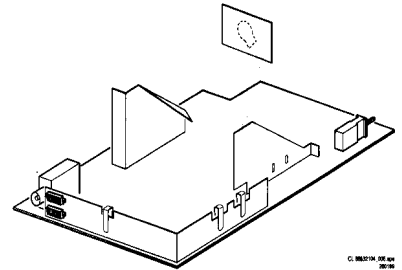


Service
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L9.1E
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Service Manual

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Mains voltage

: 90V - 276Vac; 50-60Hz

Maximum power consumption

- 25" : 75W +/- 10%
- 28" : 90W +/- 10%
- 29" : 90W +/- 10%

Standby power consumption

: 6W +/- 10%

Colour Synchronisation

: +/- 300Hz

Sub-carrier pull in range

: +/- 600 Hz

Horizontal Synchronisation

: +/- 1200 Hz

Catching range

: 49 Hz - 61Hz

Holding range

: UV 1316/Al-2 (PAL/

Vertical Lock Range

SECAM)

Tuners

2.1 Specification of the terminal sockets

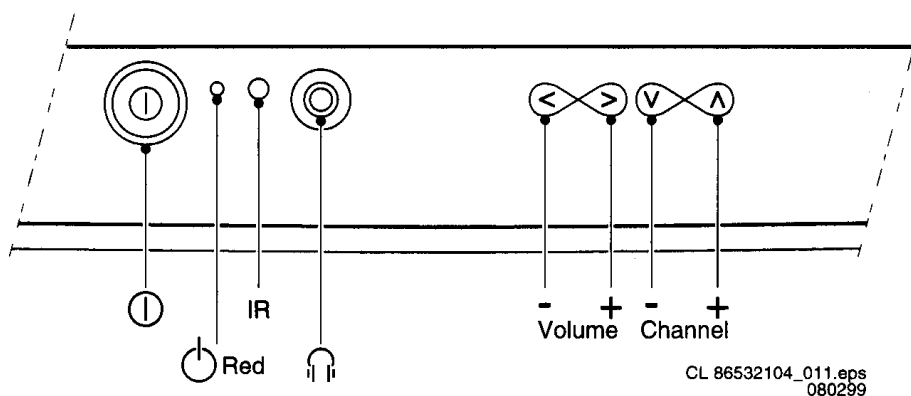


Figure 2-1

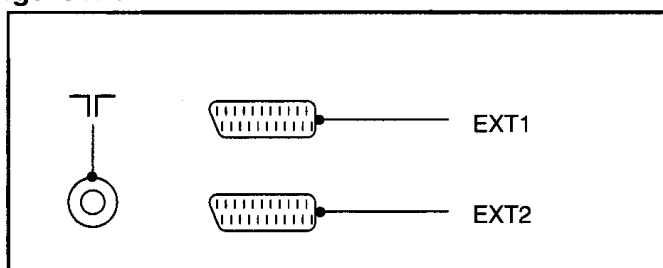


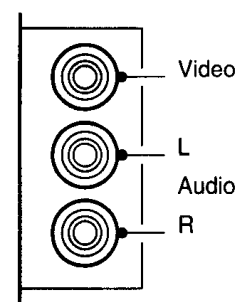
Figure 2-2

- 9- Earth screen
- 10- -
- 11- -
- 12- -
- 13- Earth screen
- 14- Earth screen
- 15- C (300mVpp/75Ω)
- 16- -
- 17- Earth screen
- 18- Earth screen
- 19- CVBS
- 20- CVBS/Y (1Vpp/75Ω)
- 21- Earth screen

2.1.1 Scart 1: CVBS(in/out) + RGB(in) - tuner at output

- 1- Audio Out R (0.5Vrms <= 1kΩ)
- 2- Audio In R (0.2-2Vrms >= 10kΩ)
- 3- Audio Out L (0.5Vrms <= 1kΩ)
- 4- Earth screen
- 5- Earth screen
- 6- Audio In L (0.2-2Vrms >= 10kΩ)
- 7- Blue (0.7Vpp/75Ω)
- 8- CVBS status (INT = 0-2V, EXT(16:9) = 4.5-7V, EXT(4:3) = 9.5-12V)
- 9- Earth screen
- 10- -
- 11- Green (0.7Vpp/75Ω)
- 12- -
- 13- Earth screen
- 14- Earth screen
- 15- Red (0.7Vpp/75Ω)
- 16- FBL (>0.9V RGB mode)
- 17- Earth screen
- 18- Earth screen
- 19- CVBS
- 20- CVBS (1Vpp/75Ω)
- 21- Earth screen

