IC 7064 (uP SAA56XX)	A1
13	Tuner I2C error	1100 - UR13XX (Tuner)	A3
14	Sound processor I2C error	IC 7620 (MSP34XX)	A8
15	SRAM error	IC 7070 (RAM 128 x 8)	A2
16	Video Formatter/Scaler I2C error	IC 7351 (Farouja_s2300)(Video Converter)	C5
17	Multi-Video Decoder I2C error	IC 7302 (Video Decoder SAA7118)	C3
18*	Reserved		
19*	Reserved		
20*	Reserved		
21	SDRAM protection active	IC 7352 (SDRAM 2M x 32)	C5

*= Not application

TV-Board

Errors

- **Error 0** = No error
- **Error 4** = +5V protection. 5V protection active; set is switched to protection; error code 4 is placed in the error buffer; the LED will blink 4 times (repeatedly). A 5V failure can be caused by a drop in the 5V supply output, resulting in an undefined behaviour of the set. Therefore, all I2C devices connected to the 5V supply are constantly monitored. When none of these devices responds to the micro controller for a prolonged time, the micro controller assumes that there is a failure in the 5V supply. By starting up the set with the service jumpers shorted, the 5V protection is disabled and it is easier to determine the cause. +5V protection will be activated when these I2C devices fail (no I2C communication):
 - Main Tuner 1100 (diagram A3)
 - ITT sound processor MSP34xx IC-7620 (diagram A8)**Service tips:** To isolate the problem area after overriding the +5V protection, determine whether:
 1. The +5V source is working properly IC7930 (diagram A10)
 2. ITT sound processor circuit is loading the +5V; isolate coil 5620 (diagram A8)
 3. The audio delay IC 7601 - IC7605 is loading the +5V source; isolate coil 5601 (diagram A7)
 4. Main tuner circuit is loading the +5V source; isolate coil 5122 (diagram A3)**Caution:** Overriding the 5V protection when there is a 5V failure can increase the temperature in the set and may cause permanent damage to components. Do not override the 5V protection for a prolonged time.
- **Error 6** = General I2C error. This will occur in the following cases:
 - SCL or SDA is shorted to ground
 - SCL is shorted to SDA
 - SDA or SCL connection at the micro controller is open circuit.

- **Error 8** = BOCMA IC TDA888xx (diagram A4) I2C communication failure. BOCMA (IC7301 on TV board) is corrupted or the I2C line to the BOCMA is low or no supply voltage present at pin 14 (3V3) or no supply voltage at pin 23.
 - **Error 9** = BOCMA IC TDA888xx 8V failure (SUP bit). No supply voltage at pin 53. Check coil 5302.
 - **Error 10** = NVM I2C error (diagram A1). NVM (EEPROM - IC7066) does not respond to the micro controller.
 - **Error 11** = Micro controller / NV Memory identification error. During the last start-up the NVM and the micro controller did not recognize each other (e.g. one of them was replaced or the NVM memory has been changed/ adapted or lost), therefore the NVM was loaded with default values.
 - **Error 12** = Microprocessor (Painter - IC 7064) internal RAM test failure.
 - **Error 13** = Main Tuner I2C failure UR13xx. Tuner (item 1100, diagram A3) is corrupted or the I2C line to the tuner is low or no supply voltage at pin 3, pin 6 or 7 of the tuner.
 - **Error 14** = Sound processor I2C error IC7620 (MSP34xx, diagram A8). Sound controller does not respond to the micro controller.
 - **Error 15** = SRAM IC CY7C1019 test failure (IC7070, diagram A2).
- Note:** Only for Europe and AP-PAL execution.

Scaler Board

When the TV detects critical errors from the Scaler board, it will shutdown into protection mode. After a short period of time, the LED will blink according to the respective error codes.

Protection errors:

- **Error 16** = Video formatter/converter I2C error IC7351 (GENESIS FLI2300, diagram C5).
 - **Error 17** = Video decoder I2C error IC7302 (Philips SAA7118E, diagram C3).
- Note:** BGA IC fixed with a heat sink (see chapter 4 how to remove).

5.4 The “Blinking LED” procedure

The contents of the error buffer can also be made visible through the “Blinking LED” procedure. This is especially useful when there is no picture.

When the SDM is entered, the LED will blink the contents of the error-buffer. Error-codes ≥ 10 are shown by a long blink of 750msec, which is an indication of the decimal digit, followed by a pause of 1500msec. followed by n short blinks. When all the error-codes are displayed, the sequence is finished with a LED display of 3 seconds. The sequence starts again.

Example:

Error code position 1 2 3 4 5
Error buffer: 12 9 6 0 0

This gives after activating SDM: 1 long blink of 750msec + pause of 1500msec + 2 short blinks - pause of 3 s - 9 short blinks - pause of 3 s - 6 short blinks - pause of 3 s - long blink of 3 s - etc.

Note: If errors 1, 2 or 4 occur, the LED **always** blinks the last occurred error, even if the set is **not** in service mode.

Another method of reading out a single error code is to use a standard RC or a DST.

- Standard RC - Press “0-6-2-5-0-x” in sequence, to read (blinking LED) out a respective error code in the error buffer, where x = 1, 2, 3, 4, 5, 6, or 7.
- DST: Press “Diagnose” “x” “OK” to read (blinking LED) out a respective error code in the error buffer, where x = 1, 2, 3, 4, 5, 6, or 7.

5.5 ComPair

5.5.1 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 I2C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I2C 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.

5.5.2 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.

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 I2C level. ComPair can access the I2C bus of the television. ComPair can send and receive I2C 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 I2C 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 extend. 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 17 and click on the correct waveform 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.

5.5.3 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 'I2C') 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.

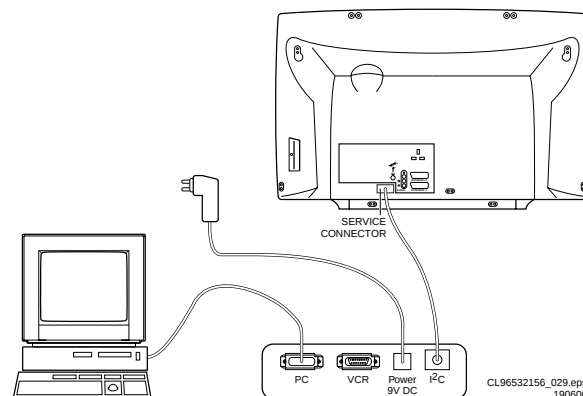


Figure 5-5 ComPair Interface connection

5.5.4 How To Order

ComPair order codes (EU/AP/LATAM):

- 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 (year 2002, 3122 785 60110 (year 2003).
- SearchMan32 CD (update): 3122 785 60080 (year 2002), 3122 785 60120 (year 2003).
- ComPair interface cable: 3122 785 90004.
- ComPair firmware upgrade IC: 3122 785 90510 (only for sets with software upgrade facilities).
- Transformer (non-UK): 4822 727 21632.
- Transformer UK: 4822 727 21633.

Note: If you encounter any problems, contact your local support desk.

5.6 Trouble Shooting Tips

5.6.1 Scaler/TV Board Power Supply Problems

In this paragraph some troubleshooting steps for checking the power supply of the Scaler-board and TV-board circuitry are described.

- Measure across pin-1 and pin-4 of connector 1003 (diagram C1). +12V (13" and 15") or +24V (20") should be present. If the voltage is not present, probably is caused by:
 - AC to DC adaptor is defect.
 - Short circuit in TV-board (can be isolated by connector 1003).
 - Fuse 1002 is open circuit.
- Measure across C2923 (diagram A10). +3V3 should be present. If not present, probably this is caused by:
 - IC7920 is defective.
 - R3925 is defective.
 - The power supply circuit (diagram C1) is defective (see Scaler-board circuit trouble shooting tips).
- Measure across C2913/C2933 (diagram A10). +8V3/+5V4 should be present respectively. If not present, probably this is caused by:
 - IC 7910/7930 regulator is defective.
 - Fuse 1903 is defective.
 - Switching FET 7900 is defective.
 - Transistor T7901 is defective.
- Measure across C2007 (diagram C1). +5V should be present. If not present, probably this is caused by:
 - +5V grounded by the load.
 - Regulator IC 7001 is defective.
 - Control transistor T7003/7002 is defective.
 - Scaler power control signal line (POW-CON-SCALER coming from TV-board) is defective.
- Measure pin-4 or pin-5 of connector 1341 (diagram C5). Pin-4 should be high (+4V7) and pin-5 also should be high (+3V4). If one/both of the voltage is not present, probably this is caused by:
 - IC 7351 (Farouja_s2300) is defective.
 - Inverter board is defective.

5.6.2 General Problems

TV switched "off" or changed channel without any user action

Set switches off after "TV SWITCHING OFF" was displayed. "Auto Standby" switched the set "off" because:

- There was no ident signal for more than 15 minutes.

- There was no remote control signal received or local key pressed for > 2 hours.

See chapter 8 for a description on the options to enable/disable "Auto Standby".

5.6.3 Picture problems

Picture too dark or too bright

- Press "Smart Picture" button on the remote control. In case the picture improves, increase / decrease the brightness value or increase / decrease the contrast value. The new "Personal Preference" value is automatically stored after 3 minutes.
- After switching on the Customer Service Mode the picture is OK. Increase / decrease the brightness value or increase / decrease the contrast value. The new "Personal Preference" value is automatically stored after 3 minutes.

Snowy picture

Check the "NOT TUNED" section of the Customer Service Mode screen.

Snowy picture and/or unstable picture

A scrambled or decoded signal is received.

Black and white picture

- Press "Smart Picture" button on the remote control. In case picture improves, increase the colour value. The new "Personal Preference" value is automatically stored after 3 minutes.
- After switching on the Customer Service Mode the picture is OK. Increase the colour value. The new "Personal Preference" value is automatically stored after 3 minutes.

Menu text not sharp enough

- Press "Smart Picture" button on the remote control. In case the picture improves, decrease the contrast value. The new "Personal Preference" value is automatically stored after 3 minutes.
- After switching on the Customer Service Mode the picture is OK. Decrease the contrast value. The new "Personal Preference" value is automatically stored after 3 minutes.

5.6.4 Sound problems

No sound or sound too loud (after channel change / switching on)

After switching on the Customer Service Mode the volume is OK. Increase / decrease the volume level. The new "Personal Preference" value is automatically stored after 3 minutes.

5.6.5 Extra information/tips:

- Complaints that may be caused by an incorrect system setting:
 - No colours
 - Colours not correct
 - Unstable picture
 - Noise in picture To change the system setting of a preset:
 1. Press the "MENU" button on the remote control
 2. Select the INSTALL sub menu
 3. Select the MANUAL STORE sub menu
 4. Select and change the SYSTEM setting until picture and sound are correct
 5. Select the STORE menu item
- The Scaler is the driving engine of the LCD panel. When there is no display and OSD on screen, check whether sound is producible on TV channel. If sound is audible, most likely the defective lies in Scaler board or inverter board.

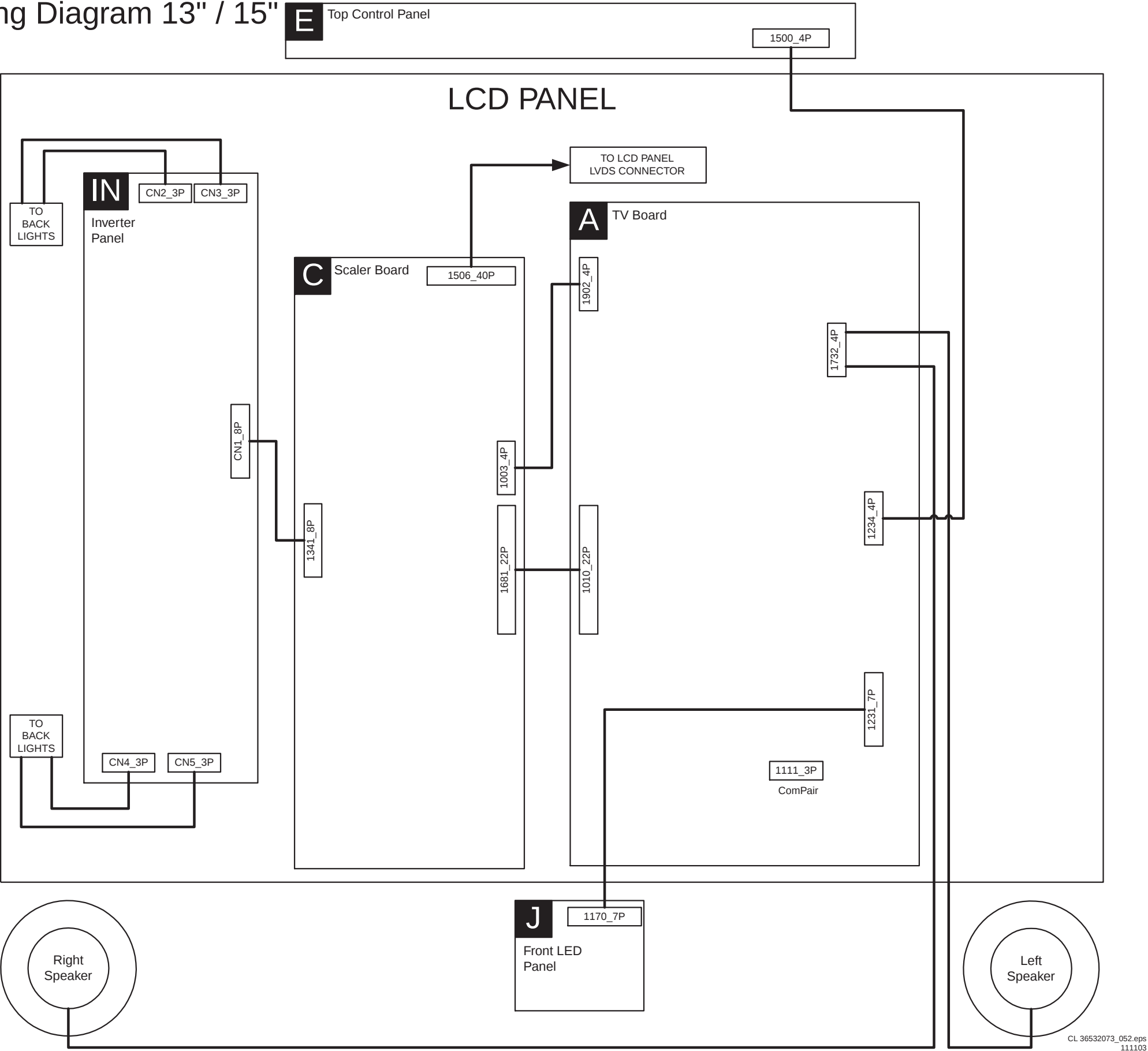
- To know fast whether inverter is functioning, visually check if the backlights are “on” by looking at the back of the LCD panel. Some bright spots can be seen on the side. Other way to tell whether the backlight is working is to switch the set to AV mode. The front of the screen had some kind of “fogged” effect.
Note: when one of the backlight connectors has loosened, the inverter circuit will be shut down.
- If the supply to the LCD panel is OK (likewise for backlight supply), but no data signals (example: signals on connector 1506) supplied from Scaler to LCD panel, you will notice that the LCD screen will shown full screen in sequential of BLUE, GREEN, RED, BLANK, dark-GREY, light-GREY and WHITE repeatedly. It means LCD panel is in good condition. The fault lies in the Scaler board

Personal Notes:

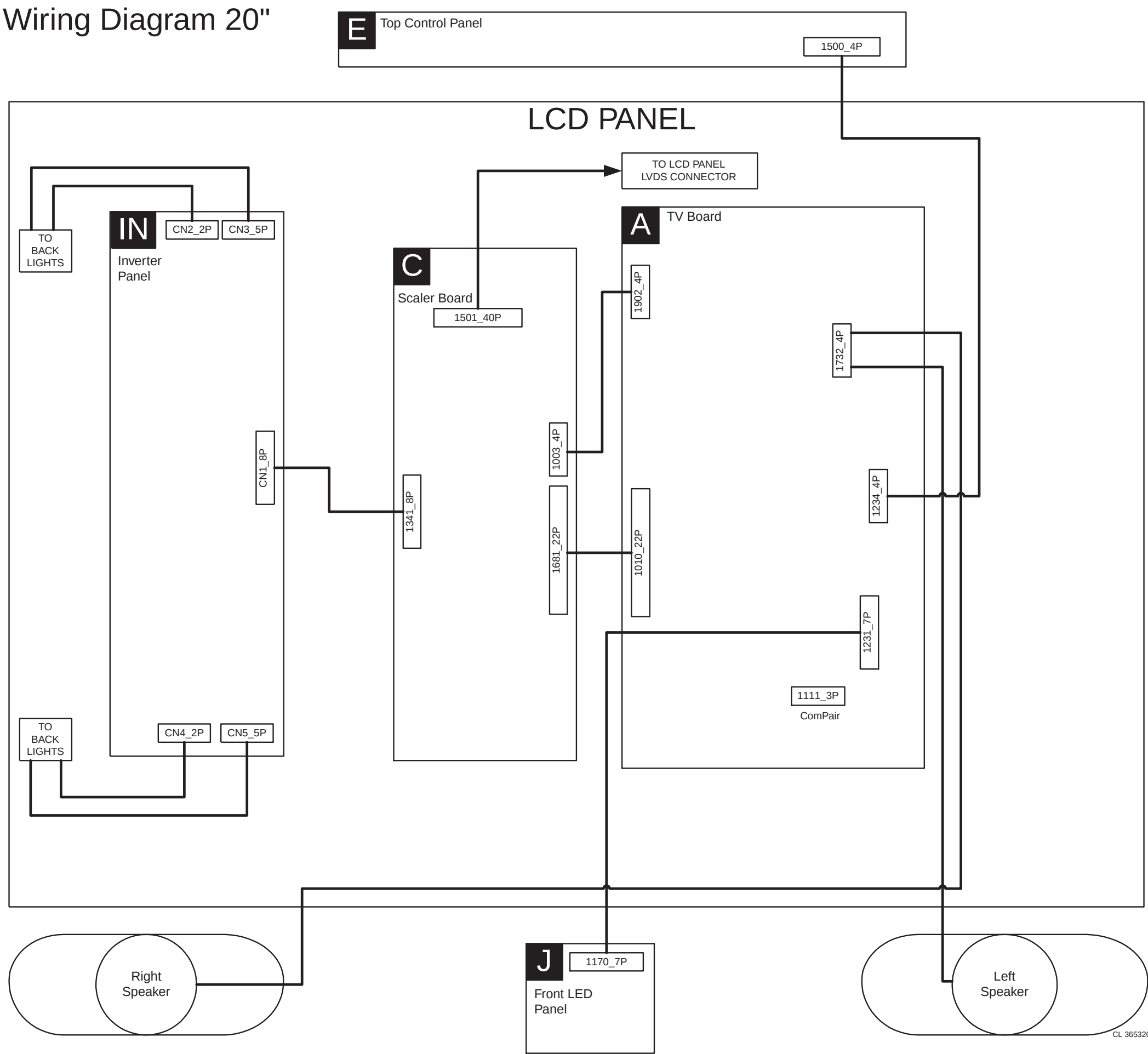
6. Block Diagrams, Testpoint Overviews, and Waveforms

Wiring Diagram (13"/15")

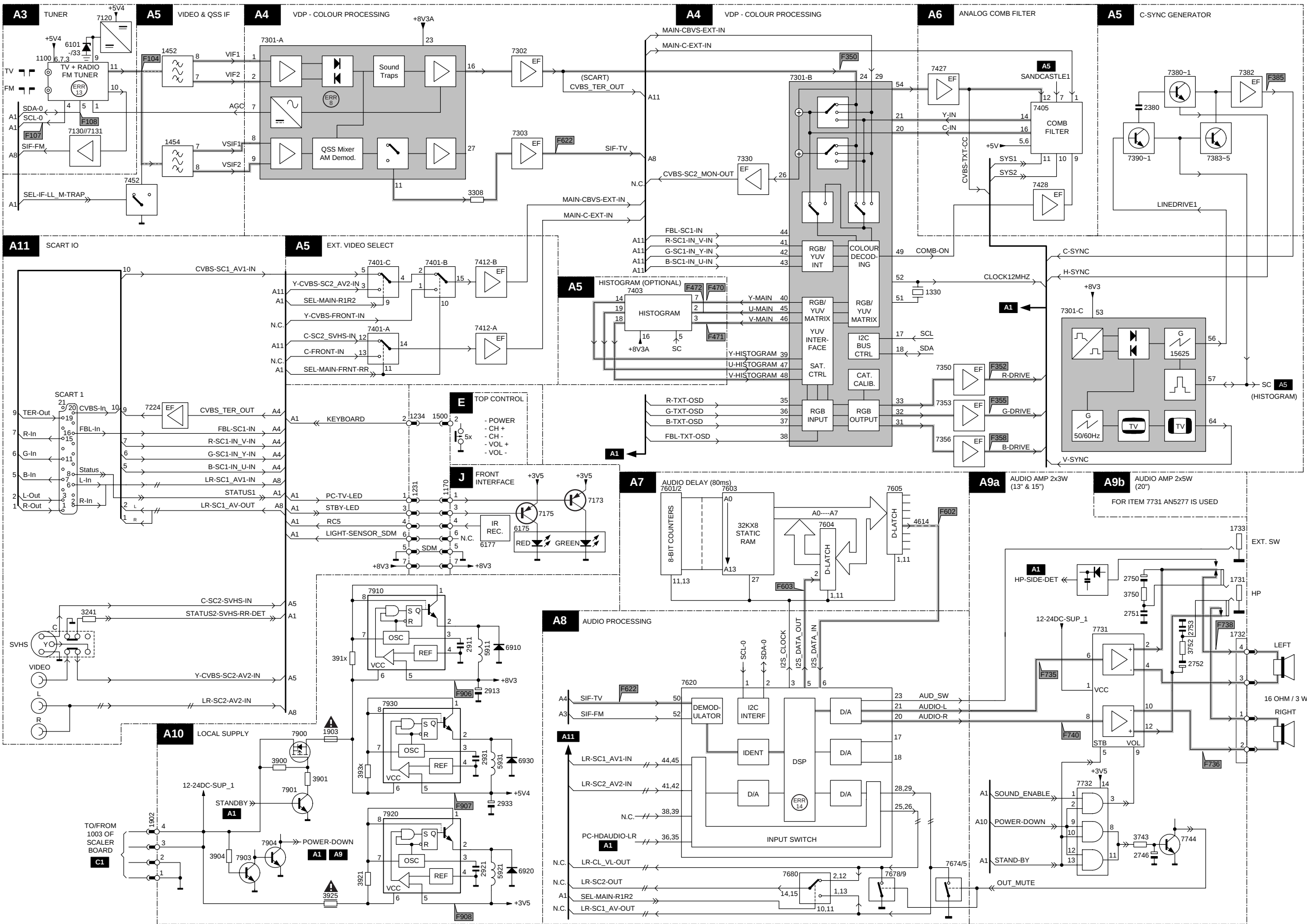
Wiring Diagram 13" / 15"



Wiring Diagram 20"

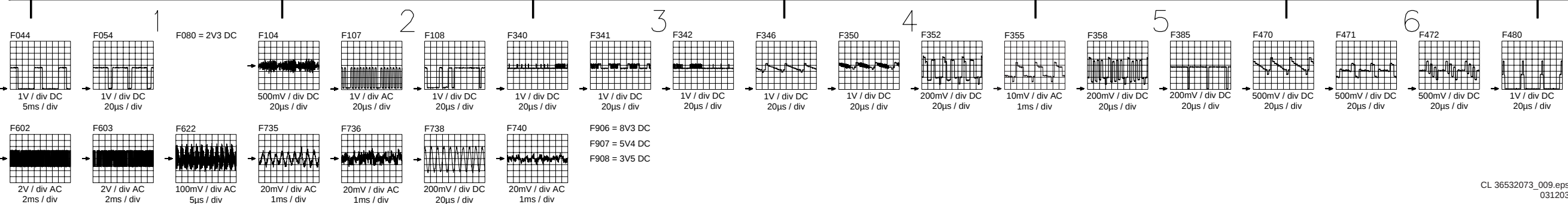
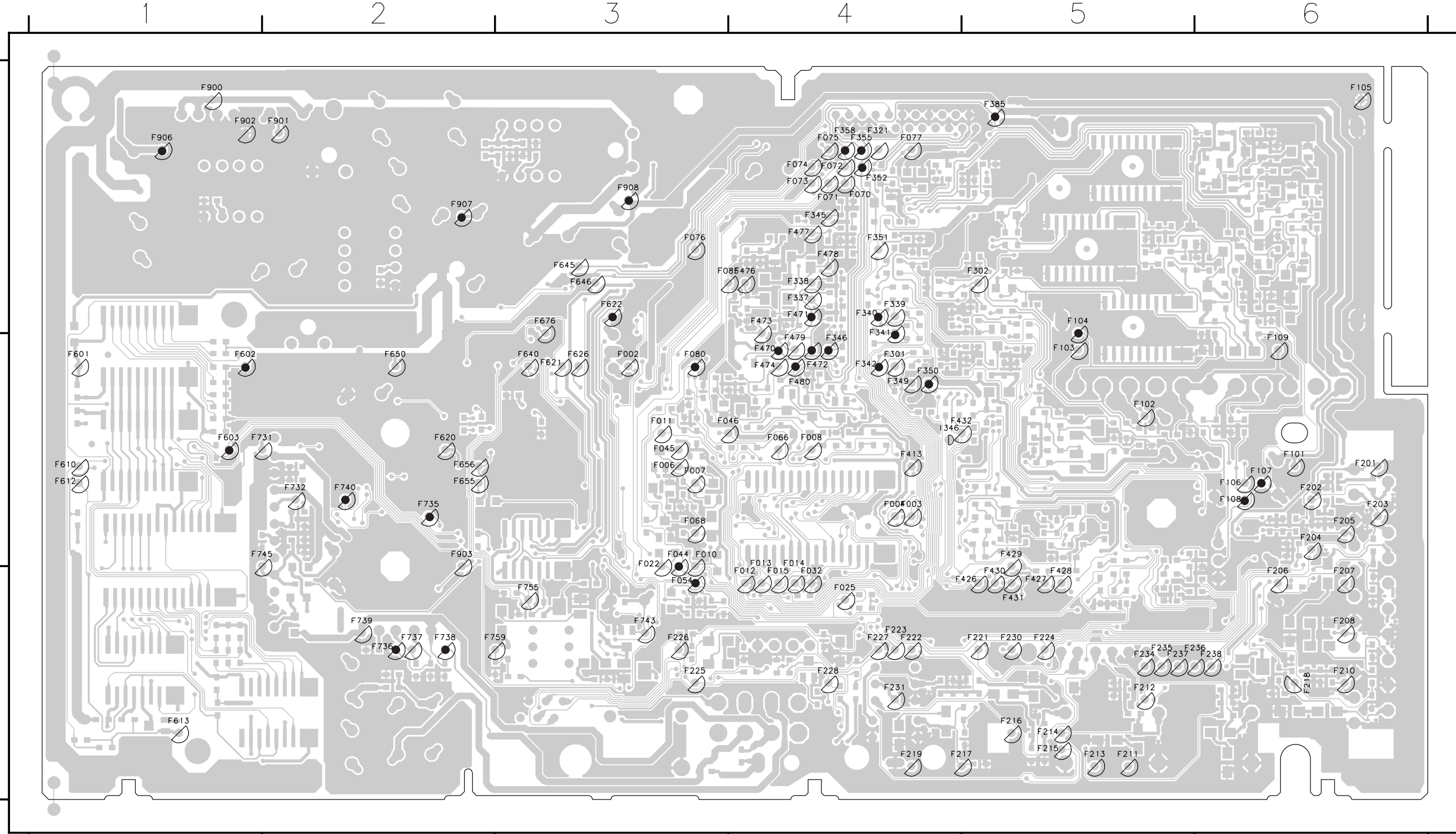


Block Diagram (Tuner-IF-Video)

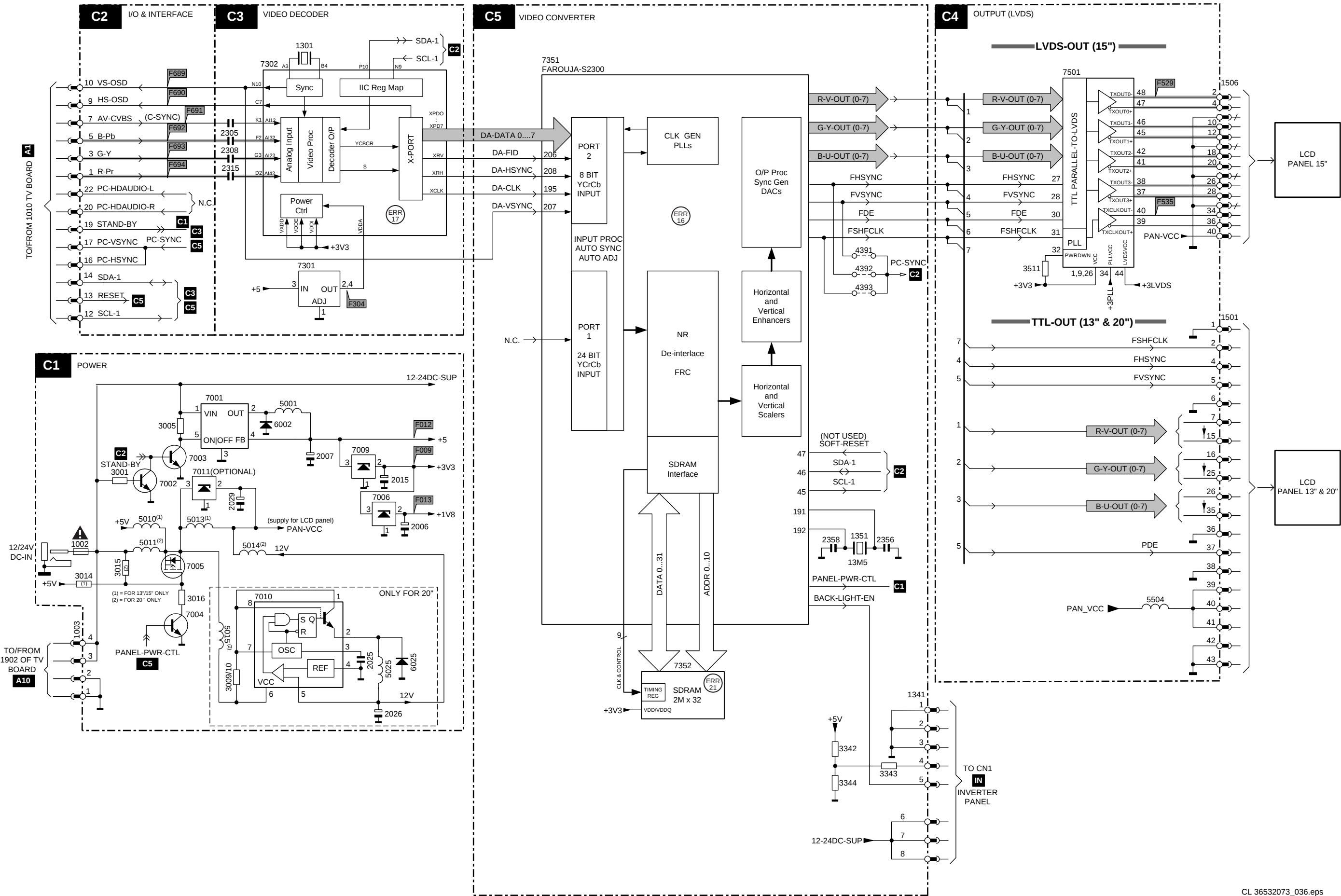


Testpoint Overview TV Board

F002 B3	F010 B3	F022 B3	F054 C3	F073 A4	F085 A3	F106 B6	F203 B6	F210 C6	F216 C5	F223 C4	F230 C5	F238 C6	F339 A4	F349 B4	F385 A5	F430 C5	F473 A4	F480 B4	F613 C1	F645 A3	F731 B1	F739 C2	F900 A1	F908 A3
F003 B4	F011 B3	F025 C4	F066 B4	F074 A4	F101 B6	F107 B6	F204 B6	F211 C5	F217 C6	F224 C5	F231 C4	F301 B4	F340 A4	F350 B4	F413 B4	F431 C5	F474 B4	F601 B1	F620 B2	F621 B3	F732 B2	F740 B2	F901 A2	I346 B4
F004 B4	F012 C4	F032 C4	F068 B3	F075 A4	F102 B5	F108 B6	F205 B6	F212 C5	F218 C6	F225 C3	F234 C5	F302 A5	F341 A4	F351 A4	F426 C5	F432 B4	F476 A4	F602 B1	F621 B3	F650 B2	F735 B2	F743 C3	F902 A1	
F006 B3	F013 B4	F044 B3	F070 A4	F076 A3	F103 B5	F109 B6	F206 C6	F213 C5	F219 C4	F226 C3	F235 C5	F321 A4	F342 B4	F352 A4	F427 C5	F470 B4	F477 A4	F603 B1	F622 A3	F655 B2	F736 C2	F745 B1	F903 B2	
F007 B3	F014 B4	F045 B3	F071 A4	F077 A4	F104 A5	F201 B6	F207 C6	F214 C5	F221 C5	F227 C4	F236 C6	F327 A4	F345 A4	F355 A4	F428 C5	F471 A4	F478 A4	F610 B1	F626 B3	F656 B2	F737 C2	F755 C3	F906 A1	
F008 B4	F015 C4	F046 B3	F072 A4	F080 B3	F105 A6	F202 B6	F208 C6	F215 C5	F222 C4	F228 C4	F237 C5	F338 A4	F346 B4	F358 A4	F429 B5	F472 B4	F479 B4	F612 B1	F640 B3	F676 A3	F738 C2	F759 C2	F907 A2	

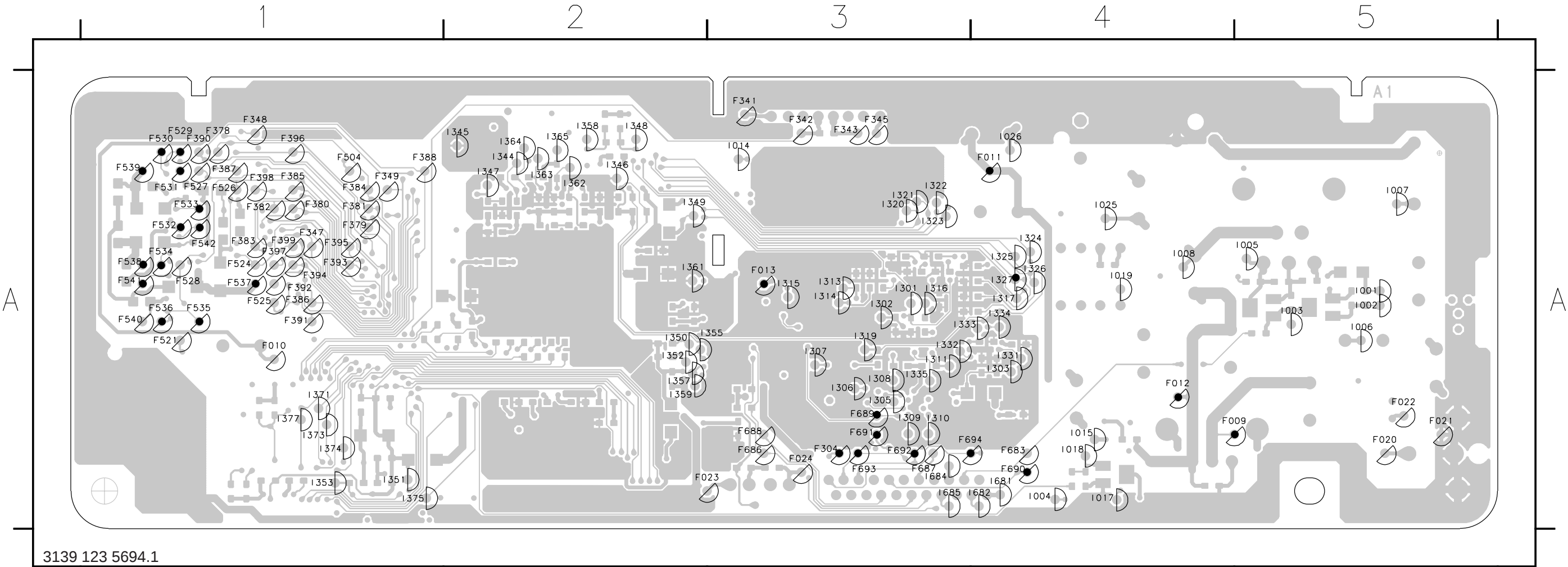


Block Diagram (Scaler Board)

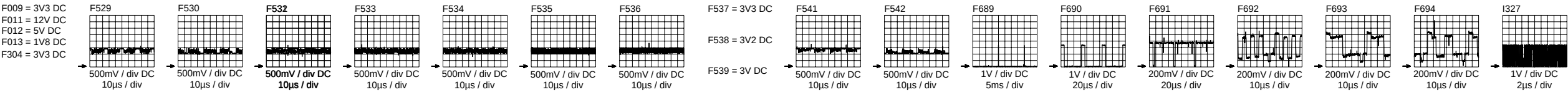


Testpoint Overview Scaler Board

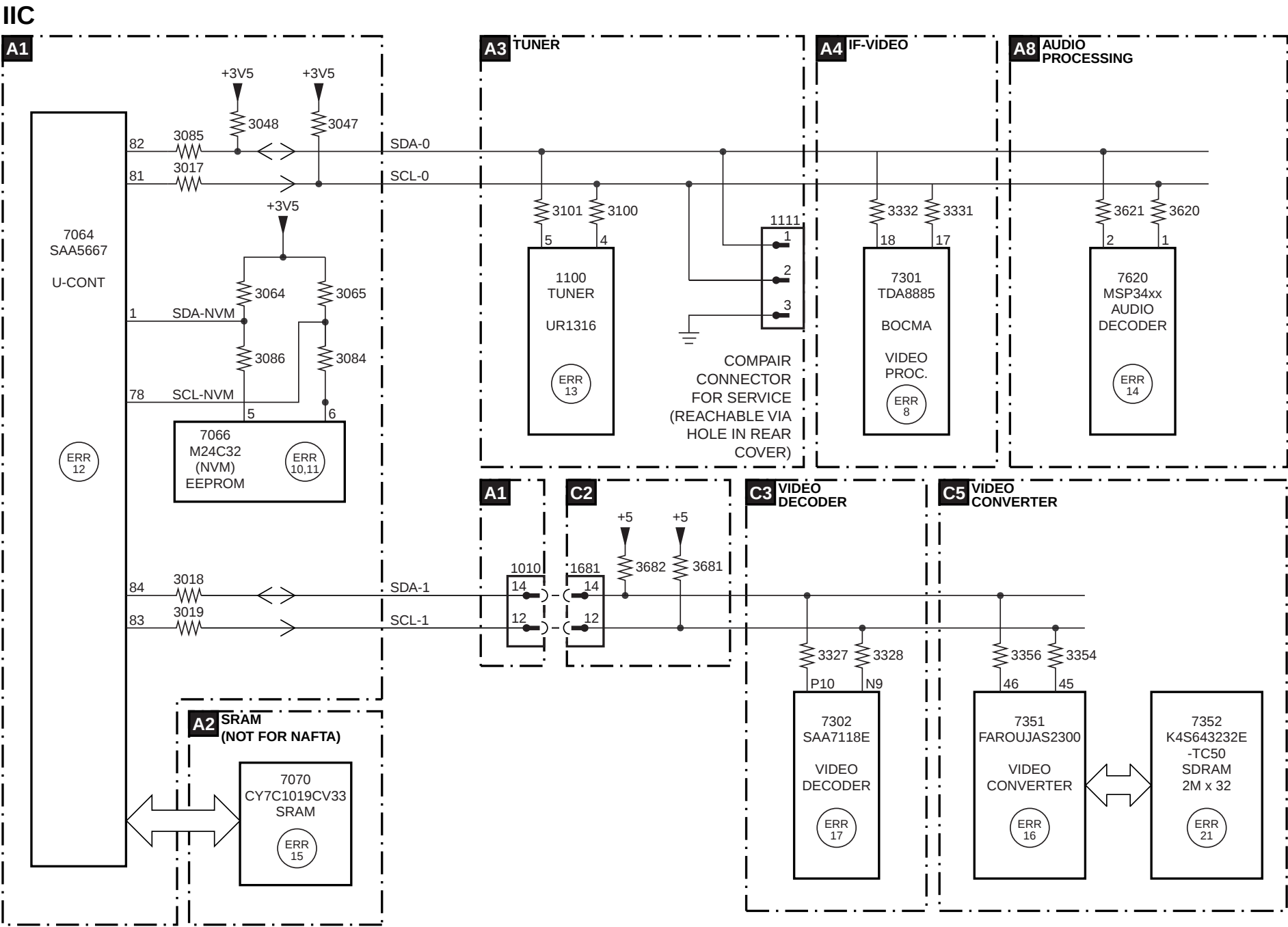
F009 A4	F021 A5	F342 A3	F378 A1	F384 A1	F391 A1	F397 A1	F525 A1	F531 A1	F537 A1	F683 A4	F691 A3	I003 A5	I014 A3	I026 A4	I307 A3	I314 A3	I321 A3	I327 A4	I344 A2	I350 A2	I358 A2	I365 A2	I681 A4
F010 A1	F022 A5	F343 A3	F379 A1	F385 A1	F392 A1	F398 A1	F526 A1	F532 A1	F538 A1	F686 A3	F692 A3	I004 A4	I015 A4	I301 A3	I308 A3	I315 A3	I322 A3	I331 A4	I345 A2	I351 A1	I359 A2	I371 A1	I682 A4
F011 A4	F023 A2	F345 A3	F380 A1	F386 A1	F393 A1	F399 A1	F527 A1	F533 A1	F539 A1	F687 A3	F693 A3	I005 A5	I017 A4	I302 A3	I309 A3	I316 A3	I323 A3	I332 A3	I346 A2	I352 A2	I361 A2	I373 A1	I684 A3
F012 A4	F024 A3	F347 A1	F381 A1	F387 A1	F394 A1	F504 A1	F528 A1	F534 A1	F540 A1	F688 A3	F694 A3	I006 A5	I018 A4	I303 A4	I310 A3	I317 A4	I324 A4	I333 A3	I347 A2	I353 A1	I362 A2	I374 A1	I685 A3
F013 A3	F304 A3	F348 A1	F382 A1	F388 A1	F395 A1	F521 A1	F529 A1	F535 A1	F541 A1	F689 A3	I001 A5	I007 A5	I019 A4	I305 A3	I311 A3	I319 A3	I325 A4	I334 A4	I348 A2	I355 A3	I363 A2	I375 A1	
F020 A5	F341 A3	F349 A1	F383 A1	F390 A1	F396 A1	F524 A1	F530 A1	F536 A1	F542 A1	F690 A4	I002 A5	I008 A4	I025 A4	I306 A3	I313 A3	I320 A3	I326 A4	I335 A3	I349 A2	I357 A2	I364 A2	I377 A1	



3139 123 5694.1



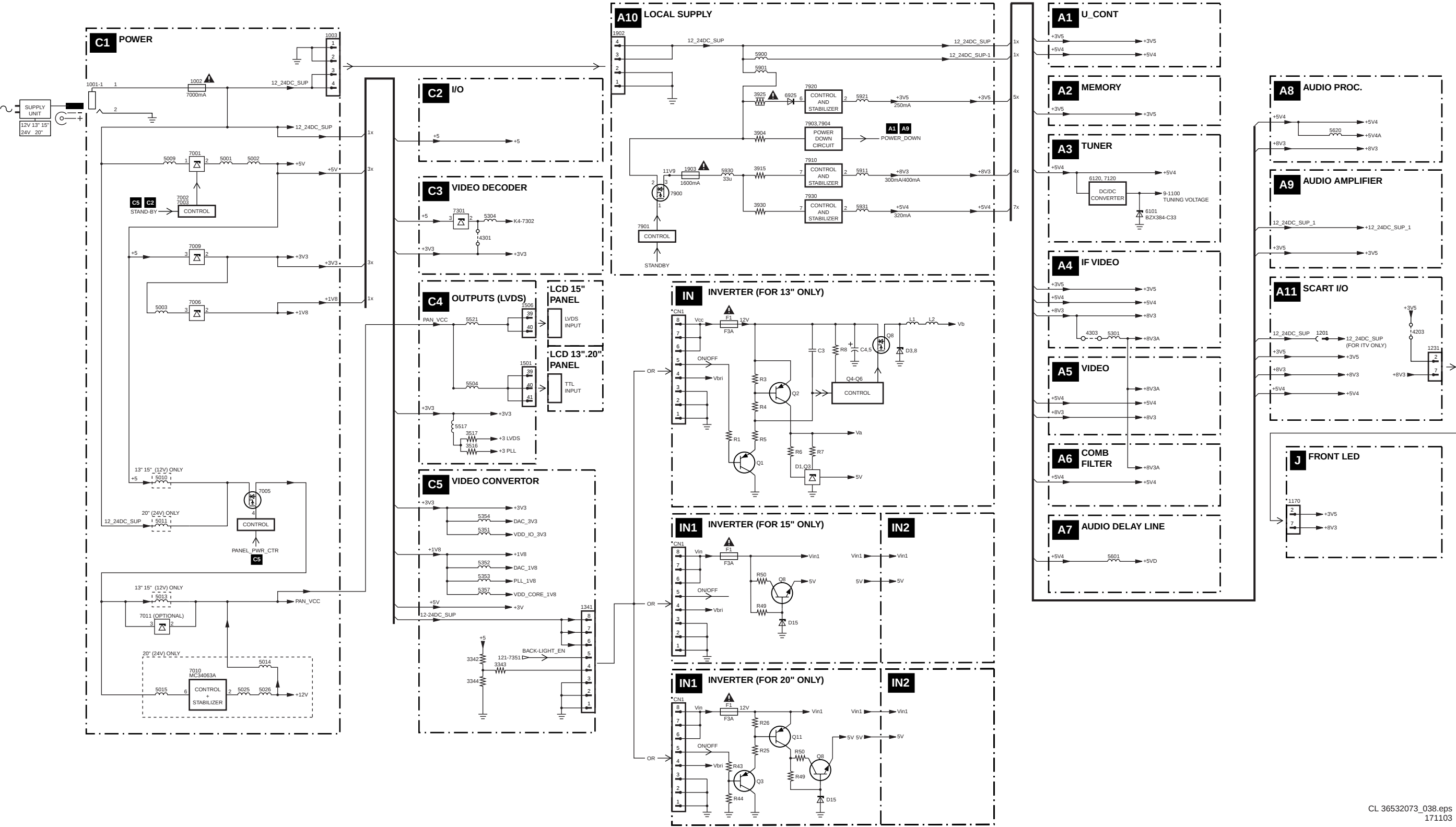
I2C-IC's and Error Codes Overview



Error code	Error description	Possible defective components	Diagram
0	No error detected	---	----
1	Reserved		
2	Reserved		
3	Reserved		
4	5V protection active	IC7620 & 1100 I2C devices (MSP34XX & Tuner)	A3, A8, A10
5	Reserved		
6	General I2C bus error	I2C bus s/c or o/c	
7	Reserved		
8	BOCMA I2C error	IC 7301 (IF Video TDA888XX)	A4
9	BOCMA 8V supply failure	IC 7910 or IC7301 (MC34063A or TDA888XX)	A4, A10
10	NVM I2C error	IC 7066 (NVM M24CXX)	A1
11	NVM identification failure	IC 7066 (NVM M24CXX)	A1
12	uProcessor internal RAM test failure	IC 7064 (uP SAA56XX)	A1
13	Tuner I2C error	1100 – UR13XX (Tuner)	A3
14	Sound processor I2C error	IC 7620 (MSP34XX)	A8
15	SRAM error	IC 7070 (RAM 128 x 8)	A2
16	Video Formatter/Scaler I2C error	IC 7351 (Farouja_s2300) (Video Converter)	C5
17	Multi-Video Decoder I2C error	IC 7302 (Video Decoder SAA7118)	C3
18*	Reserved		
19*	Reserved		
20*	Reserved		
21	SDRAM protection active	IC 7352 (SDRAM 2M x 32)	C5