2.1.3 Cinch - audio/video in



- 1- CVBS (yellow)(1Vpp 75Ω)
- 2- Audio L (red) (0.2-2Vrms 10kΩ)
- 3- Audio R (white) (0.2-2Vrms 10kΩ)

2.1.2 Scart 2: CVBS (in/out) + SVHS(in)

Input = EXT2 => output = tuner

Input = tuner/EXT1 => output = tuner/EXT1

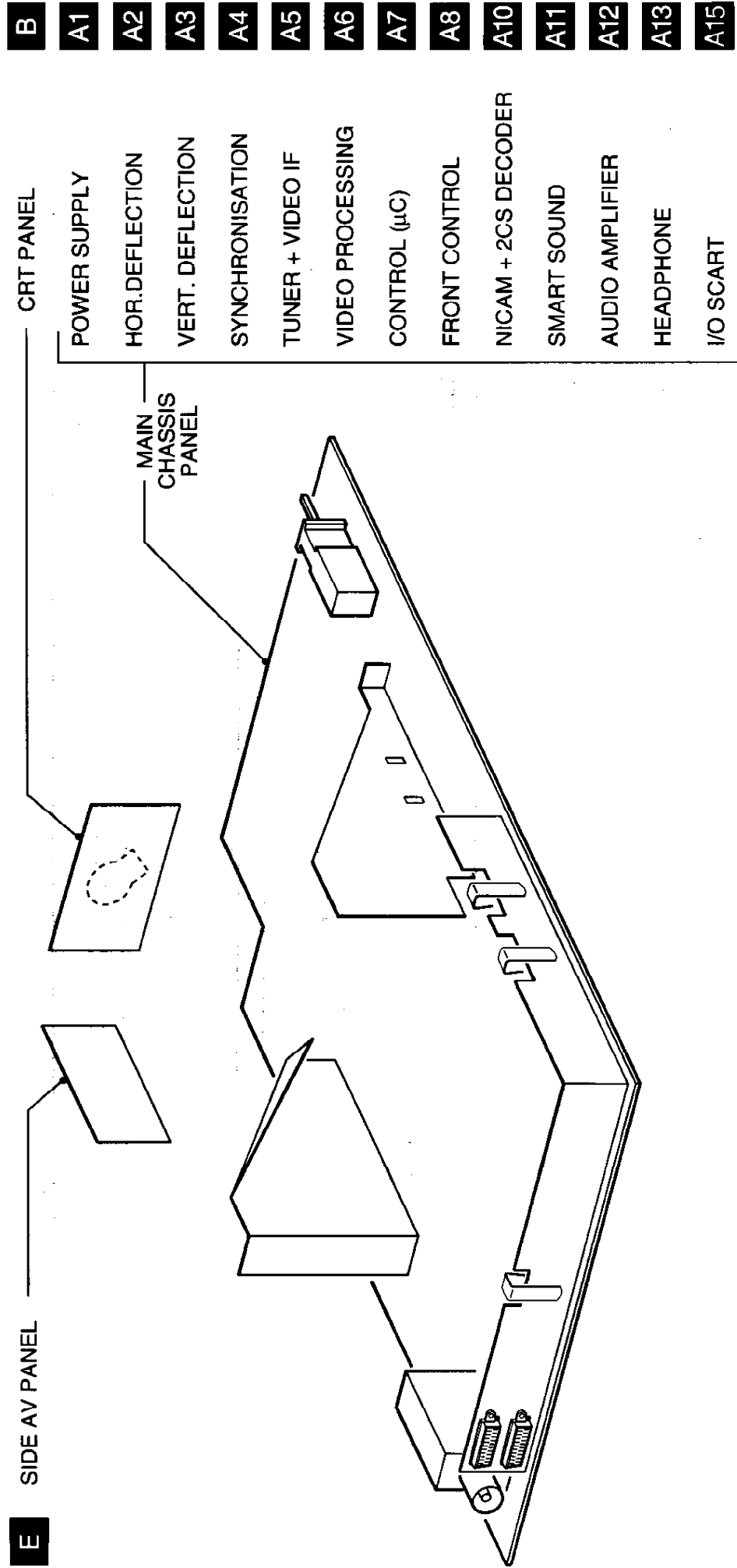
- 1- Audio Out R (0.5Vrms <= 1kΩ)
- 2- Audio In R (0.2-2Vrms >= 10kΩ)
- 3- Audio Out L (0.5Vrms <= 1kΩ)
- 4- Earth screen
- 5- Earth screen
- 6- Audio In L (0.2-2Vrms >= 10kΩ)
- 7- -
- 8- CVBS status (INT = 0-2V, EXT(16:9) = 4.5-7V, EXT(4:3) = 9.5-12V)