*= Not application

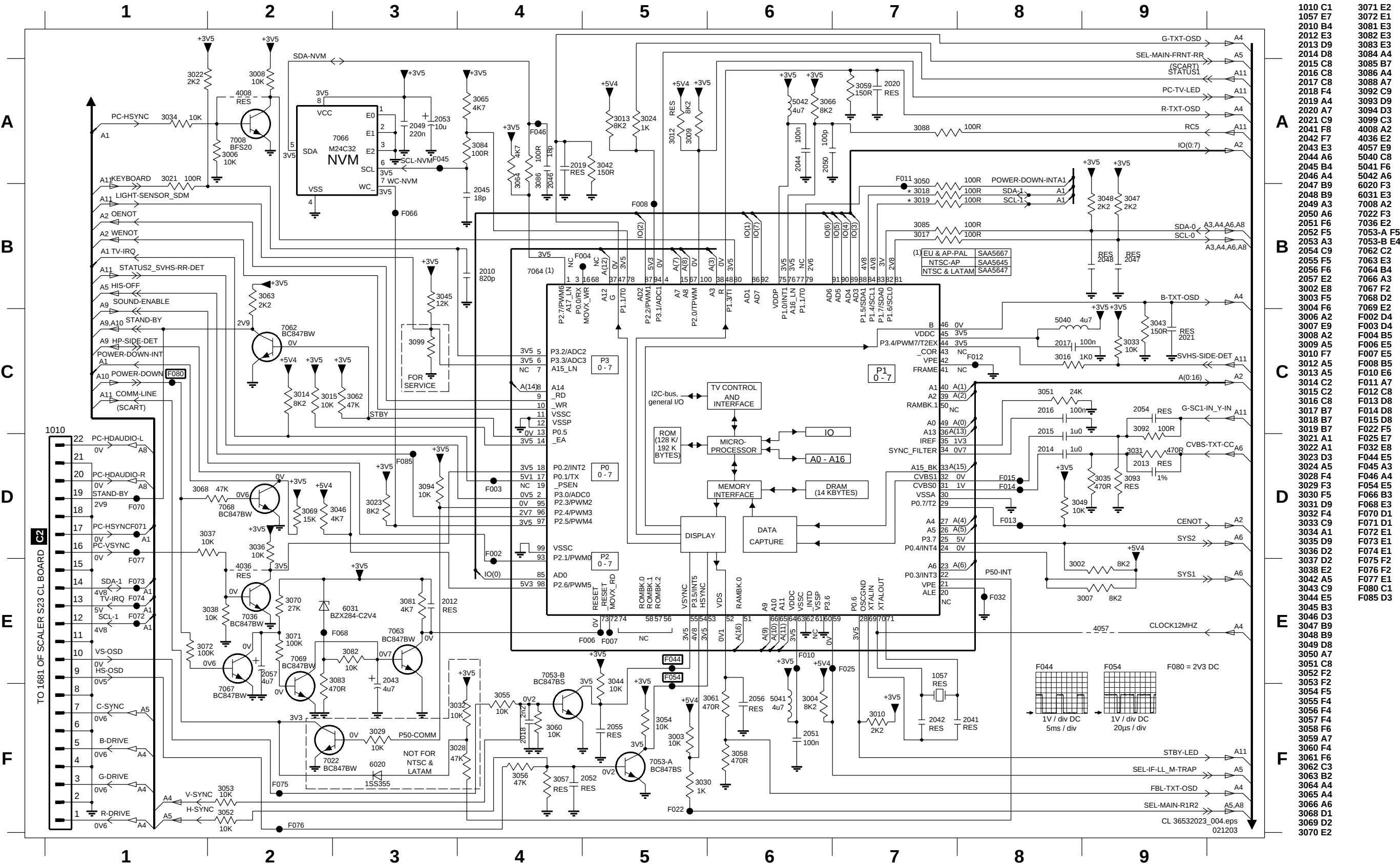
Powerlines Overview



7. Circuit Diagrams and PWB Layouts

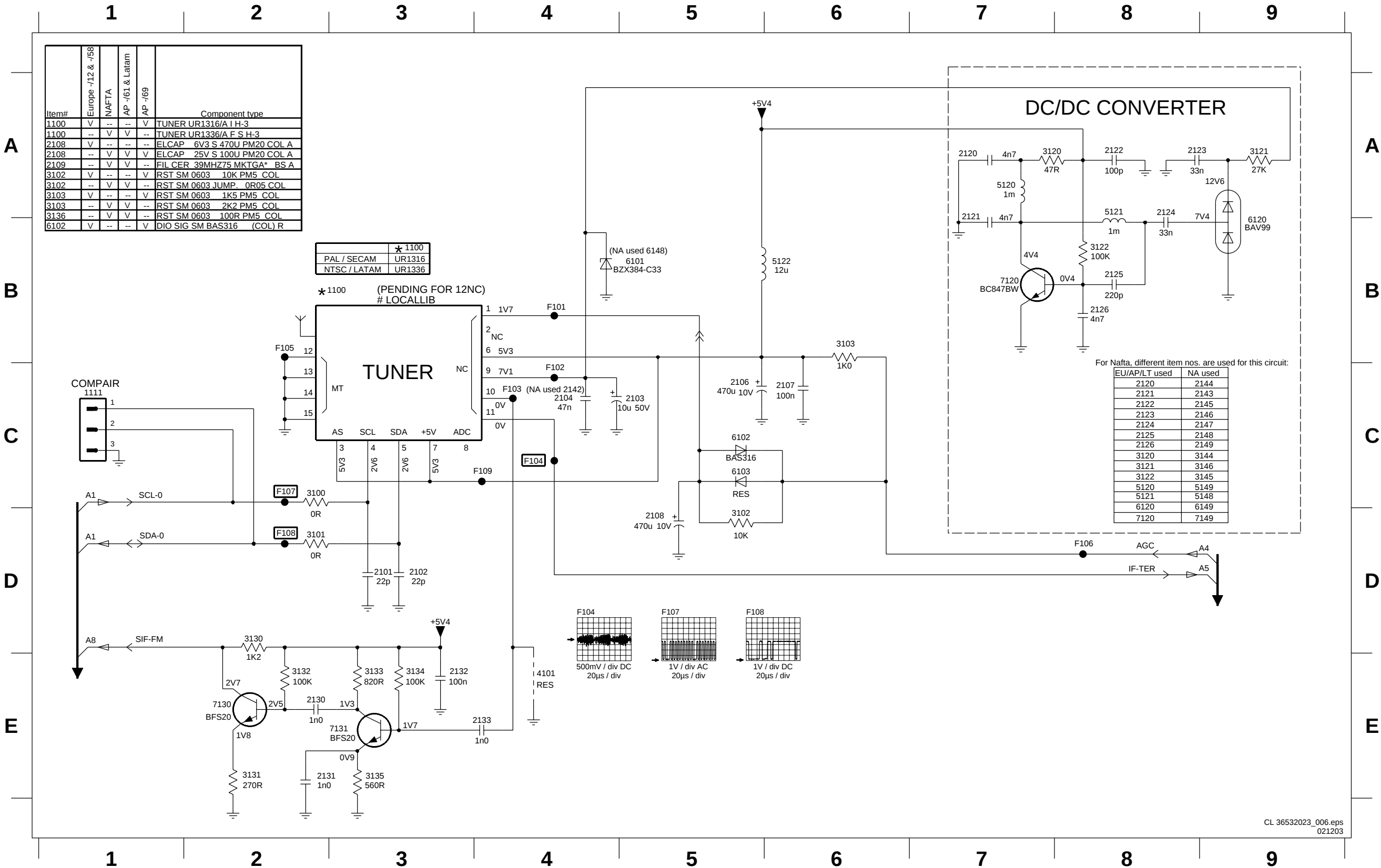
TV Board: U_Cont

A1 U_CONT
(COMMON) FOR DIVERSITY TABLE SEE DIAGRAM A2



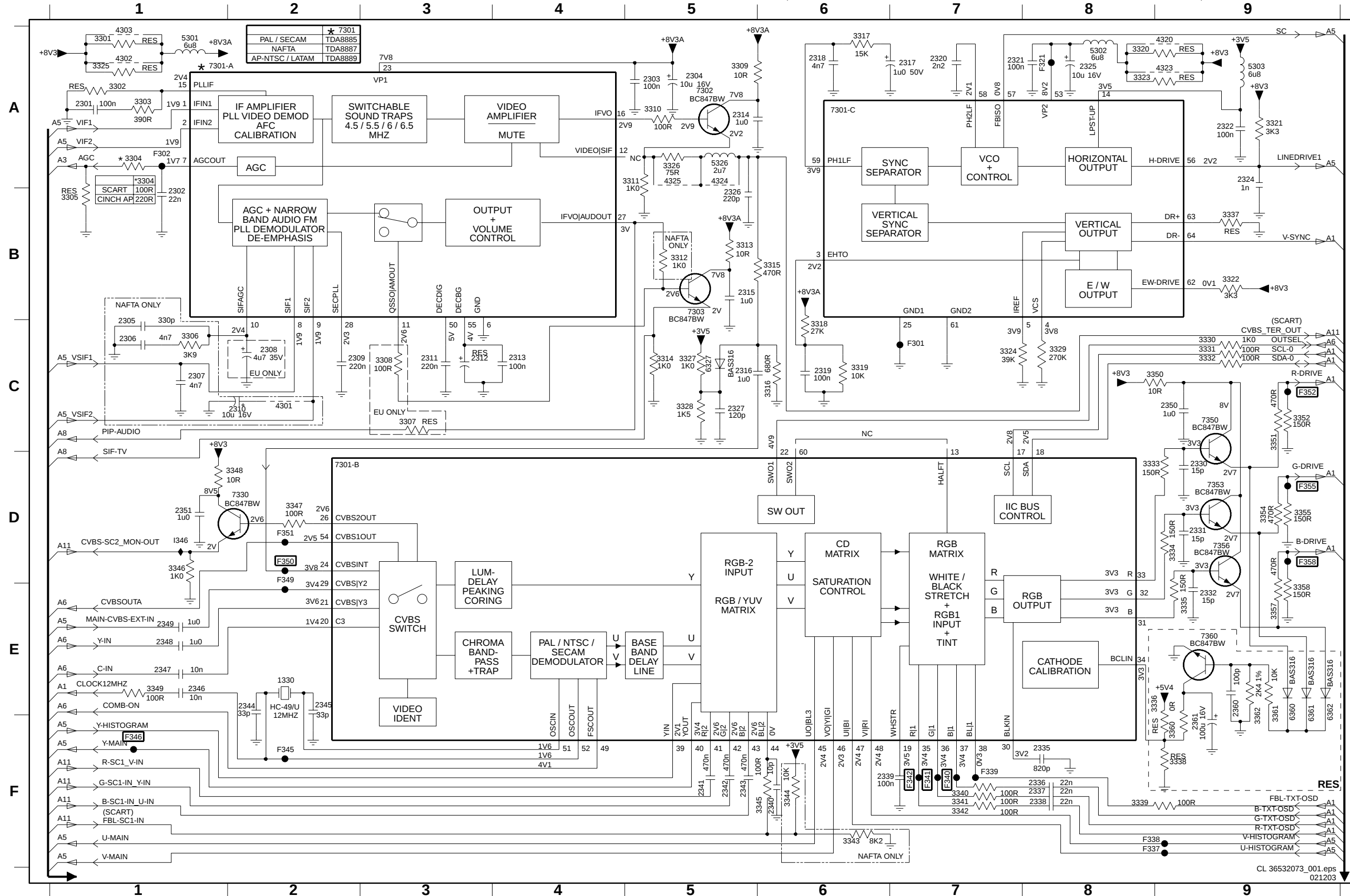
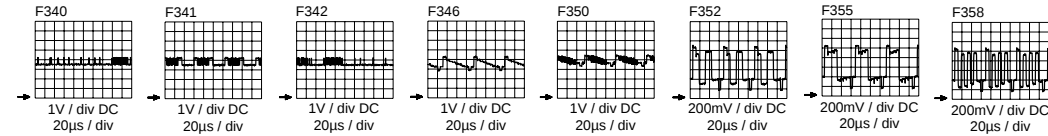
TV Board: Tuner Function

A3 TUNER FUNCTION
(13"/15"/20" SCART)



- 1100 B2
- 1111 C1
- 2101 D3
- 2102 D3
- 2103 C5
- 2104 C4
- 2106 C5
- 2107 C6
- 2108 D5
- 2120 A7
- 2121 A7
- 2122 A8
- 2123 A8
- 2124 A8
- 2125 B8
- 2126 B8
- 2130 E2
- 2131 E2
- 2132 E3
- 2133 E4
- 3100 C2
- 3101 D2
- 3102 D5
- 3103 B6
- 3120 A7
- 3121 A9
- 3122 B8
- 3130 D2
- 3131 E2
- 3132 E2
- 3133 E3
- 3134 E3
- 3135 E3
- 4101 E4
- 5120 A7
- 5121 A8
- 5122 B6
- 6101 B5
- 6102 C5
- 6103 C5
- 6120 B9
- 7120 B7
- 7130 E2
- 7131 E3
- F101 B4
- F102 C4
- F103 C4
- F104 C4
- F105 B2
- F106 C8
- F107 C2
- F108 D2
- F109 C4

A 4 IF-VIDEO -SYNC-CHROMA
(13"/15"/20" SCART & CINCH EXCEPT CINCH3L)

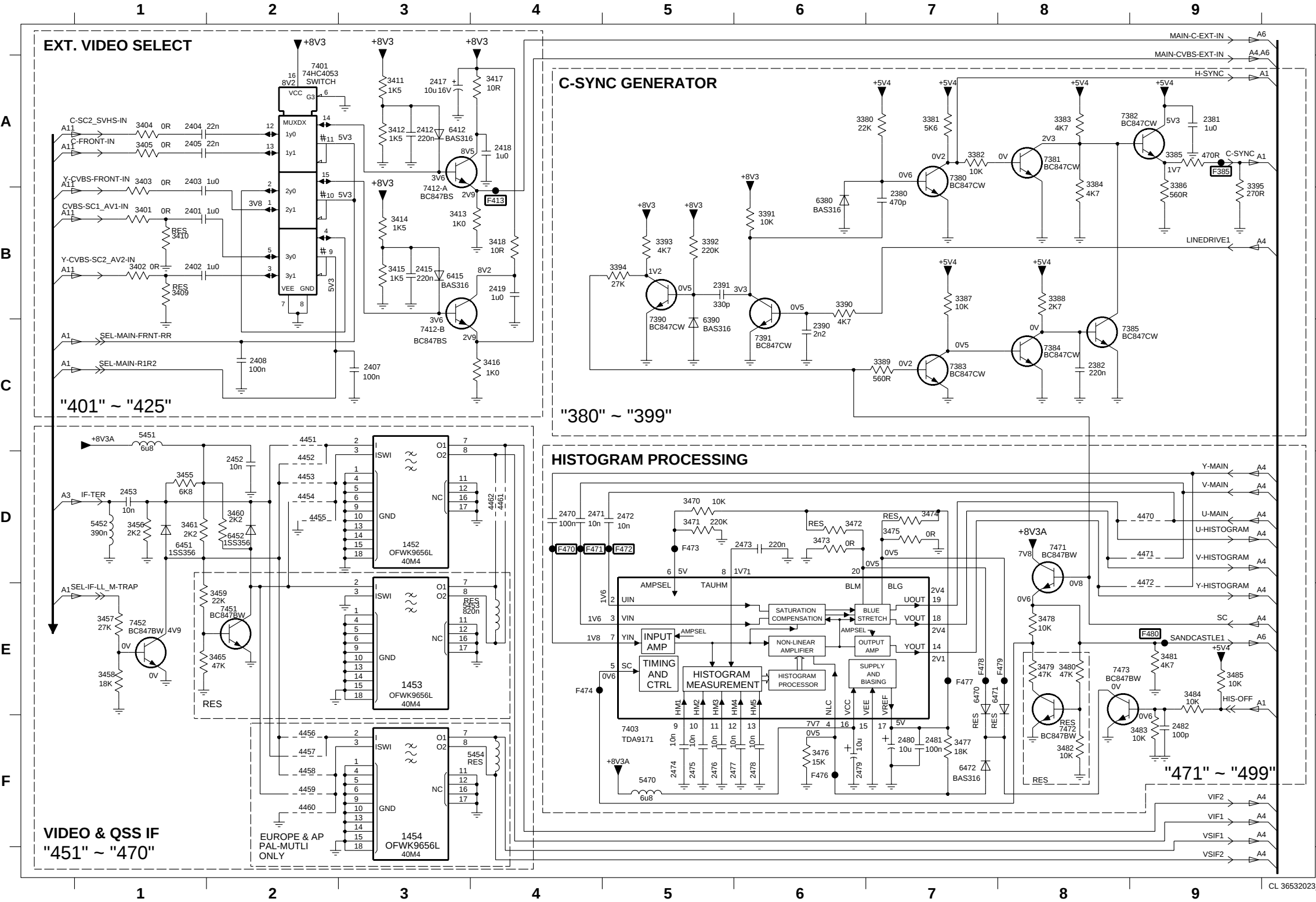
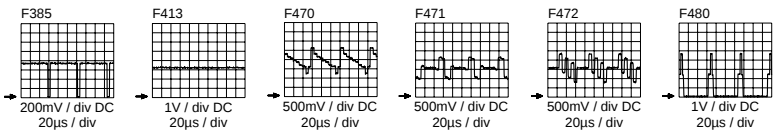


2300 E2	3345 F6
2301 A1	3346 D1
2302 B1	3347 D2
2303 A5	3348 D2
2304 A5	3349 E1
2305 C1	3350 C9
2306 C1	3351 C9
2307 C1	3352 C9
2308 C2	3354 D9
2309 C2	3355 D9
2310 C2	3357 E9
2311 C3	3358 E9
2312 C3	3360 F9
2313 C4	3361 E9
2314 A5	3362 F9
2315 B5	4301 C2
2316 C5	4302 A1
2317 A7	4303 A1
2318 A6	4320 A9
2319 C6	4323 A9
2320 A7	4324 A5
2321 A7	4325 A5
2322 A9	5301 A1
2324 A9	5302 A8
2325 A8	5303 A9
2326 B5	5326 A5
2327 C5	6327 C5
2330 D9	6360 E9
2331 D9	6361 E9
2332 E9	6362 E9
2335 F8	7301-A A1
2336 F8	7301-B D2
2337 F8	7301-C A6
2338 F8	7302 A5
2339 F6	7303 B5
2340 F6	7330 D2
2341 F5	7350 C9
2342 F5	7353 D9
2343 F5	7356 D9
2344 E2	7360 E9
2345 E2	F301 C7
2346 E1	F302 A1
2347 E1	F321 A8
2348 E1	F337 F8
2349 E1	F338 F8
2350 C9	F339 F7
2351 D1	F340 F7
2360 E9	F341 F7
2361 F9	F342 F7
3301 A1	F345 F2
3302 A1	F346 F1
3303 A1	F349 D2
3304 A1	F350 D2
3305 B1	F351 D2
3306 C1	F352 C9
3307 C3	F355 D9
3308 C3	F358 D9
3309 A5	I346 D1
3310 A5	
3311 A5	
3312 B5	
3313 B5	
3314 C5	
3315 B6	
3316 C6	
3317 A6	
3318 C6	
3319 C6	
3320 A8	
3321 A9	
3322 B9	
3323 A8	
3324 C7	
3325 A1	
3326 A5	
3327 C5	
3328 C5	
3329 C8	
3330 C9	
3331 C9	
3332 C9	
3333 D8	
3334 D9	
3335 E9	
3336 E8	
3337 B9	
3338 F8	
3339 F8	
3340 F7	
3341 F7	
3342 F7	
3343 F6	
3344 F6	

TV Board: SAW Filter, Ext. Video Select, Histogram, & C-Sync Generator

A5

SAW FILTER, EXT. VIDEO SELECT, HISTOGRAM & C-SYNC GEN
(13"/15"/20" EUROPE & AP-PAL)



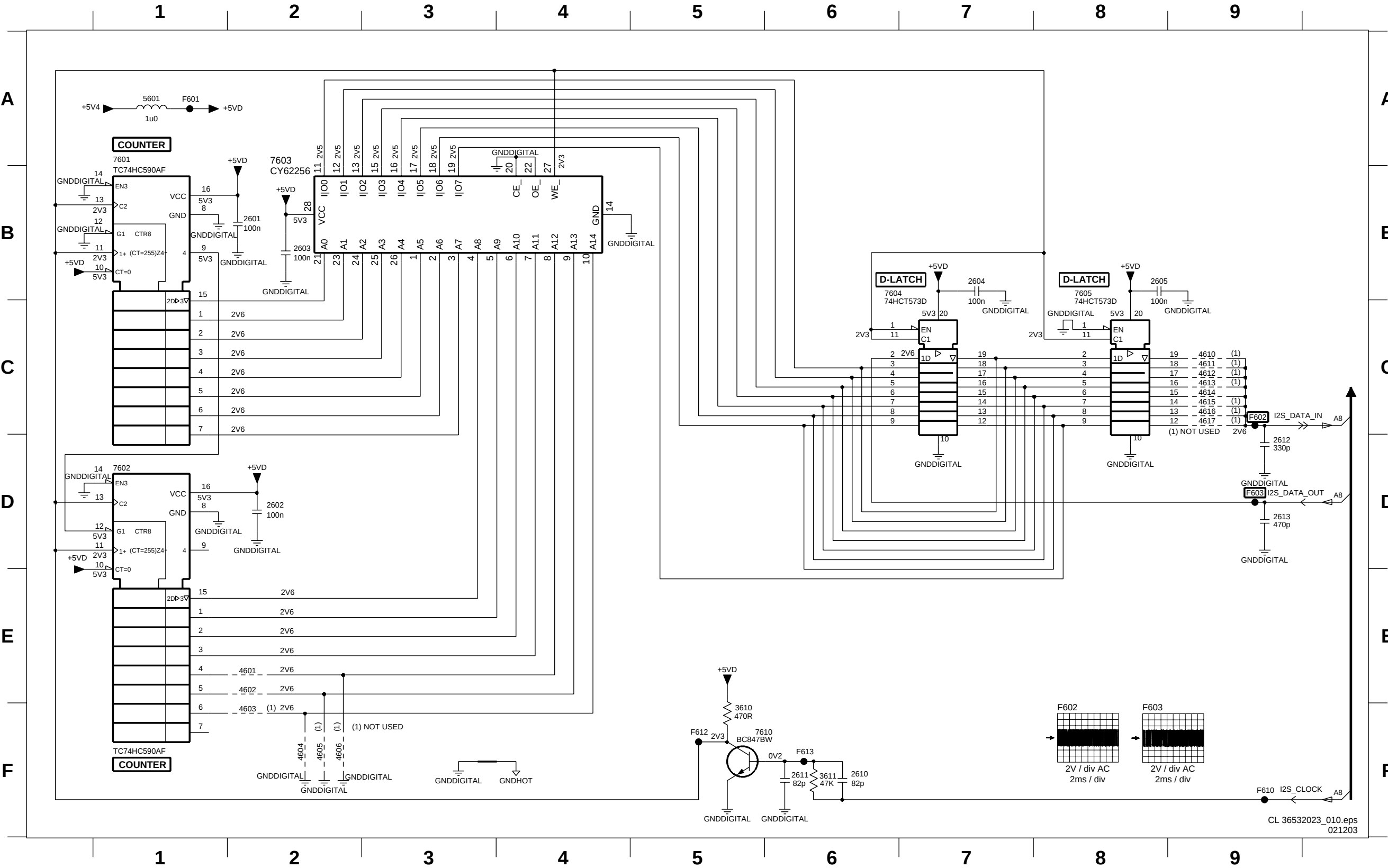
- 1452 D3
- 1453 E3
- 1454 F3
- 2380 B7
- 2381 A9
- 2382 C8
- 2390 C6
- 2391 B5
- 2401 B1
- 2402 B1
- 2403 A1
- 2404 A1
- 2405 A1
- 2407 C3
- 2408 C2
- 2412 A3
- 2415 B3
- 2417 A3
- 2418 A4
- 2419 B4
- 2452 D2
- 2453 D1
- 2470 D4
- 2471 D4
- 2472 D5
- 2473 D6
- 2474 F5
- 2475 F5
- 2476 F5
- 2477 F6
- 2478 F6
- 2479 F6
- 2480 F7
- 2481 F7
- 2482 F9
- 3380 A6
- 3381 A7
- 3382 A7
- 3383 A8
- 3384 A8
- 3385 A9
- 3386 A9
- 3387 B7
- 3388 B8
- 3389 C7
- 3390 B6
- 3391 B6
- 3392 B5
- 3393 B5
- 3394 B5
- 3395 A9
- 3396 B5
- 3397 B5
- 3398 B5
- 3399 B5
- 3401 B1
- 3402 B1
- 3403 A1
- 3404 A1
- 3405 A1
- 3409 B1
- 3410 B1
- 3411 A3
- 3412 A3
- 3413 B3
- 3414 B3
- 3415 B3
- 3416 B3
- 3417 B3
- 3418 B3
- 3419 B3
- 3420 B3
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- 3430 B3
- 3431 B3
- 3432 B3
- 3433 B3
- 3434 B3
- 3435 B3
- 3436 C4
- 3437 A4
- 3438 B4
- 3439 A9
- 3440 D1
- 3441 D1
- 3442 D1
- 3443 D1
- 3444 D1
- 3445 D1
- 3446 D1
- 3447 D1
- 3448 D1
- 3449 D1
- 3450 D1
- 3451 D1
- 3452 D1
- 3453 D1
- 3454 D1
- 3455 D1
- 3456 D1
- 3457 E1
- 3458 E1
- 3459 E2
- 3460 D2
- 3461 D1
- 3462 D1
- 3463 D1
- 3464 D1
- 3465 D1
- 3466 D1
- 3467 D1
- 3468 D1
- 3469 D1
- 3470 D5
- 3471 D5
- 3472 D6
- 3473 D6
- 3474 D7
- 3475 D7
- 3476 F6
- 3477 F7
- 3478 E8
- 3479 E8
- 3480 E8
- 3481 E9
- 3482 F8
- 3483 F9

- 3484 E9
- 3485 E9
- 4451 C2
- 4452 D2
- 4453 D2
- 4454 D2
- 4455 D2
- 4456 F2
- 4457 F2
- 4458 F2
- 4459 F2
- 4460 F2
- 4461 D4
- 4462 D4
- 4470 D9
- 4471 D9
- 4472 E9
- 5451 C1
- 5452 D1
- 5453 E4
- 5454 F4
- 5470 F5
- 6380 B6
- 6390 C5
- 6412 A3
- 6415 B3
- 6451 D1
- 6452 D2
- 6470 E7
- 6471 E7
- 6472 F7
- 7380 A7
- 7381 A8
- 7382 A8
- 7383 C7
- 7384 C8
- 7385 C8
- 7390 C5
- 7391 C6
- 7401 A2
- 7403 F5
- 7412-A B3
- 7412-B C3
- 7451 E2
- 7452 E1
- 7471 D8
- 7472 F8
- 7473 E8
- 7474 E8
- 7475 E8
- 7476 E8
- 7477 E7
- 7478 E7
- 7479 E8
- 7480 E9

Item#	Europe	NAFTA	AP-PAL	AP-NTSC/Latin	Component type
1452	V	-	-	-	FIL SAW SM 38MHZ9 OFWK3953L R
1453	V	-	-	-	FIL SAW SM 45MHZ75 OFWK1967L R
1454	V	-	-	-	FIL SAW SM 38MHZ9 OFWK7265L R
1455	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1456	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1457	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1458	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1459	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1460	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1461	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1462	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1463	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1464	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1465	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1466	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1467	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1468	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1469	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1470	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1471	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1472	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1473	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1474	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1475	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1476	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1477	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1478	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1479	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1480	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1481	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1482	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1483	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1484	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1485	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1486	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1487	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1488	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1489	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1490	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1491	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1492	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1493	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1494	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1495	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1496	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1497	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1498	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R
1499	V	-	-	-	FIL SAW SM 38MHZ9 OFWK9656L R

TV Board: Audio Delay Line

A7 AUDIO DELAY LINE
(COMMON)

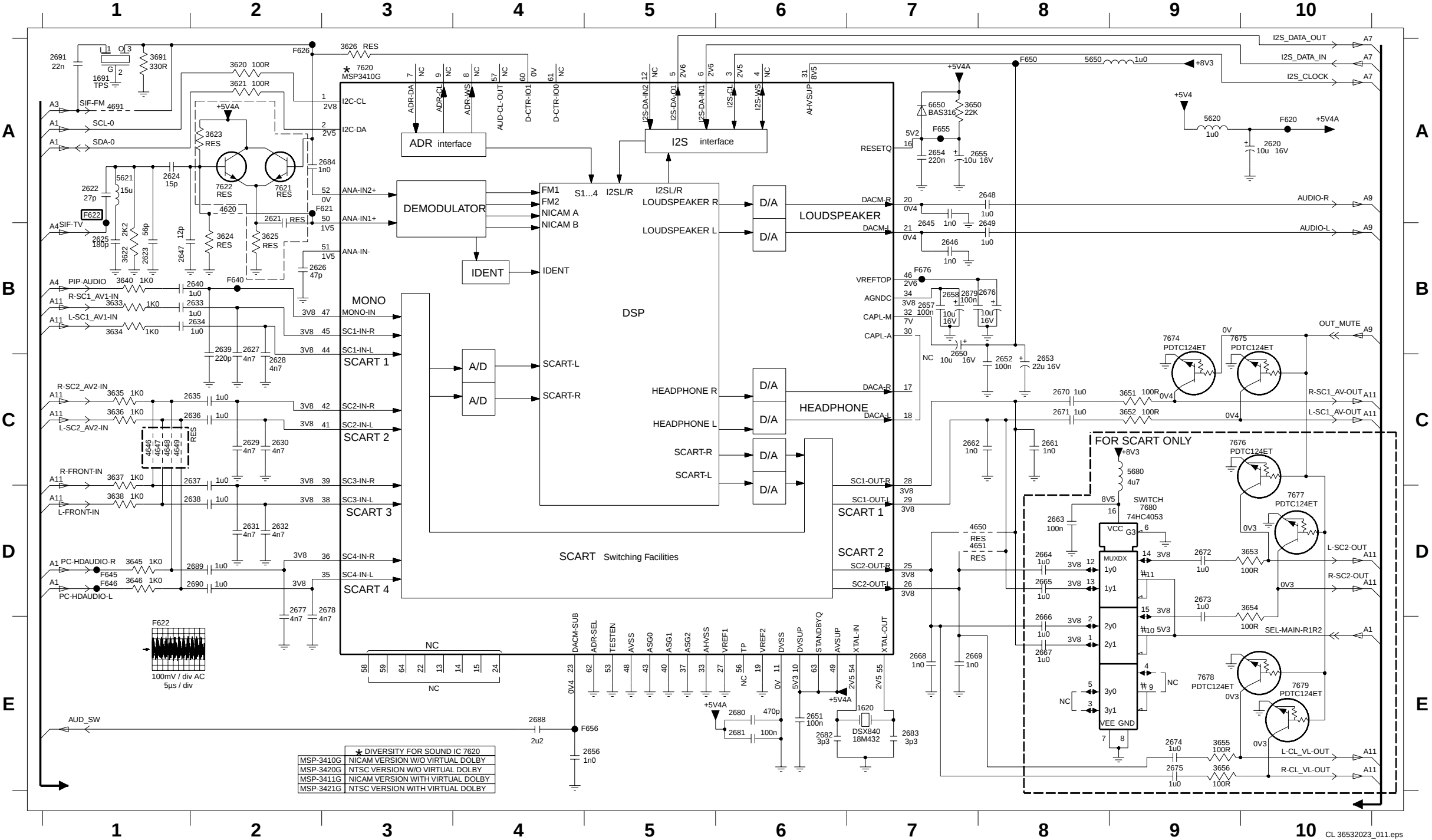


- 2601 B2
- 2602 D2
- 2603 B2
- 2604 B7
- 2605 B8
- 2610 F6
- 2611 F6
- 2612 D9
- 2613 D9
- 3610 F5
- 3611 F6
- 4601 E2
- 4602 E2
- 4603 F2
- 4604 F2
- 4605 F2
- 4606 F2
- 4610 C9
- 4611 C9
- 4612 C9
- 4613 C9
- 4614 C9
- 4615 C9
- 4616 C9
- 4617 C9
- 5601 A1
- 7601 A1
- 7602 D1
- 7603 A2
- 7604 B7
- 7605 B8
- 7610 F6
- F601 A1
- F602 C9
- F603 D9
- F610 F9
- F612 F5
- F613 F6

TV Board: Audio Processing

A8 AUDIO PROCESSING (COMMON)

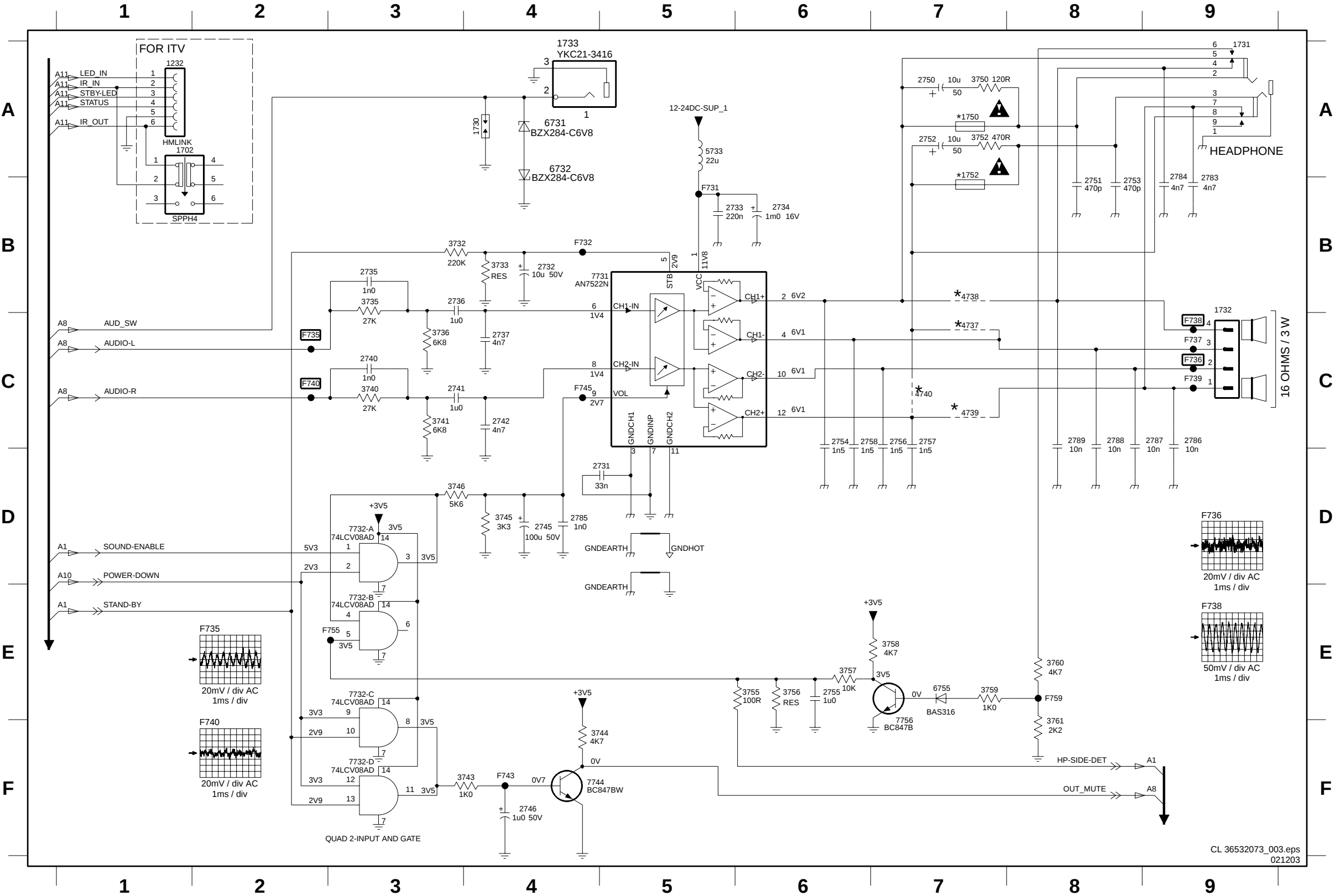
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1691 A1	2624 A1	2629 C2	2634 B2	2639 B2	2648 A8	2653 C8	2658 B7	2665 D8	2670 C8	2675 E9	2680 E6	2688 E4	3621 A2	3626 A3	3637 C1	3650 A7	3655 E9	4647 C1	4691 A1	6650 A7	7675 B10	7680 D9	F640 B2	F656 E5
2620 A10	2625 B1	2630 C2	2635 C2	2640 B2	2649 B8	2654 A7	2661 C8	2666 E8	2671 C8	2676 B8	2681 E6	2689 D2	3622 B1	3633 B1	3638 D1	3651 C9	3656 E9	4648 C1	5620 A9	7620 A3	7676 C10	F620 A10	F645 D1	F676 B7
2621 A2	2626 B2	2631 D2	2636 C2	2645 B7	2650 C7	2655 A8	2662 C7	2667 E8	2672 D9	2677 D2	2682 E6	2690 D2	3623 A2	3634 B1	3640 B1	3652 C9	3691 A1	4649 C1	5621 A1	7621 A2	7677 D10	F621 A3	F646 D1	
2622 A1	2627 B2	2632 D2	2637 C2	2646 B7	2651 E6	2656 E5	2663 D8	2668 E7	2673 D9	2678 D3	2683 E7	2691 A1	3624 B2	3635 C1	3645 D1	3653 D10	4620 A2	4650 D7	5650 A8	7622 A2	7678 E9	F622 A1	F650 A8	



Item#	Europe Non-VD 15/15/20"	NA/FTA/AP-NTSC/Latam 15/20"	AP-PAL Non-VD 15/20"	Component type
2663	--	--	--	CER2 0603 X7R 16V 100N COL
2664	--	--	--	CER2 0603 Y5V 10V 1U COL
2665	--	--	--	CER2 0603 Y5V 10V 1U COL
2666	--	--	--	CER2 0603 Y5V 10V 1U COL
2667	--	--	--	CER2 0603 Y5V 10V 1U COL
2672	--	--	--	CER2 0603 Y5V 10V 1U COL
2673	--	--	--	CER2 0603 Y5V 10V 1U COL
2674	V	--	--	CER2 0603 Y5V 10V 1U COL
2675	V	--	--	CER2 0603 Y5V 10V 1U COL
3653	--	--	--	RST SM 0603 100R PMS COL
3654	--	--	--	RST SM 0603 100R PMS COL
3655	V	--	--	RST SM 0603 100R PMS COL
3656	V	--	--	RST SM 0603 100R PMS COL
5680	--	--	--	EXDIND SM 1008 4U7 PM5 COL R
7620	V	--	--	IC SM MSP3420G-OL-BB-V3(MIAS) Y
7620	V	--	--	IC SM MSP3410G-OL-C12 (MIAS) Y
7676	--	--	--	TRA SIG SM PDMC124ET (COL) R
7677	--	--	--	TRA SIG SM PDMC124ET (COL) R
7678	V	--	--	TRA SIG SM PDMC124ET (COL) R
7679	V	--	--	TRA SIG SM PDMC124ET (COL) R
7680	--	--	--	IC SM 74HC4053PW (PHSE) R

TV Board: Audio Amplifier

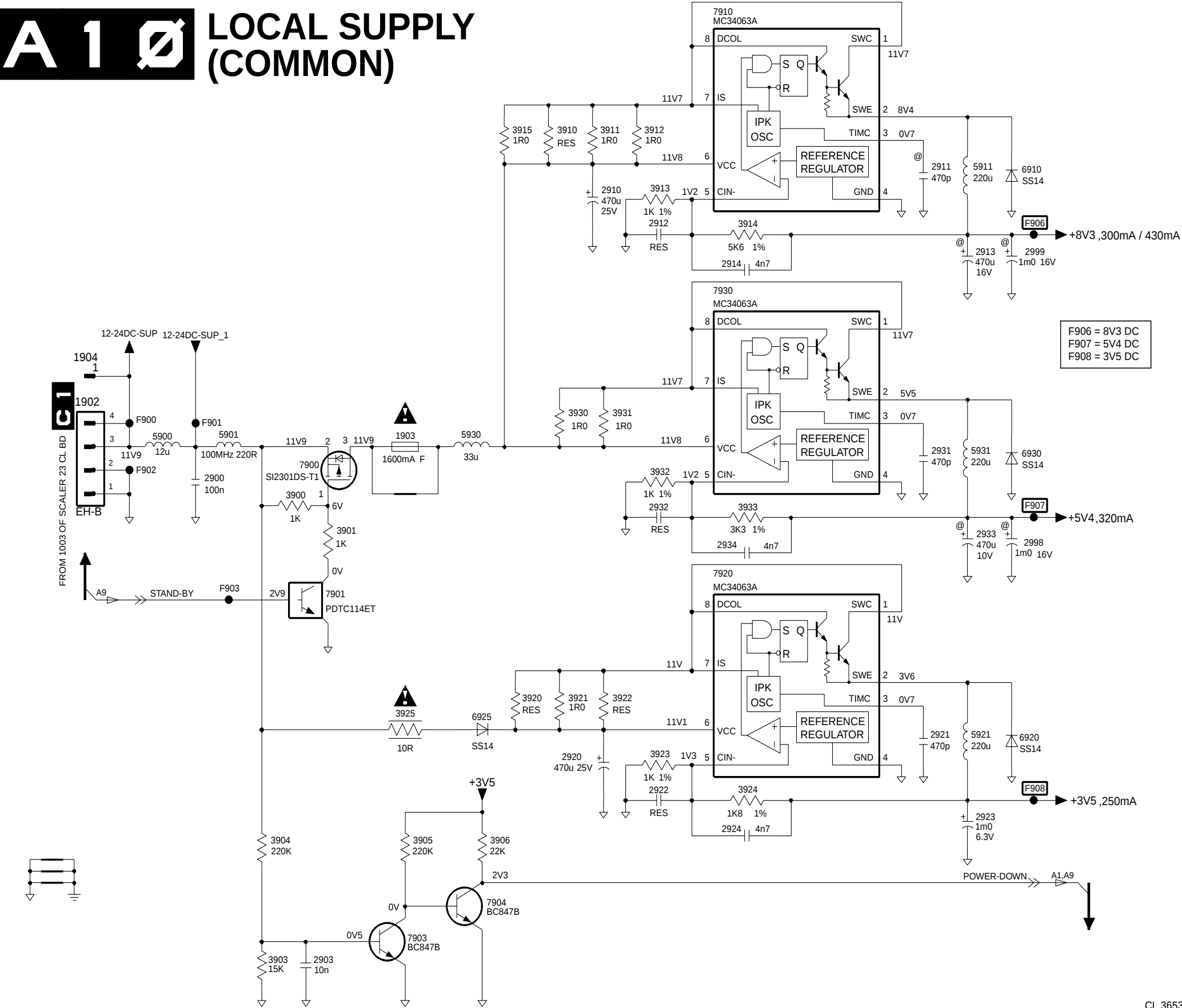
A9 AUDIO AMPLIFIER



- | | |
|-----------|---------|
| 1232 A1 | F737 C9 |
| 1702 A1 | F738 C9 |
| 1730 A4 | F739 C9 |
| 1731 A9 | F740 C2 |
| 1732 B9 | F743 F4 |
| 1733 A4 | F745 C4 |
| 1750 A7 | F755 E3 |
| 1752 B7 | F759 E8 |
| 2731 D5 | |
| 2732 B4 | |
| 2733 B5 | |
| 2734 B6 | |
| 2735 B3 | |
| 2736 B3 | |
| 2737 C4 | |
| 2740 C3 | |
| 2741 C3 | |
| 2742 C4 | |
| 2745 D4 | |
| 2746 F4 | |
| 2750 A7 | |
| 2751 B8 | |
| 2752 A7 | |
| 2753 B8 | |
| 2754 C6 | |
| 2755 E6 | |
| 2756 C7 | |
| 2757 C7 | |
| 2758 C6 | |
| 2783 A9 | |
| 2784 A9 | |
| 2785 D4 | |
| 2786 C9 | |
| 2787 C9 | |
| 2788 C8 | |
| 3732 B3 | |
| 3733 B4 | |
| 3735 B3 | |
| 3736 C3 | |
| 3740 C3 | |
| 3741 C3 | |
| 3743 F4 | |
| 3744 F5 | |
| 3745 D4 | |
| 3746 D3 | |
| 3750 A7 | |
| 3752 A7 | |
| 3755 E6 | |
| 3756 E6 | |
| 3757 E6 | |
| 3758 E7 | |
| 3759 E7 | |
| 3760 E8 | |
| 3761 E8 | |
| 4737 C7 | |
| 4738 B7 | |
| 4739 C7 | |
| 4740 C7 | |
| 5733 A5 | |
| 6731 A4 | |
| 6732 A4 | |
| 6755 E7 | |
| 7731 B5 | |
| 7732-A D3 | |
| 7732-B E3 | |
| 7732-C E3 | |
| 7732-D F3 | |
| 7744 F4 | |
| 7756 F7 | |
| F731 B5 | |
| F732 B4 | |
| F735 C2 | |
| F736 C9 | |

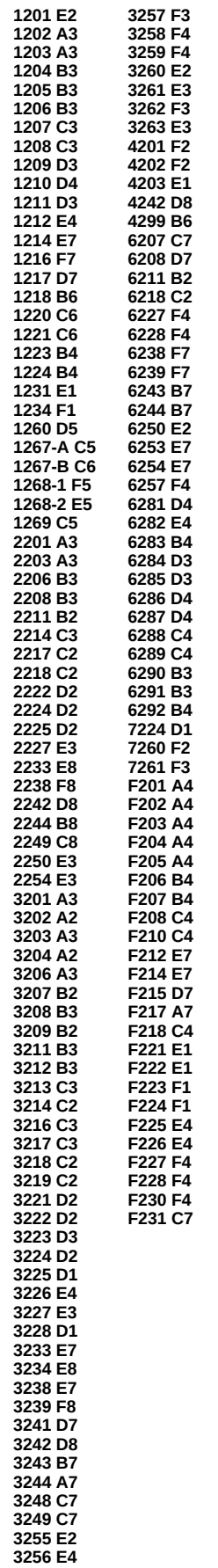
TV Board: Local Supply

**A 1 Ø LOCAL SUPPLY
(COMMON)**



- 1902 C1
- 1903 C3
- 1904 C1
- 2900 C2
- 2903 F3
- 2910 B4
- 2911 A7
- 2912 B5
- 2913 B7
- 2914 B5
- 2920 E4
- 2921 E7
- 2922 E5
- 2923 E7
- 2924 E5
- 2931 C7
- 2932 C5
- 2933 D7
- 2934 D5
- 2998 D7
- 2999 B7
- 3900 C2
- 3901 D3
- 3903 F2
- 3904 E2
- 3905 E3
- 3906 E4
- 3910 A4
- 3911 A4
- 3912 A5
- 3913 B5
- 3914 B5
- 3915 A4
- 3920 E4
- 3921 E4
- 3922 E4
- 3923 E5
- 3924 E5
- 3925 E3
- 3930 C4
- 3931 C4
- 3932 C5
- 3933 C5
- 5900 C2
- 5901 C2
- 5911 A7
- 5921 E7
- 5930 C4
- 5931 C7
- 6910 A7
- 6920 E7
- 6925 E4
- 6930 C7
- 7900 C2
- 7901 D3
- 7903 F3
- 7904 F4
- 7910 A5
- 7920 D5
- 7930 B5
- F900 C1
- F901 C2
- F902 C1
- F903 D2
- F906 B7
- F907 C7
- F908 E7

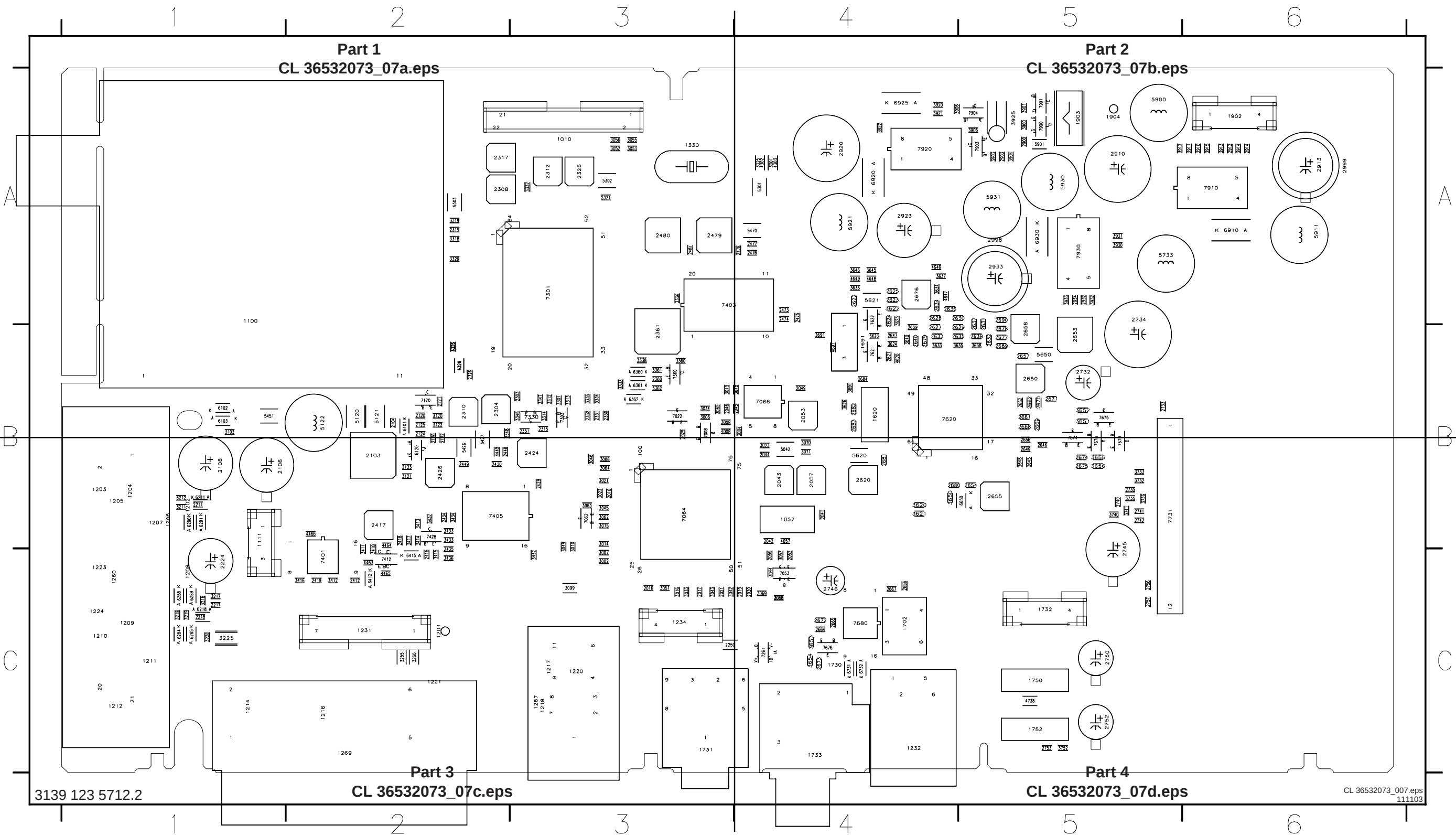
A 1 1 SCART IO



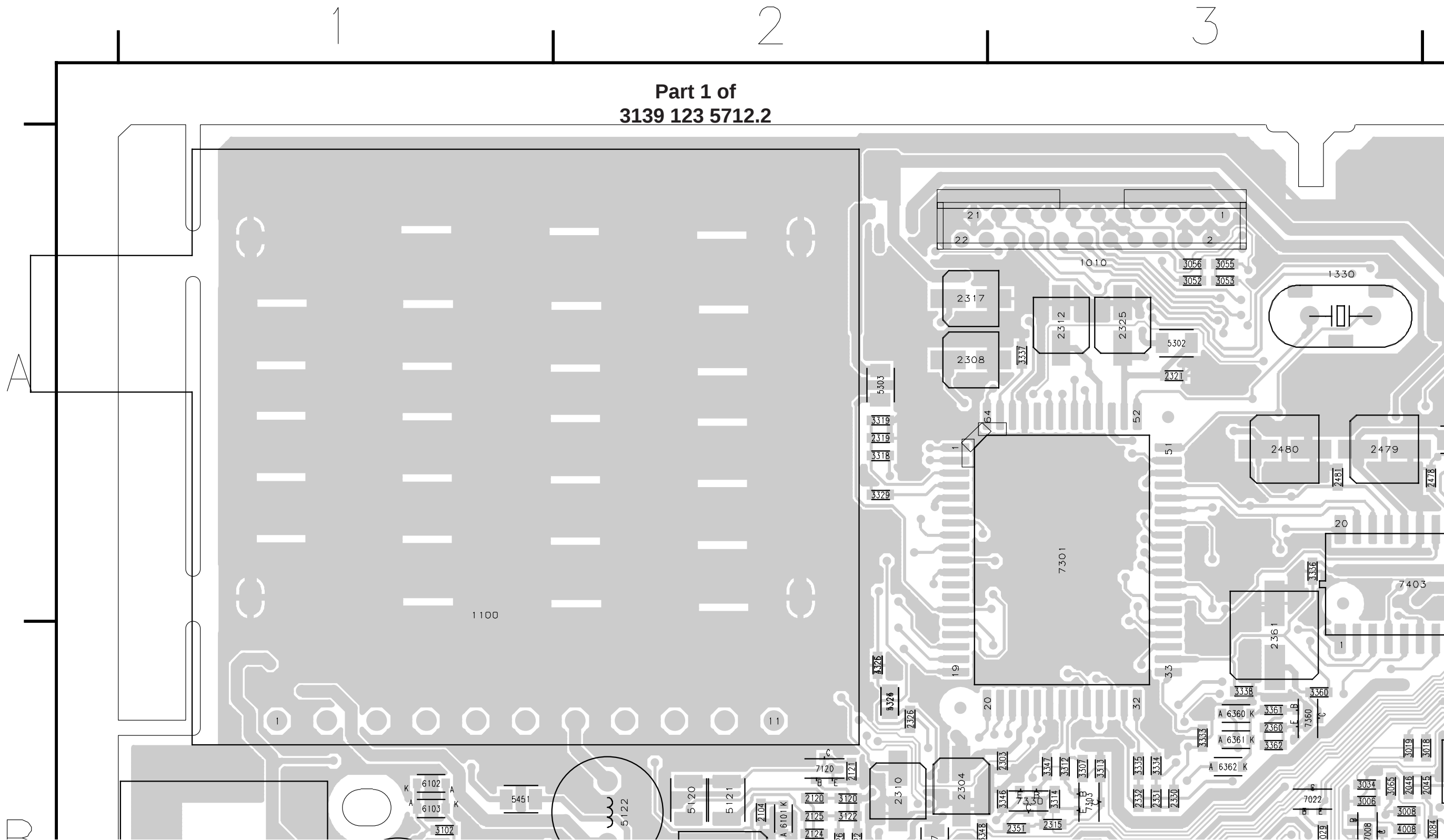
CL 36532073_005.eps
011203

Layout TV Board (13"/15") (Overview Top Side)

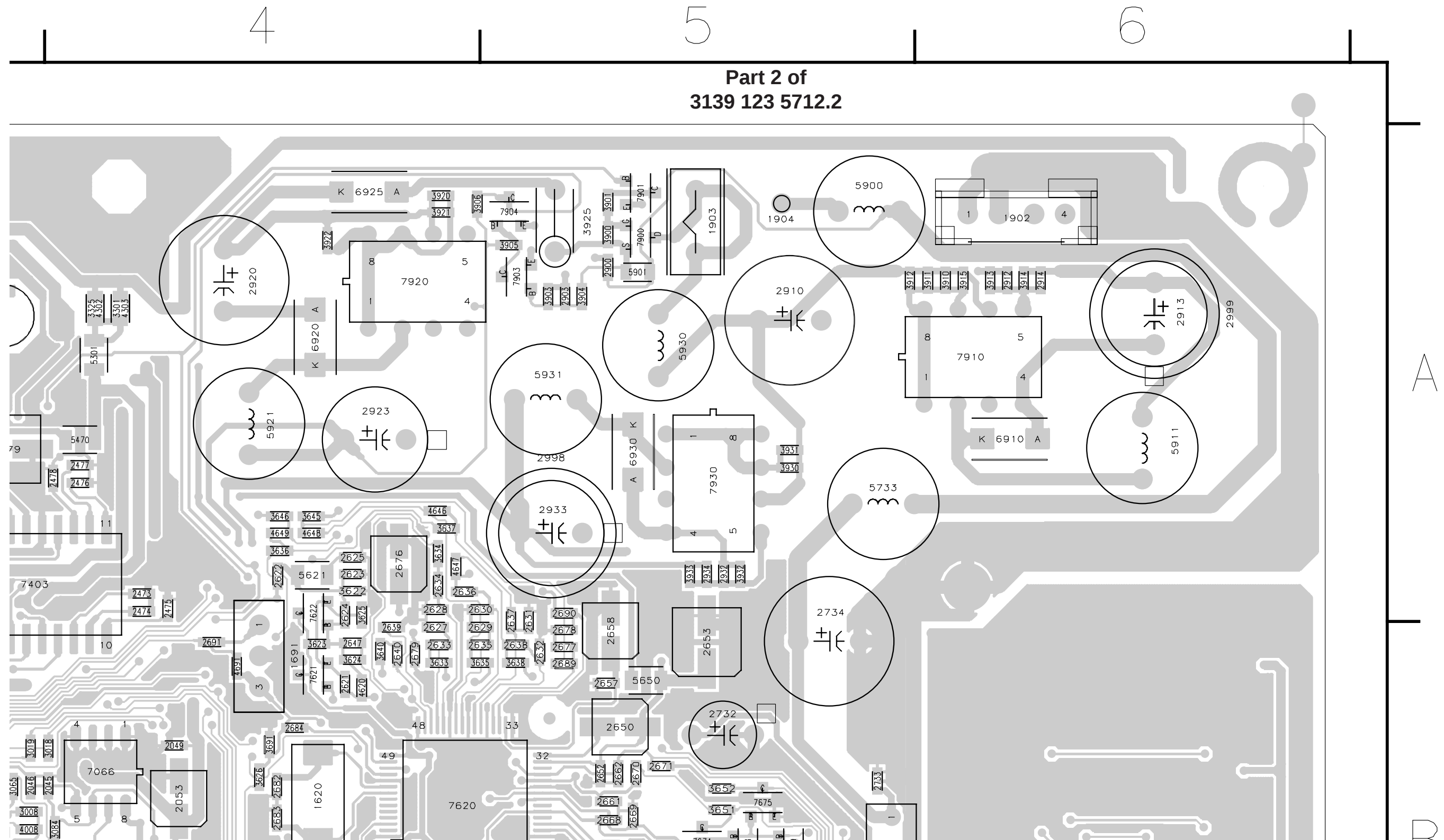
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100	A1	1730	C4	2021	C3	2108	B1	2308	A2	2412	C2	2474	A4	2628	A4	2647	B4	2666	C4	2681	B4	2746	C4	2933	A5	3022	B3	3056	A3	3121	B2	3313	B3	3348	B2	3436	C2	3640	B4	3740	B5	3920	A4	4463	C2	5301	A4	5921	A4	6360	B3	7062	B3	7621	B4	7930	A5
111	B1	1731	C3	2041	B4	2120	B2	2310	B2	2415	C2	2475	A4	2629	B5	2648	B5	2667	C4	2682	B4	2750	C5	2934	A5	3023	B4	3057	C4	3122	B2	3314	B3	3360	B3	3437	B2	3645	A4	3741	B5	3921	A4	4464	B2	5302	A3	5930	A5	6361	B3	7064	B3	7622	A4		
201	C2	1732	C5	2042	B4	2121	B2	2312	A3	2417	B2	2476	A4	2630	A5	2649	B5	2668	B5	2683	B4	2752	C5	2998	A5	3029	B3	3059	C4	3211	B1	3318	A2	3361	B3	3620	B4	3646	A4	3752	C5	3922	A4	4465	C2	5303	A2	5931	A5	6362	B3	7066	B4	7674	B5		
206	B1	1733	C4	2043	B4	2122	B2	2315	B3	2418	B2	2477	A4	2631	A5	2650	B5	2669	B5	2684	B4	2753	C5	2999	A6	3033	C3	3060	C4	3212	B1	3319	A2	3362	B3	3621	B4	3650	B4	3900	A5	3925	A5	4466	B2	5326	B2	6101	B2	6412	C2	7120	B2	7675	B5		
208	C1	1750	C5	2044	B4	2123	B2	2317	A2	2419	C2	2478	A4	2632	B5	2652	B5	2670	B5	2689	B5	2756	C5	3002	C3	3034	B3	3062	B3	3216	C1	3325	A4	3411	C2	3622	A4	3651	B5	3901	A5	3930	A5	4620	B4	5426	B2	6102	B1	6415	C2	7261	C4	7676	C4		
231	C2	1752	C5	2045	B4	2124	B2	2319	A2	2424	B3	2479	A3	2633	B4	2653	B5	2671	B5	2690	A5	2757	C5	3006	B3	3042	C3	3063	B3	3217	C1	3326	B2	3412	C2	3623	B4	3652	B5	3903	A5	3931	A5	4466	A4	5427	B2	6103	B1	6650	B5	7301	A3	7678	B5		
232	C4	1902	A6	2046	B3	2125	B2	2321	A3	2426	B2	2480	A3	2634	A4	2654	B5	2672	C4	2691	B4	2900	A5	3007	C3	3043	C3	3064	B3	3218	C1	3329	A2	3413	B2	3624	B4	3653	C4	3904	A5	3932	A5	4467	A4	5451	B1	6120	B2	6731	C4	7303	B3	7679	B5		
234	C3	1903	A5	2049	B4	2126	B2	2325	A3	2429	B3	2481	A3	2635	B5	2655	B5	2673	C4	2732	B5	2903	A5	3008	B3	3044	C4	3065	B3	3219	C1	3333	B3	3414	B2	3625	A4	3654	C4	3905	A5	3933	A5	4468	A4	5470	A4	6211	B1	6732	C4	7330	B3	7680	C4		
260	C1	1904	A5	2052	C4	2211	B1	2326	B2	2430	B2	2620	B4	2636	A4	2656	B5	2674	B5	2733	B5	2910	A5	3010	B3	3045	B3	3070	B4	3225	C1	3334	B3	3415	C2	3626	B4	3655	B5	3906	A4	4008	B3	4649	A4	5620	B4	6218	C1	6910	A6	7360	B3	7731	B5		
267	C3	2010	B3	2053	B4	2217	C1	2330	B3	2433	B2	2621	B4	2637	A5	2657	B5	2675	B5	2734	A5	2912	A6	3014	B3	3046	B3	3071	B4	3228	C1	3335	B3	3416	C2	3633	B4	3656	B5	3910	A6	4057	B4	4691	B4	5621	A4	6284	C1	6920	A4	7401	C2	7900	A5		
269	C2	2016	C3	2055	C4	2218	C1	2331	B3	2434	B2	2622	A4	2638	B5	2658	B5	2676	A4	2735	B5	2913	A6	3015	B3	3049	B3	3084	B4	3255	C2	3336	A3	3417	B2	3634	A4	3691	B4	3911	A6	4302	A4	4738	C5	5650	B5	6285	C1	6925	A4	7403	A3	7901	A5		
330	A3	2017	C3	2057	B4	2224	C1	2332	B3	2435	C2	2623	A4	2639	B4	2661	B5	2677	B5	2740	B5	2914	A6	3016	C3	3051	C3	3086	B3	3260	C2	3337	A3	3418	C2	3635	B5	3732	B5	3912	A5	4303	A4	5042	B4	5733	A5	6288	C1	6930	A5	7405	B2	7903	A5		
620	B4	2018	C4	2103	B2	2250	C3	2351	B3	2448	B2	2624	A4	2640	B4	2662	B5	2678	B5	2741	B5	2920	A4	3018	B4	3052	A3	3099	C3	3301	A4	3338	B3	3432	C3	3636	A4	3733	B5	3913	A6	4324	B2	5900	A5	6289	C1	7008	B3	7412	C2	7904	A5				



Layout TV Board (13"/15") (Part 1 Top Side)



Layout TV Board (13"/15") (Part 2 Top Side)



C



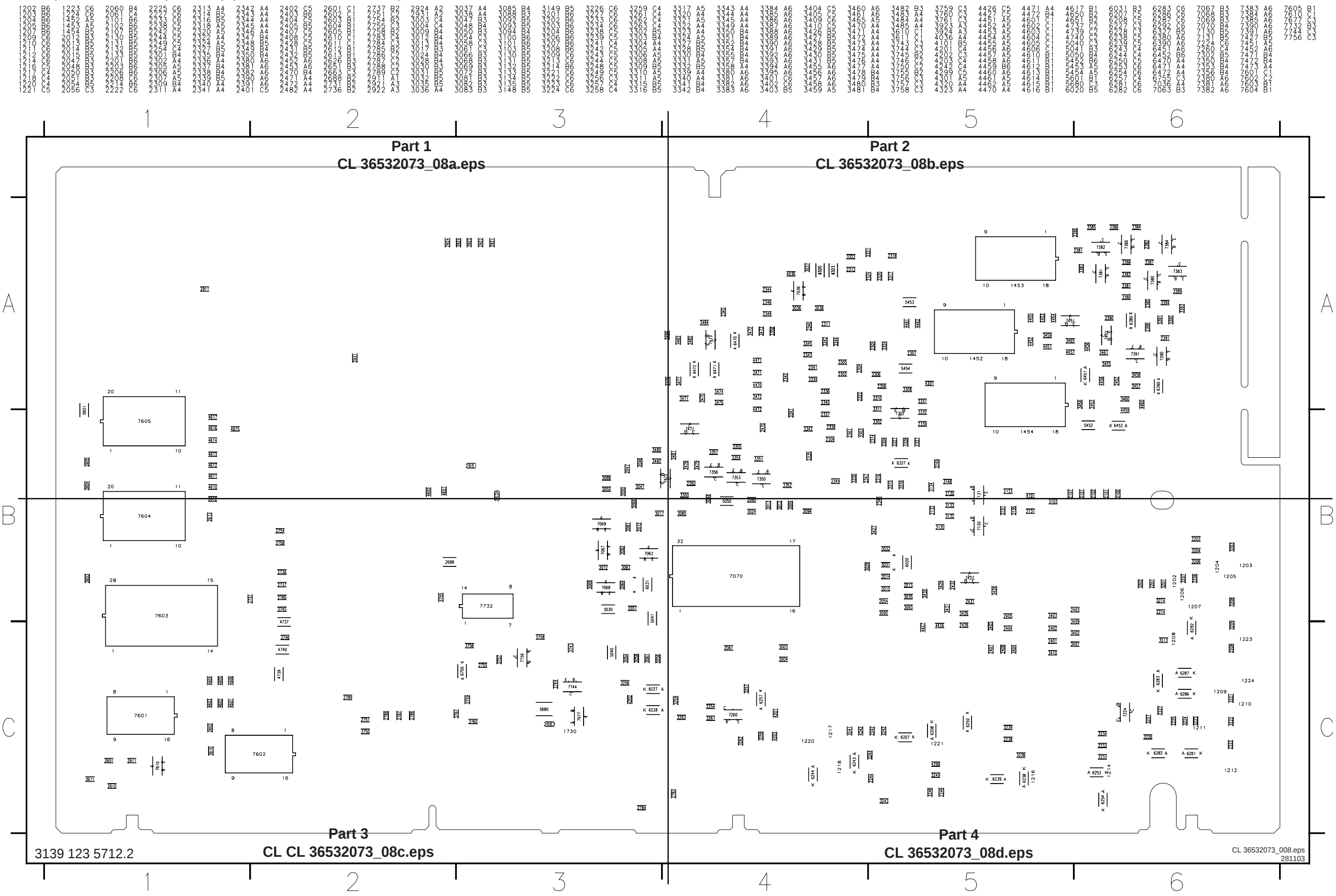
CL 36532073_07c.eps
141003

CL 36532073_07d.eps
141003

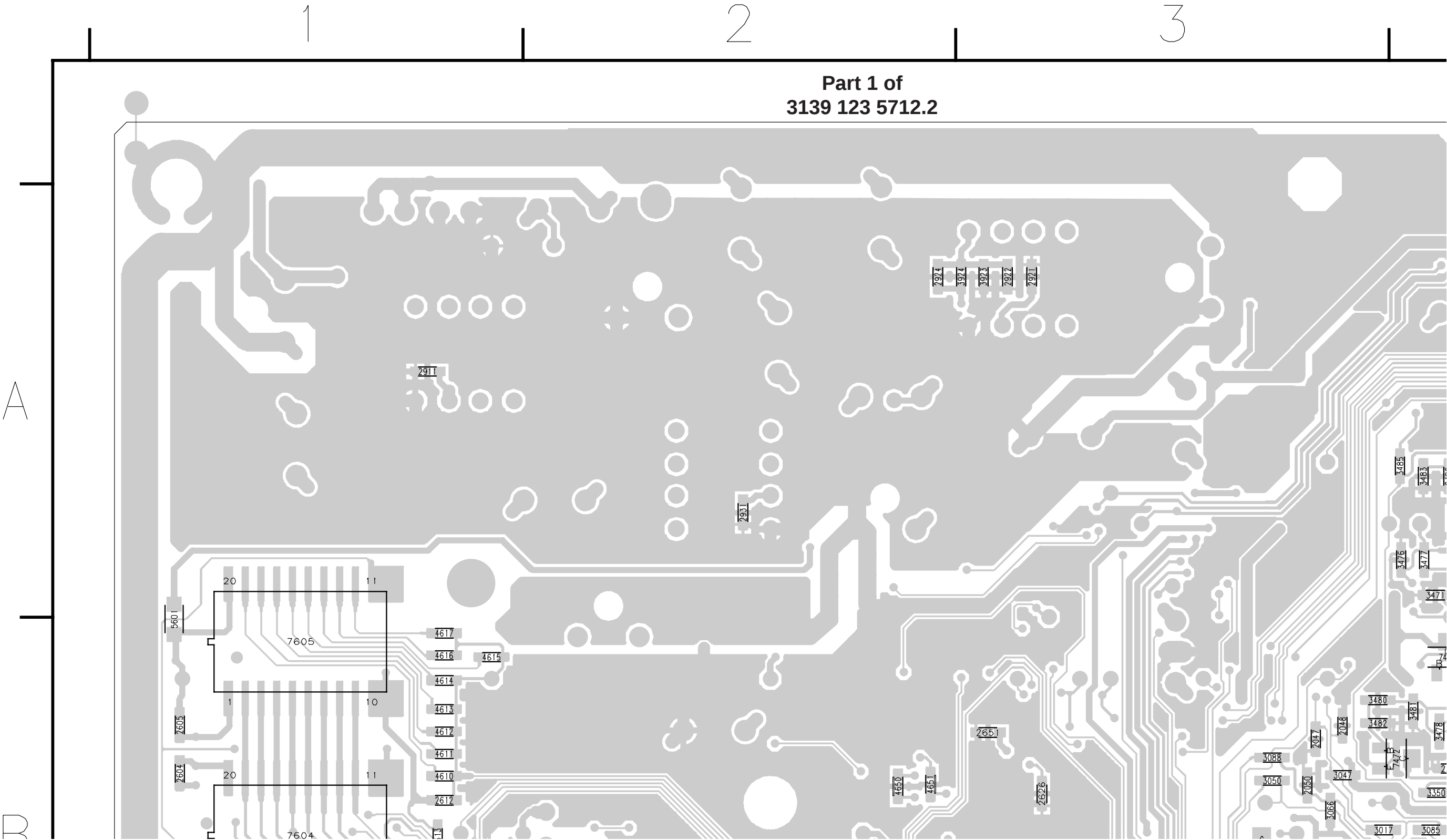
6

C

Layout TV Board (13"/15") (Overview Bottom Side)

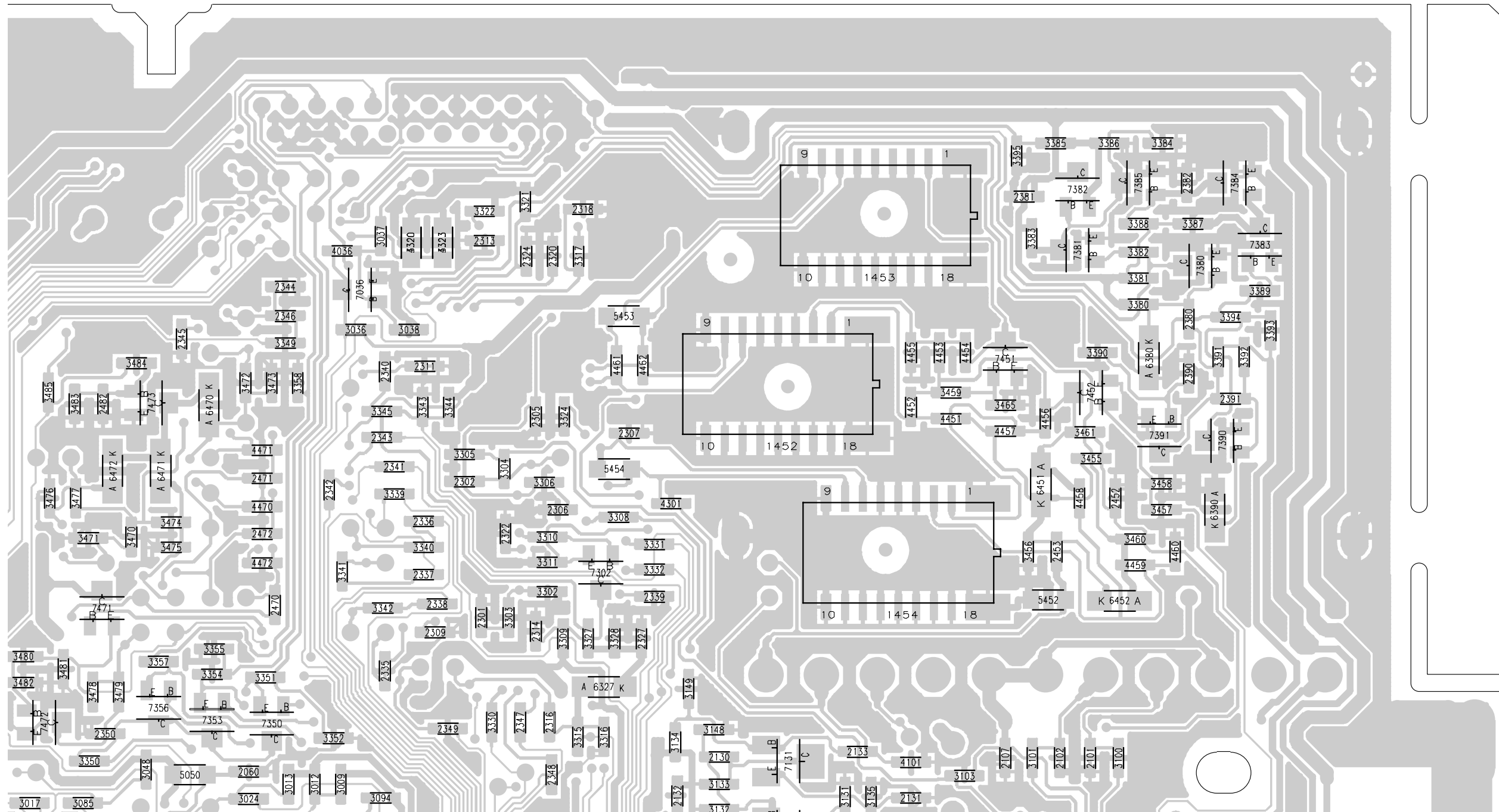


Layout TV Board (13"/15") (Part 1 Bottom Side)



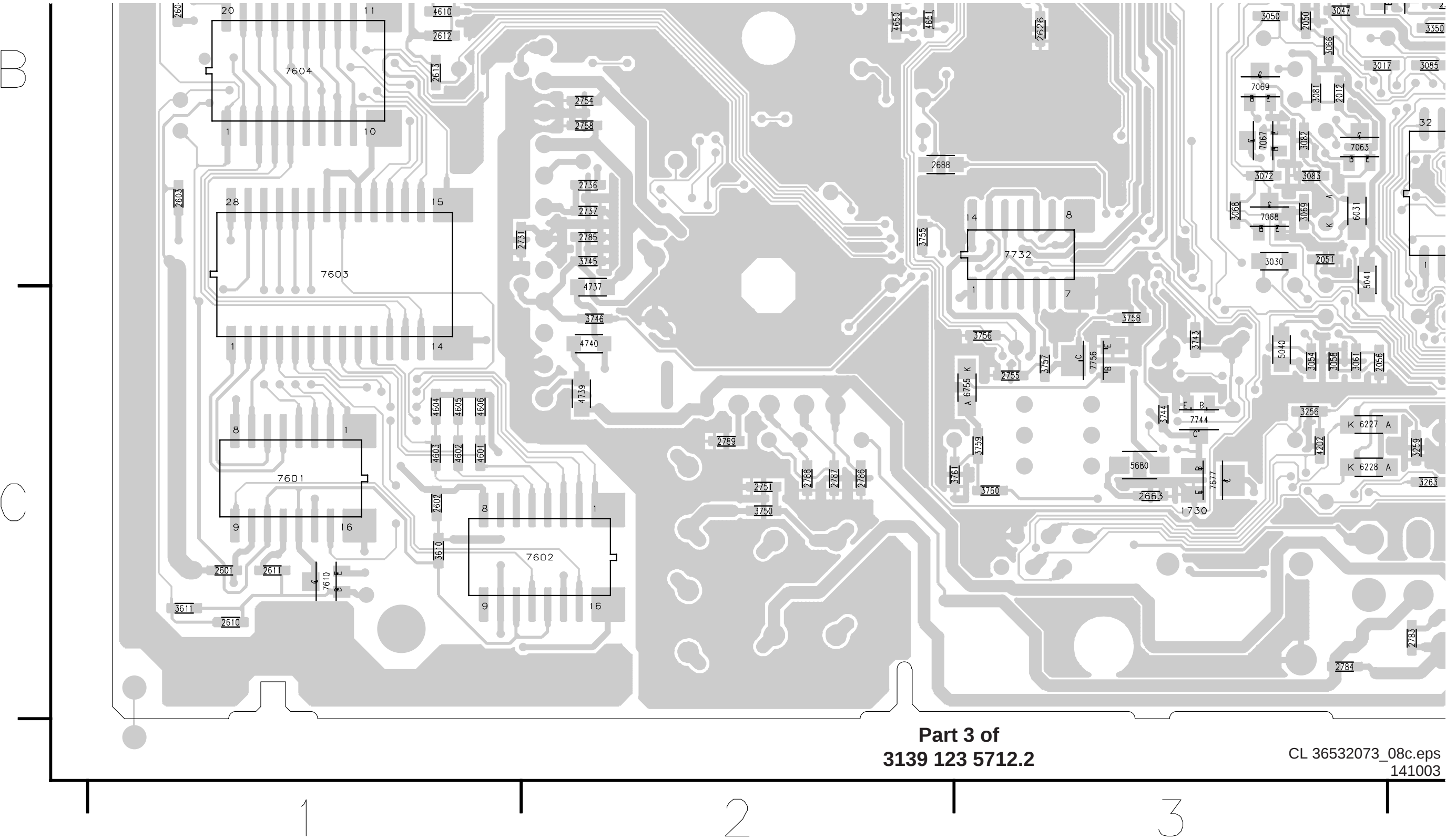
6

R



CL 36532073_08b.eps
141003

Layout TV Board (13"/15") (Part 3 Bottom Side)

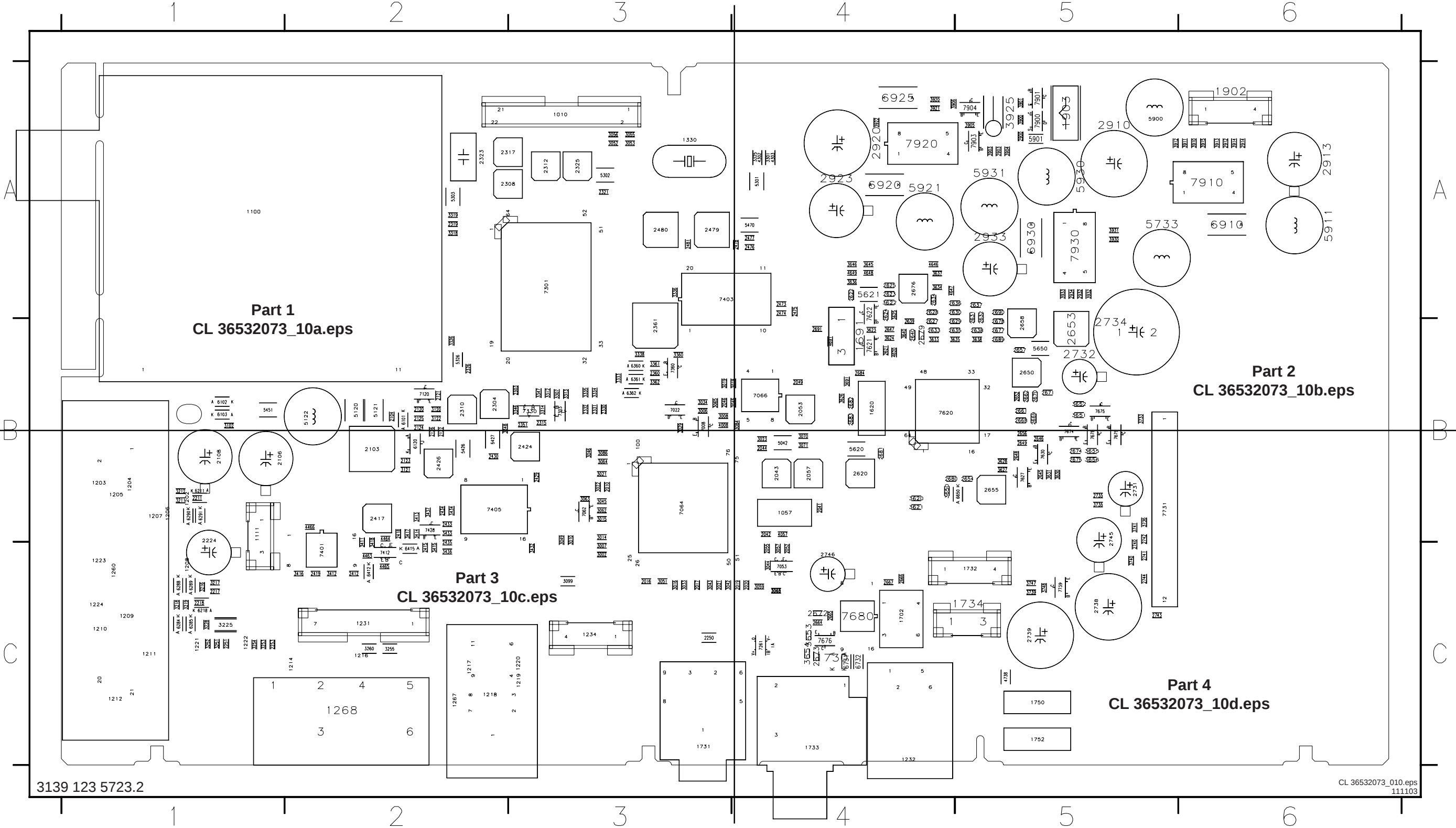


CL 36532073_08d.eps
141003

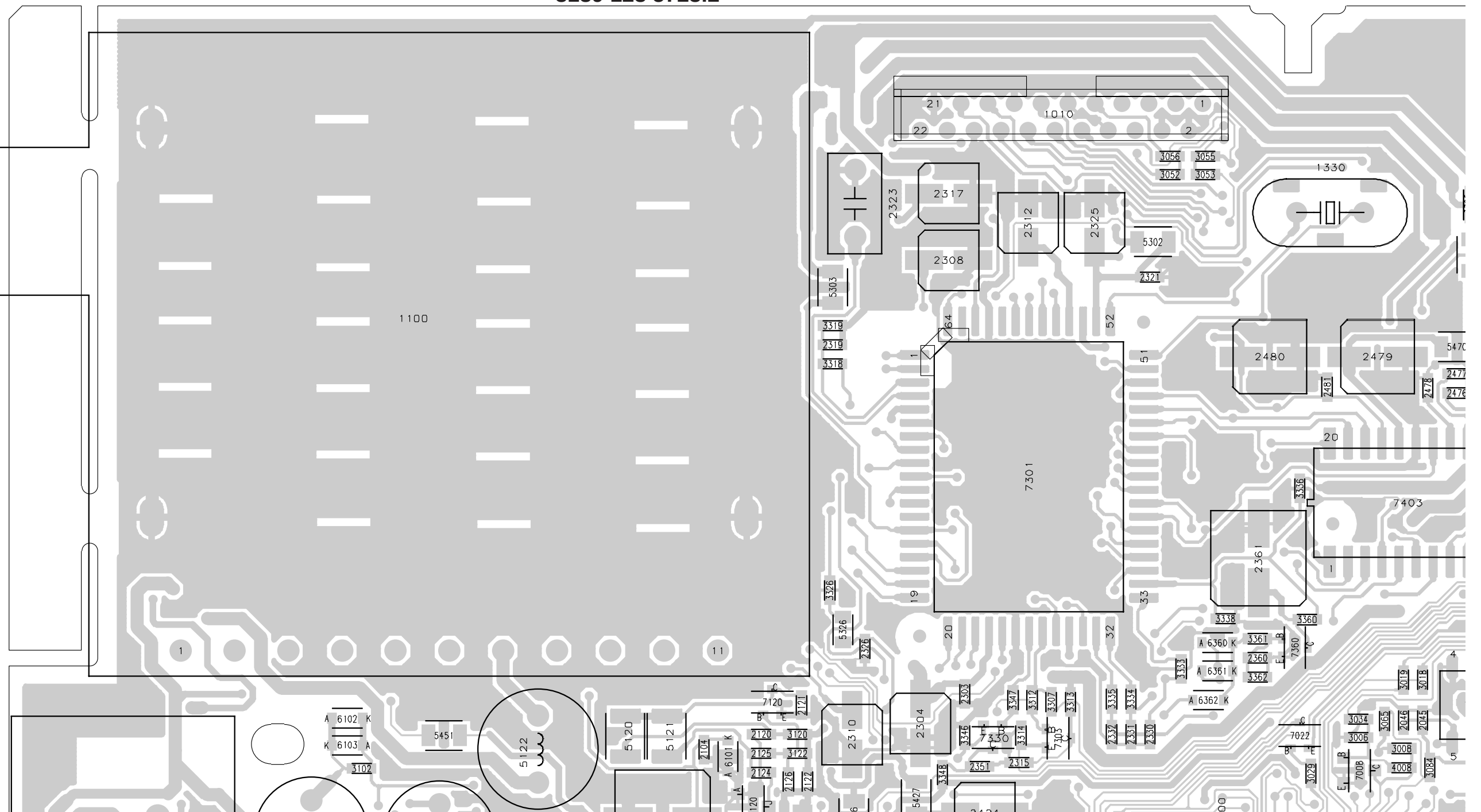
6

Layout TV Board (20") (Overview Top Side)