2.1.4 Headphone

- 1- 8-600Ω (4mW)

2 Connection facilities and chassis overview

2.2 PCB location drawing



3.1 Safety instructions for repairs



Figure 3-1

1. Safety regulations require that during a repair:
 - the set should be connected to the mains via an isolating transformer;
 - safety components, indicated by the symbol (see fig. 3.1), should be replaced by components identical to the original ones;
 - when replacing the CRT, safety goggles must be worn.

2. Safety regulations require that after a repair the set must be returned in its original condition. In particular attention should be paid to the following points.
 - As a strict precaution, we advise you to resolder the solder joints through which the horizontal deflection current is flowing, in particular:
 - all pins of the line output transformer (LOT);
 - fly-back capacitor(s);
 - S-correction capacitor(s);
 - line output transistor;
 - pins of the connector with wires to the deflection coil;
 - other components through which the deflection current flows.

Note: This resoldering is advised to prevent bad connections due to metal fatigue in solder joints and is therefore only necessary for television sets older than 2 years. The wire trees and EHT cable should be routed correctly and fixed with the mounted cable clamps.

- The insulation of the mains lead should be checked for external damage.
- The mains lead strain relief should be checked for its function in order to avoid touching the CRT, hot components or heat sinks.
- The electrical DC resistance between the mains plug and the secondary side should be checked (only for sets which have a mains isolated power supply). This check can be done as follows:
 - unplug the mains cord and connect a wire between the two pins of the mains plug;
 - set the mains switch to the on position (keep the mains cord unplugged!);
 - measure the resistance value between the pins of the mains plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 MΩ and 12 MΩ;
 - switch off the TV and remove the wire between the two pins of the mains plug.
- The cabinet should be checked for defects to avoid touching of any inner parts by the customer.

3.2 Maintenance instruction

It is recommended to have a maintenance inspection carried out by a qualified service employee. The interval depends on the usage conditions:

- When the set is used under normal circumstances, for example in a living room, the recommended interval is 3 to 5 years.

- When the set is used in circumstances with higher dust, grease or moisture levels, for example in a kitchen, the recommended interval is 1 year.
- The maintenance inspection contains the following actions:
 - Execute the above mentioned 'general repair instruction'.
 - Clean the power supply and deflection circuitry on the chassis.
 - Clean the picture tube panel and the neck of the picture tube.