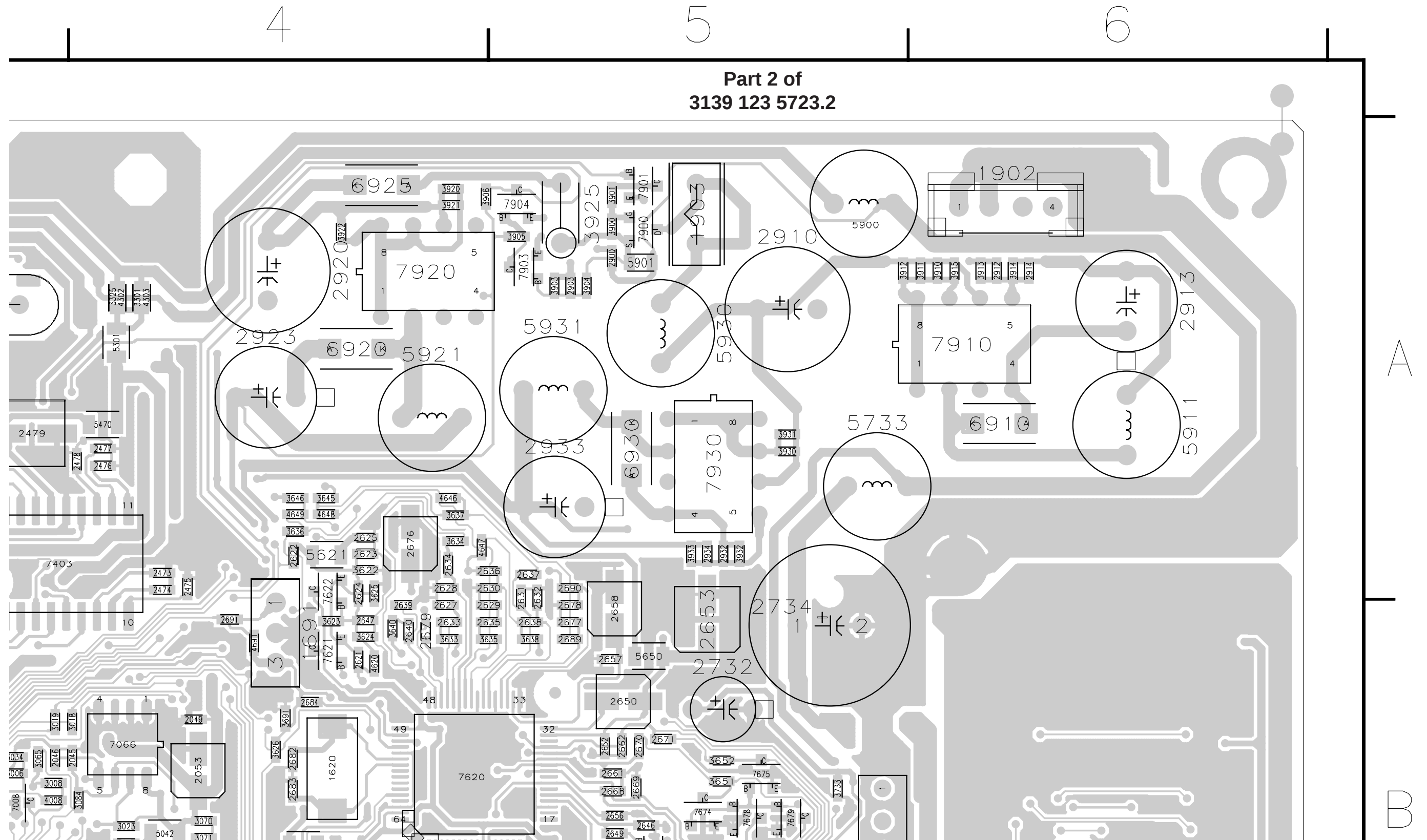
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1057 B4	1732 C5	2044 B4	2126 B2	2331 B3	2449 B2	2629 A5	2652 B5	2673 C4	2738 C5	2932 A5	3029 B3	3063 B3	3225 C1	3337 A3	3434 B2	3646 A4	3901 A5	3933 A5	4738 C5	5901 A5	6361 B3	7261 C4	7680 C4
1100 A1	1733 C4	2045 B4	2121 B1	2332 B3	2473 A4	2630 A5	2653 B5	2674 B5	2739 C5	2933 A5	3033 C3	3064 B3	3228 C1	3338 A3	3436 C2	3650 B4	3903 A5	4008 B3	5042 B4	5911 A6	6362 B3	7301 A3	7731 B5
1111 B1	1734 C5	2046 B3	2127 C1	2351 B3	2474 A4	2631 A5	2654 B5	2675 B5	2740 C5	2934 A5	3034 B3	3065 B3	3255 C2	3346 B3	3437 B2	3651 B5	3904 A5	4057 B4	5120 B2	5921 A4	6412 C2	7303 B3	7739 C5
1201 C2	1750 C5	2049 B4	2128 C1	2360 B3	2475 A4	2632 B5	2655 B5	2676 A4	2741 C5	2998 A5	3042 C3	3070 B4	3260 C2	3347 B3	3438 B2	3652 B5	3905 A5	4302 A4	5121 B2	5930 A5	6415 C2	7330 B3	7900 A5
1206 B1	1752 C5	2052 C4	2224 C1	2361 B3	2476 A4	2633 B4	2656 B5	2677 B5	2742 B5	2999 A6	3043 C3	3071 B4	3301 A4	3348 B2	3621 B4	3653 C4	3906 A4	4303 A4	5122 B2	5931 A5	6650 B5	7360 B3	7901 A5
1208 C1	1902 A6	2053 B4	2250 C3	2412 C2	2477 A4	2634 A4	2657 B5	2678 B5	2743 C5	3002 C3	3044 C4	3084 B4	3307 B3	3360 B3	3622 A4	3654 C4	3910 A6	4324 B2	5301 A4	6101 B2	6731 C4	7401 C2	7903 A5
1231 C2	1903 A5	2055 C4	2303 B3	2415 C2	2478 A4	2635 B5	2658 B5	2679 B4	2744 C5	3006 B3	3045 B3	3086 B3	3312 B3	3361 B3	3623 B4	3655 B5	3911 A6	4325 B2	5302 A3	6102 B1	6732 C4	7403 A4	7904 A5
1232 C4	1904 A5	2057 B4	2304 B2	2417 B2	2479 A3	2636 A5	2661 B5	2680 B4	2745 B5	3007 C3	3046 B3	3099 C3	3313 B3	3362 B3	3624 B4	3656 B5	3912 A5	4449 B2	5303 A2	6103 B1	6910 A6	7405 B2	7910 A6
1234 C3	2010 B3	2103 B2	2308 A2	2418 B2	2480 A3	2637 A5	2662 B5	2681 B4	2746 C4	3008 B3	3049 B3	3102 B1	3314 B3	3411 C2	3625 A4	3691 B4	3913 A6	4463 C2	5326 B2	6120 B2	6920 A4	7412 C2	7920 A4
1260 C1	2016 C3	2104 B2	2310 B2	2419 C2	2481 A3	2638 B5	2664 C4	2682 B4	2799 B5	3010 B3	3051 C3	3120 B2	3318 A2	3412 C2	3626 B4	3733 B5	3914 A6	4464 B2	5426 B2	6211 B1	6925 A4	7428 B2	7930 A5
1267 C3	2017 C3	2106 B1	2312 A3	2424 B3	2620 B4	2639 B4	2665 C4	2683 B4	2900 A5	3014 B3	3052 A3	3121 B2	3319 A2	3413 B2	3633 B4	3735 B5	3915 A6	4465 C2	5427 B2	6218 C1	6930 A5	7620 B4	
1269 C2	2018 C4	2108 B1	2315 B3	2426 B2	2621 B4	2640 B4	2666 C4	2684 B4	2903 A5	3015 B3	3053 A3	3122 B2	3325 A4	3414 B2	3634 A4	3736 B5	3920 A4	4466 B2	5451 B1	6284 C1	7008 B3	7621 B4	
1330 A3	2019 C4	2120 B2	2317 A2	2429 B3	2622 A4	2645 B5	2667 C4	2689 B5	2910 A5	3016 C3	3055 A3	3211 B1	3326 B2	3415 C2	3635 B5	3739 C5	3921 A4	4620 B4	5470 A4	6285 C1	7022 B3	7622 A4	
1620 B4	2020 C4	2121 B2	2319 A2	2430 B2	2623 A4	2646 B5	2668 B5	2690 A5	2912 A6	3018 B4	3056 A3	3212 B1	3329 A2	3416 C2	3636 A4	3740 C5	3922 A4	4646 A4	5620 B4	6288 C1	7053 C4	7674 B5	
1691 B4	2021 C3	2122 B2	2321 A3	2433 B2	2624 A4	2647 B4	2669 B5	2691 B4	2913 A6	3019 B3	3057 C4	3216 C1	3333 B3	3417 B2	3637 A4	3741 B5	3925 A5	4647 A4	5621 A4	6289 C1	7062 B3	7675 B5	
1702 C4	2041 B4	2123 B2	2325 A3	2434 B2	2625 A4	2648 B5	2670 B5	2732 B5	2914 A6	3021 B3	3059 C4	3217 C1	3334 B3	3418 C2	3638 B5	3747 C5	3930 A5	4648 A4	5650 B5	6290 B1	7064 B3	7676 C4	
1730 C4	2042 B4	2124 B2	2326 B2	2435 C2	2627 B4	2649 B5	2671 B5	2734 B5	2920 A4	3022 B3	3060 C4	3218 C1	3335 B3	3432 C3	3640 B4	3748 C5	3931 A5	4649 A4	5733 A5	6291 B1	7066 B4	7678 B5	



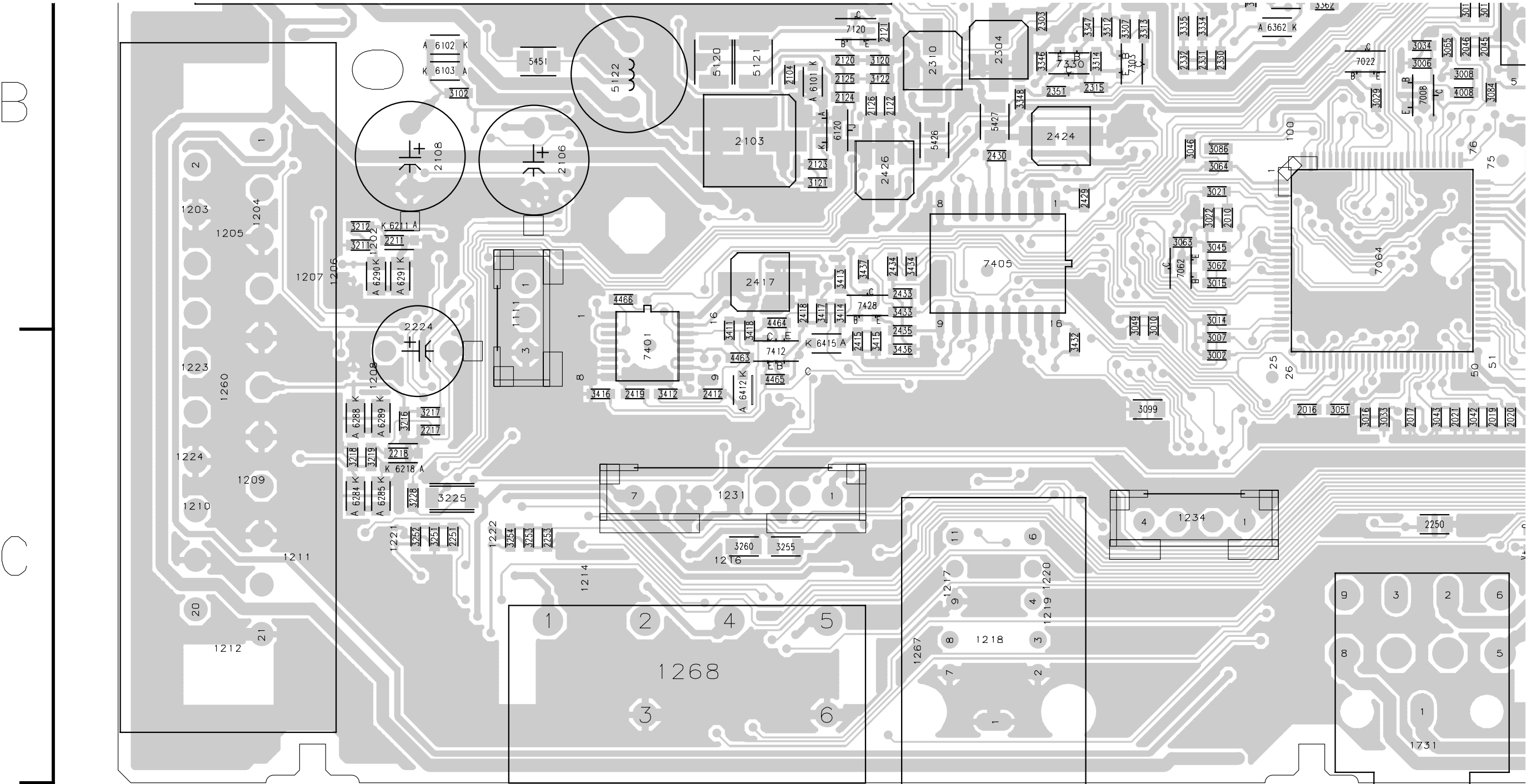
3



Layout TV Board (20") (Part 2 Top Side)



Layout TV Board (20") (Part 3 Top Side)



Part 3 of
3139 123 5723.2

CL 36532073_10c.eps
141003

[illegible]CL 36532073_10d.eps
141003

6

The drawing is a technical floor plan of a building, divided into four main sections labeled Part 1 through Part 4. Each part contains detailed architectural drawings of rooms, corridors, and structural elements. The plan includes numerous dimensions, room numbers, and labels for various components. The title block at the bottom left contains the text '3139 123 5723.2'. The bottom right corner contains the text 'CL 36532073_011.eps' and '281103'. The drawing is oriented with a north arrow pointing towards the top right.

Part 1
CL 36532073_11a.eps

Part 2
CL 36532073_11b.eps

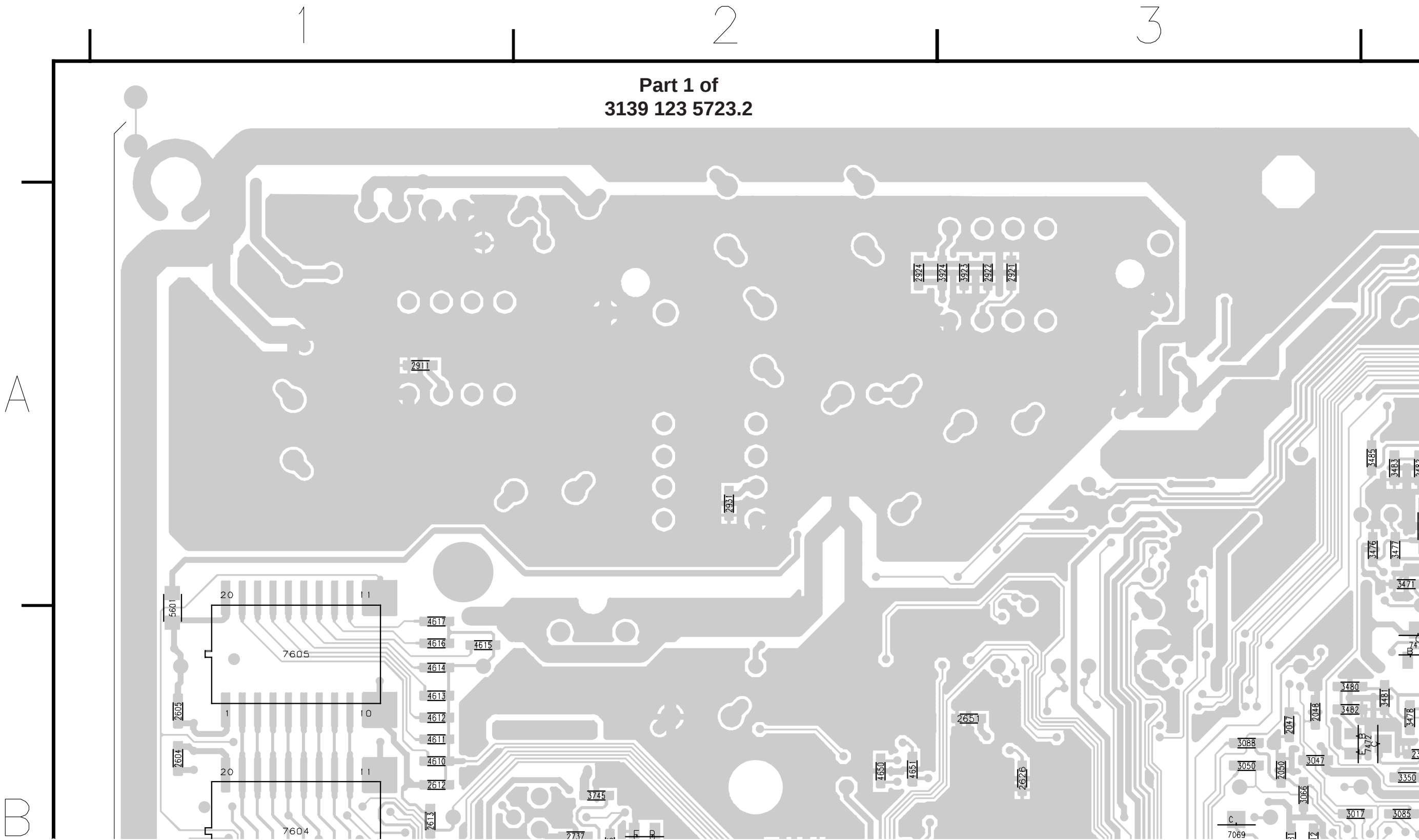
Part 3
CL 36532073_11c.eps

Part 4
CL 36532073_11d.eps

3139 123 5723.2

CL 36532073_011.eps
281103

Layout TV Board (20") (Part 1 Bottom Side)



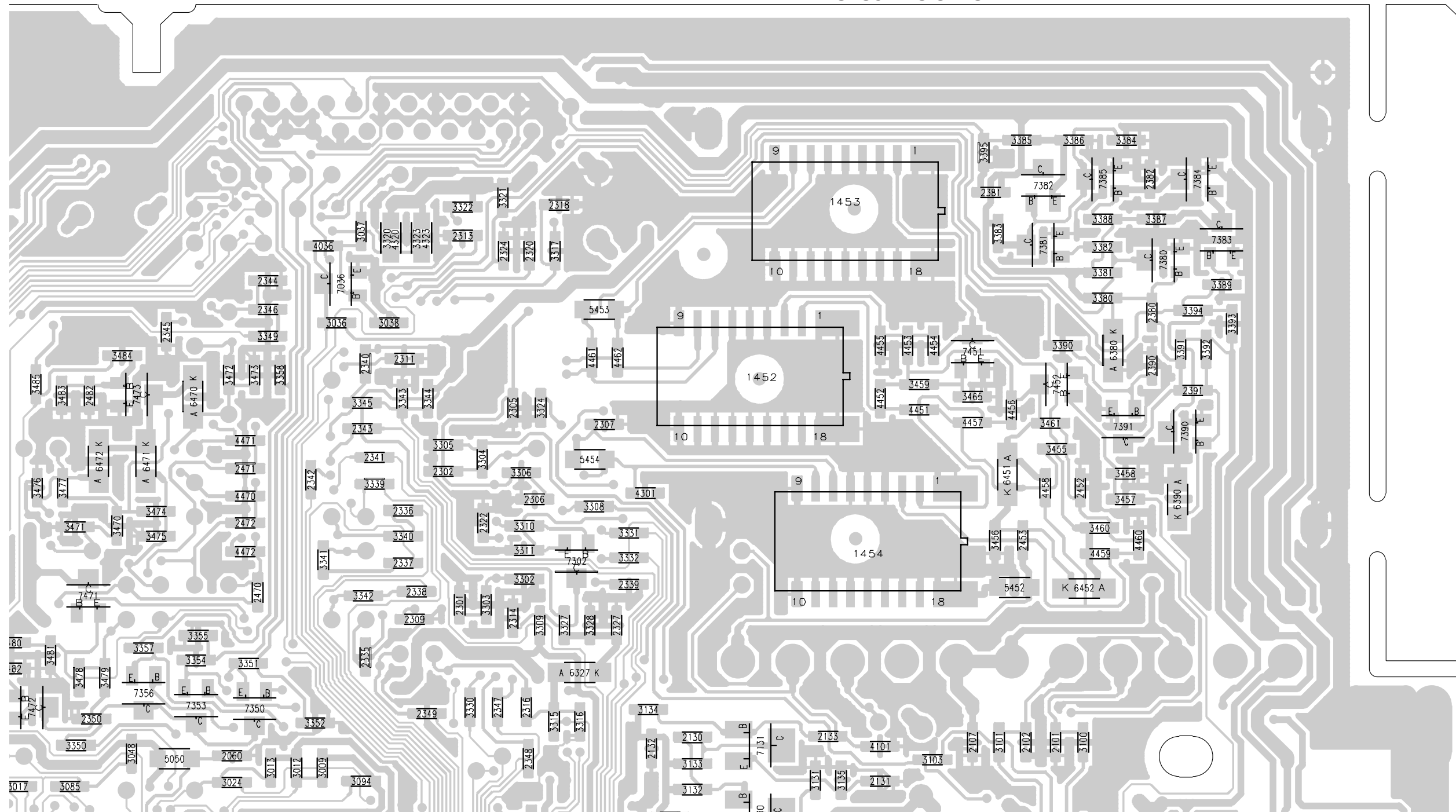
Layout TV Board (20") (Part 2 Bottom Side)

4

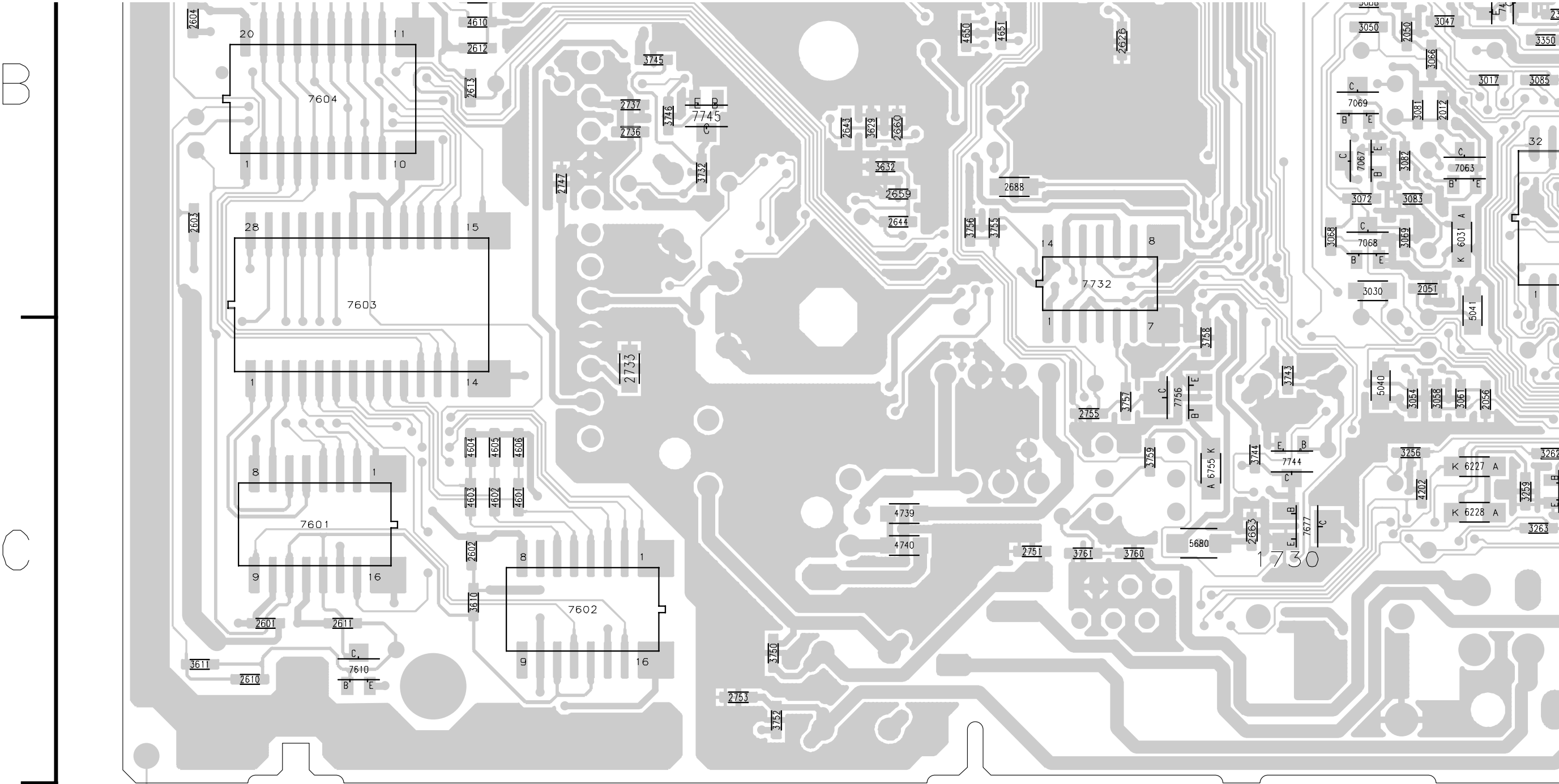
5

6

Part 2 of
3139 123 5723.2

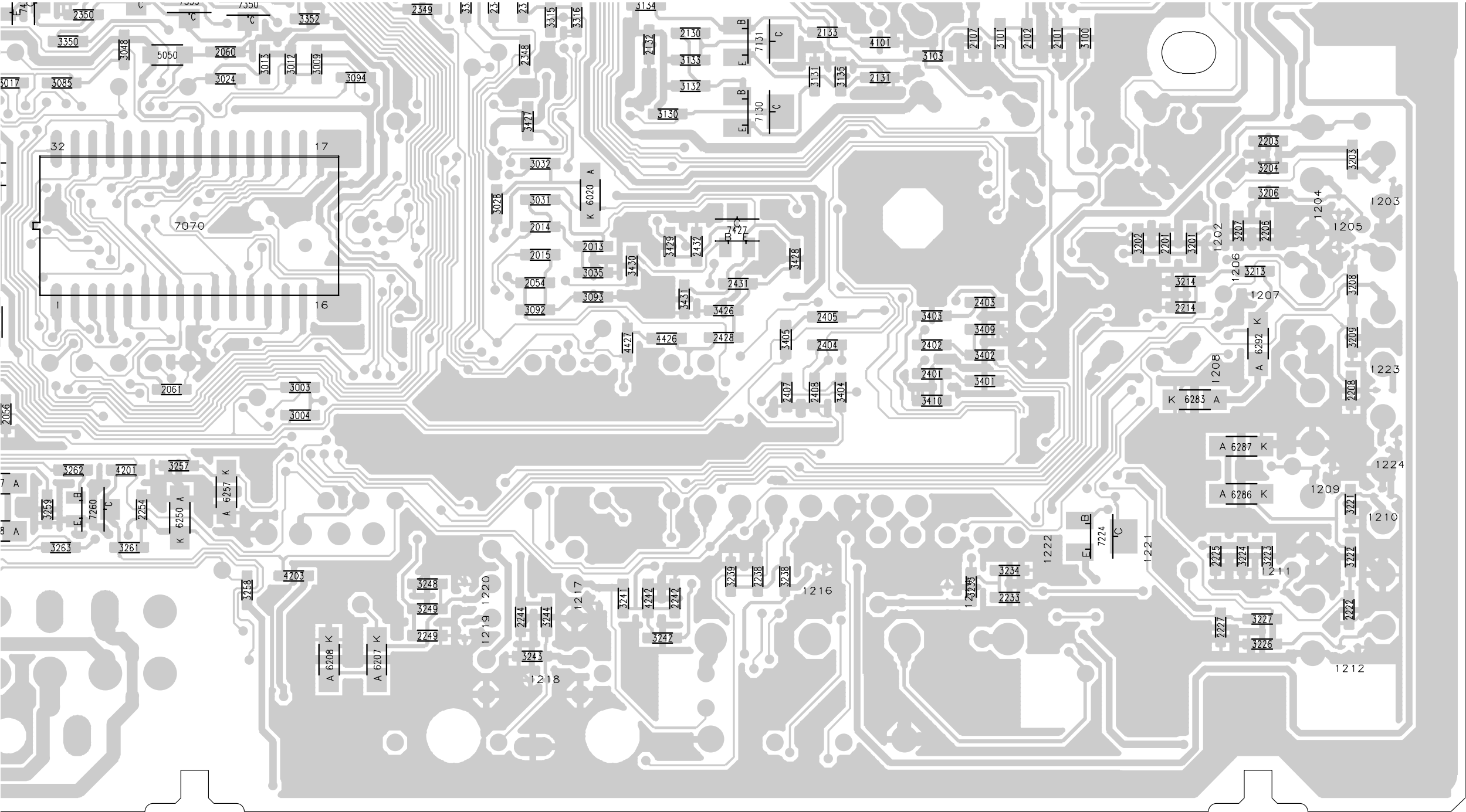


Layout TV Board (20") (Part 3 Bottom Side)



Part 3 of
3139 123 5723.2

Layout TV Board (20") (Part 4 Bottom Side)



B

C

Part 4 of
3139 123 5723.2

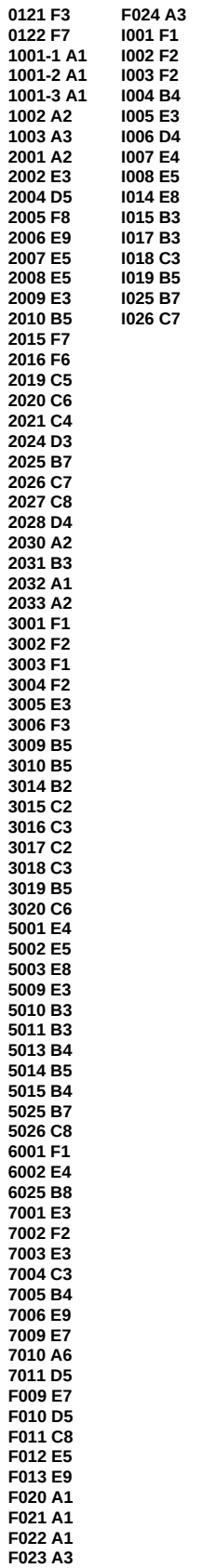
CL 36532073_11d.eps
141003

4

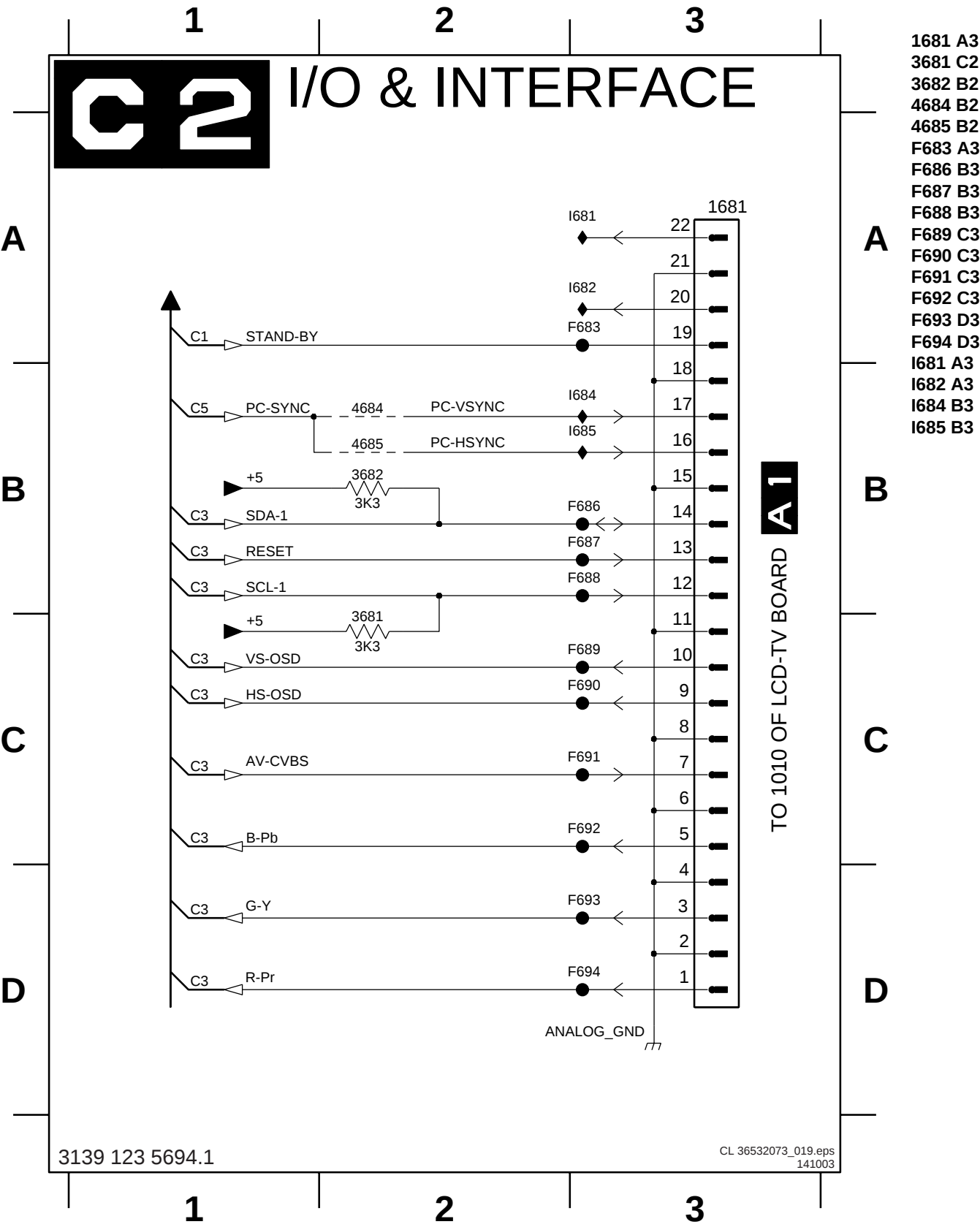
5

6

C1 POWER



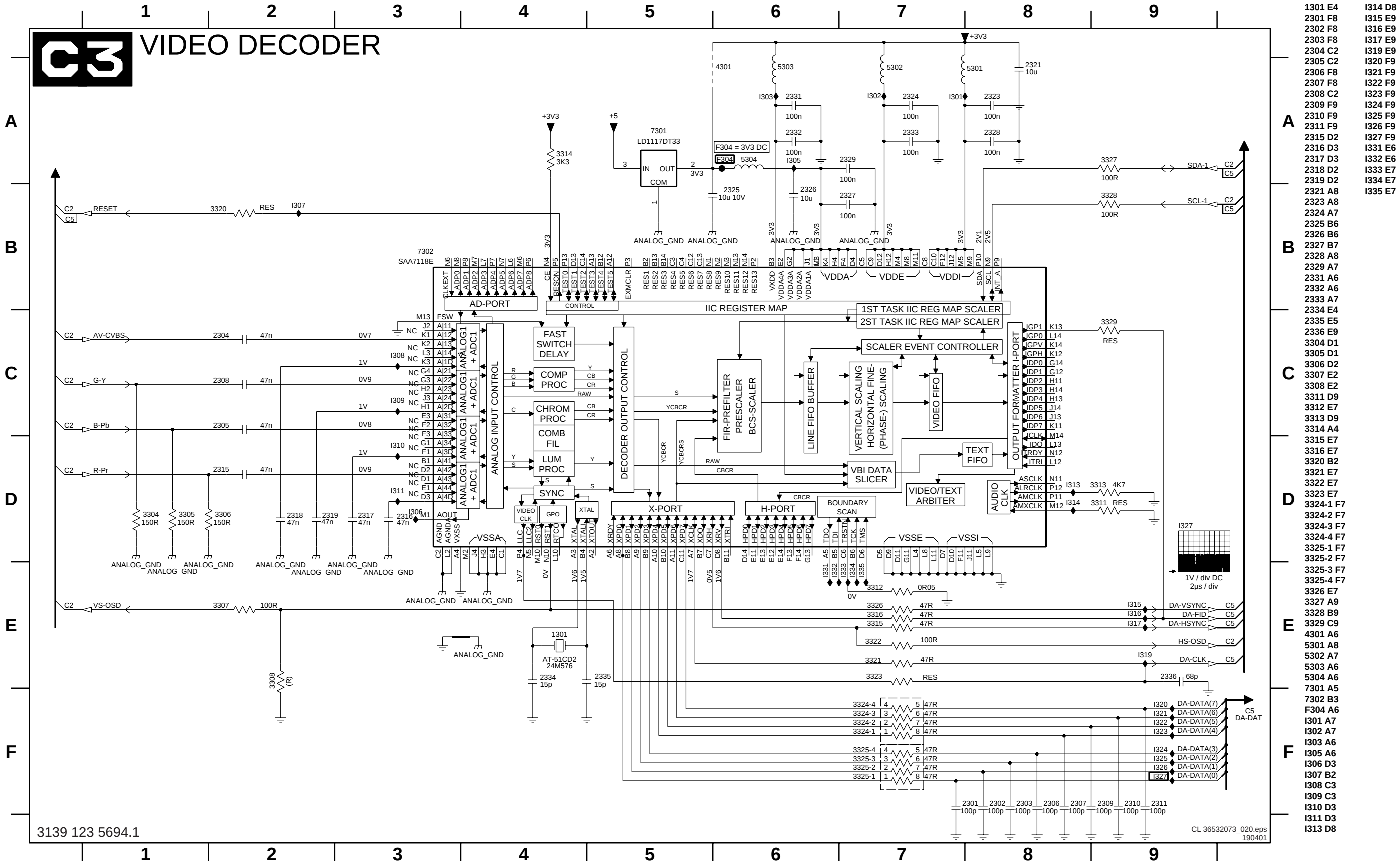
Scaler Board: I/O & Interface



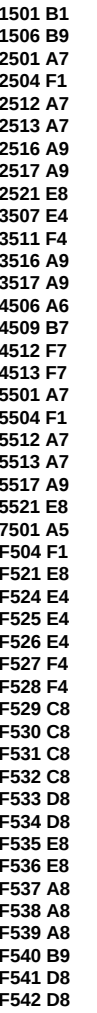
Personal Notes:

1681 A3
3681 C2
3682 B2
4684 B2
4685 B2
F683 A3
F686 B3
F687 B3
F688 B3
F689 C3
F690 C3
F691 C3
F692 C3
F693 D3
F694 D3
I681 A3
I682 A3
I684 B3
I685 B3

Scaler Board: Video Decoder



C 4 OUTPUT (LVDS)



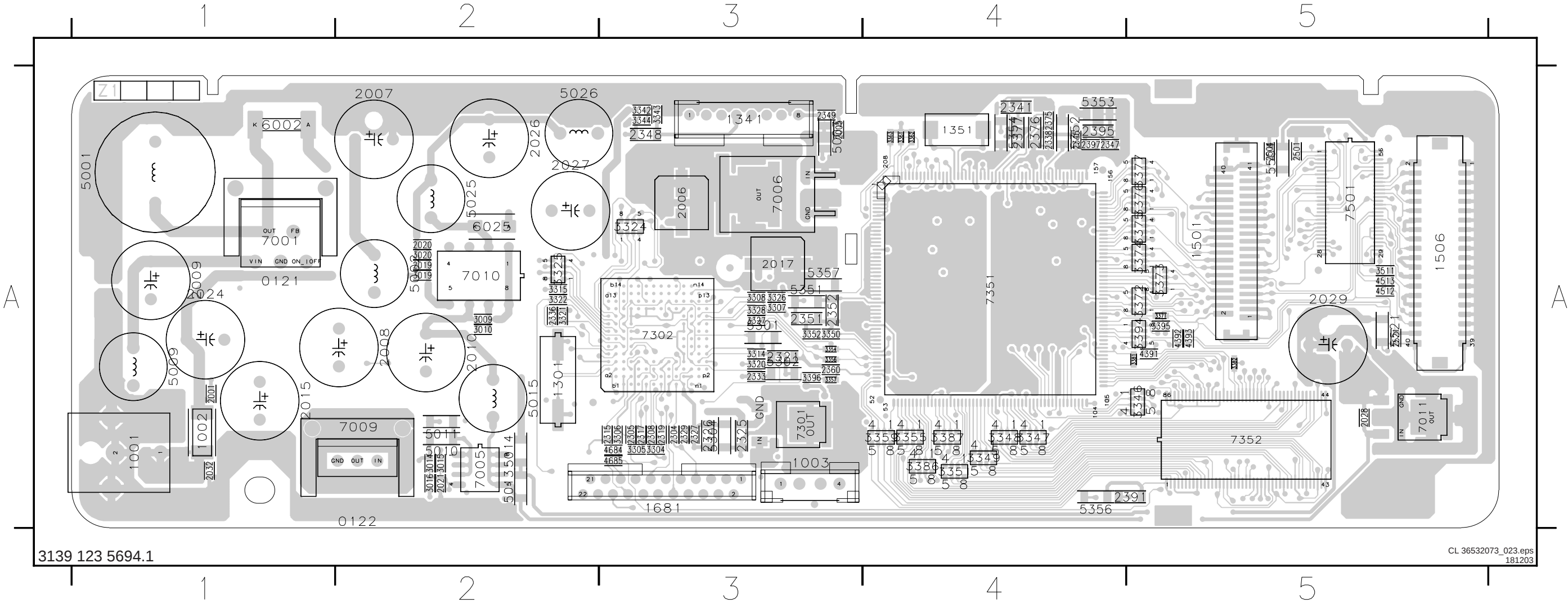
The image shows a complex PCB layout for a video converter. The central component is a Farquar s2300 IC, which is populated with various surface-mount components. The layout includes power planes for +3V3, +1V8, and +5V, and is populated with numerous surface-mount components like resistors, capacitors, and an inverter. Signal traces for video data, address, and control signals are shown connecting the IC to the board edges. The layout is organized into sections, with components labeled with their part numbers and values. The overall design is a professional engineering drawing for a printed circuit board.

CL 36532073_022.eps
021203

2341 A10	3377+1 111
1351 G1	3377-2 111
2338 I1A	3377-3 111
2339 I1A	3377-4 111
2340 I1A	3378 E11
2341 I13	3379 D7
2342 I13	3380 D7
2343 I13	3381 C10
2344 I1	3382 D10
2345 I13	3383 D7
2346 I13	3384 D7
2347 H13	3385 D7
2348 A9	3386-1 B7
2349 A9	3386-2 B7
2351 H1	3386-3 B7
2352 H1	3386-4 B7
2353 H1	3387-1 B7
2354 H2	3387-2 B7
2355 H2	3387-3 B7
2356 G2	3387-4 B7
2357 H2	3388 A7
2358 G2	3389 I6
2359 H3	3391 I6
2360 E2	3394-1 A6
2361 I1	3394-2 A6
2362 I1	3395 A7
2363 I2	3394-4 A6
2364 I2	3395 A6
2365 I2	3396 D1
2366 H3	4391 A7
2367 H3	4392 A7
2368 H3	4393 E8
2369 H4	5351 H1
2371 I3	5352 F12
2372 I3	5353 H12
2373 I3	5354 I12
2374 I3	5355 A13
2375 H5	5356 A11
2376 H5	5357 I1
2377 H6	7351 C5
2378 I7	7352 I11
2379 H6	F341 A10
2381 A14	F342 A10
2382 A14	F343 A10
2383 A14	F345 A10
2384 A14	F347 I11
2385 A13	F348 I11
2386 A13	F349 I11
2387 A13	F378 E11
2388 A12	F379 E11
2389 A12	F380 F11
2390 A11	F381 F11
2392 A11	F382 F11
2393 A11	F383 F11
2394 A10	F384 F11
2395 H13	F385 F11
2396 H13	F386 G11
2397 H13	F387 G11
3342 A8	F388 G11
3343 A9	F390 G11
3344 A8	F391 H11
3346-1 D7	F392 H11
3347-1 D7	F393 H11
3346-3 D7	F394 H11
3346-4 D7	F395 H11
3347-1 C7	F396 I11
3347-2 C7	F397 I11
3348-1 C7	F398 I11
3347-4 C7	F399 I11
3348-1 C7	I344 F13
3348-2 C7	I345 G13
3348-3 C7	I346 I13
3349-1 C7	I347 H7
3349-2 C7	I348 G1
3349-3 C7	I349 D1
3349-4 C7	I351 A12
3350 D2	I352 D2
3351-1 C7	I353 A12
3351-2 C7	I355 D3
3351-3 B7	I357 D3
3351-4 B7	I358 F1
3352 D2	I359 D3
3353 C2	I361 I1
3354 D2	I362 I6
3355-1 B7	I363 I6
3355-2 B7	I364 I6
3355-3 B7	I365 I6
3356 D2	I366 I11
3357 D2	I371 C10
3358 C2	I373 D10
3359-1 A7	I375 D10
3359-2 A7	I377 C10
3359-3 A7	
3359-4 A7	
3360 D7	
3361 F1	
3362 F2	
3363 F2	
3364 G1	
3365 H6	
3366 I6	
3367 H7	
3368 H5	
3369 G3	
3370 D7	
3371 E7	
3372-1 E11	
3372-2 E11	
3372-3 E11	
3372-4 E11	
3373-1 F11	
3373-2 F11	
3373-3 F11	
3373-4 F11	
3374-1 G11	
3374-2 G11	
3374-3 G11	
3374-4 G11	
3375-1 H11	
3375-2 H11	
3375-3 H11	
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3376-1 H11	
3376-2 H11	
3376-3 H11	
3376-4 H11	
3377-1 I11	

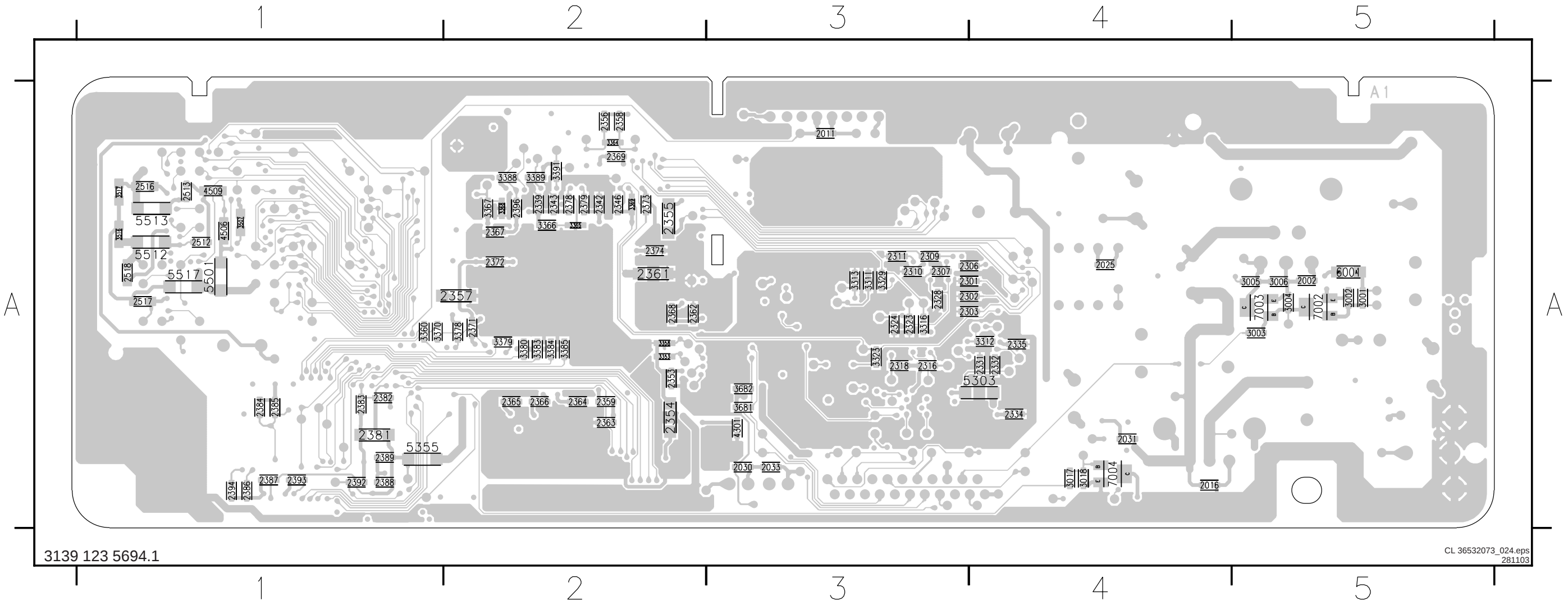
Layout Scaler Board (Top Side)

0121 A1	1351 A4	2007 A2	2020 A2	2032 A1	2321 A3	2338 A4	2352 A3	2397 A4	3015 A2	3307 A3	3324 A3	3344 A3	3352 A3	3362 A4	3376 A5	3395 A5	4513 A5	5010 A2	5301 A3	5356 A4	7005 A2	7351 A4
0122 A2	1501 A5	2008 A2	2021 A2	2304 A3	2325 A3	2341 A4	2360 A3	2501 A5	3016 A2	3308 A3	3325 A2	3346 A5	3354 A3	3363 A4	3377 A5	3396 A3	4684 A3	5011 A2	5302 A3	5357 A3	7006 A3	7352 A5
1001 A1	1506 A5	2009 A1	2024 A1	2305 A3	2326 A3	2345 A4	2375 A4	2504 A5	3019 A2	3314 A3	3326 A3	3347 A4	3355 A4	3371 A5	3381 A5	3511 A5	4685 A3	5013 A2	5304 A3	5504 A5	7009 A2	7501 A5
1002 A1	1681 A3	2010 A2	2026 A2	2308 A3	2327 A3	2347 A4	2376 A4	2521 A5	3020 A2	3315 A2	3327 A3	3348 A4	3356 A3	3372 A5	3382 A5	4391 A5	5001 A1	5014 A2	5351 A3	5521 A5	7010 A2	
1003 A3	2001 A1	2015 A1	2027 A2	2315 A3	2329 A3	2348 A4	2377 A4	3009 A2	3304 A3	3320 A3	3328 A3	3349 A4	3357 A3	3373 A5	3386 A4	4392 A5	5002 A2	5015 A2	5352 A4	6002 A1	7011 A5	
1301 A2	2005 A3	2017 A3	2028 A5	2317 A3	2333 A3	2349 A3	2391 A5	3010 A2	3305 A3	3321 A2	3342 A3	3350 A3	3359 A4	3374 A5	3387 A4	4393 A5	5003 A3	5025 A2	5353 A4	6025 A2	7301 A3	
1341 A3	2006 A3	2019 A2	2029 A5	2319 A3	2336 A2	2351 A3	2395 A4	3014 A2	3306 A3	3322 A2	3343 A3	3351 A4	3361 A4	3375 A5	3394 A5	4512 A5	5009 A1	5026 A2	5354 A4	7001 A1	7302 A3	