3.3 Warnings



1. ESD

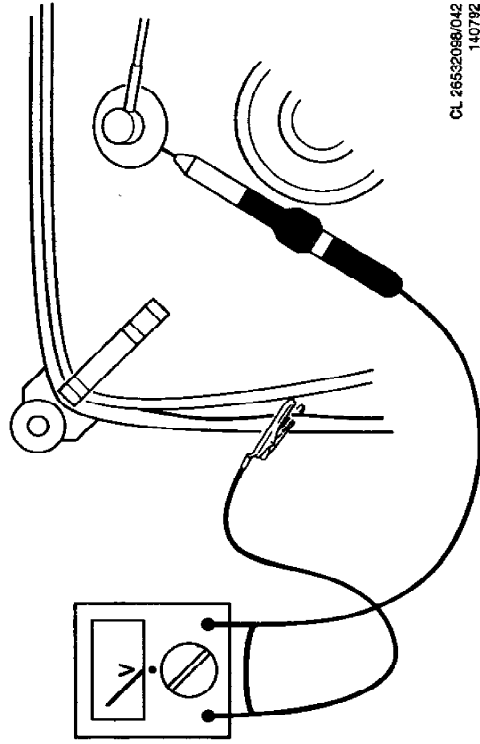
All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically. When repairing, make sure that you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.

 - complete kit ESD3 small table mat, wristband, connectionbox, extensioncable and earthcable 4822 310 10671
 - wristband tester 4822 344 13999
2. In order to prevent damage to ICs and transistors, all high-voltage flashovers must be avoided. In order to prevent damage to the picture tube, the method shown in Fig. 3.2 should be used to discharge the picture tube. Use a high-voltage probe and a multimeter (position DC-V). Discharge until the meter reading is 0V (after approx. 30s).
3. Together with the deflection unit and any multipole unit, the flat square picture tubes used from an integrated unit. The deflection and the multipole units are set optimally at the factory. Adjustment of this unit during repair is therefore not recommended.
4. Be careful during measurements in the high-voltage section and on the picture tube.
5. Never replace modules or other components while the unit is switched on.
6. When making settings, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.
7. Wear safety goggles during replacement of the picture tube

3.4 Notes

1. The direct voltages and oscillograms should be measured with regard to the tuner earth, or hot earth as this is called (see fig. 3.3)
2. The direct voltages and oscillograms shown in the diagrams are indicative and should be measured in the Service Default Mode (see chapter 8) with a colour bar signal and stereo sound (L:3 kHz, R:1 kHz unless stated otherwise) and picture carrier at 475.25 MHz.
3. Where necessary, the oscillograms and direct voltages are measured with and without aerial signal. Voltages in the power supply section are measured both for normal operation and in standby. These values are indicated by means of the appropriate symbols (see fig. 3.3).
4. The picture tube PWB has printed spark gaps. Each spark gap is connected between an electrode of the picture tube and the Aquadag coating.
5. The semiconductors indicated in the circuit diagram and in the parts lists are completely interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.

6. Manufactured under license from Dolby Laboratories Licensing Corporation.
7. DOLBY, the double D symbol and PRO LOGIC are trademarks of Dolby Laboratories Licensing Corporation.



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Figure 3-2

<p>⊥</p> <p>tuner earth tuner aarde la masse du tuner Tuner-Erde massa del tuner tierra del sintonizador</p>	<p>⚡</p>	<p>hot earth hete aarde la terre directe heißen Erde massa calda tierra caliente</p>
<p>⊥</p> <p>with aerial signal met antenne signaal avec signal d'antenne mit Antennensignal con segnale d'antenna con la señal de antena</p>	<p>✖</p>	<p>without aerial signal zonder antenne signaal sans signal d'antenne ohne Antennensignal senza segnale d'antenna sin la señal de antena</p>
<p>ⓘ</p> <p>normal condition normaal bedrijf fonctionnement normal normaler Betrieb funcionamiento normal funcionamiento normal</p>	<p>⏸</p>	<p>stand by stand by position de veille in Bereitschaft modo di attesa posición de espera</p>