Layout Scaler Board (Bottom Side)

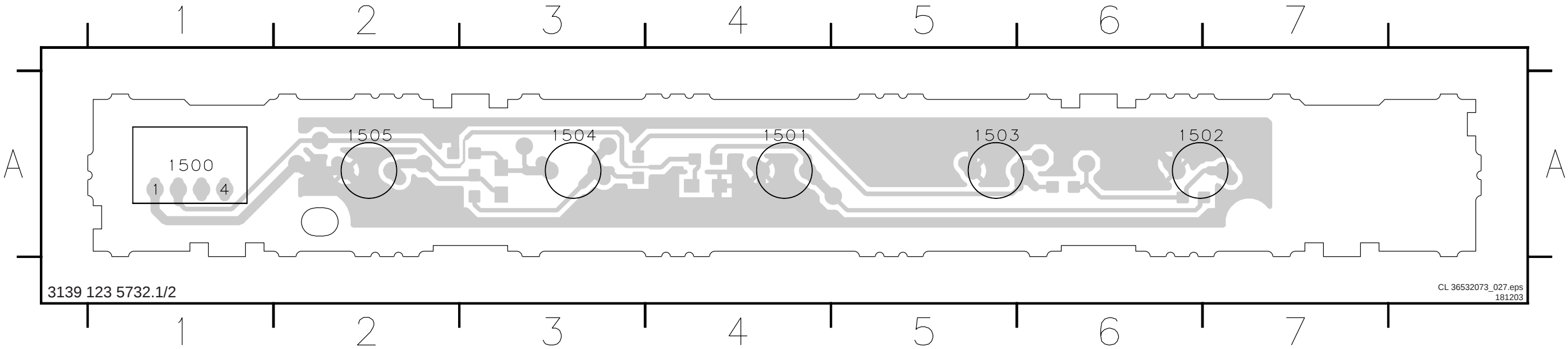
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2011	A3	2303	A4	2323	A3	2342	A2	2358	A2	2367	A2	2379	A2	2388	A1	2516	A1	3006	A5	3329	A3	3368	A2	3385	A2	3682	A3	5513	A1
2016	A4	2306	A4	2324	A3	2343	A2	2359	A2	2368	A2	2381	A1	2389	A1	2517	A1	3017	A4	3333	A2	3369	A2	3388	A2	4301	A3	5517	A1
2025	A4	2307	A3	2328	A3	2346	A2	2361	A2	2369	A2	2382	A1	2392	A1	2518	A1	3018	A4	3335	A2	3370	A1	3389	A2	4501	A1	6001	A5
2030	A3	2309	A3	2331	A4	2353	A2	2362	A2	2371	A2	2383	A1	2393	A1	3001	A5	3311	A3	3353	A1	3378	A2	3391	A2	4506	A1	7001	A5
2031	A4	2310	A3	2332	A4	2354	A2	2363	A2	2372	A2	2384	A1	2394	A1	3002	A5	3312	A4	3355	A2	3379	A2	3392	A1	4509	A4	7002	A5
2033	A3	2311	A3	2333	A4	2355	A2	2364	A2	2373	A2	2385	A1	2395	A1	3003	A5	3313	A3	3356	A2	3380	A2	3393	A1	5303	A1	7003	A5
2301	A4	2316	A3	2335	A4	2356	A2	2365	A2	2374	A2	2386	A1	2512	A1	3004	A5	3316	A3	3364	A2	3383	A2	3516	A1	5501	A1	7004	A4



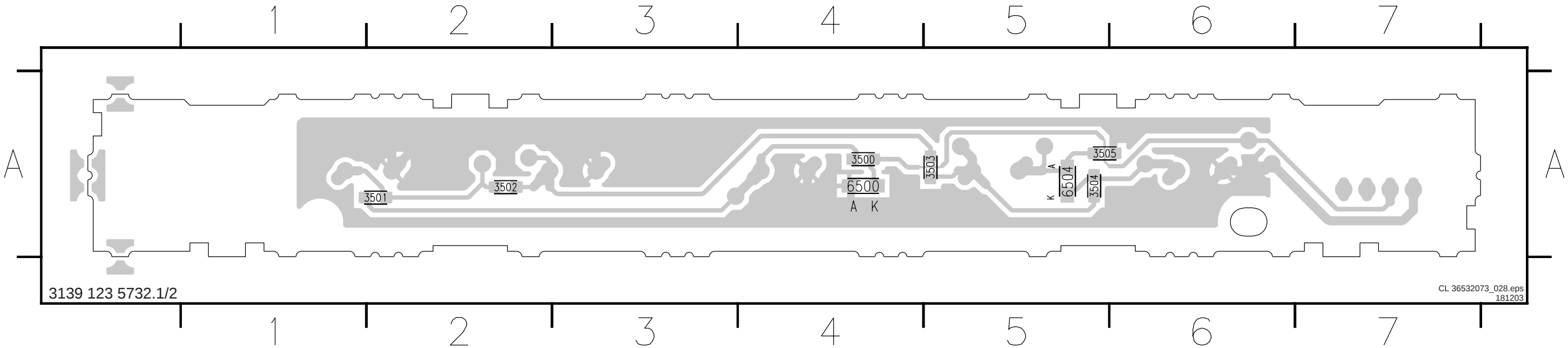
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181203

[illegible]

Layout Top Control (Top Side)



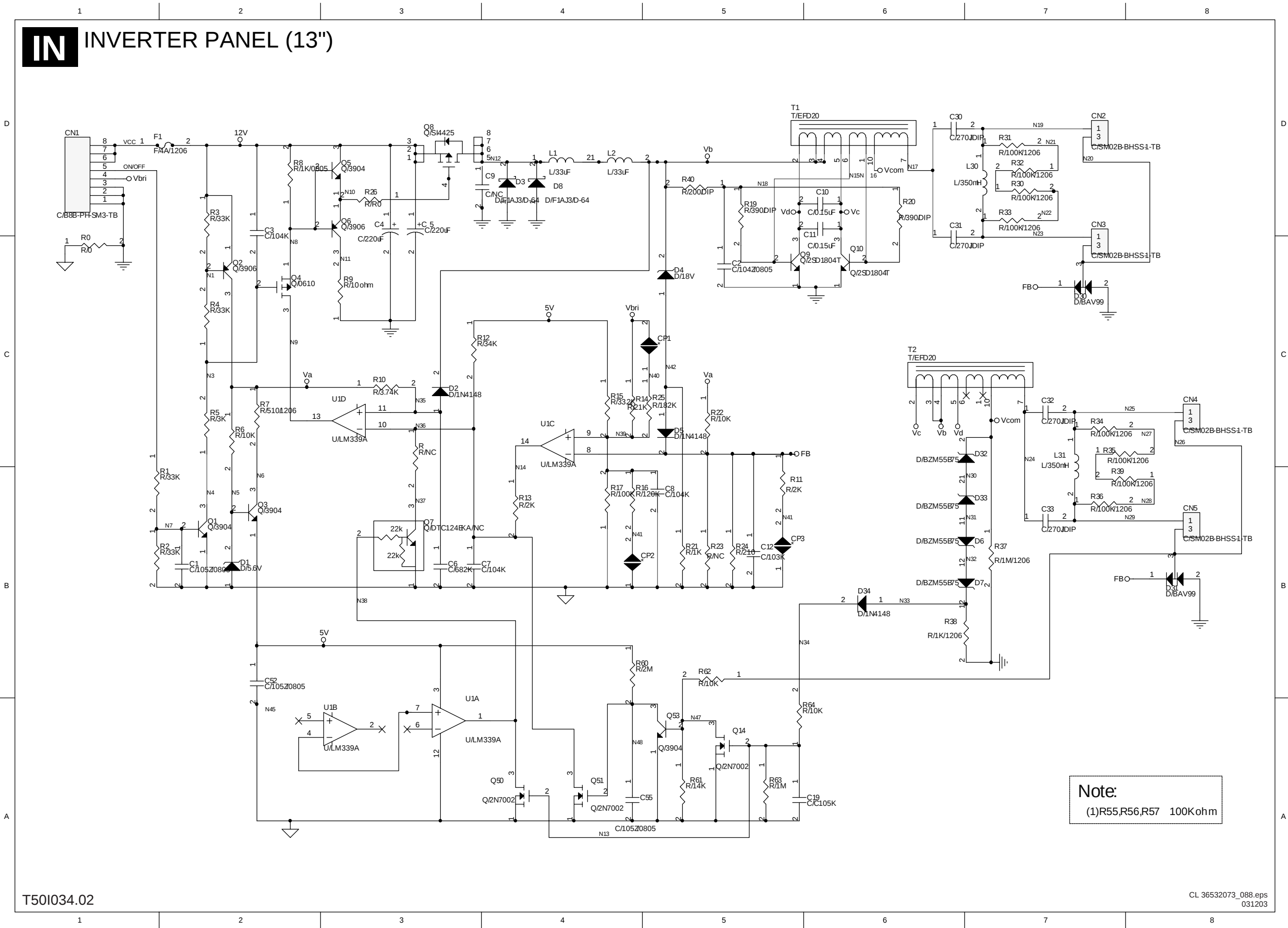
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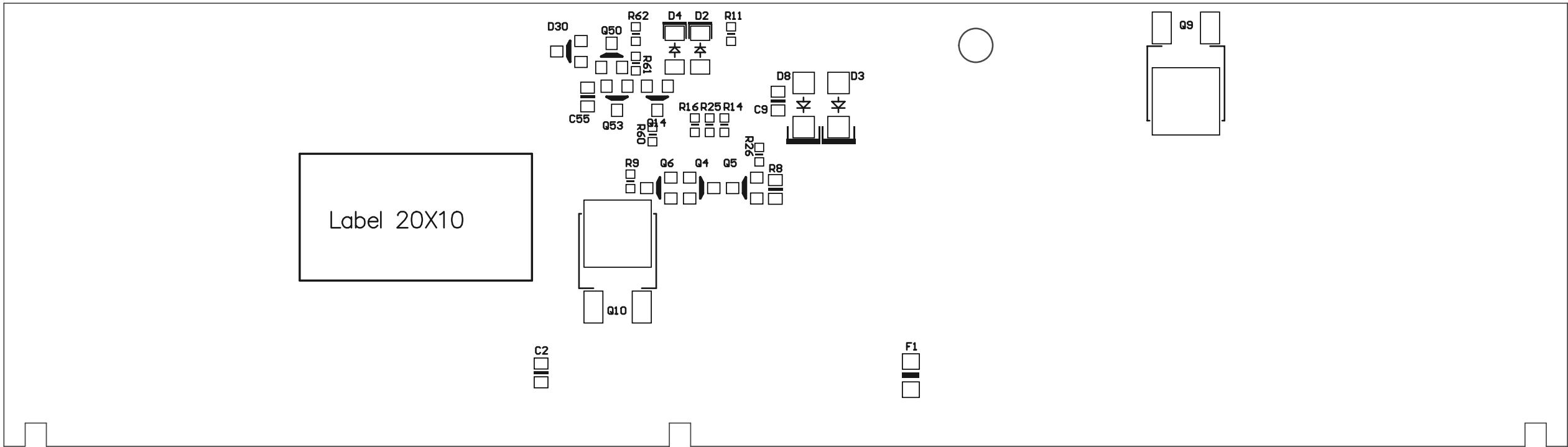
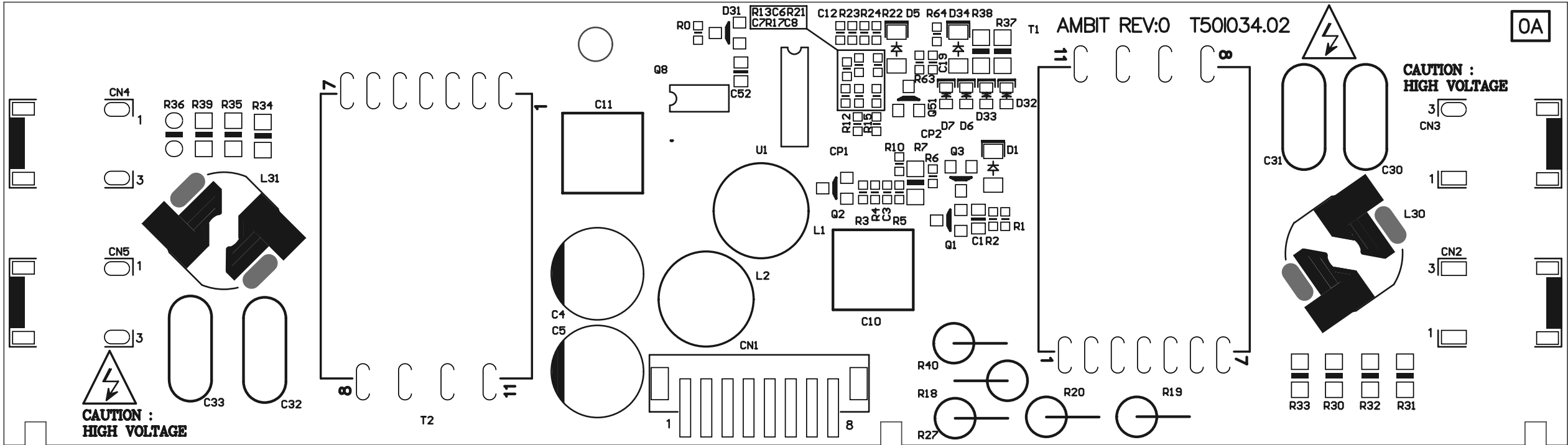
Inverter Panel (13")

IN

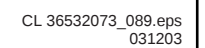
INVERTER PANEL (13")



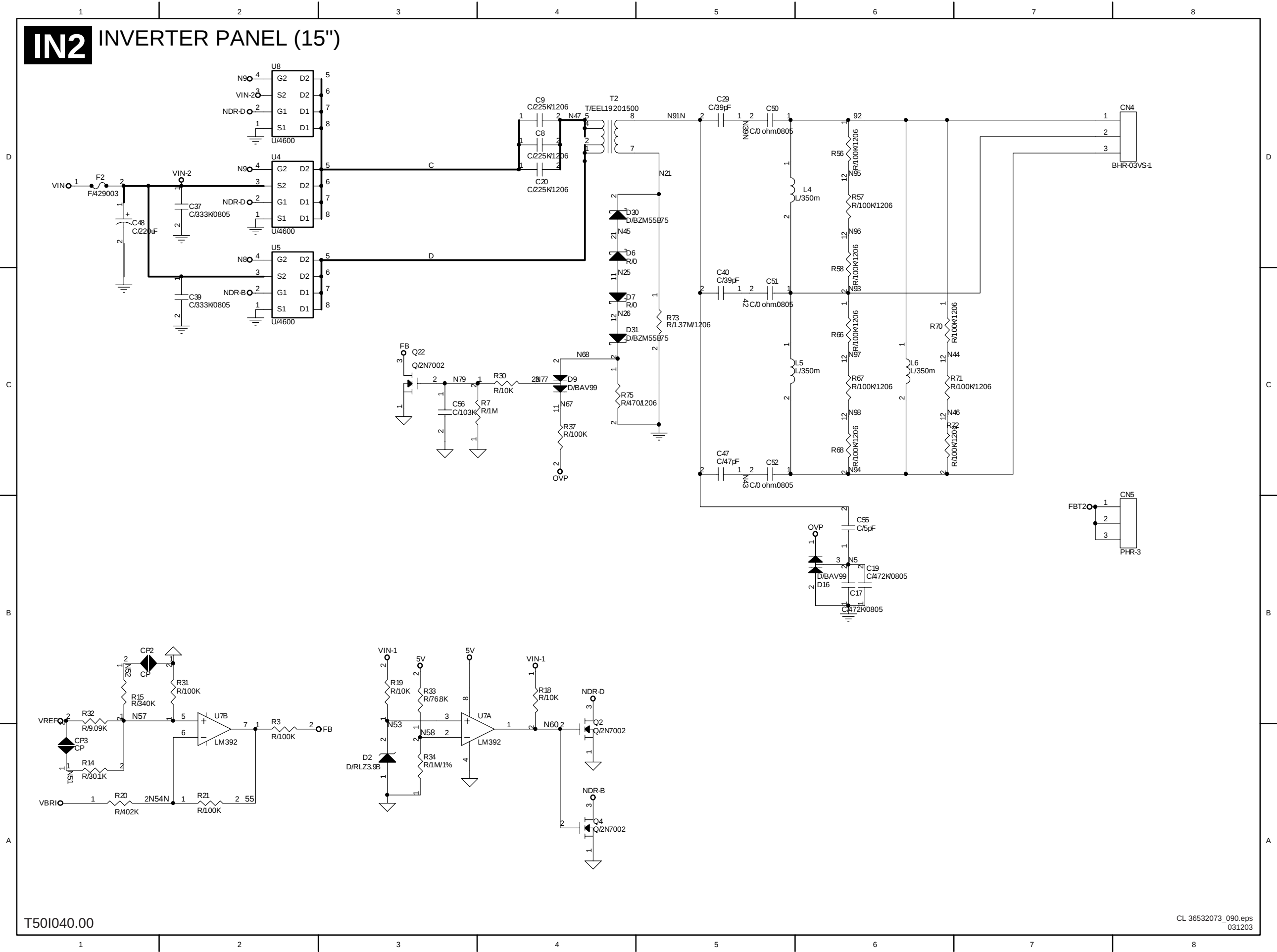
Layout Inverter Panel (13")
INVERTER PANEL (13")



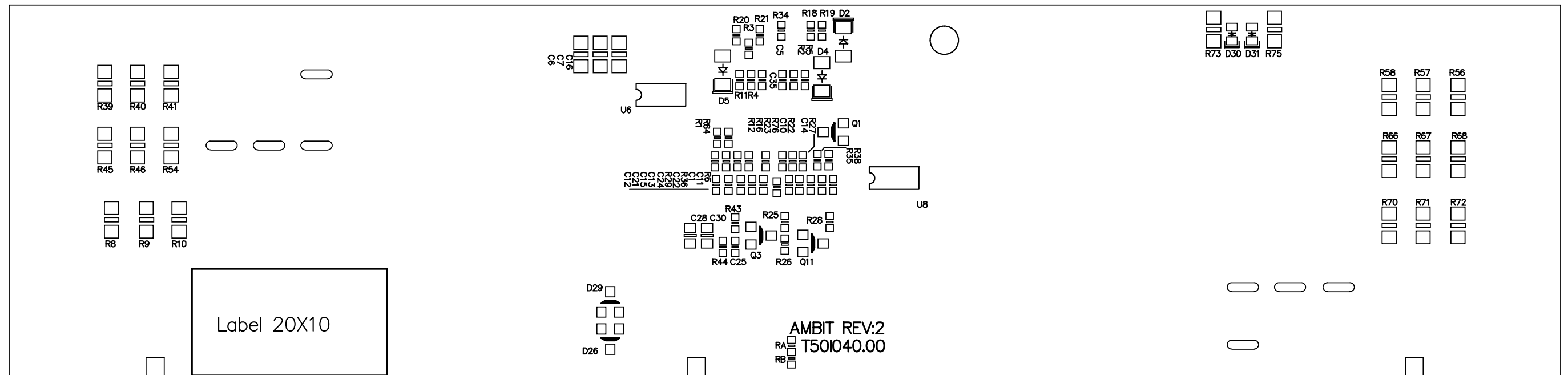
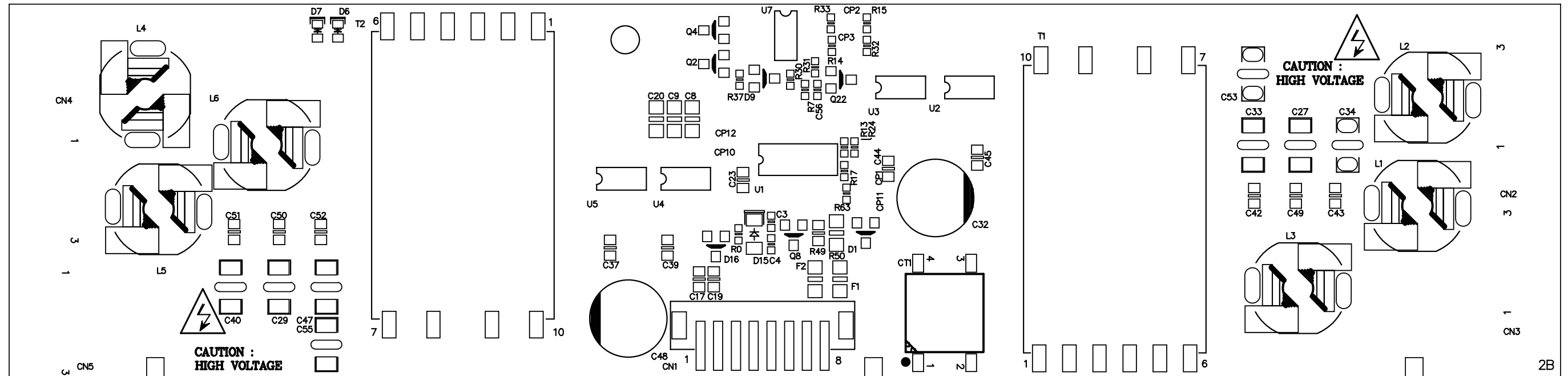
IN1 INVERTER PANEL (15")



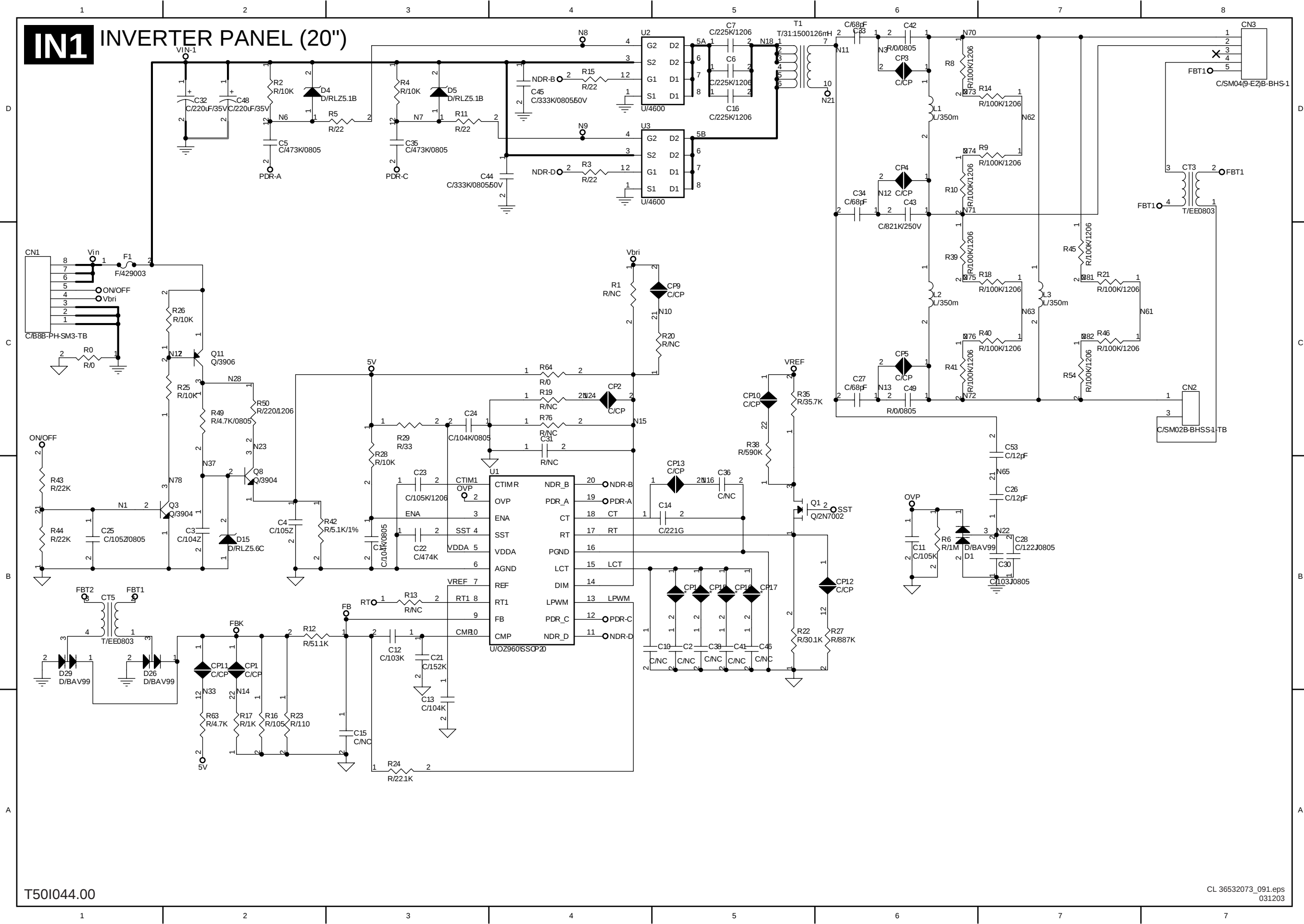
Inverter Panel (15")



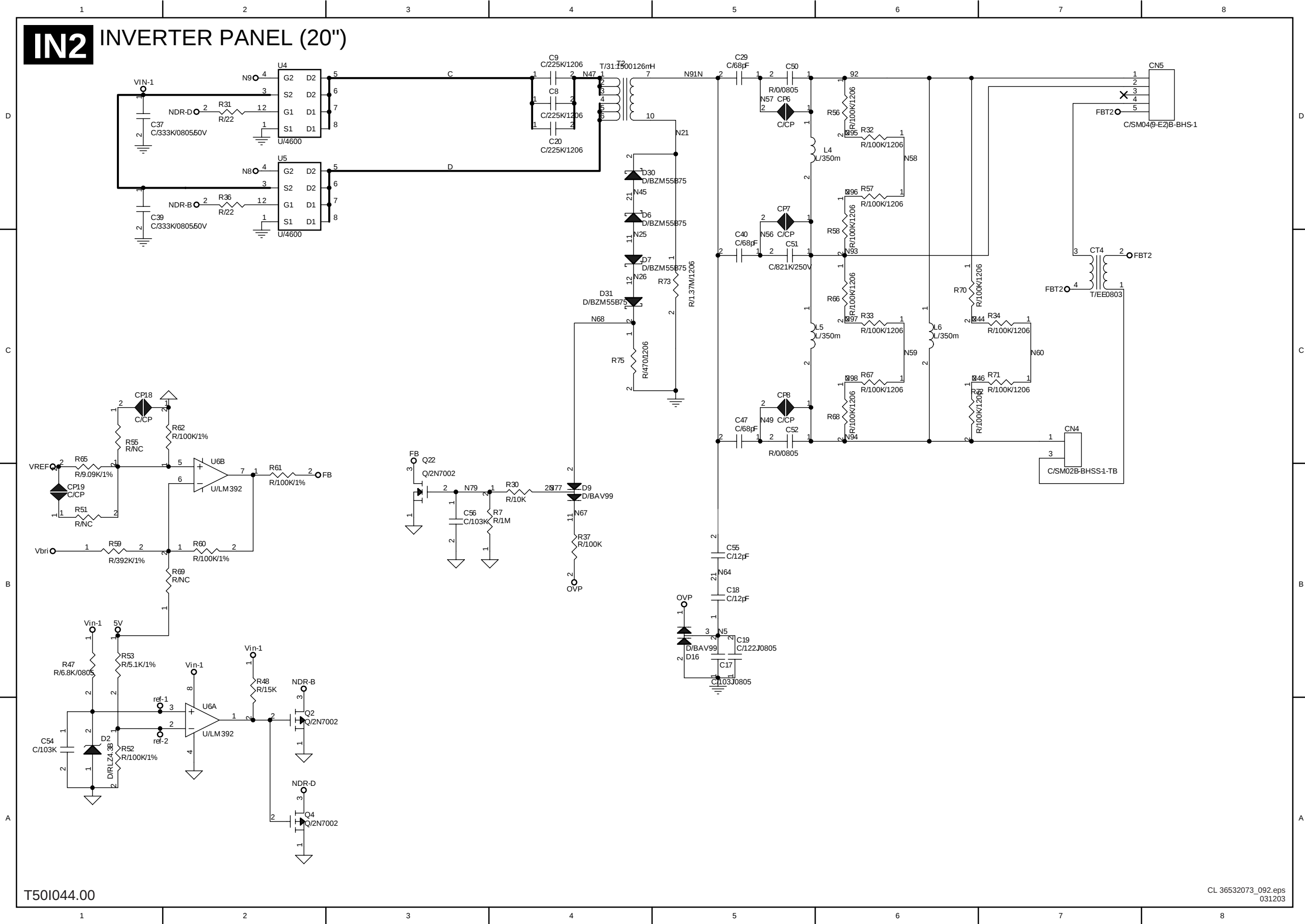
INVERTER PANEL (15")



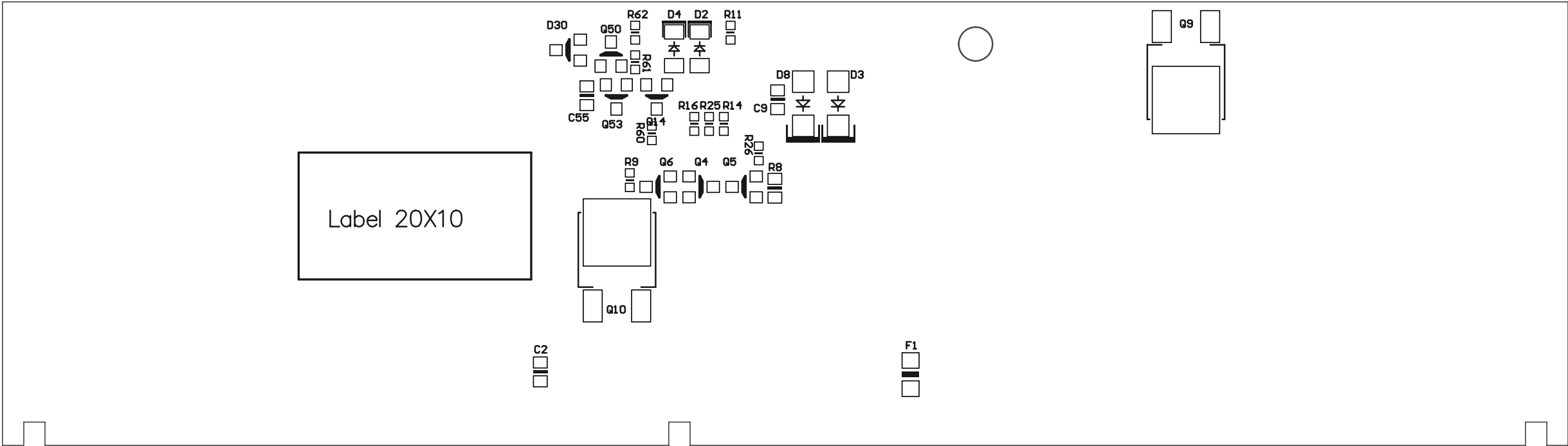
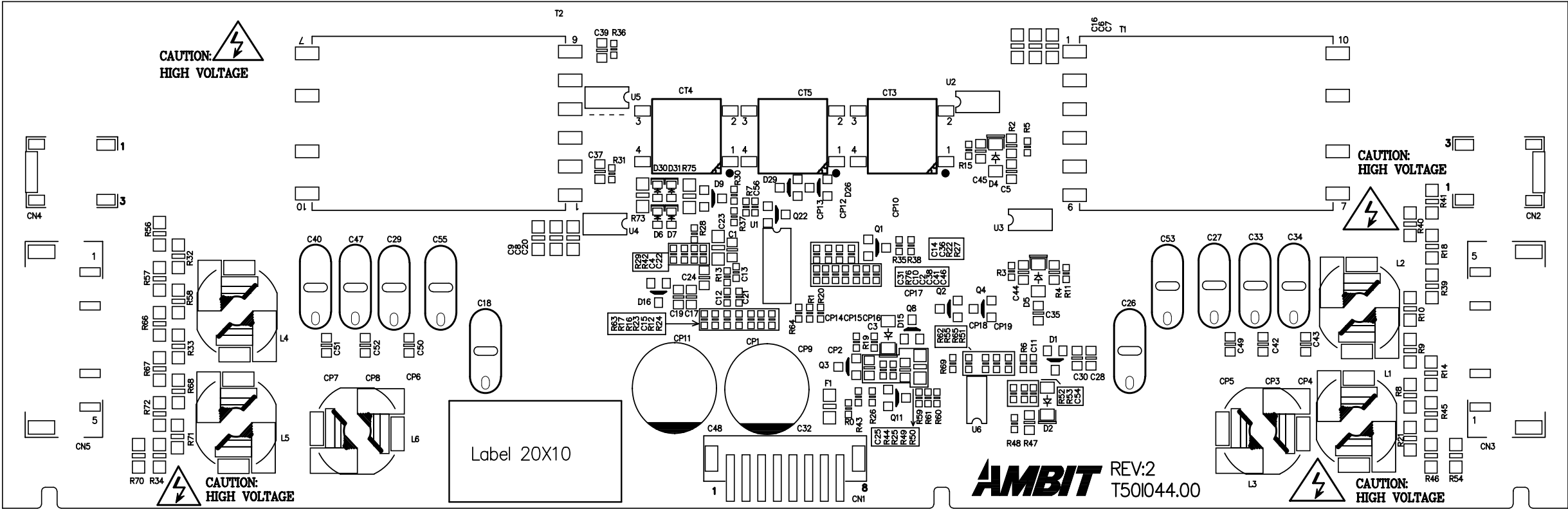
Inverter Panel (20")



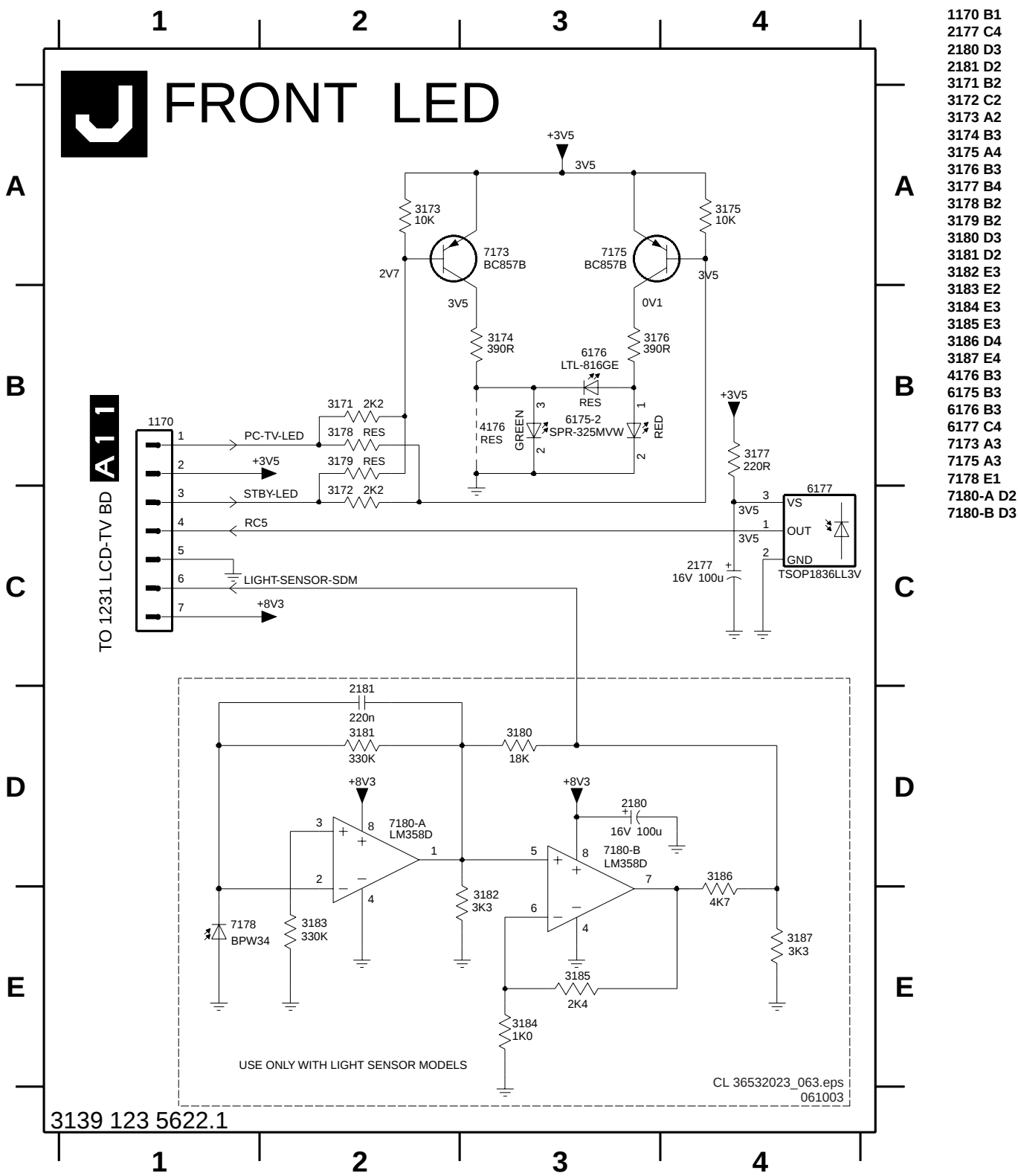
Inverter Panel (20")



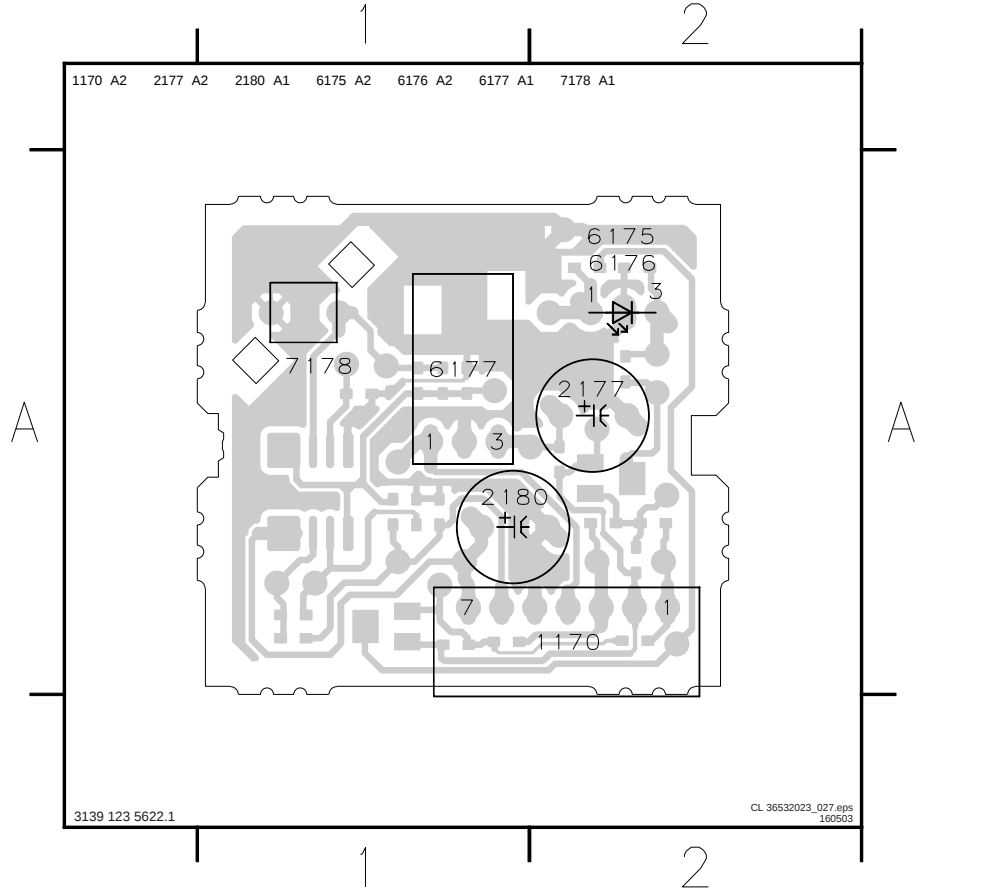
Layout Inverter Panel (20")
INVERTER PANEL (20")



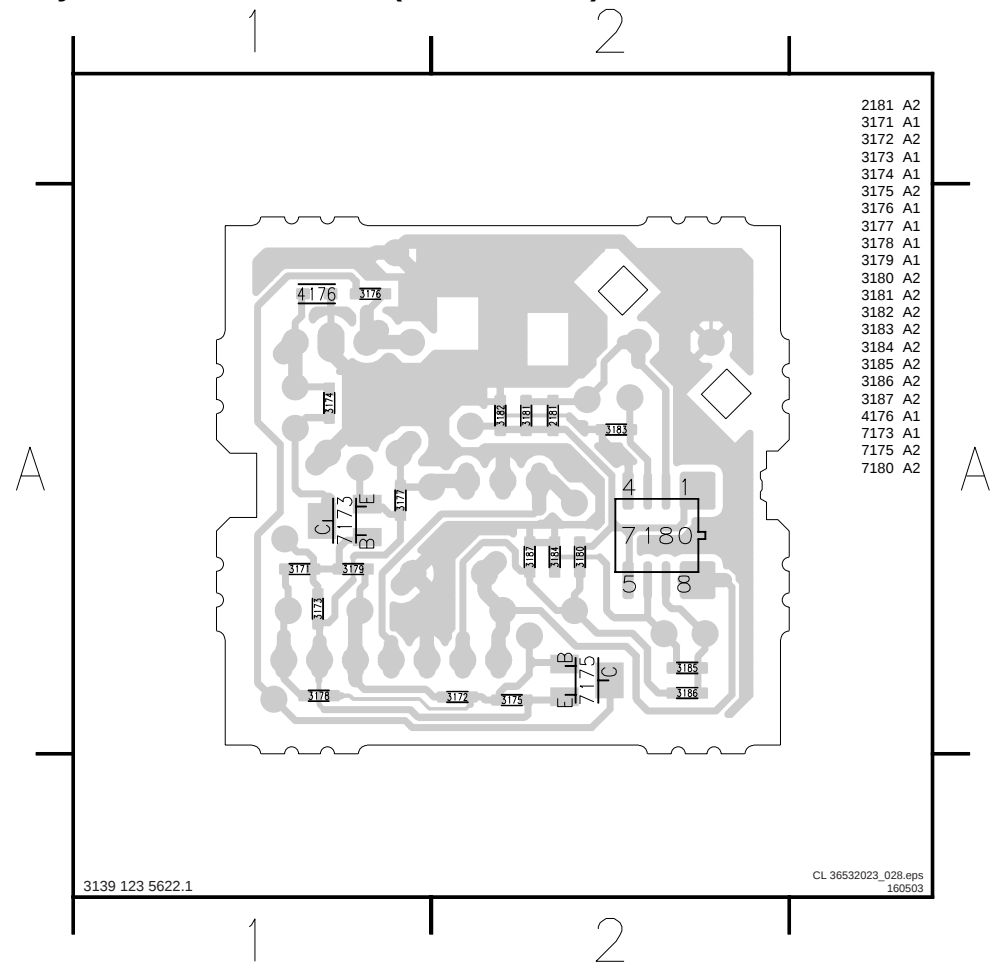
Front LED Panel



Layout Front LED Panel (Top Side)



Layout Front LED Panel (Bottom Side)



8. Alignments

The Service Default Mode (SDM) and Service Alignment Mode (SAM) are described in chapter 5. Menu navigation is done with the CURSOR UP, DOWN, LEFT or RIGHT keys of the remote control transmitter.

8.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:
Mains voltage and frequency: 100-240 V / 50/60 Hz.
Allow the set to warm up for approximately 10 minutes.
Test probe: Ri > 10 M ohm; Ci < 2.5 pF.

8.3.1 SAM Menu

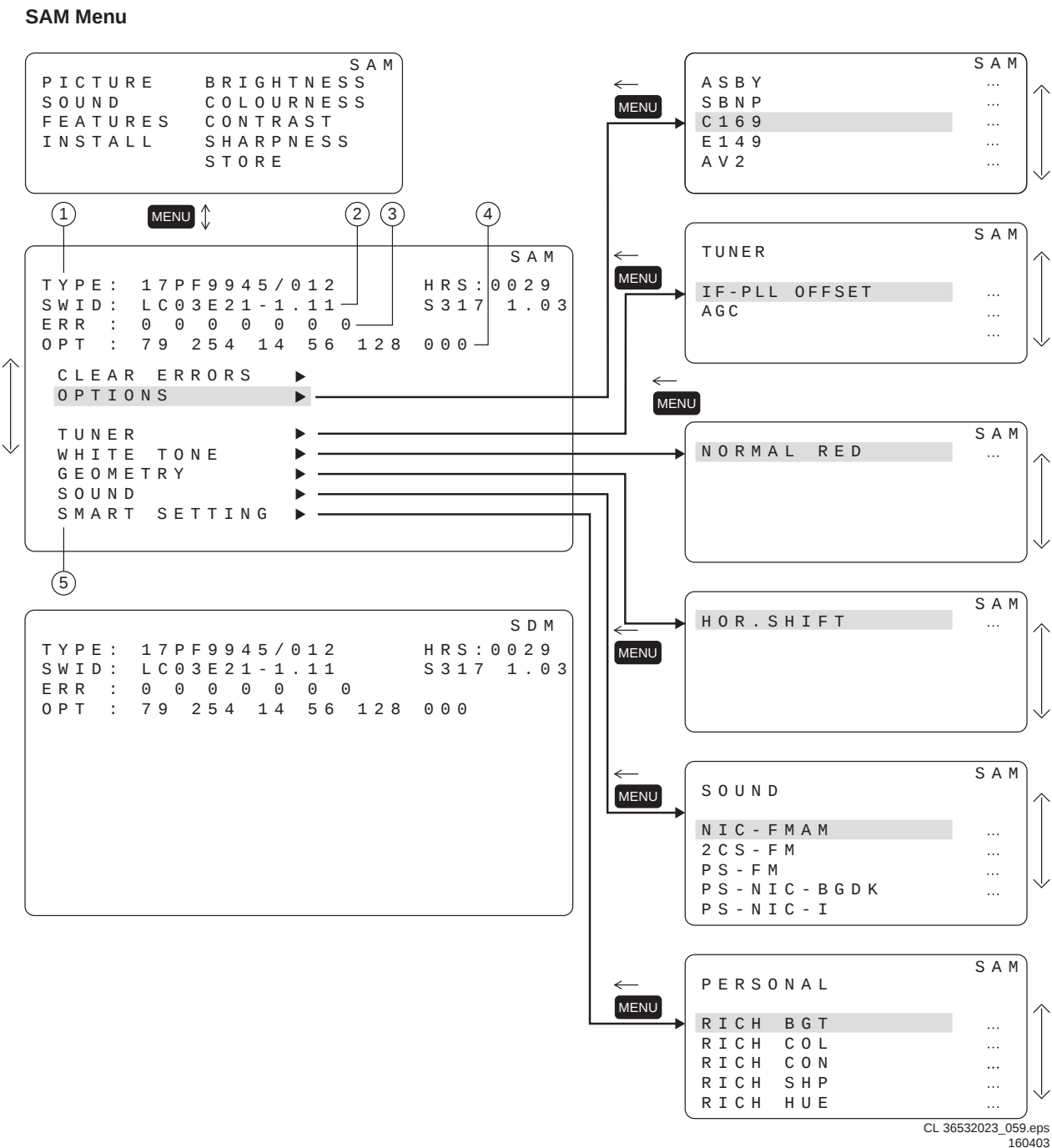


Figure 8-1 SAM menu

8.3.2 Tuner Adjustment

AGC (RF AGC Take Over Point)

Set pattern generator (e.g. PM5418) with colour bar pattern and connect to aerial input with RF signal amplitude - 10 mV and set frequency for PAL/SECAM to 475.25 MHz. For France select the L'-signal.

- Activate the SAM-menu. Go to the sub-menu TUNER, select the sub-menu option AFC WINDOW and adjust the value to 100kHz.
- Select the AGC sub-menu.
- Connect a DC multi-meter to pin 1 of the tuner (item 1100).
- Adjust the AGC until the voltage at pin 1 of the tuner is 1.0V +/- 0.1V.
- The value can be incremented or decremented by pressing the right/left MENU-button on the RC.
- Switch the set to main menu and select the STORE item, by pressing the right/left button on the RC to store the data.

IF PLL OFFSET

No adjustments needed for these alignments.

The default values for these options are:

- IF PLL OFFSET: 31 (default).
- AGC WINDOW: 24 (default).

8.3.3 White Tone

In the WHITE TONE sub menu the color values for the colour value for RED can be changed.

In this way the colour temperature mode (NORMAL) is adjusted. Range: 0-63, 33 represent the middle of the value (no offset difference).

Note: the alignment values are non-linear. The range is: -50 to +50, 0 represents the middle value, (no offset difference).

- Input signal strength: >=10 mV rms (80 dBuV) terminal voltage.
- Input injection point: Aerial input.

Align Method

Initial Set-up

- 12 minutes soaking time before carrying out Colour Temp alignment.
- Incredible Picture/Contrast+ and Active Control (Blue stretch off) must be switched OFF for proper tracking.
- The alignment is done for NORMAL only.

Method of alignments

1. Place the colour sensor of the meter at the centre of the screen.
2. Set the meter in (T, delta UV, Y) mode.
3. Set brightness and colour to nominal (factory mode).
4. Set contrast to make the light output Y on the meter 250 nit +/-10%.
5. Adjust GREEN to bring delta UV to the value as in the table.

Expected Results

Measured parameters: Refer to table.

Specifications: Refer to table.

Units of measurement: Kelvin.

Table 8-1 Colour Temperatures

Colour temperature	13" VGA (NORMAL)		15" XGA (NORMAL)		20" VGA (NORMAL)	
	T (K)	ΔUV	T (K)	ΔUV	T (K)	ΔUV
EUROPE	8,500	-0.003	9,500	-0.003	9,000	-0.003
AP	8,500	-0.003	9,500	-0.003	9,000	-0.003
USA	8,500	-0.003	9,500	-0.003	9,000	-0.003
LATAM	8,500	-0.003	9,500	-0.003	9,000	-0.003
Tolerance	+/-10%	+/-0.003	+/-10%	+/-0.003	+/-10%	+/-0.003

8.3.4 Geometry

The geometry alignments menu contains 1 item to align correct picture geometry. The geometry alignments is :

- HOR SHIFT; align the horizontal center of the picture to the horizontal center of the display.

8.3.5 Sound

No adjustments needed for sound.

The default values for the audio alignments are:

- NIC-FMAM: 250 (NICAM error rate threshold, the higher the more tolerance).
- 2CS-FM: 40.
- PS-FM: 38 (Pre-scale for FM).
- PS-NIC BG/DK: 82 (Pre-scale for NICAM in BG/DK system).
- PS-NIC I: 127 (Pre-scale for NICAM in I system).
- PS-NIC L: 82 (Pre-scale for NICAM in L system).
- DEVIATION: on/off.

8.4 Options

8.4.1 Options

Options are used to control the presence / absence of certain features and hardware. There are two ways to change the option settings, see figure 1: "Service Alignments Mode screens and structure".

Changing a single option

An option can be selected with the MENU UP/DOWN keys and its setting can be changed with the MENU LEFT/RIGHT keys.

Changing multiple options by changing option byte values

Option bytes make it possible to set very fast all options. An option byte represents a number of different options. All options of the chassis are controlled via 8 option bytes. Select the option byte (OB1, OB2, OB3, OB4, OB5, OB6, OB7, OB8) and key in the new value.

8.4.2 List of options

Unless otherwise stated:

- Y(es) means present (or ON),
- N(o) means not present (or OFF).

Table 8-2 List of options

Features	Abbreviations LC13	Description
Auto Standby (after 2 hours)	ASBY	OFF=Disabled auto standby. ON=Enabled auto standby after 2 hours.
Auto Standby No Picture	SBNP	OFF=Disabled, no automatic switch to standby. ON=Enabled, switches to standby after 10 minutes when no ident.
Picture setting for Compress 16:9	C169	OFF=Disabled, 16:9 COMPRESS setting is not available in FORMAT menu. ON=Enabled 16:9 COMPRESS setting is available in FORMAT menu item.
Picture setting for Expand 14:9	E149	OFF=Disabled, 14:9 EXPAND setting is not available in FORMAT menu. ON=Enabled 14:9 EXPAND setting is available in FORMAT menu item.
SCART2 AV Source	AV2	OFF=Disabled, AV2 not available. ON=Enabled, AV2 available.
Auto Standby with timer	AUSB	OFF=Disabled. ON=Enabled.
Wide Screen	WSCR	OFF=Disabled, wide screen is displayed by FORMAT. ON=Enabled, FORMAT is replaced by WIDESCREEN.
Comb Filter	CBFL	OFF=Disabled, no comb filter on the SSB. ON=Enabled, comb filter on the SSB.
Incredible Picture	IPIX	OFF=Disabled, INCR, PICT is replaced by CONTRAST+ ON=Enabled, CONTRAST+ is replaced by INCR, PICT.
Incredible Picture via Menu	IPMU	OFF=Disabled, menu item INCR. PICT not available. ON=Enabled, menu item INCR. PICT available.
Virtual Dolby	VDBY	OFF=Disabled, menu item DOLBY VIRTUAL not available. ON=Enabled, menu item DOLBY VIRTUAL available.
Philips Tuner	PITN	OFF=Disabled, ALPS compatible tuner is used. ON=Enabled, Philips compatible tuner is used.
Automatic Channel Installation	ACI	OFF=Disabled, Automatic Channel Installation. ON=Enabled Automatic Channel Installation.
Automatic Tuning System	ATS	OFF=Disabled, automatic tuning system is ignored. ON=Enabled Automatic tuning system, sort the program in an ascending order starting from Program 1.
Program List	PLST	OFF=Disabled, the access to program List Command is ignored. ON=Enabled the access to program List Command is processed.
Virgin Mode	VMOD	OFF= Virgin mode disabled. ON= Virgin mode enabled.
Smart OSD (Picture and sound)	SOSD	OFF=Disabled, full display of OSD not available. ON=Enabled, full display of OSD available.
Favorite Page	FAPG	OFF=Disabled favorite page in Teletext mode. ON=Enabled favorite page in Teletext mode.
UK Plug and Play	UKPNP	OFF=Disabled, cannot access 'Plug and Play'. ON=Enabled, can access 'Plug and Play'.
Dynamic noise reduction	DNRM	OFF= Dynamic noise reduction ON= Dynamic noise reduction
Video Mute	VMUT	OFF=Disabled, no video blanking during channel/source change. ON=Enabled, video blanking during channel/source change.
Automatic Volume Leveller	AAVL	OFF=Disable, menu item AVL not available. ON=to enable, menu item AVL available.
Sound Board MSP3451	SNIC	OFF=Disabled, Sound IC MSP3451 is not present. ON=Enabled, Sound IC MSP3451 is present.
Time Window	TMWIN	OFF=Disabled, Time Window is set to 2 secs. ON=Enabled, Time Window is set to 5 secs.
Max No. of Programs	NPRG	OFF=Disabled, maximum no. of program 100. ON=Enabled maximum no. of program 80.
Wide Screen Signal Bit	WSSB	OFF=disable the detection of off-air transmission wide screen signal bit. ON=to enable the detection.
Internal Comb Filter	INCF	OFF=disable the BOCMA internal comb filter (for demo purpose). ON=to enable.
NVM data protection	NVM	OFF=Disabled. ON=Enabled.
HML	HML	OFF ON
FM radio ON	FMON	OFF=Disable FM radio. ON=Enable FM radio.
Lip synchronisation	LSYN	OFF= Lip synchronisation ON= Lip synchronisation
Panel size	PASI	OFF for 20" ON for 13"
System	SYSTEM	EW - Select West. Europe's colour and sound system. EE - Select East. Europe's colour and sound system. EM - Select Central Europe's colour and sound system.
Option Byte 1	OB1	8 bits, 7-1 (used)
Option Byte 2	OB2	8 bits, 7-1 (used)
Option Byte 3	OB3	8 bits, 7-1 (used)
Option Byte 4	OB4	8 bits, 7-1 (used)
Option Byte 5	OB5	8 bits, 7-1 (not used)
Option Byte 6	OB6	8 bits, 7-1 (not used)
Option Byte 7	OB7	8 bits, 7-1 (not used)
Option Byte 8	OB8	8 bits, 7-1 (used)

8.4.3 Option bits/bytes (Default values)

Table 8-3 Option bytes default values

	13PF7835/58	15PF7835/58	20PF7835/58	13PF7835/12	15PF7835/12	20PF7835/12
OB1	124	124	125	124	124	125
OB2	223	223	223	222	222	222
OB3	95	95	95	94	94	94
OB4	52	52	52	52	52	52
OB5	0	0	0	0	0	0
OB6	0	0	0	0	0	0
OB7	0	0	0	0	0	0
OB8	1	1	1	0	0	0

Note: Set all “Not used” Option bytes to 0

9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

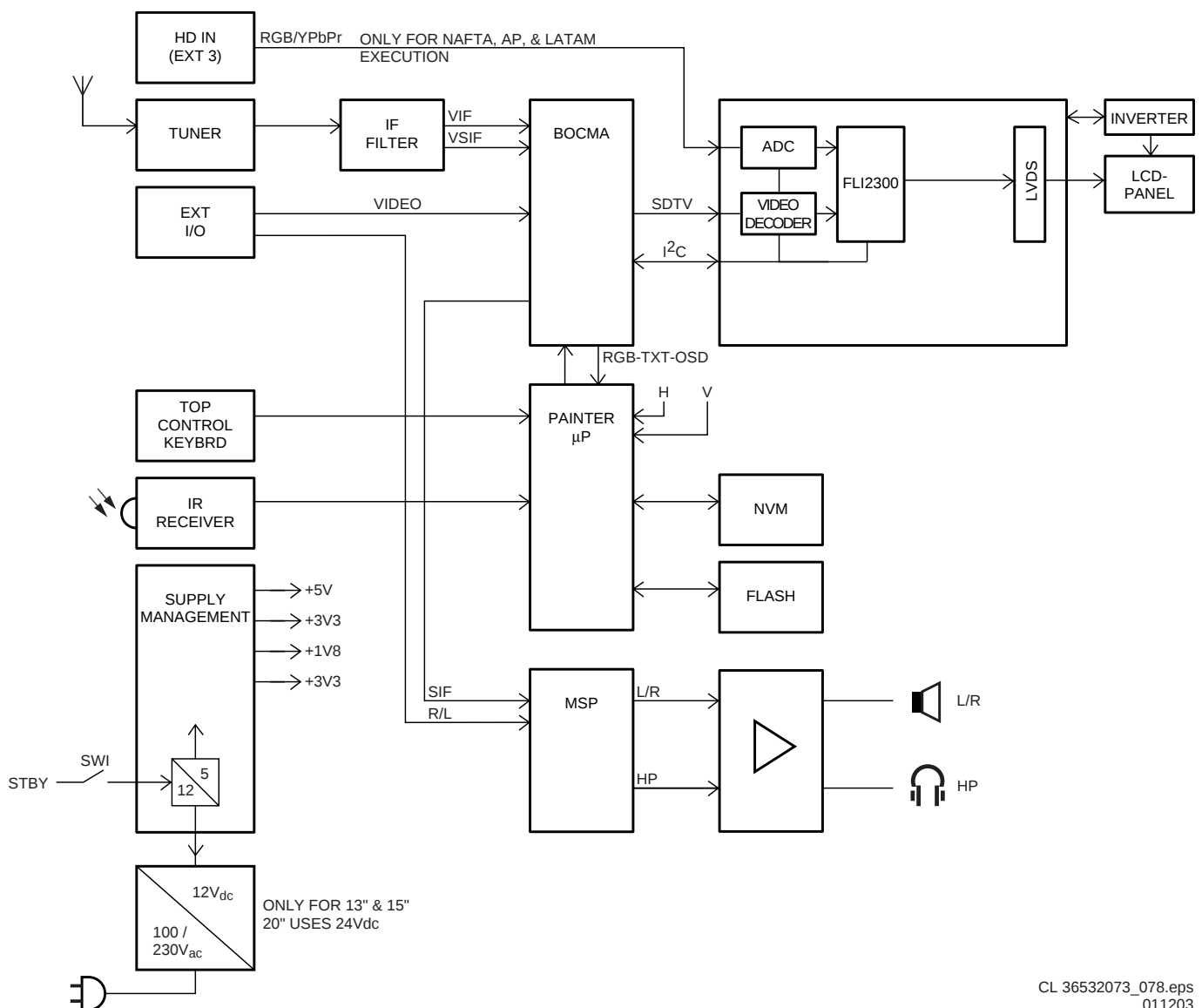
Index of this chapter

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2. Block Diagram
3. Power Supply
4. Input/Output
5. Tuner and IF
6. Video: TV board
7. Video: Scaler Board
8. Audio Processing
9. Control
10. Inverter
11. LCD Display
12. Abbreviation List
13. IC Data Sheets

9.1 Introduction

The LC13 LCD TV is based on the A10 Small Signal Board, with additional I/O's, Tuner, Scaler Board, and Audio Amplifier. The Scaler board is added, for scaling all input signals to the preferred LCD resolution.

9.2 Block Diagram



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011203

Figure 9-1 Block diagram LCD TV

The PLL tuner UR1316 (with FM radio) delivers the IF-signal, via audio & video SAW-filters, to the multi-system TV processor TDA888x (item 7301, also called BOCMA). This IC has the following functions:

- Multi-system decoder.
- Video source- and record select.
- Colour decoder.
- RGB output.
- Sound demodulator.
- Geometry control.
- Picture improvement.
- Synchronisation.

The BOCMA has one input for the internal CVBS signal and two inputs for external CVBS or Y signals. It has only one chroma input so that it is not possible to apply two separate Y/C inputs. The selection is made via the I2C-bus.

It has two independently switchable CVBS outputs for e.g. TXT, Comb-filter, CVBS-monitor, or PIP (optional).

Two SCART-connectors are used: SCART1 is fully equipped and SCART2 is meant for VCR. Pin 10 of SCART2 is used for Easylink (P50) and there is a possibility for Y/C in. The CVBS-out on pin 19 can be used for WYSIWYR (What You See Is What You Record).

Internal video processing is done with YUV-signals. It also handles the video control, geometry part, and the insertion of the TXT/OSD RGB-signals. The video part delivers the RGB signals to the Scaler panel.

The Scaler board can receive two video input signals: SDTV (from BOCMA) or HD (from external HD source like DVD). The SDTV and HD signals are first digitalised, after which they enter the FLI2300. This component does de-interlacing, scaling, and video processing.

After the video processing, the digital data is sent via a Low Voltage Differential Signalling bus to the LCD panel. LVDS is used to improve data speed and to reduce EMI significantly.

The microprocessor, called Painter (SAA55XX, IC7064), takes care of the set control, error generation and analogue TXT/OSD input- and output processing.

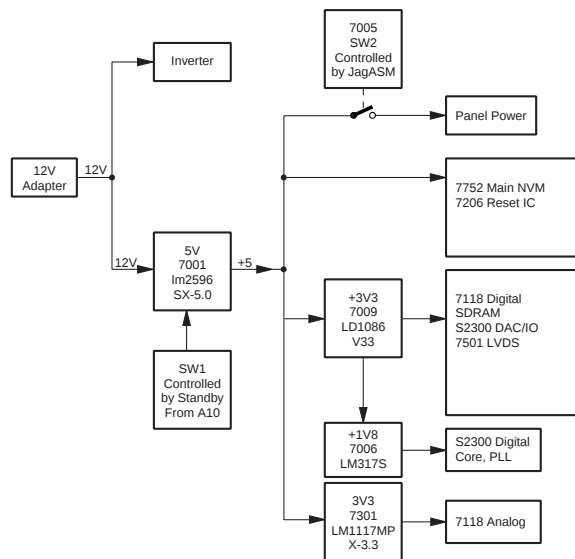
The Painter, ROM, and RAM are supplied with 3.3 V, which is also present during STANDBY.

The NVM (Non Volatile Memory) is used to store the settings, the flash-RAM contains the set software and the DRAM (located inside the microprocessor) is capable for storing 10 Teletext pages.

The sound part is built up 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 an integrated power amplifier IC (AN7522 for 13" and 15" models, AN5277 for 20" models).

Power supply input is a DC voltage coming from an external power adapter.

9.3 Power Supply



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281102

Figure 9-2 Block diagram power distribution.

9.3.1 External Power Adapter

The power source for the LC13 is an **external** AC/DC adapter (not repairable). The type and power of this adapter depends on the screen size of the LCD panel and the rated audio output power. For the 13" and 15" versions, the same 12 V_{dc} adapter is used. However, the 20" model uses an adapter with 24 V_{dc} output.

Specifications for 13" and 15" models:

Power	: 12 V / 5 A
Type number	: SA165A-1250V-3
Supplier	: Sino American
Ordering code	: 3139 128 76811

Specifications for 20" models:

Power	: 24 V / 5 A
Type number	: AD3591
Supplier	: PI Electronic
Ordering code	: 3139 128 76771

9.3.2 Internal Power Distribution

For the internal power distribution, the following regulators are used:

- Low power supply regulator LM2596T-5: working frequency 150 kHz, switch current 3 A, max. input voltage 40 V, max. output voltage 5 V.
- Low power supply regulator MC34063A: working frequency 24 - 42 kHz, switch current 1.5 A, max. input voltage 40 V.

The supply voltages for the TV board are derived via three MC34063A voltage regulators.

Standby: The STANDBY line (active "low") comes from the microprocessor and pulls the gate of FET 7900 to ground when activated. This will block the FET. Directly after this FET, a fuse (1903) is located.

Power down: When the DC voltage from the external adapter drops below a certain value, the POWER_DOWN line will inform this to the microprocessor (active "low").

9.4 Input/Output

The I/O is divided over two parts: Rear I/O and Side I/O. The rear has two SCART inputs, and a HD (YPbPr) input. The side has a CVBS and Y/C (SVHS) input.

EXT1: The input of SCART1 is CVBS + RGB + L/R and the output is the video (+ sound) signal from the tuner (CVBS_TER_OUT).

EXT2: The input of SCART2 is Y/C + CVBS + L/R. The output signal is CVBS_SC2_MON_OUT (+ sound). SCART2 is meant for VCR and has therefore some additional signals in relation to EXT1 but no RGB: it has the possibility for Y/C_in and Easylink-Plus (P50): Y_in on pin 20 and Chroma_in on pin 15.

Easylink is handled via pin 10 of the SCART2 (this is a bi-directional communication with the microprocessor) and supports the next features:

- Signal quality and aspect ratio matching
- One touch play & text
- PIP
- Pre-set download
- WYSIWYR
- Automatic Standby
- Country and language installation
- System Standby
- Intelligent set top box features
- NexTV download
- Timer record control
- VCR control feature

The selection of the external I/O's is controlled by the Painter microprocessor (pins 16 & 55) and handled via IC7401:

- SEL-MAIN-R1R2 is the selection between SCART1 (R1) and SCART2 (R2).
- SEL-FRNT-RR selection is made between Side and Rear I/O.

The status signals (on SCART pin 8) and Front detection are fed to the Painter (pins 2, 4 and 6).

HD (YPbPr) in: This input is directly going to the Scaler board. See paragraph "Video: Scaler Board".

9.5 Tuner and IF

9.5.1 Tuner (diagram A3, A4, and A5)

A Philips UR13xx Tuner with second input (for FM Radio) is used in the TV board. The SIF FM signal is decoded by the Micronas IC.

The tuner is I2C controlled, and is capable of receiving off-air, S- (cable) and Hyperband channels.

Tuning is done via I2C. The reference voltage on pin 9 is 7.1 V. This voltage is derived from the +5 V via a DC/DC converter.

Video IF amplifier

The IF-filter is integrated in a SAW (Surface Acoustic Wave) filter. One for filtering IF-video (1452, or 1453 in case of system L/L') and one for IF-audio (1454). The type of these filters is depending of the standard(s) that has to be received.

The output of the tuner is controlled via an IF-amplifier with AGC-control. This is a voltage feedback from pin 7 of the BOCMA to pin 1 of the tuner. The AGC-detector operates on top sync and top white level. AGC take-over point is adjusted via the service alignment mode 'Tuner' - 'AGC'. If there is too much noise in the picture, then it could be that the AGC setting is wrong. The AGC-setting could also be mis-aligned if the picture deforms with perfect signal; the IF-amplifier amplifies too much.

An (alignment free) PLL carrier regenerator with an internal VCO demodulates the video signal. This VCO is calibrated by means of a digital control circuit, which uses the clock frequency of the microprocessor as a reference. The frequency setting for the various standards is realised via the I2C-bus. The AFC output is generated by the digital control circuit of the IF-PLL demodulator and can be read via the I2C-bus.

The video identification circuit is used to identify the selected CBVS or Y/C signal. The IC contains a "group delay correction" circuit, which can be switched between the BG and a flat group delay response characteristic. This has the advantage that in multi-standard receivers no compromise has to be made for the choice of the SAW filter. Also, the sound trap is integrated. The centre frequency of the trap can be switched via the I2C-bus. The signal is available on pin 27.

QSS sound circuit

The single reference QSS mixer is realised by a multiplier. In this multiplier, the SIF signal is converted to the intercarrier frequency by mixing it with the regenerated picture carrier from the VCO. The mixer output signal is supplied to the output via a high-pass filter for attenuation of the residual video signals. With this system, a high performance hi-fi stereo sound processing can be achieved.

The AM sound demodulator is realised by a multiplier. The modulated sound IF signal is multiplied in phase with the limited SIF signal. The demodulator output signal is supplied to the output via a low-pass filter for attenuation of the carrier harmonics. The AM signal is supplied to the output (pin 27) via the volume control.

9.6 Video: TV-board (diagrams A4 and A5)

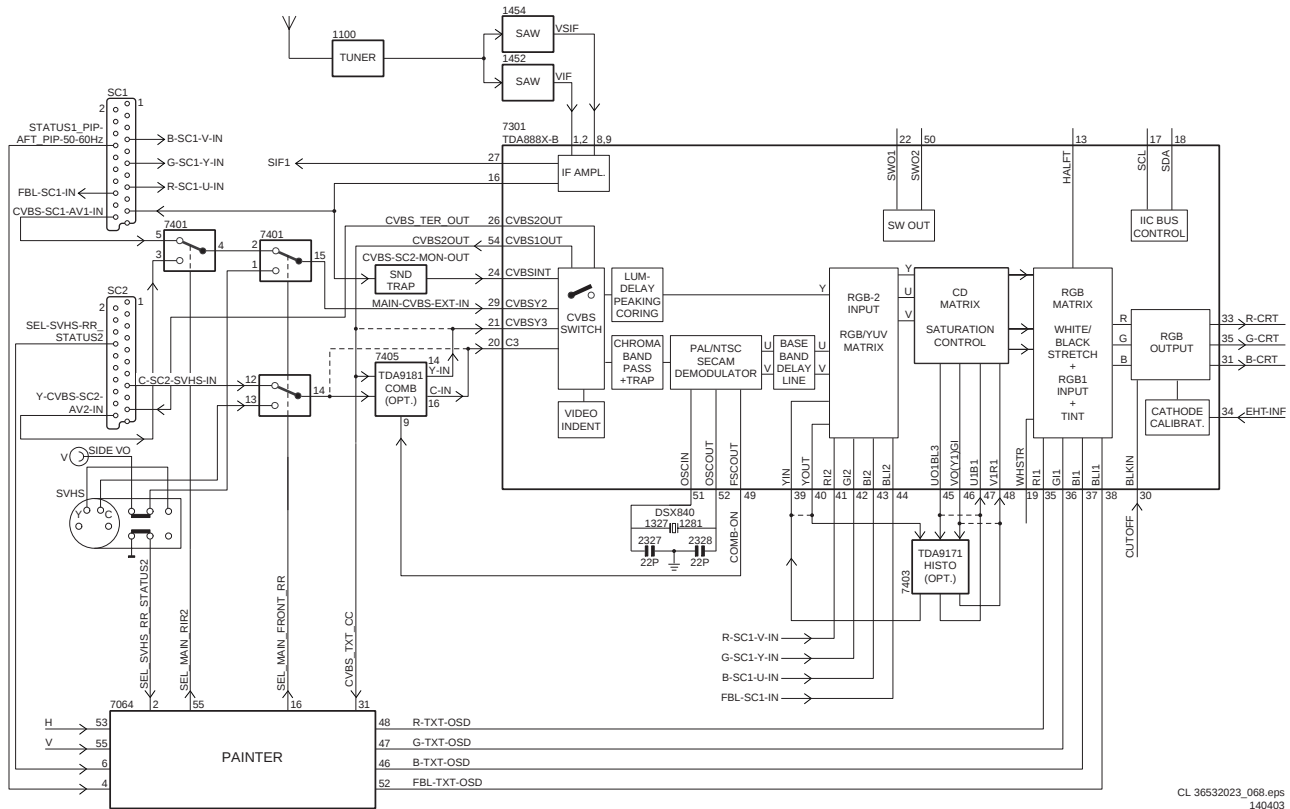


Figure 9-3 Block diagram video processing

The video processing is completely handled by a one-chip video processor: the TDA888x. This IC is called BOCMA (Bimos One Chip Mid-end Architecture) and contains:

- IF demodulator.
- Chrominance decoder
- Sync separator.
- Horizontal & vertical drive.
- RGB processing.
- CVBS and SVHS source select.

It has also build in features like:

- CTI.
- Black stretch.
- Blue stretch.
- White stretch.
- Slow start up.
- Dynamic skin tone correction etc.

Further, it also incorporates sound IF traps and filters, and requires only one crystal for all systems.

9.6.1 Source selection

The BOCMA has an input for the internal CVBS signal and two inputs for external CVBS or Y signals. The circuit has only one chroma input so that it is not possible to apply two separate Y/C inputs.

The selection of the various sources is made via the I2C-bus. The used IC version has two independently switch able outputs:

- The CVBS1 output (pin 54) is identical to the selected signal that is supplied to the internal video processing circuit and is used as source signal for the teletext decoder (Painter). Both CVBS outputs have an amplitude of 2.0 V_{pp}.
- The CVBS2 output (pin 26) is fed to pin 19 of SCART2 for WYSIWYR (What You See Is What You Record).

If the Y3/C3 signal is selected for one of the outputs, the luminance and chrominance signals are added so that a CVBS signal is obtained again.

9.6.2 Analogue Comb filter

After the selection of the external signals (EXT1, EXT2 or Side I/O) is made, the Y/CVBS signal is fed to the TDA888x (pin 29) along with the Front-end signal (pin 24). The selection between the two is made in the BOCMA and the output (pin 26) is fed to the (optional) 2-line comb filter (to separate the luminance from the chroma). The comb filter output is again fed to the BOCMA (pin 21) for further processing.

The external colour signals are also fed to the comb filter. In SVHS mode the comb filter is bypassed and the external signals are directly fed to the BOCMA.

Switching the comb filter is done via pin 49 of IC7301. The "video standard" selection is done via the SYS1 and SYS2 signals from the microprocessor. If the comb filter is not used, jumpers are present and the external Y/C signals are directly fed to the pins 20, 21 of IC7301.

After this stage, the external RGB signals (from SCART) are added to pins 40 - 44.

9.6.3 Histogram (YUV picture improvement) IC

The demodulated video-signal can be checked on pins 40, 45, and 46 of IC7301 and is fed to pins 39, 47, and 48. In this path, the Histogram IC TDA9171 can be inserted. Without this IC, jumpers are used.

The TDA9171 can control picture improvements like: histogram processing and blue stretch.

9.6.4 Chroma and Luminance processing

The BOCMA (IC7301-B) contains a chroma band pass and trap circuit (including a luminance delay line and the delay for

the peaking circuit). The centre frequency of the chroma band pass filter is switchable via the I2C-bus so that the performance can be optimised for 'front-end' signals and external CVBS signals.

9.6.5 Colour decoder

The colour decoder (demodulator) can decode PAL, NTSC, and SECAM signals. The internal clock signals for the various colour standards are generated by means of an internal VCO, which uses the 12 MHz crystal (item 1330) frequency as a reference.

Under bad-signal conditions (e.g. VCR-playback), it may occur that the colour killer is activated although the colour PLL is still in lock. When this killing action is not wanted it is possible to overrule it.

The IC contains an Automatic Colour Limiting (ACL) circuit, which is switchable via the I2C-bus, and which prevents that over saturation occurs when signals with a high chroma-to-burst ratio are received.

The reference frequency of the colour decoder is fed to the FSC output (pin 49) and can be used to control an external comb filter (only for 20 inch models).

The base-band delay line is integrated. The demodulated colour difference signals are internally supplied to the delay line. The colour difference matrix switches automatically between PAL/SECAM and NTSC.

9.6.6 Picture improvement features

In the BOCMA, various picture improvement features have been integrated. These features are:

- Video dependent coring in the peaking circuit. The coring can be activated only in the low-light parts of the screen. This effectively reduces noise while having maximum peaking in the bright parts of the picture.
- Colour Transient Improvement (CTI). This circuit improves the rise and fall times of the colour difference signals.
- Black-stretch. This circuit corrects the black level for incoming video signals, which have a deviation between the black level and the blanking level (back porch).
- Blue-stretch. This circuit is intended to shift colour near 'white' with sufficient contrast values towards more blue to obtain a brighter impression of the picture.
- White-stretch. This function adapts the transfer characteristic of the luminance amplifier in a non-linear way dependent on the picture content. The system operates such that maximum stretching is obtained when signals with a low video level are received. For bright pictures, the stretching is not active.
- Dynamic skin tone (flesh) control. This function is realised in the YUV domain by detecting the colours near to the skin tone. The correction angle can be controlled via the I2C-bus.

9.6.7 RGB output

The ICs have a flexible control circuit for RGB and YUV input signals which has the following features:

- Input, which can be used for YUV or RGB, input signals and as YUV interface. The selection of the various modes can be realised via the I2C-bus. For the YUV input 2 different input signal conditions can be chosen. It is also possible to connect the synchronisation circuit to the incoming Y input signal. This input signal can be controlled on saturation, contrast, and brightness.
- The RGB-1 input which is intended for OSD/text signals and which can be controlled on contrast and brightness. By means of software, the insertion blanking can be switched "on" or "off". It is also possible to convert the incoming RGB-1 signal to a YUV signal. The resulting signal is supplied to the YUV outputs.
- The TDA888x versions have an additional YUV or RGB input which can be controlled on contrast, saturation, and

brightness. This signal is supplied to the control circuit via the YUV interface so that an external picture improvement IC will also have effect on this signal.

9.6.8 Synchronisation (diagrams A4 and A5)

Horizontal Sync (H Sync)

Before the video processor IC7301 can generate horizontal drive pulses (LINEDRIVE, pin 56), the supply voltages on both pins 23 and 53 must be present. After the start-up command of the Painter (via the I2C), the BOCMA starts giving horizontal pulses.

Vertical Sync (V Sync)

The vertical saw tooth generator drives the vertical output drive circuit. On pins 63 and 64 are two differential voltages DR+ and DR-. For this chassis, only DR- is used. This line is called V-SYNC, and goes to the Painter microprocessor.

Composite Sync (C Sync)

On pin 57 of IC7301 the sandcastle pulse (SC) is available. This is a 2-state pulse that is used for synchronisation of the (optional) histogram IC (item 7403). Together with the LINEDRIVE pulse, this signal is also used to create the C-SYNC signal, which is used to synchronise the Scaler board.

9.7 Video: Scaler Board

The Scaler Board controls the display processing in an LCD TV, e.g. like the deflection circuit in a CRT-based TV. It controls all the view modes (e.g. like "zooming" and "shifting"). Features like HD inputs, are also handled by this board.

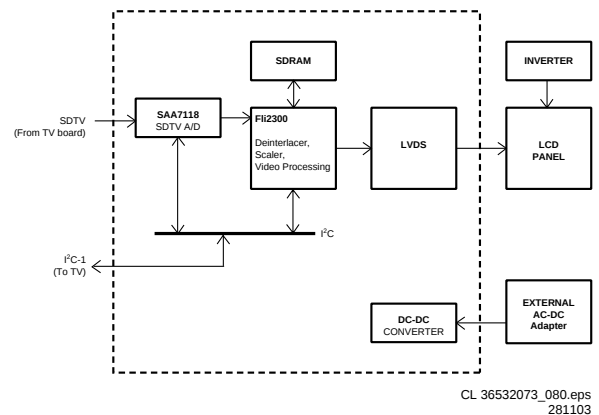


Figure 9-4 Block diagram Scaler board

9.7.1 Inputs

HD (YPbPr) input specifications

Input via Scaler Board. Supports:

- 576p, 720p and 1080i for PAL
- 480p, 720p, and 1080i for NTSC.
- Sync Detection: SOG/SOY and YUV/RGB supported.

9.7.2 Video Converter: FI2300

This 208-pins BGA-IC creates a picture signal with double the scan lines of a conventional interlaced picture, to create a noticeably sharper and smoother image. It offers higher picture resolution and eliminates virtually all motion artefacts. Even on large screens, the progressive scan lines are barely noticeable and it reduces picture flickering significantly.

Below listed processing is done in the FI2300:

- HD/SDTV brightness, saturation, hue, and sharpness control.
- Noise reduction and de-interlacing (only for SDTV).
- Scaling
- DAC RGB output for fault finding (on connector 1352)

9.8 Audio Processing

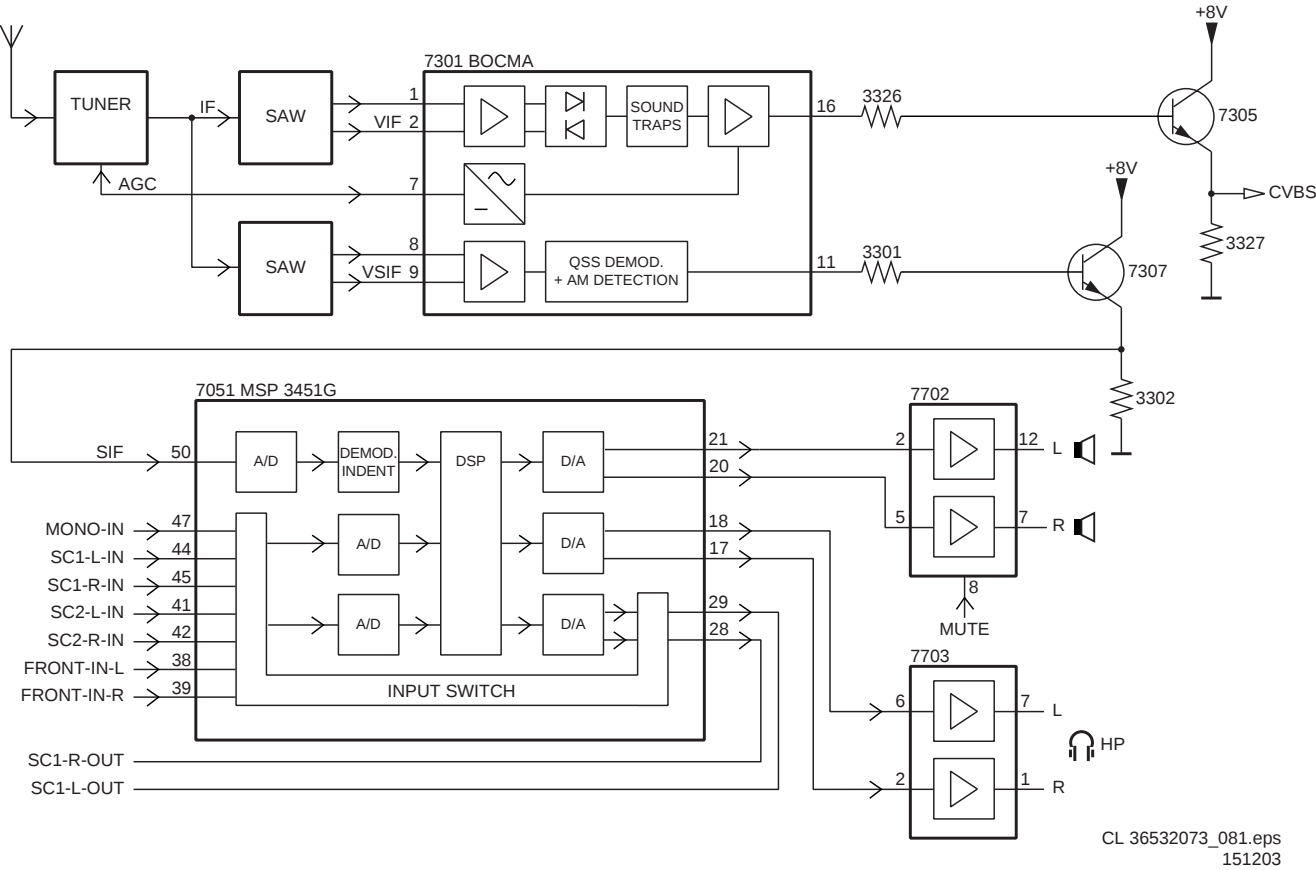


Figure 9-5 Block diagram audio processing

9.8.1 Introduction

All sets contain one of ITT's Multistandard Sound Processing ICs for sound decoding:

- MSP3410 (or 3411): Multi System (incl. NICAM) decoding for Europe and AP (Virtual Dolby).
- MSP3421 (or 3421): BTSC decoding for NAFTA and LATAM (Virtual Dolby).

This IC takes care of the main FM, AM and NICAM sound decoding.

The analogue input and output sections of MSP offer wide range of switching facilities such that it is possible to distribute all possible source signals (internal and external) to the desired output channels (main, headphone or SCART outputs).

All MSP versions contain digital audio processing, used for the basic left/right stereo sound, such as bass, treble, balance, incredible sound and spatial and source selection (SIF-signal, EXT1 or EXT2).

In addition to that, the MSP34x1 versions are also able to perform Virtual Dolby, a Dolby approved sound mode for surround sound reproduction with left/right speakers only.

9.8.2 Source selection

Table 9-1 MSP Overview

Micronas IC	System	Virtual Dolby	Region
MSP3410G	Multi-system	No	Europe/AP
MSP3411G	Multi-system	Yes	Europe/AP
MSP3420G	BTSC	No	Nafta/Latam
MSP3421G	BTSC	Yes	Nafta/Latam

The above-mentioned Micronas ICs are all having four pairs (L/R) of SCART audio inputs. The fourth input pair (AV4) is used as audio-in (input cinches located at the Scaler board) for PC and HD modes.

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).

9.8.3 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.

This digital signal can be processed by two demodulation channels. 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 (Digital Controlled Oscillator).

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.

9.8.4 Audio processing

The sound processing is completely done by the MSP34xx:

- **Volume control** is done by the user via the SOUND menu.
- **Tone control** in 'Stereo' sets is done via the BASS/TREBLE control.
- **Headphone control** in 'Stereo'-sets is done via the loudspeaker output of the MSP, no sound control possible. In 'Virtual Dolby'-sets, the MSP has a separate Headphone output so separate sound control is possible.
- **Mute control** can be done in different ways:
 - System muting. System muting is implemented for "special events" such as channel/source change event, loss of identification signal, on/off of set, during search and auto store/program, sound mode change. This muting is transparent to the user. Audio output should be muted before the above "special events" occurred, to prevent problems such as audible pop. Muting is done via the SOUND-ENABLE line (active "low") connected to the amplifier-IC and coming from the Painter.
 - Headphone status mute. A headphone status is available to detect the presence of the headphone and mute the main speakers if the headphone is detected. The microprocessor will read the HP-SIDE-DETECT status.
 - User muting. This is a mute option available to the user. The user select the MUTE option on the remote control to switched off/on the sound output to the main loudspeaker and the subwoofer.

Automatic Volume Levelling (AVL)

One of the features of the MSP-family is 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 switch able. Therefore, the AVL feature is customer switch able via the menu.

9.8.5 Audio amplification (diagram A9)

Some specifications:

- 13" and 15" models: 2 x 3 W with power amplifier AN7522N.
- 20" models: 2 x 5 W with power amplifier AN5277N.
- All models are equipped with a subwoofer output.

The audio output stage is built around IC7731, which is a balanced amplifier, and is located on the TV board. It uses an monolithic integrated power amplifier IC, the AN5277. The gain of the amplifier is constant. This means that volume control has

to be done via the MSP. The supply voltage (12 or 24 V depending on the screen size) is filtered by L5733.

The AN5277 (for 20 inch models) delivers an output of 2 x 10 W_{RMS} to two full range speakers. A subwoofer is not implemented.

Headphone Amplifier

The headphone outputs are from the same audio power amplifier. The headphone jack will disconnect the audio output to the speakers when a headphone plug is inserted. Hence, the speakers are muted if a headphone is connected.

Resistors (items 3750 and 3752) limit the audio output to the HP against short circuits.

9.8.6 Audio: Lip Sync

A "lip sync" circuit with an 80 ms audio delay is added, in order to synchronise with video delay due to the complexity of the display processing. See table:

Table 9-2 Lip sync overview

Input	Speaker out(delay)	Monitor out(delay)	SCART1 out(delay)	SCART2 out(delay)
AV1	AV1 (80 ms)	AV1 (80 ms)	RF (none)	AV1 (80 ms)
AV2	AV2 (80 ms)	AV2 (80 ms)	RF (none)	RF (none)
AV3	AV3 (80 ms)	AV3 (80 ms)	RF (none)	AV3 (80 ms)
AV4	AV4 (80 ms)	AV4 (80 ms)	RF (none)	AV4 (80 ms)
RF	RF (80 ms)	RF (80 ms)	RF (80 ms)	RF (80 ms)

Note: SCART out not valid for NAFTA/Latam versions.

The video delay is significant, due to memory based processing. For instance, the "frame rate conversion" cause a delay of two frames, while the LCD panel response also cause a delay.

The circuit is a (16 bit) FIFO based digital delay. The memory size required for a 80 ms delay (with a data clock of 1.024 MHz) can be calculated with: Memory size = delay time * f_{clk}. This gives: 80 ms * 1.024 MHz = 81920 bits.

To calculate the memory size for a 16 bits mode I2S digital audio stream we must use the following data:

- f_s = 32 kHz, 16 bits, stereo
- Data clock = 32 kHz * 16 * 2 = 1.024 MHz
- Memory size for 1 ms delay = 1 ms * 1.024 MHz = 1024 bits = 1 kbit

So, the delay time of 80 ms can be built with five steps of 16 ms, which is close to the frame rate. Therefore, a 128 kbit SRAM (16 x 8) is chosen.

9.9 Control

9.9.1 Painter

The microprocessor (SAA55xx, IC7064 called Painter) provides:

- Control functions for the TV-set.
- On Screen Display (OSD).
- Teletext functions.
- P50 (Easylink) communication.
- I/O-ports for I2C, RC5, LED, and service modes.
- Error code generation.

Ten pages TXT-data can be stored internally. For 100 pages, an external memory is used (IC7070).

The Non Volatile Memory IC7066 is a 4 kB version M24C32W6.

All ICs in this part are supplied with 3V5 that is also present during Standby. This voltage is supplied via voltage regulator IC7920.

For stable OSD and TXT, the display is synchronised to the TV signal processing device by way of horizontal and vertical sync signals provided by external circuits (H-SYNC and V-SYNC). From these signals, all display timings are derived. The OSD/TXT RGB-outputs (46/47/48) and fast blanking (52) are fed to the BOCMA (pins 35 - 38).

9.9.2 I2C-busses

In this chassis, two I2C-busses used:

- Hardware I2C-bus, used for all IC communication.
- Separate short bus for the Non Volatile Memory (NVM), to avoid data corruption.

9.9.3 NVM

The Non Volatile Memory IC7066 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.

9.9.4 Light control

A pair of light sensors, at the Front Control panel, is used to monitor the external ambient light condition and adjust the brightness, contrast, and any relevant video parameters of the display.