Figure 3-3

4 Mechanical instructions

L9.1E

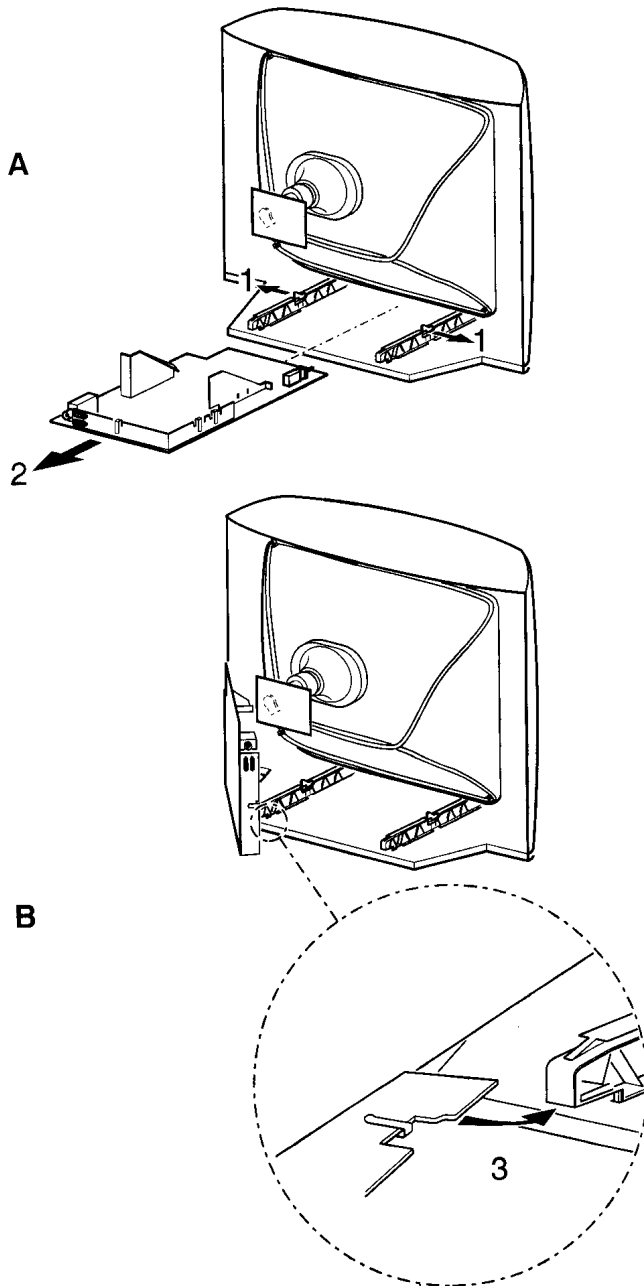
7

4.1 Service positions

See figure 4.1 for the service position.

1. Disconnect the connecting cable feeding the right-hand speaker, also disconnect the degaussing cable.

2. The mono-carrier is removed by pushing the two centre clips (1) at both chassis brackets outwards and pulling the panel forward. (2)
3. Flip the mono-carrier over so that the component side of the board faces towards the CRT.
4. Slide the metal heat sink underneath the left chassis bracket (3) until the carrier is locked in position.



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Figure 4-1

This chapter includes information covering:

- 5.1 Test points
- 5.2 Service Modes and Dealer Service Tool (DST)
- 5.3 The menus and submenus
- 5.4 Error code buffer and error codes
- 5.5 The "blinking LED" procedure
- 5.6 Trouble shooting tips
- 5.7 Customer service mode
- 5.8 Compair
- 5.9 Ordering Compair

5.1 Test points

The L9.1E chassis is equipped with easily identifiable test points. These are clearly marked on the PCB. The test points refer to specific functional blocks, these are:

- A1-A2-A3, etc.: Test points for the Nicam + 2CS decoder / Audio amplifier
- C1-C2-C3, etc.: Test points for the control circuit / front control
- F1-F2-F3, etc.: Test points for the vertical deflection circuit
- I1-I2-I3, etc.: Test points for the intermediate frequency circuit
- L1-L2-L3, etc.: Test points for the horizontal deflection circuit
- P1-P2-P3, etc.: Test points for the power supply
- S1-S2-S3, etc.: Test points for the synchronisation circuit
- V1-V2-V3, etc.: Test points for the video processing circuitry / CRT panel

Measurements are performed under the following conditions:

Video: colour bar signal; audio: 3kHz left, 1kHz right

5.2 Service modes and Dealer Service Tool (DST)

For easy installation and diagnosis, the dealer service tool (DST) RC7150 can be used. When there is no picture (to access the error code buffer via the OSD). The DST can enable the set to display the entire contents of the error code buffers by using the flashing LED procedure.