9.10 Inverter

1. Introduction
2. Control
3. Buck Converter
4. Royer Circuit
5. HV Circuit
6. Balance Circuit
7. Feedback Circuit
8. Protection Circuit

9.10.1 Introduction

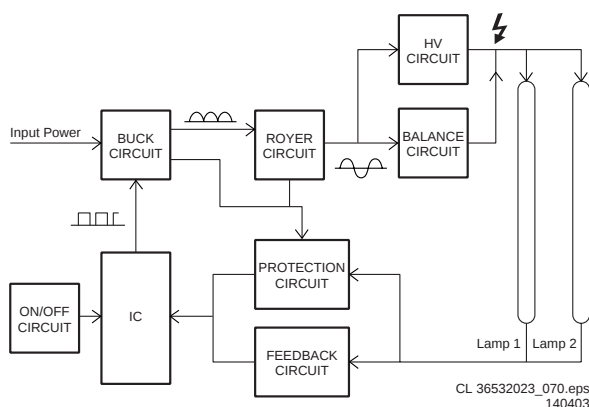


Figure 9-6 Block diagram Inverter Circuit

This is a separate panel (separate from LCD) for the 13" and 15" models, but is built-in in the 20" LCD panel.

This circuit is a basic DC/AC inverter for driving Cold Cathode Fluorescent Lamps (CCFL) who are located behind the LCD panel.

9.10.2 Control

The "On/Off circuit" delivers an input signal to turn the AC output voltage "on" or "off":

- ON ≥ 2.5 V
- OFF ≤ 2.0 V

This signal switches transistor Q4 "on/off", resulting in "start/stop" of the buck converter.

9.10.3 Buck Converter

This circuit uses the Power MOSFET (item Q8) to control the input power for the Royer circuit. It is based on the "Buck Converter" principle. The transistor switch (Q8) is the heart of the buck converter, and it controls the power supplied to the load. It is controlled via a PWM controller (U1, LM339). The LM339 controls the lamp current and brightness. Its functions include burst mode control, PWM control, and "soft start".

Note: this circuit needs a minimum load, in order to work properly.

9.10.4 Royer Circuit

This is a standard Royer structure. It transfers the DC input signal into an AC output signal.

It is a self-resonant oscillator, where one transistor conducts current while the opposite one does not, and vice versa. The transformer core saturates in each half cycle, causing each transistor to switch "on" or "off".

The energy required to operate the transistors as switches, is supplied by the feedback windings of the transformer to the bases of the transistors.

The resistors R19 and R20 supply the base current for Q5 and Q6. Capacitor C10/C11 and transformer T1 define the oscillation frequency (working frequency). For the 13" model, the working frequency lies around 45 kHz, for the 15" model, this is about 47 kHz.

Example: If the primary voltage is 15 V_{rms}, and the transformer turn ratio is 100, the secondary voltage is about 15 * 100 = 1500 V_{rms}.

9.10.5 HV Circuit

The High Voltage (HV) circuit supplies the power to drive the lamps. The output voltage () is:

- 13" model: 540 V (with load), 1430 V (without load).
- 15" model: 645 V (with load), 1430 V (without load).

Note: Ensure that the backlight connectors are fully inserted, in order to prevent high voltage arcing.

9.10.6 Balance Circuit

The Balance circuit uses an LCR resonant mode, to control the output current. It delivers the same output current, even if the load is different.

9.10.7 Feedback Circuit

The sense voltage of the feedback circuit is set at half the 5 V supply voltage via R15 and R17 (at pin 9 of the comparator). The control IC compares this voltage with the output current, and regulates the PWM drive signal.

9.10.8 Protection Circuit

The protection circuit senses the output for current and for abnormal signal behaviour, in order to protect the inverter:

- Output current: It monitors the lamp current. If this current is correct, the inverter will operate continuous. If the current is incorrect, the inverter will be shut down. This means for instance that if one lamp is not working, the inverter will go into protection.

Note: Be sure that the lamp connectors are connected properly.

- Abnormal signals: It monitors the signals from the PWM and Royer stage. If anything is wrong, the protection circuit will shutdown the inverter.

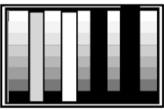
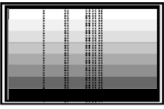
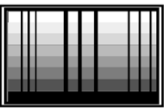
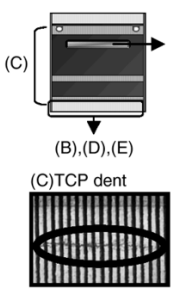
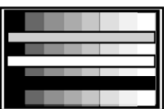
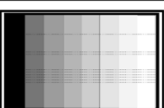
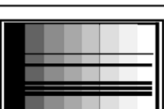
9.11 LCD Display

9.11.1 Specifications

Panel model	: LC130V01 (13")
	: LC150X01 (15")
	: LC201V02 (20")
Resolution (HxV)	: 640x480 pixels (13")
	: 1280x768 pixels (15")
	: 640x480 pixels (20")
Luminance	: 450 nit (13")
	: 450 nit (15")
	: 450 nit (20")
Contrast ratio	: 400 (13")
	: 400 (15")
	: 350 (20")
Supplier	: LG.Philips LCD

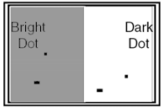
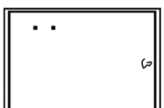
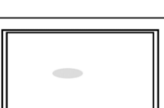
9.11.2 LCD Failure Modes

Figures below can be used to evaluate problems with the LCD display.

Defect Part	Failure Mode	Description	Phenomenon	Root Cause / Responsibility
TCP	V B/D	Block defect (Entire TCP defect)		Block defect : TCP crack or chip broken - Can find damaged mark
	V Dim	Dim line		Dim or L/D : TCP dent(External stress) : TCP lead crack : Conductive particle inside ACF bonding area : Conductive particle induced from outside of LCD or due to improper condition : Mis-align between TCP & panel : Panel defect : TCP malfunction - Can find damaged mark - Can find damaged mark - Easy to find out responsibility with ingredient analysis for conductive particle
	V L/D	Vertical line defect (Always bright or dark)		 (A) Chip broken (B) TCP crack (D) Conductive particle inside ACF bonding area (E) Mis-align btwn TCP & panel (C) TCP dent
	H B/D	Block type defect (Entire TCP defect)		
	H Dim	Dim line		
	H L/D	Vertical line defect (Always bright or dark)		
				• Customer responsibility(Regardless of the No. of defective line) : In case of damaged marks such as TCP dent or chip broken : TCP crack due to interference with customer system : Mutually agreed defect as customer's responsibility • Supplier responsibility(Regardless of the No. of defective line) : The others

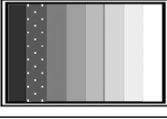
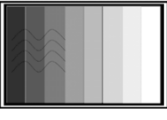
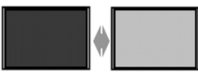
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Figure 9-7 LCD failure modes (1)

Defect Part	Failure Mode	Description	Phenomenon	Root Cause / Responsibility
Panel or Polarizer	Dot Defect	Panel has bright or dark dot. Sometimes adjacent 2 dot		Malfunction of TFT inside panel. - Follow IIS(Incoming Inspection Standard)
	Polarizer Bubble	Polarizer has bubbles		Bubble between upper glass and polarizer. - Follow IIS(Incoming Inspection Standard)
	Polarizer Scratch	Polarizer has scratch		Hard or sharp tool made this defect. - Follow IIS(Incoming Inspection Standard)
	F/M inside Polarizer	Foreign material inside polarizer. It shows linear or dot shape.		Foreign material inside polarizer. - Follow IIS(Incoming Inspection Standard)
	Yellowish /Purplish	Some area is different on white screen		1. Panel gap between upper and down layer glass is not uniform 2. Liquid crystal deteriorated 3. Limit sample
	Mura/Mottling	Small area/ spot of un-uniformity /		1. Panel gap between upper and down layer glass is not uniform 2. Limit sample

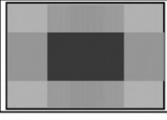
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Figure 9-8 LCD failure modes (2)

Defect Part	Failure Mode	Description	Phenomenon	Root Cause / Responsibility
Panel or Polarizer	New Ring	Ringed brightness uneven		Cell gap is not uniformity
	Chromaticity shift	Color coordinates is deviation		Transmittivity of panel declined (cell gap declined)
Circuit	Noise on grayscale	Noise on grayscale bar		Frame convertor IC(GMZ1) abnormal output(monitor system problem)
	Picture waving	Foreign material inside polarizer. It shows linear or dot shape.		Drive IC output is not stable (interference)
	Abnormal Display	Any kind of abnormal display except vertical or horizontal block defect.		1. Malfunction of any chipsets inside LCM - Customer responsibility 2. mechanical or electrical stress from customer system after analysis. - customer responsibility 3. Cold/short soldering of any components - Supplier responsibility 4. Poor connection between LCD and customer system. - Customer responsibility
	Flashing	Bright and dark display by turns.		

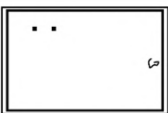
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Figure 9-9 LCD failure modes (3)

Defect Part	Failure Mode	Description	Phenomenon	Root Cause / Responsibility
Circuit	White Screen	LCD displays only white screen when B/L is normal condition. It corresponds to normally white mode.		1. LCD Fuse would be open because of surge current need to check compatibility 2. LCM cable no connecting (normal white)
	Black Screen	LCD displays only black screen when B/L is normal condition. It corresponds to normally black mode.		1. LCD Fuse would be open because of surge current need to check compatibility 2. LCM cable no connecting (normal Black, IPS)
	Flicker	LCD flickers at special pattern.		1. Vcom voltage in LCD is not balanced well - supplier responsibility but it can re-adjustable.
	Crosstalk	Brightness is different due to crosstalk at the pattern for crosstalk check.		1. An un-desired, parasite capacitance inside LCD panel can make vertical or horizontal crosstalk. All LCDs have weak crosstalk inevitably. But most of weak crosstalks are difficult to distinguish, especially with naked eye. 2. Follow IIS spec.
	Abnormal Color	LCD operate normally except different color.		1. Malfunction of any chipsets inside LCM-- Supplier responsibility 2. Mechanical or electrical stress from customer system after analysis-- Customer responsibility 3. Cold/short soldering of any components-- supplier responsibility 4. Poor connection between LCD and customer system -- customer responsibility
	Saturation	Higher grayscale bars is mixed (on 32 grayscale pattern)		1. Drive IC DC level is not correct 2. Monitor system improper adjustment on sub_contrast/sub_bright

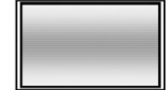
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Figure 9-10 LCD failure modes (4)

Defect Part	Failure Mode	Description	Phenomenon	Root Cause / Responsibility
Mechanical or B/L	Mechanical Noise	Mechanical noise heard when twisted.		Mechanical interference in back light unit. - Needs limit sample
	Ripple	Concentric circle formed		Mechanical interference between panel and any mechanical structure including back light unit, customer's connector or front bezel effects cell gap of the LCD. As a result, Concentric circle observed. - Mechanical Interference : need to co-work
	B/L off	B/L is not working without any damaged in appearance		1. Cold soldering between wire and lamp electrode supplier responsibility 2. Lamp broken -- Customer responsibility
	B/L dark	B/L is darker than normality		1. Cold soldering between wire and lamp electrode. 2. Intermittent short between wire and lamp housing. Supplier responsibility
	B/L wire damaged	B/L wire damaged		Mis handling or any interference with customer system - Customer responsibility
	B/L wire open	No B/L		Mis handling or any interference with customer system - Customer responsibility
	B/L shutdown	B/L shutdown after a period of time		Intermittent short between wire and lamp housing happened because the power consumption is over than capacity of B/L inverter. - LG.PHILIPS LCD responsibility
	F/M	B/L has foreign material. Black or white color, linear or circular type		Foreign material inside B/L unit - Depend on IIS(Incoming Inspection Standard)

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Figure 9-11 LCD failure modes (5)

Defect Part	Failure Mode	Description	Phenomenon	Root Cause / Responsibility
Mechanical or B/L	Light leakage	Bottom part(B/L) of LCM is brighter than normal		Light from the B/L lamp directly shown through the irregular gap of B/L unit. - need to discuss or Needs limit sample
	Uniformity	B/L un-uniformity		Light is scattered by wrinkled sheet inside B/L unit. depend on product specification or Needs limit sample
	Mount hole	No mount hole or mount damaged		• No mount hole -- Supplier responsibility • Mount damaged -- Customer responsibility
	Low brightness	Brightness out of spec		Backlight declined due to diffuser isn't normal
	Panel crack	Panel glass is broken		1. Improper handle the panel 2. Poor packing on panel
Etc.	Label	No label or incorrect label or barcode can't read		Poor workmanship Supplier responsibility
	Can not screw	Impossible to screw		No spiral in nut or smaller diameter -- Supplier responsibility
	Etc.	Others		Any other defect that hard to classify into any defect item from above, should be classified into etc with detail description.

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Figure 9-12 LCD failure modes (6)

9.12 Abbreviation list

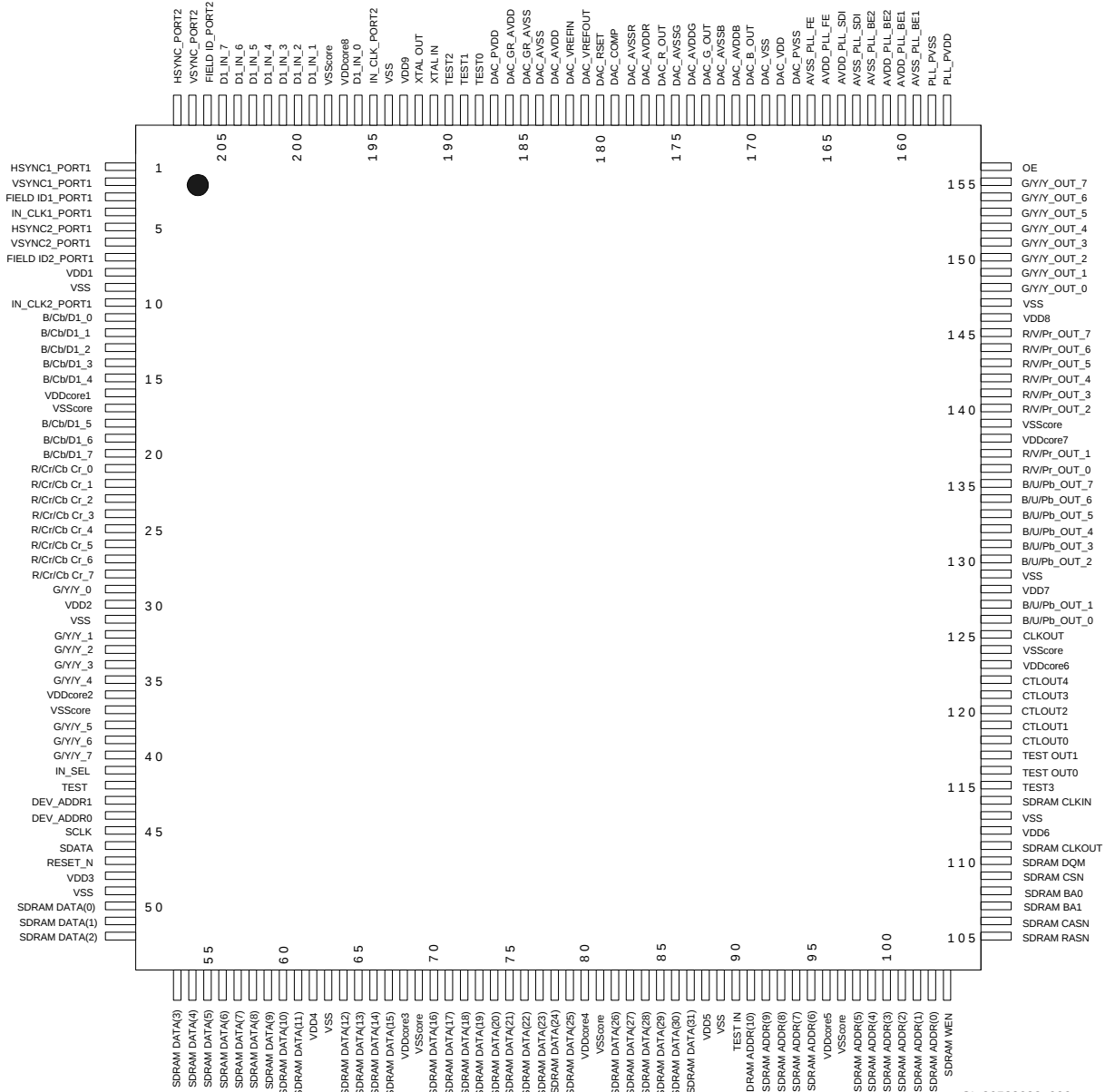
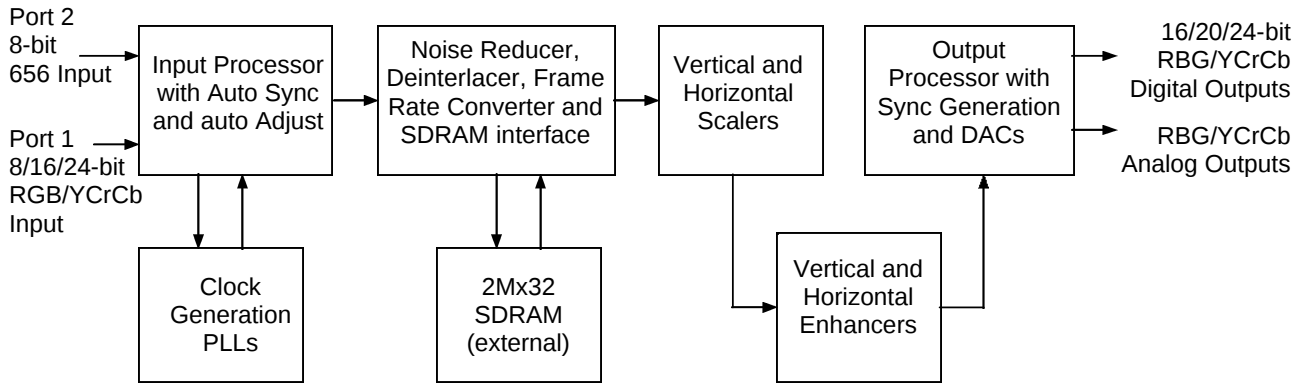
0/6/12	SCART switch control signal on A/V board. 0 = loop through (AUX to TV), 6 = play 16:9 format, 12 = play 4:3 format	FLASH	FLASH memory
1080i	1080 visible lines, interlaced	FM	Field Memory / Frequency Modulation
1080p	1080 visible lines, progressive scan	FMR	FM Radio
2CS	2 Carrier Stereo	FRC	Frame Rate Converter
480i	480 visible lines, interlaced	FRONT-C	Front input chrominance (SVHS)
480p	480 visible lines, progressive scan	FRONT-DETECT	Front input detection
ACI	Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predefined TXT page	FRONT-Y_CVBS	Front input luminance or CVBS (SVHS)
ADC	Analogue to Digital Converter	G-SC1-IN	Green SCART1 in
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency	G-SC2-IN	Green SCART2 in
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box	G-TXT	Green teletext
AM	Amplitude Modulation	H	H_sync to the module
AP	Asia Pacific	HA	Horizontal Acquisition: horizontal sync pulse coming out of the BOCMA
AR	Aspect Ratio: 4 by 3 or 16 by 9	HD	High Definition
Artistic	See Painter 2.5: main processor	HP	HeadPhone
ASD	Automatic Standard Detection	I	Monochrome TV system. Sound carrier distance is 6.0 MHz
AV	Audio Video	I2C	Integrated IC bus
B-SC1-IN	Blue SCART1 in	I2S	Integrated IC Sound bus
B-SC2-IN	Blue SCART2 in	IC	Integrated Circuit
B-TXT	Blue teletext	IF	Intermediate Frequency
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz	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.
BOCMA	Bimos one Chip Mid-end Architecture: video and chroma decoder	IR	Infra Red
C-FRONT	Chrominance front input	IRQ	Interrupt ReQuest
CBA	Circuit Board Assembly (or PWB)	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 to the customers wishes
CL	Constant Level: audio output to connect with an external amplifier	LATAM	LATin America
CLUT	Colour Look Up Table	LC03	Philips chassis name for LCD TV 2003 project
ComPair	Computer aided rePair	LCD	Liquid Crystal Display
CSM	Customer Service Mode	LED	Light Emitting Diode
CVBS	Composite Video Blanking and Synchronisation	LINE-DRIVE	Line drive signal
CVBS-EXT	CVBS signal from external source (VCR, VCD, etc.)	L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
CVBS-INT	CVBS signal from Tuner	LS	LoudSpeaker
CVBS-MON	CVBS monitor signal	LVDS	Low Voltage Differential Signalling, data transmission system for high speed and low EMI communication.
CVBS-TER-OUT	CVBS terrestrial out	M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
DAC	Digital to Analogue Converter	MOSFET	Metal Oxide Semiconductor Field Effect Transistor
DBE	Dynamic Bass Enhancement: extra low frequency amplification	MPEG	Motion Pictures Experts Group
DFU	Directions For Use: owner's manual	MSP	Multi-standard Sound Processor: ITT sound decoder
DNR	Dynamic Noise Reduction	MUTE	MUTE Line
DRAM	Dynamic RAM	NC	Not Connected
DSP	Digital Signal Processing	NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, used mainly in Europe.
DST	Dealer Service Tool: special (European) remote control designed for service technicians	NTSC	National Television Standard Committee. Colour system used mainly in North America and Japan. Colour carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)
DTS	Digital Theatre Sound	NVM	Non Volatile Memory: IC containing TV related data (for example, options)
DVD	Digital Video Disc	O/C	Open Circuit
EEPROM	Electrically Erasable and Programmable Read Only Memory	ON/OFF LED	On/Off control signal for the LED
EPG	Electronic Program Guide: system used by broadcasters to transmit TV guide information (= NexTVView)	OSD	On Screen Display
EU	EUrope	P50	Project 50 communication: protocol between TV and peripherals
EXT	EXternal (source), entering the set by SCART or by cinches (jacks)	PAL	Phase Alternating Line. Colour system used mainly in Western Europe
FBL	Fast Blanking: DC signal accompanying RGB signals		
FBL-SC1-IN	Fast blanking signal for SCART1 in		
FBL-SC2-IN	Fast blanking signal for SCART2 in		
FBL-TXT	Fast Blanking Teletext		

	(colour carrier = 4.433619 MHz) and South America (colour carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz)	VGA	Video Graphics Array
PC	Personal Computer	WD	Watch Dog
PCB	Printed Circuit Board (or PWB)	WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
PIG	Picture In Graphic	XTAL	Quartz crystal
PIP	Picture In Picture	YPbPr	Component video (Y= Luminance, Pb/Pr= Colour difference signals)
PLL	Phase Locked Loop. Used, for example, in FST tuning systems. The customer can directly provide the desired frequency	Y/C	Luminance (Y) and Chrominance (C) signal
Progressive Scan	Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.	Y-OUT	Luminance-signal
PWB	Printed Wiring Board (or PCB)	YUV	Component video
RAM	Random Access Memory		
RC	Remote Control transmitter		
RC5	Remote Control system 5, the signal from the remote control receiver		
RGB	Red, Green, and Blue. The primary colour signals for TV. By mixing levels of R, G, and B, all colours (Y/C) are reproduced.		
RGBHV	Red, Green, Blue, Horizontal sync, and Vertical sync		
ROM	Read Only Memory		
SAM	Service Alignment Mode		
SIF	Sound Intermediate Frequency		
SC	SandCastle: two-level pulse derived from sync signals		
SC1-OUT	SCART output of the MSP audio IC		
SC2-B-IN	SCART2 Blue in		
SC2-C-IN	SCART2 chrominance in		
SC2-OUT	SCART output of the MSP audio IC		
S/C	Short Circuit		
SCART	Syndicat des Constructeurs d'Appareils Radiorecepteurs et Televisieurs		
SCL	CLock Signal on I2C bus		
SD	Standard Definition		
SDA	DAta Signal on I2C bus		
SDRAM	Synchronous DRAM		
SECAM	SEequence Couleur Avec Memoire. Colour system used mainly in France and Eastern Europe. Colour carriers = 4.406250 MHz and 4.250000 MHz		
SIF	Sound Intermediate Frequency		
SMPS	Switch Mode Power Supply		
SND	SouND		
SNDL-SC1-IN	Sound left SCART1 in		
SNDL-SC1-OUT	Sound left SCART1 out		
SNDL-SC2-IN	Sound left SCART2 in		
SNDL-SC2-OUT	Sound left SCART2 out		
SNDR-SC1-IN	Sound right SCART1 in		
SNDR-SC1-OUT	Sound right SCART1 out		
SNDR-SC2-IN	Sound right SCART2 in		
SNDR-SC2-OUT	Sound right SCART2 out		
SNDS-VL-OUT	Surround sound left variable level out		
SNDS-VR-OUT	Surround sound right variable level out		
SOPS	Self Oscillating Power Supply		
S/PDIF	Sony Philips Digital InterFace		
SRAM	Static RAM		
STBY	STandBY		
SVHS	Super Video Home System		
SW	SubWoofers / SoftWare		
THD	Total Harmonic Distortion		
TXT	TeleteXT		
uP	Microprocessor		
VA	Vertical Acquisition		
UVSH	UHF/VHF/S-Chanel Hyperband		
VL	Variable Level out: processed audio output toward external amplifier		
VCR	Video Cassette Recorder		

9.13 IC Data Sheets

This section shows the internal block diagrams and pin layouts of ICs that are drawn as "black boxes" in the electrical diagrams (with the exception of "memory" and "logic" ICs).

9.13.1 Diagram C9, Type Fli2300 (IC7351)



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Figure 9-13 Internal Block Diagram and Pin Configuration

10. Spare Parts List

TV Board [A]

Various

1010	4822 265 11154	Connector 22p
1111	4822 267 10735	Connector 3p m
1231	2422 025 11244	Connector 7p m
1234	4822 267 10565	Connector 4p
1260	2422 025 16725	Connector SCART f m Bk
1267	2422 026 04926	Socket SVHS 4p f
1269	2422 026 05499	Socket CINCH 3p f
		RdWhYe
1330	4822 242 10685	Xtal 12MHz
1452	2422 549 44372	SAW 38.9MHz K3953L
1454	2422 549 44369	SAW 38.9MHz K9656L
1620	2422 543 01059	Xtal 18.432MHz
1731	2422 026 05449	Connector phono 1p f
1732	4822 267 10565	Connector 4p
1734	2422 025 16382	Connector 3p m
1902	4822 267 10565	Connector 4p
8010	3139 131 03011	Cable 22p 80mm
8902	3139 131 03081	Cable 4p 140mm

—||—

2010	3198 016 38210	820pF 25V
2014	3198 017 41050	1μF 10V 0603
2015	3198 017 41050	1μF 10V 0603
2016	2238 586 59812	100nF 20-80% 50V 0603
2017	2238 586 59812	100nF 20-80% 50V 0603
2043	2020 021 91729	4.7μF 20% 35V
2044	2238 586 59812	100nF 20-80% 50V 0603
2045	4822 126 14507	18pF 5% 50V 0603
2046	4822 126 14507	18pF 5% 50V 0603
2049	4822 126 13879	220nF 20% 16V
2050	2020 552 94427	100pF 5% 50v 0603
2051	2238 586 59812	100nF 20-80% 50V 0603
2053	4822 124 23002	10μF 20% 16V
2055	5322 126 11578	1nF 10% 50V 0603
2057	2020 021 91729	4.7μF 20% 35V
2101	4822 122 33761	22pF 5% 50V
2102	4822 122 33761	22pF 5% 50V
2103	4822 124 12082	10μF 20% 50V
2104	3198 017 34730	47nF 16V 0603
2106	4822 124 80195	470μF 20% 10V
2107	2238 586 59812	100nF 20-80% 50V 0603
2108	4822 124 81044	470μF 20% 6.3V
2120	4822 126 13193	4.7nF 10% 63V
2121	4822 126 13193	4.7nF 10% 63V
2122	2020 552 94427	100pF 5% 50v 0603
2123	4822 126 14549	33nF 16V 0603
2124	4822 126 14549	33nF 16V 0603
2125	4822 126 13883	220pF 5% 50V
2126	4822 126 13193	4.7nF 10% 63V
2130	3198 016 31020	1nF 10% 25V 0603
2131	3198 016 31020	1nF 10% 25V 0603
2132	2238 586 59812	100nF 20-80% 50V 0603
2133	3198 016 31020	1nF 10% 25V 0603
2201	4822 126 14241	330pF 50V 0603
2203	4822 126 14241	330pF 50V 0603
2206	4822 126 14241	330pF 50V 0603
2208	4822 126 14241	330pF 50V 0603
2214	4822 126 14241	330pF 50V 0603
2224	4822 124 40433	47μF 20% 25V
2227	4822 126 14241	330pF 50V 0603
2233	4822 126 14241	330pF 50V 0603
2238	4822 126 14241	330pF 50V 0603
2242	4822 126 14241	330pF 50V 0603
2244	4822 126 14241	330pF 50V 0603
2249	4822 126 14241	330pF 50V 0603
2251	4822 126 14241	330pF 50V 0603
2253	4822 126 14241	330pF 50V 0603
2301	2238 586 59812	100nF 20-80% 50V 0603
2302	2238 916 15641	22nF 10% 25V 0603
2303	2238 586 59812	100nF 20-80% 50V 0603
2304	4822 124 23002	10μF 20% 16V
2308	2020 021 91729	4.7μF 20% 35V
2309	4822 126 13879	220nF 20% 16V
2311	4822 126 13879	220nF 20% 16V
2313	2238 586 59812	100nF 20-80% 50V 0603
2314	3198 017 41050	1μF 10V 0603
2315	3198 017 41050	1μF 10V 0603
2316	3198 017 41050	1μF 10V 0603
2317	4822 124 12084	1μF 20% 50V
2318	4822 126 13193	4.7nF 10% 63V
2319	2238 586 59812	100nF 20-80% 50V 0603
2320	4822 126 14238	2.2nF 50V 0603
2321	2238 586 59812	100nF 20-80% 50V 0603
2322	2238 586 59812	100nF 20-80% 50V 0603

2324	3198 016 31020	1nF 10% 25V 0603
2325	4822 124 23002	10μF 20% 16V
2326	4822 126 14508	180pF 5% 50V
2327	5322 122 33861	120pF 10% 50V
2330	4822 122 33752	15pF 5% 50V
2331	4822 122 33752	15pF 5% 50V
2332	4822 122 33752	15pF 5% 50V
2335	3198 016 38210	820pF 25V
2336	2238 916 15641	22nF 10% 25V 0603
2337	2238 916 15641	22nF 10% 25V 0603
2338	2238 916 15641	22nF 10% 25V 0603
2339	2238 586 59812	100nF 20-80% 50V 0603
2340	4822 122 33741	10pF 10% 50V
2341	3198 017 44740	470nF 10V 0603
2342	3198 017 44740	470nF 10V 0603
2343	3198 017 44740	470nF 10V 0603
2344	2222 867 15339	33pF 5% 50V 0603
2345	2222 867 15339	33pF 5% 50V 0603
2346	5322 126 11583	10nF 10% 50V 0603
2347	5322 126 11583	10nF 10% 50V 0603
2348	3198 017 41050	1μF 10V 0603
2349	3198 017 41050	1μF 10V 0603
2350	3198 017 41050	1μF 10V 0603
2351	3198 017 41050	1μF 10V 0603
2361	4822 124 80151	47μF 20% 16V
2380	4822 126 13881	470pF 5% 50V
2381	3198 017 41050	1μF 10V 0603
2382	4822 126 13879	220nF 20% 16V
2390	2238 916 15641	22nF 10% 25V 0603
2391	4822 126 14241	330pF 50V 0603
2401	3198 017 41050	1μF 10V 0603
2402	3198 017 41050	1μF 10V 0603
2404	2238 916 15641	22nF 10% 25V 0603
2407	2238 586 59812	100nF 20-80% 50V 0603
2408	2238 586 59812	100nF 20-80% 50V 0603
2412	4822 126 13879	220nF 20% 16V
2415	4822 126 13879	220nF 20% 16V
2417	4822 124 23002	10μF 20% 16V
2418	3198 017 41050	1μF 10V 0603
2419	3198 017 41050	1μF 10V 0603
2424	4822 124 23002	10μF 20% 16V
2426	4822 124 23002	10μF 20% 16V
2428	3198 017 41050	1μF 10V 0603
2429	3198 017 34730	47nF 16V 0603
2432	3198 017 41050	1μF 10V 0603
2433	2020 552 94427	100pF 5% 50v 0603
2434	2020 552 94427	100pF 5% 50v 0603
2435	3198 017 34730	47nF 16V 0603
2448	2238 586 59812	100nF 20-80% 50V 0603
2452	5322 126 11583	10nF 10% 50V 0603
2453	5322 126 11583	10nF 10% 50V 0603
2601	2238 586 59812	100nF 20-80% 50V 0603
2602	2238 586 59812	100nF 20-80% 50V 0603
2603	2238 586 59812	100nF 20-80% 50V 0603
2604	2238 586 59812	100nF 20-80% 50V 0603
2605	2238 586 59812	100nF 20-80% 50V 0603
2610	4822 126 14226	82pF 5% 50V 0603
2611	4822 126 14226	82pF 5% 50V 0603
2612	4822 126 14241	330pF 50V 0603
2613	4822 126 13881	470pF 5% 50V
2620	4822 124 23002	10μF 20% 16V
2622	4822 126 11669	27pF 5% 50V 0603
2623	4822 126 14225	56pF 5% 50V 0603
2624	4822 122 33752	15pF 5% 50V
2625	4822 126 14508	180pF 5% 50V
2626	4822 126 11785	47pF 5% 50V 0603
2627	4822 126 13193	4.7nF 10% 63V
2628	4822 126 13193	4.7nF 10% 63V
2629	4822 126 13193	4.7nF 10% 63V
2630	4822 126 13193	4.7nF 10% 63V
2631	4822 126 13193	4.7nF 10% 63V
2632	4822 126 13193	4.7nF 10% 63V
2633	3198 017 41050	1μF 10V 0603
2634	3198 017 41050	1μF 10V 0603
2635	3198 017 41050	1μF 10V 0603
2636	3198 017 41050	1μF 10V 0603
2637	3198 017 41050	1μF 10V 0603
2638	3198 017 41050	1μF 10V 0603
2639	4822 126 13883	220pF 5% 50V
2640	3198 017 41050	1μF 10V 0603
2645	3198 016 31020	1nF 10% 25V 0603
2646	3198 016 31020	1nF 10% 25V 0603
2647	4822 126 11663	12pF 5% 50V 0603
2648	3198 017 41050	1μF 10V 0603
2649	3198 017 41050	1μF 10V 0603
2650	4822 124 23002	10μF 20% 16V
2651	2238 586 59812	100nF 20-80% 50V 0603
2652	2238 586 59812	100nF 20-80% 50V 0603
2653	5322 124 41945	22μF 20% 35V
2654	4822 126 13879	220nF 20% 16V

2655	4822 124 23002	10μF 20% 16V
2656	3198 016 31020	1nF 10% 25V 0603
2657	2238 586 59812	100nF 20-80% 50V 0603
2658	4822 124 23002	10μF 20% 16V
2661	3198 016 31020	1nF 10% 25V 0603
2662	3198 016 31020	1nF 10% 25V 0603
2668	3198 016 31020	1nF 10% 25V 0603
2669	3198 016 31020	1nF 10% 25V 0603
2670	3198 017 41050	1μF 10V 0603
2671	3198 017 41050	1μF 10V 0603
2674	3198 017 41050	1μF 10V 0603
2675	3198 017 41050	1μF 10V 0603
2676	4822 124 23002	10μF 20% 16V
2677	4822 126 13193	4.7nF 10% 63V
2678	4822 126 13193	4.7nF 10% 63V
2679	2238 586 59812	100nF 20-80% 50V 0603
2680	4822 126 13881	470pF 5% 50V
2681	2238 586 59812	100nF 20-80% 50V 0603
2682	3198 016 33380	3.3pF 50V 0603
2683	3198 016 33380	3.3pF 50V 0603
2684	3198 016 31020	1nF 10% 25V 0603
2688	4822 126 14491	2.2μF -20+80% 10V 0805
2689	3198 017 41050	1μF 10V 0603
2690	3198 017 41050	1μF 10V 0603
2731	4822 126 14549	33nF 16V 0603
2732	4822 124 40248	10μF 20% 63V
2733	4822 126 13879	220nF 20% 16V
2734	4822 124 12056	1000μF 20% 35V
2734	4822 124 81144	1000μF 16V
2735	3198 016 31020	1nF 10% 25V 0603
2736	3198 017 41050	1μF 10V 0603
2737	4822 126 13193	4.7nF 10% 63V
2738	5322 126 11579	3.3nF 10% 63V
2740	2020 012 93762	330μF 20% 50V
2739	2020 012 93762	330μF 20% 50V
2740	3198 016 31020	1nF 10% 25V 0603
2741	3198 017 41050	1μF 10V 0603
2742	4822 126 13193	4.7nF 10% 63V
2742	5322 126 11579	3.3nF 10% 63V
2745	4822 124 40207	100μF 20% 25V
2746	4822 124 21913	1μF 20% 63V
2750	4822 124 40248	10μF 20% 63V
2751	4822 126 13881	470pF 5% 50V
2752	4822 124 40248	10μF 20% 63V
2753	4822 126 13881	470pF 5% 50V
2799	4822 124 40255	100μF 20% 63V
2900	2238 586 59812	100nF 20-80% 50V 0603
2903	5322 126 11583	10nF 10% 50V 0603
2910	4822 123 14026	470μF 20% 35V
2910	4822 124 11767	470μF 20% 25V
2911	4822 126 13881	470pF 5% 50V
2911	4822 126 14506	270pF 5% 50V 0603
2913	4822 124 80791	470μF 20% 16V
2914	4822 126 13193	4.7nF 10% 63V
2920	4822 123 14026	470μF 20% 35V
2920	4822 124 11767	470μF 20% 25V
2921	4822 126 13881	470pF 5% 50V
2923	4822 124 40184	1000μF 20% 10V
2924	4822 126 13193	4.7nF 10% 63V
2931	4822 126 13881	470pF 5% 50V
2933	4822 124 80195	470μF 20% 10V
2934	4822 126 13193	4.7nF 10% 63V
2998	4822 124 81144	1000μF 16V
2999	4822 124 81144	1000μF 16V

3023	4822 117 12902	8.2kΩ 1% 0.063W 0603	3253	4822 117 12891	220kΩ 1% 0.063W 0603	3620	4822 051 30101	100Ω 5% 0.062W
3023	5322 117 13056	8.2kΩ 1% 0.063W 0603	3254	4822 051 30151	150Ω 5% 0.062W	3621	4822 051 30101	100Ω 5% 0.062W
3024	4822 051 30102	1kΩ 5% 0.062W	3303	4822 051 30391	390Ω 5% 0.062W	3622	4822 051 30222	2.2kΩ 5% 0.062W
3030	4822 051 30102	1kΩ 5% 0.062W	3304	4822 051 30101	100Ω 5% 0.062W	3633	4822 051 30102	1kΩ 5% 0.062W
3031	4822 051 30471	470Ω 5% 0.062W	3307	4822 051 30101	100Ω 5% 0.062W	3634	4822 051 30102	1kΩ 5% 0.062W
3033	4822 051 30103	10kΩ 5% 0.062W	3308	4822 051 30101	100Ω 5% 0.062W	3635	4822 051 30102	1kΩ 5% 0.062W
3034	4822 051 30101	100Ω 5% 0.062W	3309	4822 051 30109	10Ω 5% 0.062W	3636	4822 051 30102	1kΩ 5% 0.062W
3035	4822 051 30471	470Ω 5% 0.062W	3310	4822 051 30101	100Ω 5% 0.062W	3637	4822 051 30102	1kΩ 5% 0.062W
3037	4822 051 30101	100Ω 5% 0.062W	3311	4822 051 30102	1kΩ 5% 0.062W	3638	4822 051 30102	1kΩ 5% 0.062W
3042	4822 051 30151	150Ω 5% 0.062W	3313	4822 051 30109	10Ω 5% 0.062W	3640	4822 051 30102	1kΩ 5% 0.062W
3043	4822 051 30151	150Ω 5% 0.062W	3314	4822 051 30102	1kΩ 5% 0.062W	3645	4822 051 30102	1kΩ 5% 0.062W
3044	4822 051 30103	10kΩ 5% 0.062W	3315	4822 051 30471	470Ω 5% 0.062W	3646	4822 051 30102	1kΩ 5% 0.062W
3045	4822 051 30123	12kΩ 5% 0.062W	3316	4822 051 30471	470Ω 5% 0.062W	3650	4822 051 30223	22kΩ 5% 0.062W
3046	4822 051 30472	4.7kΩ 5% 0.062W	3316	4822 051 30681	680Ω 5% 0.062W	3651	4822 051 30101	100Ω 5% 0.062W
3047	4822 051 30222	2.2kΩ 5% 0.062W	3317	4822 051 30153	15kΩ 5% 0.062W	3652	4822 051 30101	100Ω 5% 0.062W
3048	4822 051 30222	2.2kΩ 5% 0.062W	3318	4822 051 30273	27kΩ 5% 0.062W	3655	4822 051 30101	100Ω 5% 0.062W
3050	4822 051 30101	100Ω 5% 0.062W	3319	4822 051 30103	10kΩ 5% 0.062W	3656	4822 051 30101	100Ω 5% 0.062W
3051	4822 117 13525	24kΩ 1% 0.62W 0603	3321	4822 051 30332	3.3kΩ 5% 0.062W	3732	4822 117 12891	220kΩ 1% 0.063W 0603
3053	4822 051 30222	2.2kΩ 5% 0.062W	3322	4822 051 30332	3.3kΩ 5% 0.062W	3735	4822 051 30183	18kΩ 5% 0.062W
3054	4822 051 30103	10kΩ 5% 0.062W	3324	4822 051 30393	39kΩ 5% 0.062W	3735	4822 051 30273	27kΩ 5% 0.062W
3056	4822 117 12925	47kΩ 1% 0.063W 0603	3326	4822 051 30479	47Ω 5% 0.062W	3736	4822 051 30392	3.9kΩ 5% 0.063W 0603
3058	4822 051 30471	470Ω 5% 0.062W	3327	4822 051 30102	1kΩ 5% 0.062W	3736	4822 051 30682	6.8kΩ 5% 0.062W
3059	4822 051 30151	150Ω 5% 0.062W	3328	4822 051 30152	1.5kΩ 5% 0.062W	3739	4822 051 30102	1kΩ 5% 0.062W
3060	4822 051 30222	2.2kΩ 5% 0.062W	3329	4822 117 12889	270kΩ 1% 0.063W 0603	3740	4822 051 30183	18kΩ 5% 0.062W
3061	4822 051 30471	470Ω 5% 0.062W	3330	4822 051 30102	1kΩ 5% 0.062W	3740	4822 051 30273	27kΩ 5% 0.062W
3062	4822 117 12925	47kΩ 1% 0.063W 0603	3331	4822 051 30101	100Ω 5% 0.062W	3741	4822 051 30392	3.9kΩ 5% 0.063W 0603
3063	4822 051 30222	2.2kΩ 5% 0.062W	3332	4822 051 30101	100Ω 5% 0.062W	3741	4822 051 30682	6.8kΩ 5% 0.062W
3064	4822 051 30472	4.7kΩ 5% 0.062W	3333	4822 051 30151	150Ω 5% 0.062W	3743	4822 051 30102	1kΩ 5% 0.062W
3065	4822 051 30472	4.7kΩ 5% 0.062W	3334	4822 051 30151	150Ω 5% 0.062W	3744	4822 051 30472	4.7kΩ 5% 0.062W
3066	4822 117 12902	8.2kΩ 1% 0.063W 0603	3335	4822 051 30151	150Ω 5% 0.062W	3745	4822 051 30332	3.3kΩ 5% 0.062W
3066	5322 117 13056	8.2kΩ 1% 0.063W 0603	3339	4822 051 30101	100Ω 5% 0.062W	3745	4822 051 30472	4.7kΩ 5% 0.062W
3068	4822 117 12925	47kΩ 1% 0.063W 0603	3340	4822 051 30101	100Ω 5% 0.062W	3746	4822 051 30102	1kΩ 5% 0.062W
3069	4822 051 30153	15kΩ 5% 0.062W	3341	4822 051 30101	100Ω 5% 0.062W	3746	4822 051 30562	5.6kΩ 5% 0.063W 0603
3070	4822 051 30273	27kΩ 5% 0.062W	3342	4822 051 30101	100Ω 5% 0.062W	3747	4822 051 30472	4.7kΩ 5% 0.062W
3071	4822 117 13632	100kΩ 1% 0.62W 0603	3345	4822 051 30101	100Ω 5% 0.062W	3748	5322 117 13056	8.2kΩ 1% 0.063W 0603
3072	4822 117 13632	100kΩ 1% 0.62W 0603	3346	4822 051 30102	1kΩ 5% 0.062W	3750	4822 051 30471	470Ω 5% 0.062W
3081	4822 051 30472	4.7kΩ 5% 0.062W	3347	4822 051 30102	1kΩ 5% 0.062W	3752	4822 051 30471	470Ω 5% 0.062W
3082	4822 051 30103	10kΩ 5% 0.062W	3348	4822 051 30109	10Ω 5% 0.062W	3799	4822 117 12891	220kΩ 1% 0.063W 0603
3083	4822 051 30471	470Ω 5% 0.062W	3349	4822 051 30101	100Ω 5% 0.062W	3900	4822 051 30102	1kΩ 5% 0.062W
3084	4822 051 30101	100Ω 5% 0.062W	3350	4822 051 30109	10Ω 5% 0.062W	3901	4822 051 30102	1kΩ 5% 0.062W
3085	4822 051 30101	100Ω 5% 0.062W	3351	4822 051 30271	270Ω 5% 0.062W	3903	4822 051 30153	15kΩ 5% 0.062W
3086	4822 051 30101	100Ω 5% 0.062W	3352	4822 051 30151	150Ω 5% 0.062W	3904	4822 117 12891	220kΩ 1% 0.063W 0603
3088	4822 051 30101	100Ω 5% 0.062W	3353	4822 051 30103	10kΩ 5% 0.062W	3905	4822 117 12891	220kΩ 1% 0.063W 0603
3092	4822 051 30101	100Ω 5% 0.062W	3354	4822 051 30271	270Ω 5% 0.062W	3906	4822 051 30223	22kΩ 5% 0.062W
3100	4822 051 30008	Jumper 0603	3355	4822 051 30151	150Ω 5% 0.062W	3911	4822 117 12917	1Ω 5% 0.062W 0603
3101	4822 051 30008	Jumper 0603	3357	4822 051 30271	270Ω 5% 0.062W	3912	4822 117 12917	1Ω 5% 0.062W 0603
3102	4822 051 30103	10kΩ 5% 0.062W	3358	4822 051 30151	150Ω 5% 0.062W	3913	2322 704 61002	1kΩ 1% 0603
3103	4822 051 30152	1.5kΩ 5% 0.062W	3360	4822 051 30008	Jumper 0603	3913	5322 117 13018	1kΩ 1% 0.063W 0603
3120	4822 051 30479	47Ω 5% 0.062W	3380	4822 051 30223	22kΩ 5% 0.062W	3914	5322 117 13031	5.6kΩ 1% 0603
3121	4822 051 30273	27kΩ 5% 0.062W	3381	4822 051 30562	5.6kΩ 5% 0.063W 0603	3915	4822 117 12917	1Ω 5% 0.062W 0603
3122	4822 051 30333	33kΩ 5% 0.062W	3382	4822 051 30103	10kΩ 5% 0.062W	3921	4822 117 12917	1Ω 5% 0.062W 0603
3122	4822 117 13632	100kΩ 1% 0.62W 0603	3383	4822 051 30472	4.7kΩ 5% 0.062W	3923	2322 704 61002	1kΩ 1% 0603
3130	4822 117 11817	1.2kΩ 1% 0.062W	3384	4822 051 30472	4.7kΩ 5% 0.062W	3923	5322 117 13018	1kΩ 1% 0.063W 0603
3131	4822 051 30271	270Ω 5% 0.062W	3385	4822 051 30471	470Ω 5% 0.062W	3924	5322 117 13046	1.8kΩ 1% 0.063W 0603
3132	4822 117 13632	100kΩ 1% 0.62W 0603	3386	4822 051 30561	560Ω 5% 0.062W	3925	4822 052 11109	10Ω 5% 0.5W
3133	4822 117 12968	820Ω 5% 0.62W	3387	4822 051 30103	10kΩ 5% 0.062W	3930	4822 117 12917	1Ω 5% 0.062W 0603
3134	4822 117 13632	100kΩ 1% 0.62W 0603	3388	4822 051 30272	2.7kΩ 5% 0.062W	3930	4822 117 13613	2.2Ω 5% 0603
3135	4822 051 30561	560Ω 5% 0.062W	3389	4822 051 30183	18kΩ 5% 0.062W	3931	4822 117 12917	1Ω 5% 0.062W 0603
3201	4822 051 30151	150Ω 5% 0.062W	3390	4822 051 30472	4.7kΩ 5% 0.062W	3932	2322 704 61002	1kΩ 1% 0603
3202	4822 117 12891	220kΩ 1% 0.063W 0603	3391	4822 051 30103	10kΩ 5% 0.062W	3932	5322 117 13018	1kΩ 1% 0.063W 0603
3203	4822 051 30151	150Ω 5% 0.062W	3392	4822 051 30154	150kΩ 5% 0.062W	3933	5322 117 13048	3.3kΩ 1% 0.063W 0603
3204	4822 117 12925	47kΩ 1% 0.063W 0603	3393	4822 051 30472	4.7kΩ 5% 0.062W	4xxx	4822 051 30008	Jumper 0603
3206	4822 051 30151	150Ω 5% 0.062W	3394	4822 051 30273	27kΩ 5% 0.062W	4xxx	4822 051 20008	Jumper 0805
3207	4822 117 12891	220kΩ 1% 0.063W 0603	3395	4822 051 30271	270Ω 5% 0.062W			
3208	4822 051 30151	150Ω 5% 0.062W	3401	4822 051 30101	100Ω 5% 0.062W			
3209	4822 117 12925	47kΩ 1% 0.063W 0603	3402	4822 051 30101	100Ω 5% 0.062W			
3211	4822 051 30759	75Ω 5% 0.062W	3404	4822 051 30101	100Ω 5% 0.062W			
3212	4822 051 30101	100Ω 5% 0.062W	3411	4822 051 30152	1.5kΩ 5% 0.062W			
3213	4822 051 30223	22kΩ 5% 0.062W	3412	4822 051 30152	1.5kΩ 5% 0.062W			
3214	4822 051 30682	6.8kΩ 5% 0.062W	3413	4822 051 30102	1kΩ 5% 0.062W			
3216	4822 051 30759	75Ω 5% 0.062W	3414	4822 051 30152	1.5kΩ 5% 0.062W			
3217	4822 051 30101	100Ω 5% 0.062W	3415	4822 051 30152	1.5kΩ 5% 0.062W			
3218	4822 051 30759	75Ω 5% 0.062W	3416	4822 051 30102	1kΩ 5% 0.062W			
3219	4822 051 30101	100Ω 5% 0.062W	3417	4822 051 30109	10Ω 5% 0.062W			
3221	4822 051 30759	75Ω 5% 0.062W	3418	4822 051 30109	10Ω 5% 0.062W			
3222	4822 051 30101	100Ω 5% 0.062W	3426	4822 051 30102	1kΩ 5% 0.062W			
3223	4822 051 30689	68Ω 5% 0.063W 0603	3427	4822 051 30102	1kΩ 5% 0.062W			
3224	4822 051 30102	1kΩ 5% 0.062W	3428	4822 051 30102	1kΩ 5% 0.062W			
3225	5322 117 11726	10Ω 5%	3429	4822 051 30109	10Ω 5% 0.062W			
3226	4822 051 30759	75Ω 5% 0.062W	3430	4822 051 30101	100Ω 5% 0.062W			
3227	4822 051 30109	10Ω 5% 0.062W	3431	4822 051 30102	1kΩ 5% 0.062W			
3228	4822 051 30101	100Ω 5% 0.062W	3432	4822 051 30008	Jumper 0603			
3233	4822 051 30151	150Ω 5% 0.062W	3433	4822 051 30101	100Ω 5% 0.062W			
3234	4822 117 12925	47kΩ 1% 0.063W 0603	3434	4822 051 30101	100Ω 5% 0.062W			
3238	4822 051 30151	150Ω 5% 0.062W	3436	4822 051 30102	1kΩ 5% 0.062W			
3239	4822 117 12925	47kΩ 1% 0.063W 0603	3437	4822 051 30101	100Ω 5% 0.062W			
3241	4822 051 30223	22kΩ 5% 0.062W	3455	4822 051 30682	6.8kΩ 5% 0.062W			
3242	4822 051 30682	6.8kΩ 5% 0.062W	3456	4822 051 30222	2.2kΩ 5% 0.062W			
3243	4822 051 30759	75Ω 5% 0.062W	3457	4822 051 30273	27kΩ 5% 0.062W			
3244	4822 051 30101	100Ω 5% 0.062W	3458	4822 051 30183	18kΩ 5% 0.062W			



6031	9340 548 42115	PDZ2.4B
6101	9340 548 71115	PDZ233B
6102	4822 130 11397	BAS316
6120	5322 130 34337	BAV99
6207	4822 130 10852	BZX284-C6V8
6208	4822 130 10852	BZX284-C6V8
6211	9340 548 61115	PDZ12B
6218	9340 548 61115	PDZ12B
6238	9340 548 61115	PDZ12B
6239	9340 548 61115	PDZ12B
6243	9340 548 61115	PDZ12B
6244	9340 548 61115	PDZ12B
6253	9340 548 61115	PDZ12B
6254	9340 548 61115	PDZ12B
6281	9340 548 61115	PDZ12B
6282	9340 548 61115	PDZ12B
6283	9340 548 61115	PDZ12B
6284	9340 548 61115	PDZ12B
6285	9340 548 61115	PDZ12B
6286	9340 548 61115	PDZ12B
6287	9340 548 61115	PDZ12B
6288	9340 548 61115	PDZ12B
6289	9340 548 61115	PDZ12B
6290	9340 548 61115	PDZ12B
6291	9340 548 61115	PDZ12B
6292	9340 548 61115	PDZ12B
6327	4822 130 11397	BAS316
6380	4822 130 11397	BAS316
6390	4822 130 11397	BAS316
6412	4822 130 11397	BAS316
6415	4822 130 11397	BAS316
6451	4822 130 11525	1SS356
6650	4822 130 11397	BAS316
6731	9340 548 61115	PDZ12B
6732	9340 548 61115	PDZ12B
6910	9322 128 70685	SMSS14
6920	9322 128 70685	SMSS14
6925	9322 128 70685	SMSS14
6930	9322 128 70685	SMSS14



7053	9340 425 20115	BC847BS
7062	3198 010 42310	BC847BW
7063	3198 010 42310	BC847BW
7064	9965 000 23142	LC13EG1-1.05
7064	9965 000 23143	LC13EG2-1.05
7066	9322 156 81668	M24C32-WMN6TNKSA
7067	3198 010 42310	BC847BW
7068	3198 010 42310	BC847BW
7069	3198 010 42310	BC847BW
7120	3198 010 42310	BC847BW
7130	5322 130 42718	BFS20
7131	5322 130 42718	BFS20
7224	5322 130 60159	BC846B
7301	9352 626 19557	TDA8885
7302	3198 010 42310	BC847BW
7303	3198 010 42310	BC847BW
7330	3198 010 42310	BC847BW
7350	3198 010 42310	BC847BW
7353	3198 010 42310	BC847BW
7356	3198 010 42310	BC847BW
7380	3198 010 42310	BC847BW
7381	3198 010 42310	BC847BW
7382	3198 010 42310	BC847BW
7383	3198 010 42310	BC847BW
7384	3198 010 42310	BC847BW
7385	3198 010 42310	BC847BW
7390	3198 010 42310	BC847BW
7391	3198 010 42310	BC847BW
7401	9351 869 40118	74HC4052PW
7405	9352 630 99118	TDA9181T
7412	9340 425 20115	BC847BS
7427	3198 010 42310	BC847BW
7428	3198 010 42310	BC847BW
7452	3198 010 42310	BC847BW
7471	3198 010 42310	BC847BW
7601	9322 167 76668	TC74HC590AF
7602	9322 167 76668	TC74HC590AF
7603	4822 209 91023	UM62256EM-70LL
7604	5322 209 31276	SN74HCT573DW
7605	5322 209 31276	SN74HCT573DW
7610	3198 010 42310	BC847BW
7620	9322 195 11671	MSP3410G-QI-C12
7674	4822 130 63732	MMUN2212
7675	4822 130 63732	MMUN2212
7678	4822 130 63732	MMUN2212
7679	4822 130 63732	MMUN2212
7731	9322 148 81667	AN5277
7731	9322 181 41682	AN7522N
7732	9352 500 20118	74LVC08AD

7739	5322 130 60159	BC846B
7744	3198 010 42310	BC847BW
7745	3198 010 42310	BC847BW
7900	9322 157 51685	SI12301DS
7900	9322 190 77685	SI2307DS
7901	4822 130 11155	PDTC114ET
7903	5322 130 60159	BC846B
7904	5322 130 60159	BC846B
7910	4822 209 60059	MC34063AP1
7920	4822 209 60059	MC34063AP1
7930	4822 209 60059	MC34063AP1

Scaler Board [C]

Various

1001	8238 277 11021	Socket power 1p f
1002	8238 277 10841	Fuse 7A 125V
1003	4822 267 10565	Connector 4p
1301	2422 543 01255	Xtal 24.576MHz 30pF
1341	4822 265 11352	Connector 8p
1351	2422 543 01246	Xtal 13.5MHz 12pF
1501	2422 025 18059	Connector 41p m
1506	2422 025 18024	Connector 40p m
1681	4822 265 11154	Connector 22p
8341	3139 110 27991	Cable 8p 80mm
8341	3139 110 28001	Cable 8p 100mm



2001	2238 586 59812	100nF 20-80% 50V 0603
2002	2238 586 59812	100nF 20-80% 50V 0603
2005	2238 586 59812	100nF 20-80% 50V 0603
2006	4822 124 80151	47µF 20% 16V
2007	4822 124 11767	470µF 20% 25V
2008	4822 124 11767	470µF 20% 25V
2009	4822 123 14026	470µF 20% 35V
2009	4822 124 11767	470µF 20% 25V
2010	4822 123 14026	470µF 20% 35V
2015	4822 124 11767	470µF 20% 25V
2016	2238 586 59812	100nF 20-80% 50V 0603
2017	4822 124 80151	47µF 20% 16V
2020	4822 126 13193	4.7nF 10% 63V
2021	5322 126 11583	10nF 10% 50V 0603
2024	4822 123 14026	470µF 20% 35V
2025	4822 126 13881	470pF 5% 50V
2026	4822 124 11767	470µF 20% 25V
2027	4822 124 11767	470µF 20% 25V
2028	2238 586 59812	100nF 20-80% 50V 0603
2029	4822 124 11767	470µF 20% 25V
2301	4822 122 33753	150pF 5% 50V
2302	4822 122 33753	150pF 5% 50V
2303	4822 122 33753	150pF 5% 50V
2304	3198 017 34730	47nF 16V 0603
2305	3198 017 34730	47nF 16V 0603
2306	4822 122 33753	150pF 5% 50V
2307	4822 122 33753	150pF 5% 50V
2308	3198 017 34730	47nF 16V 0603
2309	4822 122 33753	150pF 5% 50V
2310	4822 122 33753	150pF 5% 50V
2311	4822 122 33753	150pF 5% 50V
2315	3198 017 34730	47nF 16V 0603
2316	3198 017 34730	47nF 16V 0603
2317	3198 017 34730	47nF 16V 0603
2318	3198 017 34730	47nF 16V 0603
2319	3198 017 34730	47nF 16V 0603
2321	2020 552 96507	10µF 10V
2323	2238 586 59812	100nF 20-80% 50V 0603
2324	2238 586 59812	100nF 20-80% 50V 0603
2325	2020 552 96507	10µF 10V
2326	2020 552 96507	10µF 10V
2327	2238 586 59812	100nF 20-80% 50V 0603
2328	2238 586 59812	100nF 20-80% 50V 0603
2329	2238 586 59812	100nF 20-80% 50V 0603
2331	2238 586 59812	100nF 20-80% 50V 0603
2332	2238 586 59812	100nF 20-80% 50V 0603
2333	2238 586 59812	100nF 20-80% 50V 0603
2334	4822 122 33752	15pF 5% 50V
2335	4822 122 33752	15pF 5% 50V
2336	4822 126 14221	68PF 5% NPO 50V 0603
2338	2238 586 59812	100nF 20-80% 50V 0603
2339	2238 586 59812	100nF 20-80% 50V 0603
2341	2020 552 96507	10µF 10V
2342	2238 586 59812	100nF 20-80% 50V 0603
2343	2238 586 59812	100nF 20-80% 50V 0603
2344	4822 124 80151	47µF 20% 16V
2345	2238 586 59812	100nF 20-80% 50V 0603
2346	2238 586 59812	100nF 20-80% 50V 0603
2347	2238 586 59812	100nF 20-80% 50V 0603
2348	2020 552 96507	10µF 10V
2349	4822 126 14238	2.2nF 50V 0603

2351	2020 552 96507	10µF 10V
2352	2020 552 96507	10µF 10V
2353	2238 586 59812	100nF 20-80% 50V 0603
2354	2020 552 96507	10µF 10V
2355	2020 552 96507	10µF 10V
2356	2222 867 15339	33pF 5% 50V 0603
2357	2020 552 96507	10µF 10V
2358	2222 867 15339	33pF 5% 50V 0603
2359	2238 586 59812	100nF 20-80% 50V 0603
2361	2020 552 96507	10µF 10V
2362	2238 586 59812	100nF 20-80% 50V 0603
2363	2238 586 59812	100nF 20-80% 50V 0603
2364	2238 586 59812	100nF 20-80% 50V 0603
2365	2238 586 59812	100nF 20-80% 50V 0603
2366	2238 586 59812	100nF 20-80% 50V 0603
2367	2238 586 59812	100nF 20-80% 50V 0603
2368	2238 586 59812	100nF 20-80% 50V 0603
2369	2238 586 59812	100nF 20-80% 50V 0603
2371	2238 586 59812	100nF 20-80% 50V 0603
2372	2238 586 59812	100nF 20-80% 50V 0603
2373	2238 586 59812	100nF 20-80% 50V 0603
2374	2238 586 59812	100nF 20-80% 50V 0603
2375	2238 586 59812	100nF 20-80% 50V 0603
2376	2020 552 96507	10µF 10V
2377	2020 552 96507	10µF 10V
2378	2238 586 59812	100nF 20-80% 50V 0603
2379	2238 586 59812	100nF 20-80% 50V 0603
2381	2020 552 96507	10µF 10V
2382	2238 586 59812	100nF 20-80% 50V 0603
2383	2238 586 59812	100nF 20-80% 50V 0603
2384	2238 586 59812	100nF 20-80% 50V 0603
2385	2238 586 59812	100nF 20-80% 50V 0603
2386	2238 586 59812	100nF 20-80% 50V 0603
2387	2238 586 59812	100nF 20-80% 50V 0603
2388	2238 586 59812	100nF 20-80% 50V 0603
2389	2238 586 59812	100nF 20-80% 50V 0603
2391	2020 552 96507	10µF 10V
2392	2238 586 59812	100nF 20-80% 50V 0603
2393	2238 586 59812	100nF 20-80% 50V 0603
2394	2238 586 59812	100nF 20-80% 50V 0603
2395	2020 552 96507	10µF 10V
2396	2238 586 59812	100nF 20-80% 50V 0603
2397	2238 586 59812	100nF 20-80% 50V 0603
2501	4822 126 13879	220nF 20% 16V
2504	4822 126 13879	220nF 20% 16V
2512	4822 126 13879	220nF 20% 16V
2513	4822 126 13879	220nF 20% 16V
2516	5322 126 11583	10nF 10% 50V 0603
2517	5322 126 11583	10nF 10% 50V 0603
2518	5322 126 11583	10nF 10% 50V 0603
2521	4822 126 13879	220nF 20% 16V



3001	4822 051 30103	10kΩ 5% 0.062W
3002	4822 051 30472	4.7kΩ 5% 0.062W
3003	4822 117 12925	47kΩ 1% 0.063W 0603
3004	4822 051 30223	22kΩ 5% 0.062W
3005	4822 051 30103	10kΩ 5% 0.062W
3006	4822 051 30223	22kΩ 5% 0.062W
3009	4822 117 12917	1Ω 5% 0.062W 0603
3010	4822 117 12917	1Ω 5% 0.062W 0603
3014	4822 051 30103	10kΩ 5% 0.062W
3015	4822 051 30103	10kΩ 5% 0.062W
3016	4822 051 30103	10kΩ 5% 0.062W
3016	4822 117 12917	1Ω 5% 0.062W 0603
3017	4822 117 12925	47kΩ 1% 0.063W 0603
3018	4822 051 30223	22kΩ 5% 0.062W
3019	2322 704 61402	1.4kΩ 1% 0603
3020	5322 117 13028	12kΩ 1% 0.063W 0603
3304	4822 051 30151	150Ω 5% 0.062W
3305	4822 051 30151	150Ω 5% 0.062W
3306	4822 051 30151	150Ω 5% 0.062W
3307	4822 051 30101	100Ω 5% 0.062W
3312	4822 117 12917	1Ω 5% 0.062W 0603
3313	4822 051 30472	4.7kΩ 5% 0.062W
3314	4822 051 30332	3.3kΩ 5% 0.062W
3315	4822 051 30479	47Ω 5% 0.062W
3316	4822 051 30479	47Ω 5% 0.062W
3321	4822 051 30479	47Ω 5% 0.062W
3322	4822 051 30101	100Ω 5% 0.062W
3324	4822 117 13573	4 x 47Ω 5%
3325	4822 117 13573	4 x 47Ω 5%
3326	4822 051 30479	47Ω 5% 0.062W
3327	4822 051 30101	100Ω 5% 0.062W
3328	4822 051 30101	100Ω 5% 0.062W
3342	4822 051 30103	10kΩ 5% 0.062W
3343	4822 051 30471	470Ω 5% 0.062W
3346	2350 035 10229	4 x 22Ω 5%
3347	2350 035 10229	4 x 22Ω 5%
3348	2350 035 10229	4 x 22Ω 5%
3349	2350 035 10229	4 x 22Ω 5%
3350	4822 117 12917	1Ω 5% 0.062W 0603
3351	2350 035 10229	4 x 22Ω 5%

3352	4822 117 12917	1Ω 5% 0.062W 0603
3354	4822 051 30471	470Ω 5% 0.062W
3355	2350 035 10229	4 x 22Ω 5%
3356	4822 051 30471	470Ω 5% 0.062W
3357	4822 051 30471	470Ω 5% 0.062W
3359	2350 035 10229	4 x 22Ω 5%
3360	4822 117 12139	22Ω 5% 0.062W
3361	4822 051 30103	10kΩ 5% 0.062W
3362	4822 051 30103	10kΩ 5% 0.062W
3363	4822 051 30103	10kΩ 5% 0.062W
3364	4822 051 30474	470kΩ 5% 0.062W
3365	4822 051 30181	180Ω 5% 0.062W
3366	4822 117 12917	1Ω 5% 0.062W 0603
3368	4822 051 30472	4.7kΩ 5% 0.062W
3369	4822 051 30103	10kΩ 5% 0.062W
3370	4822 117 12139	22Ω 5% 0.062W
3371	4822 117 12139	22Ω 5% 0.062W
3372	2350 035 10229	4 x 22Ω 5%
3372	4822 117 13573	4 x 47Ω 5%
3373	2350 035 10229	4 x 22Ω 5%
3373	4822 117 13573	4 x 47Ω 5%
3374	2350 035 10229	4 x 22Ω 5%
3374	4822 117 13573	4 x 47Ω 5%
3375	2350 035 10229	4 x 22Ω 5%
3375	4822 117 13573	4 x 47Ω 5%
3376	2350 035 10229	4 x 22Ω 5%
3376	4822 117 13573	4 x 47Ω 5%
3377	2350 035 10229	4 x 22Ω 5%
3377	4822 117 13573	4 x 47Ω 5%
3379	4822 117 12139	22Ω 5% 0.062W
3380	4822 117 12139	22Ω 5% 0.062W
3381	4822 117 12139	22Ω 5% 0.062W
3382	4822 051 30472	4.7kΩ 5% 0.062W
3383	4822 117 12139	22Ω 5% 0.062W
3384	4822 117 12139	22Ω 5% 0.062W
3385	4822 117 12139	22Ω 5% 0.062W
3386	2350 035 10229	4 x 22Ω 5%
3387	2350 035 10229	4 x 22Ω 5%
3388	4822 051 30759	75Ω 5% 0.062W
3389	4822 051 30759	75Ω 5% 0.062W
3391	4822 051 30759	75Ω 5% 0.062W
3394	2350 035 10229	4 x 22Ω 5%
3395	4822 117 12139	22Ω 5% 0.062W
3396	4822 051 30472	4.7kΩ 5% 0.062W
3507	4822 051 30103	10kΩ 5% 0.062W
3511	4822 051 30103	10kΩ 5% 0.062W
3516	4822 051 30109	10Ω 5% 0.062W
3517	4822 051 30109	10Ω 5% 0.062W
3681	4822 051 30472	4.7kΩ 5% 0.062W
3682	4822 051 30472	4.7kΩ 5% 0.062W
4xxx	4822 051 30008	Jumper 0603

5001	2422 536 00504	68μH 10%
5002	2422 535 94639	10μH 20%
5003	2422 549 45333	Bead 120Ω at 100MHz
5009	2422 535 94639	10μH 20%
5010	2422 549 45333	Bead 120Ω at 100MHz
5011	2422 549 45333	Bead 120Ω at 100MHz
5013	2422 549 45333	Bead 120Ω at 100MHz
5014	2422 549 45333	Bead 120Ω at 100MHz
5015	4822 157 11869	33μH 10%
5025	2422 535 94648	220μH 10%
5026	2422 535 94639	10μH 20%
5301	2422 549 45333	Bead 120Ω at 100MHz
5302	2422 549 45333	Bead 120Ω at 100MHz
5303	2422 549 45333	Bead 120Ω at 100MHz
5304	2422 549 45333	Bead 120Ω at 100MHz
5351	2422 549 45333	Bead 120Ω at 100MHz
5352	2422 549 45333	Bead 120Ω at 100MHz
5353	2422 549 45333	Bead 120Ω at 100MHz
5354	2422 549 45333	Bead 120Ω at 100MHz
5355	2422 549 45333	Bead 120Ω at 100MHz
5356	2422 549 45333	Bead 120Ω at 100MHz
5357	2422 549 45333	Bead 120Ω at 100MHz
5501	2422 549 45333	Bead 120Ω at 100MHz
5504	2422 549 45333	Bead 120Ω at 100MHz
5512	2422 549 45333	Bead 120Ω at 100MHz
5513	2422 549 45333	Bead 120Ω at 100MHz
5517	2422 549 45333	Bead 120Ω at 100MHz
5521	2422 549 45333	Bead 120Ω at 100MHz

6001	4822 130 11522	UDZ15B
6001	9340 548 69115	PDZ27B
6002	9322 082 82668	SS34
6025	9322 128 70685	SMSS14



7001	9322 142 69667	LM2596T-5.0
7002	5322 130 60159	BC846B
7003	5322 130 60159	BC846B
7004	5322 130 60159	BC846B
7005	9322 115 29668	SI9433DY
7005	9965 000 13595	SI4431DY (SO8)
7006	9322 189 19668	LD1086D2T18
7009	9322 152 53687	LD1086V33
7010	4822 209 60059	MC34063AP1
7011	4822 209 17398	LD1117DT33
7301	4822 209 17398	LD1117DT33
7302	9352 673 95518	SAA7118E/V1
7351	9322 190 49671	FLI2300-AB
7352	9322 190 51671	MT48LC2M32B2TG-5
7501	9322 171 82668	SN75LVDS83DGGR

Top Control Panel [E]

Various

1500	4822 267 10567	Connector 4P
1501	4822 276 13775	Switch
1502	4822 276 13775	Switch
1503	4822 276 13775	Switch
1504	4822 276 13775	Switch
1505	4822 276 13775	Switch



3500	4822 051 30101	100Ω 5% 0.062W
3501	4822 051 30391	390Ω 5% 0.062W
3502	4822 051 30561	560Ω 5% 0.062W
3503	4822 051 30271	270Ω 5% 0.062W
3504	4822 051 30332	3.3kΩ 5% 0.062W
3505	4822 051 30152	1.5kΩ 5% 0.062W



6500	9340 548 61115	PDZ12B
6504	4822 130 80622	BAT54

Inverter Panel [IN]

Various

	9965 000 05478	PMBS3904
	9965 000 08855	MMBT3904LT1
	9965 000 12392	MMBT3906LT1
	9965 000 12394	TP0610T
	9965 000 12957	PMBS3906
	9965 000 17807	Connector 3p
	9965 000 17814	2N7002E
	9965 000 17824	Transf. DC-AC inverter
	9965 000 21128	5pF 3kV 1808
CN1	9965 000 17806	Connector 8p
CN2	9965 000 17807	Connector 3p
CN3	9965 000 17807	Connector 3p
CN3	9965 000 23100	Connector 3p
CN4	9965 000 17807	Connector 3p
CN5	9965 000 17807	Connector 3p
CN5	9965 000 23100	Connector 3p
F01	9965 000 11546	Fuse KE40 1206
F01	9965 000 12955	Fuse 5A
F01	9965 000 23106	Fuse 3A 1206



C01	4822 126 14585	100nF 10% 50V
C01	9965 000 17804	1μF 50V 0805
C01	9965 000 21129	10.4nF 16V 0603
C02	4822 126 14118	100nF 20-80% 50V 0805
C03	9965 000 05466	10.4nF 16V 0603
C03	9965 000 05476	100nF 25V 0603
C03	9965 000 23095	100nF 25V 0603
C04	2222 586 18812	100nF 10% 50V 0603
C04	9965 000 05465	1μF 10V 0603
C04	9965 000 14741	220μF 25V
C05	4822 126 13751	47nF 10% 63V
C05	9965 000 14741	220μF 25V
C05	9965 000 21130	47.3nF 25V 0603
C06	9965 000 17805	68.2nF 50V 0603
C06	9965 000 21131	22.5nF 25V 1206
C07	9965 000 05466	10.4nF 16V 0603
C07	9965 000 21131	22.5nF 25V 1206
C08	9965 000 05466	10.4nF 16V 0603
C08	9965 000 21131	22.5nF 25V 1206

C09	9965 000 21131	22.5nF 25V 1206
C0T	9965 000 21132	GJ-EE0803-002
C10	9965 000 17802	0.15μF
C10	9965 000 21133	68.2pF 50V 0603
C11	9965 000 17802	0.15μF
C11	9965 000 21134	10.5nF
C12	5322 126 11583	10nF 10% 50V 0603
C12	9965 000 05464	10.3nF 50V 0603
C12	9965 000 21138	10.3nF 50V 0603
C14	9965 000 21139	221G 50V 0603
C16	9965 000 21131	22.5nF 25V 1206
C17	5322 122 33063	2.2PF 5%NP0 50V
C17	9965 000 21140	47.2nF 50V 0805
C18	2020 558 90659	12pF 5% 3kV
C19	5322 122 31866	6.8nF 10% 63V
C19	9965 000 05465	1μF 10V 0603
C19	9965 000 21140	47.2nF 50V 0805
C20	9965 000 21131	22.5nF 25V 1206
C21	4822 126 14247	1.5nF 50V 0603
C21	9965 000 21141	15.2nF 50V 0603
C22	9965 000 14747	47.4nF 10V 0603
C22	9965 000 23096	220nF 10V 0603
C23	2020 552 96671	1μF 10% 25V 1206
C23	9965 000 21142	10.5nF 10V 0805
C24	4822 126 14585	100nF 10% 50V
C24	9965 000 05465	1μF 10V 0603
C25	9965 000 05465	1μF 10V 0603
C25	9965 000 18606	1μF 16V
C26	2020 558 90659	12pF 5% 3kV
C27	9965 000 21143	39pF 3kV 1808
C27	9965 000 23097	47pF
C28	5322 122 31866	6.8nF 10% 63V
C28	9965 000 21140	47.2nF 50V 0805
C29	9965 000 21143	39pF 3kV 1808
C29	9965 000 23097	47pF
C30	5322 122 33063	2.2PF 5%NP0 50V
C30	9965 000 21140	47.2nF 50V 0805
C30	9965 000 23126	10nF
C31	9965 000 23126	10nF
C32	9965 000 14741	220μF 25V
C32	9965 000 23098	220μF
C32	9965 000 23126	10nF
C33	9965 000 21143	39pF 3kV 1808
C33	9965 000 23097	47pF
C33	9965 000 23126	10nF
C34	9965 000 21143	39pF 3kV 1808
C34	9965 000 23097	47pF
C35	4822 126 13751	47nF 10% 63V
C35	9965 000 21130	47.3nF 25V 0603
C37	4822 126 12105	33nF 5% 50V
C37	9965 000 14745	33.3nF 50V 0805
C39	4822 126 12105	33nF 5% 50V
C39	9965 000 14745	33.3nF 50V 0805
C40	9965 000 21143	39pF 3kV 1808
C40	9965 000 23097	47pF
C42	4822 051 20008	Jumper 0805
C43	4822 051 20008	Jumper 0805
C43	9965 000 23099	220pF
C44	4822 126 12105	33nF 5% 50V
C44	9965 000 14745	33.3nF 50V 0805
C45	4822 126 12105	33nF 5% 50V
C45	9965 000 14745	33.3nF 50V 0805
C47	9965 000 21143	39pF 3kV 1808
C47	9965 000 23097	47pF
C48	9965 000 14741	220μF 25V
C48	9965 000 23098	220μF
C49	4822 051 20008	Jumper 0805
C50	4822 051 20008	Jumper 0805
C51	4822 051 20008	Jumper 0805
C51	9965 000 23099	220pF
C52	4822 051 20008	Jumper 0805
C52	9965 000 17804	1μF 50V 0805
C53	2020 558 90659	12pF 5% 3kV
C53	9965 000 21144	5pF 3kV 1808
C54	5322 126 11583	10nF 10% 50V 0603
C55	2020 558 90659	12pF 5% 3kV
C55	9965 000 17804	1μF 50V 0805
C55	9965 000 21144	5pF 3kV 1808
C56	5322 126 11583	10nF 10% 50V 0603
C56	9965 000 21138	10.3nF 50V 0603
CT5	9965 000 23101	GJ-EE0803-002



R00	4822 051 20008	Jumper 0805
R00	4822 051 30008	Jumper 0603
R01	4822 051 30333	33kΩ 5% 0.062W
R02	4822 051 30103	10kΩ 5% 0.062W
R02	4822 051 30333	33kΩ 5% 0.062W
R02	9965 000 05488	10kΩ 5% 0603
R03	4822 051 30333	33kΩ 5% 0.062W
R03	9965 000 21146	100kΩ 5% 0603
R03	9965 000 23109	22Ω 5% 0603

R04	4822 051 30103	10kΩ 5% 0.062W
R04	4822 051 30333	33kΩ 5% 0.062W
R04	9965 000 05488	10kΩ 5% 0603
R05	2322 704 63002	3kΩ 1% 0603
R05	4822 051 30008	Jumper 0603
R05	9965 000 23109	22Ω 5% 0603
R06	4822 051 30105	1MΩ 5% 0.062W
R06	4822 117 12706	10kΩ 1% 0.063W 0603
R07	4822 051 10511	510kΩ 2% 0.25W
R07	4822 051 30105	1MΩ 5% 0.062W
R08	4822 051 10104	100kΩ 2% 0.25W
R08	9965 000 17817	1Ω 1% 0805
R08	9965 000 21147	100kΩ 5% 1206
R09	4822 051 10104	100kΩ 2% 0.25W
R09	4822 051 30109	10Ω 5% 0.062W
R09	9965 000 21147	100kΩ 5% 1206
R10	4822 051 10104	100kΩ 2% 0.25W
R10	9965 000 17821	3.74kΩ 1% 0603
R10	9965 000 21147	100kΩ 5% 1206
R11	2322 704 62002	2kΩ 1% 0603
R11	4822 051 30008	Jumper 0603
R11	9965 000 23109	22Ω 5% 0603
R12	9965 000 17823	34kΩ 1% 0603
R12	9965 000 21148	51.1kΩ 1% 0603
R13	2322 704 62002	2kΩ 1% 0603
R14	4822 051 10104	100kΩ 2% 0.25W
R14	9965 000 23127	21Ω 1% 0603
R15	9965 000 17822	33.2kΩ 1% 0603
R15	9965 000 23109	22Ω 5% 0603
R16	5322 117 13017	100Ω 1% 0.063W 0603
R16	9965 000 21149	105Ω 0603 1%
R16	9965 000 23128	120kΩ 5% 0603
R17	4822 051 30102	1kΩ 5% 0.062W
R17	5322 117 13019	100kΩ 1% 0.063W 0603
R17	9965 000 21150	1kΩ 0603 5%
R18	4822 051 10104	100kΩ 2% 0.25W
R18	9965 000 05488	10kΩ 5% 0603
R19	9965 000 05488	10kΩ 5% 0603
R19	9965 000 20794	390Ω 5% 0.5W
R20	9965 000 20794	390Ω 5% 0.5W
R20	9965 000 21151	392kΩ 1% 0603
R21	4822 051 10104	100kΩ 2% 0.25W
R21	5322 117 13018	1kΩ 1% 0.063W 0603
R21	9965 000 21146	100kΩ 5% 0603
R22	4822 117 12706	10kΩ 1% 0.063W 0603
R22	9965 000 21152	28kΩ 5% 0603
R22	9965 000 23110	30.1kΩ 1% 0603
R23	5322 117 13017	100Ω 1% 0.063W 0603
R23	9965 000 21149	105Ω 0603 1%
R24	9965 000 23111	22.1Ω 1% 0603
R24	9965 000 23129	210Ω 1% 0603
R25	4822 051 30103	10kΩ 5% 0.062W
R25	9965 000 05488	10kΩ 5% 0603
R25	9965 000 20795	182kΩ 1% 0603
R26	4822 051 30008	Jumper 0603
R26	4822 051 30103	10kΩ 5% 0.062W
R26	9965 000 05488	10kΩ 5% 0603
R27	9965 000 21153	590kΩ 1% 0603
R27	9965 000 23112	887kΩ 1% 0603
R28	4822 051 30103	10kΩ 5% 0.062W
R28	9965 000 05488	10kΩ 5% 0603
R29	4822 051 30339	33Ω 5% 0.062W
R29	9965 000 21154	33Ω 5% 0603
R30	4822 051 30103	10kΩ 5% 0.062W
R30	9965 000 05488	10kΩ 5% 0603
R30	9965 000 21147	100kΩ 5% 1206
R31	9965 000 21146	100kΩ 5% 0603
R31	9965 000 21147	100kΩ 5% 1206
R31	9965 000 23109	22Ω 5% 0603
R32	4822 051 10104	100kΩ 2% 0.25W
R32	9965 000 21147	100kΩ 5% 1206
R32	9965 000 21155	9.09Ω 1% 0603
R33	4822 051 10104	100kΩ 2% 0.25W
R33	9965 000 21147	100kΩ 5% 1206
R33	9965 000 21156	76.8kΩ 1% 0603
R34	4822 051 10104	100kΩ 2% 0.25W
R34	9965 000 21147	100kΩ 5% 1206
R34	9965 000 21157	1MΩ 1% 0603
R35	9965 000 21147	100kΩ 5% 1206
R35	9965 000 21158	35.7kΩ 1% 0603
R36	9965 000 21146	100kΩ 5% 0603
R36	9965 000 21147	100kΩ 5% 1206
R36	9965 000 23109	22Ω 5% 0603
R37	4822 051 10104	100kΩ 2% 0.25W
R37	4822 051 10105	1MΩ 5% 0.25W
R37	9965 000 21146	100kΩ 5% 0603
R38	9965 000 05483	1K 5% 1206
R38	9965 000 05484	348kΩ 1% 0603
R38	9965 000 21153	590kΩ 1% 0603
R39	4822 051 10104	100kΩ 2% 0.25W
R39	9965 000 21147	100kΩ 5% 1206
R40	4822 051 10104	100kΩ 2% 0.25W
R40	9965 000 21147	100kΩ 5% 1206
R40	9965 000 23130	200Ω 5% 0.5W

R41	4822 051 10104	100kΩ 2% 0.25W
R41	9965 000 21147	100kΩ 5% 1206
R42	9965 000 23116	5.1Ω 1% 0603
R43	4822 051 30223	22kΩ 5% 0.062W
R43	9965 000 21159	22kΩ 5% 0603
R44	4822 051 30223	22kΩ 5% 0.062W
R44	9965 000 21159	22kΩ 5% 0603
R45	4822 051 10104	100kΩ 2% 0.25W
R45	9965 000 21147	100kΩ 5% 1206
R46	4822 051 10104	100kΩ 2% 0.25W
R46	9965 000 21147	100kΩ 5% 1206
R47	9965 000 17507	6.8k 5% 0.1W
R48	4822 051 30153	15kΩ 5% 0.062W
R49	4822 051 20472	4.7kΩ 5% 0.1W
R49	9965 000 21160	10kΩ 1% 0805
R50	4822 051 10221	220Ω 2% 0.25W
R50	9965 000 21161	220Ω 5% 1206
R51	9965 000 23117	53.6kΩ 1% 0603
R52	5322 117 13019	100kΩ 1% 0.063W 0603
R53	9965 000 23116	5.1Ω 1% 0603
R54	4822 051 10104	100kΩ 2% 0.25W
R54	9965 000 21147	100kΩ 5% 1206
R55	9965 000 23118	340kΩ 1% 0603
R56	4822 051 10104	100kΩ 2% 0.25W
R56	9965 000 21147	100kΩ 5% 1206
R57	4822 051 10104	100kΩ 2% 0.25W
R57	9965 000 21147	100kΩ 5% 1206
R58	4822 051 10104	100kΩ 2% 0.25W
R58	9965 000 21147	100kΩ 5% 1206
R59	9965 000 23119	422kΩ 1% 0603
R60	5322 117 13019	100kΩ 1% 0.063W 0603
R60	9965 000 17820	2MΩ 5% 0603
R61	5322 117 13019	100kΩ 1% 0.063W 0603
R61	9965 000 05482	14kΩ 1% 0603
R62	4822 117 12706	10kΩ 1% 0.063W 0603
R62	5322 117 13019	100kΩ 1% 0.063W 0603
R63	4822 051 30105	1MΩ 5% 0.062W
R63	9965 000 21162	4.7kΩ 5% 0603
R63	9965 000 23120	5.49kΩ 1% 0603
R64	4822 051 20008	Jumper 0805
R64	4822 051 30008	Jumper 0603
R64	4822 117 12706	10kΩ 1% 0.063W 0603
R65	9965 000 21155	9.09Ω 1% 0603
R66	4822 051 10104	100kΩ 2% 0.25W
R66	9965 000 21147	100kΩ 5% 1206
R67	4822 051 10104	100kΩ 2% 0.25W
R67	9965 000 21147	100kΩ 5% 1206
R68	4822 051 10104	100kΩ 2% 0.25W
R68	9965 000 21147	100kΩ 5% 1206
R70	4822 051 10104	100kΩ 2% 0.25W
R70	9965 000 21147	100kΩ 5% 1206
R71	4822 051 10104	100kΩ 2% 0.25W
R71	9965 000 21147	100kΩ 5% 1206
R72	4822 051 10104	100kΩ 2% 0.25W
R72	9965 000 21147	100kΩ 5% 1206
R73	9965 000 21163	1.37MΩ 1% 1206
R75	4822 117 11645	470Ω 1% 0.125W
R75	9965 000 21164	470Ω 5% 1206



L01	9965 000 06270	RLZ5.1B
L01	9965 000 20791	33μH
L01	9965 000 23107	350mH
L02	9965 000 06270	RLZ5.1B
L02	9965 000 20791	33μH
L02	9965 000 23107	350mH
L03	9965 000 06270	RLZ5.1B
L03	9965 000 23107	350mH
L04	9965 000 06270	RLZ5.1B
L04	9965 000 23107	350mH
L05	9965 000 06270	RLZ5.1B
L05	9965 000 23107	350mH
L06	9965 000 06270	RLZ5.1B
L06	9965 000 23107	350mH
L30	9965 000 12391	SPC-1005P-354-SMD
L31	9965 000 12391	SPC-1005P-354-SMD
T01	9965 000 17824	Transf. DC-AC inverter
T02	9965 000 17824	Transf. DC-AC inverter



D01	5322 130 34337	BAV99
D01	9965 000 12954	RLZ5.6B
D02	5322 130 83609	LS4148/GS08
D02	9965 000 21145	RLZ3.9B
D02	9965 000 23102	RLZ5.1B/TE-11
D03	9965 000 17809	SR24 SMA
D04	9965 000 06270	RLZ5.1B
D04	9965 000 17808	RLZ18B/TE-11
D04	9965 000 23103	RLZ5.1B/TE-11
D05	5322 130 83609	LS4148/GS08
D05	9965 000 06270	RLZ5.1B

D05	9965 000 23103	RLZ5.1B/TE-11
D06	9965 000 14749	BZM55B75-TR
D06	9965 000 23104	BZM55B75-TR
D07	9965 000 14749	BZM55B75-TR
D07	9965 000 23104	BZM55B75-TR
D08	9965 000 17809	SR24 SMA
D09	5322 130 34337	BAV99
D15	9965 000 12954	RLZ5.6B
D15	9965 000 23105	RLZ5.6C/TE-11
D16	5322 130 34337	BAV99
D26	5322 130 34337	BAV99
D29	5322 130 34337	BAV99
D30	5322 130 34337	BAV99
D30	9965 000 14749	BZM55B75-TR
D30	9965 000 23104	BZM55B75-TR
D31	5322 130 34337	BAV99
D31	9965 000 14749	BZM55B75-TR
D31	9965 000 23104	BZM55B75-TR
D32	9965 000 14749	BZM55B75-TR
D33	9965 000 14749	BZM55B75-TR
D34	5322 130 83609	LS4148/GS08



Q01	9965 000 08855	MMBT3904LT1
Q01	9965 000 12956	BSS138 (SOT23)
Q01	9965 000 17814	2N7002E
Q02	4822 130 11057	2N7002
Q02	9965 000 12392	MMBT3906LT1
Q02	9965 000 17814	2N7002E
Q03	9965 000 08855	MMBT3904LT1
Q03	9965 000 23108	PMBS3904 SOT23
Q04	4822 130 11057	2N7002
Q04	9965 000 17810	NDS0610
Q04	9965 000 17814	2N7002E
Q05	9965 000 08855	MMBT3904LT1
Q06	9965 000 12392	MMBT3906LT1
Q08	9965 000 08855	MMBT3904LT1
Q08	9965 000 17815	Si4425DY
Q08	9965 000 23108	PMBS3904 SOT23
Q09	9965 000 12326	2SD1804T-TL
Q10	9965 000 12326	2SD1804T-TL
Q11	9339 728 80215	PMBS3906 SOT23
Q11	9965 000 12392	MMBT3906LT1
Q14	4822 130 11057	2N7002
Q22	4822 130 11057	2N7002
Q22	9965 000 17814	2N7002E
Q50	4822 130 11057	2N7002
Q51	4822 130 11057	2N7002
Q53	9965 000 08855	MMBT3904LT1
U01	9965 000 12327	LM339AM
U01	9965 000 12960	IOZ960DS
U01	9965 000 23121	OZ960DS
U02	9965 000 21165	AO4600 (SO8)
U03	9965 000 21165	AO4600 (SO8)
U04	9965 000 21165	AO4600 (SO8)
U05	9965 000 21165	AO4600 (SO8)
U06	9965 000 21166	LM392M (SO8)
U07	9965 000 21166	LM392M (SO8)

Front LED Panel [J]

Various

1170	2422 025 12491	Connector 7p m
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2177	4822 124 41643	100μF 20% 16V
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3171	4822 051 30222	2.2kΩ 5% 0.062W
3172	4822 051 30222	2.2kΩ 5% 0.062W
3173	4822 051 30103	10kΩ 5% 0.062W
3174	4822 051 30391	390Ω 5% 0.062W
3175	4822 051 30103	10kΩ 5% 0.062W
3176	4822 051 30391	390Ω 5% 0.062W
3177	4822 051 30221	220Ω 5% 0.062W



6175	9322 192 35676	SPR-325MVW
6177	9322 189 66667	TSOP1836LL3V



7173	4822 130 60373	BC856B
7175	4822 130 60373	BC856B

11. Revision List

Manual xxxx xxx xxxx.0

- First release.

Manual xxxx xxx xxxx.1

- Chapter 3: DFU was wrong and is changed to the correct version.
- Chapter 5: ComPair instruction added.
- Chapter 7: Small corrections in diagrams, like diversity table and mapping.
- Chapter 10: Parts list updated.
- Chapter 11: This chapter added.
- Other chapters: small updates and corrections