Important Note: The L9.1E does not incorporate two way Infra red communication.

The part number for the DST (RC7150) is 4822 218 21232.

5.2.1 Installation features for the dealer

The dealer can use the RC7150 for programming the TV-set with presets. 10 Different program tables can be programmed into the DST via a GFL TV, MD or MG set (downloading from the TV to the DST; for example see the GFL service manuals) or by the DST-I (DST interface; part number 4822 218 21277). For an explanation of the installation features of the DST, please see the directions of use for use of the DST (for the L9.1E chassis, download code 4 should be used).

5.2.2 Diagnosis features for the servicer

L9.1E models can be put into either of the two available service modes by using the RC7150. These are the Service Default Mode (SDM) and the Service Alignment Mode (SAM).

5.2.3 Service Default Mode (SDM)

The purpose of the SDM is:

- Used to provide a pre defined situation (pre-defined parameters), so that the same measurements can be obtained as per the service manual.
- Overrides the 5V protection when the internal method of SDM is used (connecting together pin 24 and pin 25).
- starts the LED flashing procedure
- Setting up of options codes
- Inspect the error buffer

Entering the 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 062596 followed by the key "MENU"
- By connecting test-points M25 and M24s together (on the mono-carrier) while switching on the set. After switching on the set the link should be removed (Caution!! By entering the SDM mode you Override the 5V protections).

Exit the SDM:

Switch the set to Standby or press EXIT on the DST (the error buffer is also 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 error buffer will be cleared).

The SDM sets the following pre-defined conditions:

- Pal/Secam sets: tuning at 475.25 PAL (For France select the L'-signal)

Volume level is set to 25% (of the maximum volume level). Other picture and sound settings are set to 50%. The following functions are "ignored" in SDM since they interfere with diagnosing/repairing a set. "Ignoring" means that the event that is triggered is not executed, the setting remains unchanged.

- (Sleep)Timer
- Blue mute
- Auto switch off
- Hotel or Hospitality Mode
- Child lock or Parental lock
- Skipping, blanking of "Not favourite" present/channels
- Automatic storing of Personal Preset settings
- Automatic user menu time-out

All other controls operate normally.

5.2.4 Special functions in SDM

Access to normal user menu

Pressing the "MENU" button on the remote control will enter the normal user menu (TV lock, Installation, Brightness, colour and contrast) while "SMD" remains displayed in top of screen). Pressing the "MENU" key again will return to the last SDM status.

Error buffer

Pressing the "OSD" button of the remote control shows all OSD (incl. error buffer).

Access to SDM

By pressing the "CHANNEL DOWN" and "VOLUME DOWN" buttons on the local keyboard simultaneously the set switches from SDM to SAM or pressing "ALIGN" on the DST

In the SDM the following information is displayed on the screen:

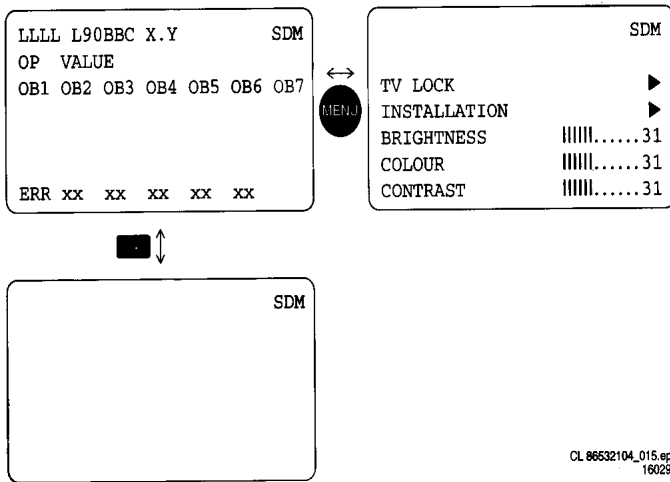


Figure 5-1 : Service Default Mode screens and structure

Explanation notes/references:

- (1) "LLLL" Operation hours timer (hexadecimal)
- (2) Software identification of the main micro controller (L90BBC X.Y)

- L90 is the chassis name for L9.0E
- BBC is a 2 letter and 1 digit combination that indicates the software type and the supported languages:
- X = (main version number)
- Y = (subversion number) BB = (range specification)

- (3) "SDM" To indicate that the TV set is in de service mode
- (4) "OP" Options Code consist of 2 characters. It is possible to change each option code

"VALUE" The value of the selected option (ON/OFF or a combination of 2 letters)

"XXX" Value of the options bytes (OB1 .. OB7)

"ERR" The last five detected errors; The left most number indicates the most recent error detected.

The MENU UP or MENU DOWN command can be used to select the next/previous option; The MENU LEFT and MENU RIGHT command can be used to change the option value.

Remark: When the option-code RC = OFF, the P+ and the P- key have the same functions as the MENU UP/DOWN keys while the VOL+ and the VOL- key have the same function as the MENU LEFT/RIGHT keys. It is not possible to change the channel pre-set or to adjust the volume when in SAM/SDM menu when the option RC = OFF.

Using a L9.1E remote control, option-code RC = ON, the P+, P-, VOL- and VOL+ can be used to change the pre-set and/or to adapt the volume, while the menu-cursor keys are used to select the option and to change its value.

For an extended overview of the option codes see Chapter 8 - Options

5.2.5 Service Alignment Mode (SAM)

The SAM allows adjustment of the Demodulator I.F, align the white tone, adjust the picture geometry and sound adjustments.

For easy identification of the SAM mode, "SAM" is displayed in the top of the right side of the screen

Entering SAM:

- By transmitting the "ALIGN" command with the RC7150 Dealer Service Tool
- By pressing the "CHANNEL DOWN" and "VOLUME DOWN" key on the local keyboard simultaneously when the set is in SDM
- Standard RC sequence 062596 followed by the key "OSD"
- By shorting test-point M28 and M29 on the mono-carrier while switching on the set. After switching on the set the short-circuit can be removed. (Caution!! Override of 5V protections).

Exiting the SAM:

Switch the set to standby or press EXIT on the DST (the error buffer is not cleared).

Note: When the mains power is switched off while the set is in SAM, the set will switch to SAM immediately when the mains is switched on again. (The error buffer will not be cleared).

In the SAM the following information is displayed on the screen:

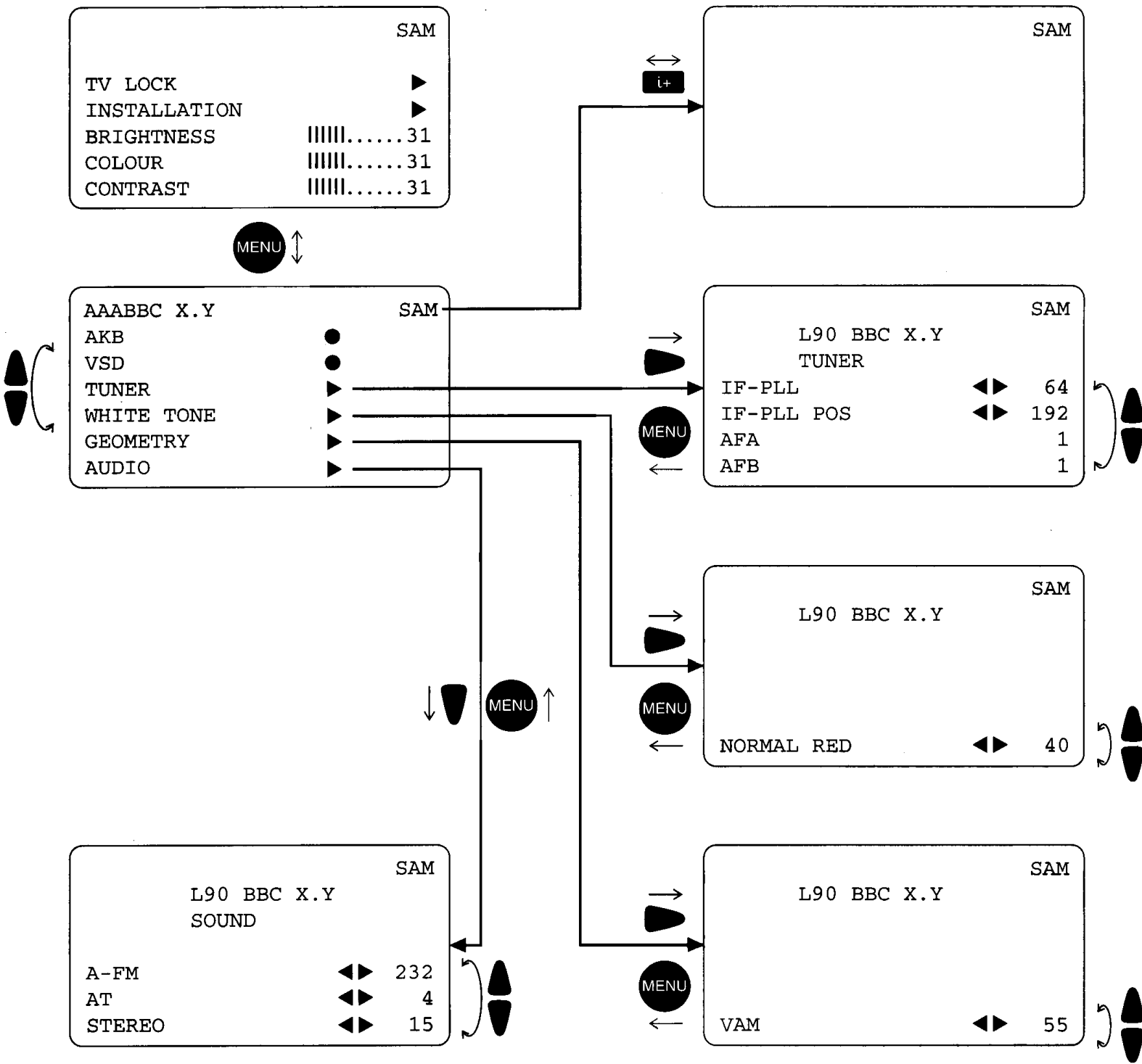


Figure 5-2 : Service Alignment Mode screens and structure

Access to normal user menu

Pressing the "MENU" button on the remote control will enter the normal user menu (TV lock, installation, brightness, colour and contrast) while "SAM" remains displayed in top of screen. Pressing the "MENU" key again will return to the last SAM status.

Pressing the "OSD" button of the remote control shows only "SAM" in the top of screen

Access to SDM

Pressing the "DEFAULT" button on the DST

SAM menu control

Menu items (AKB, VSD, Tuner, White tone, Geometry and Sound) can be selected with the MENU Up or MENU DOWN key. Entry into the selected items (sub menus) is done by the MENU LEFT or MENU RIGHT key. The selected item will be highlighted.

With the cursor LEFT/RIGHT keys, it is possible to increase/ decrease the value of the selected item.

5.3 The menus and submenus

5.3.1 Tuner sub menu

The tuner sub menu contains the following items:

- IF_PLL: PLL Alignment for all PAL/SECAM systems, excluding SECAM-LL'
- IF_PLL POS: PLL Alignment for SECAM-LL'
- IF_PLL OFFSET: Default value = 48 ; Do not align
- AFW: AFC Window
- AGC: AGC take-over point
- YD: Default value = 12 ; Do not align
- CL: Default value = 4 ; Do not align
- AFA
- AFB

The items AFA and AFB can not be selected, they are for monitoring purposes only.

The commands MENU UP and MENU DOWN are used to select the next/previous item.

The commands MENU LEFT and MENU RIGHT are used to increase/decrease the value of the selected item. The changed values will be send directly to the related hardware.

The item values are stored in NVM if this sub menu is left.

5.3.2 White tone sub menu

The white tone sub menu contains the following items:

- NORMAL RED
- NORMAL GREEN
- NORMAL BLUE
- DELTA COOL RED
- DELTA COOL GREEN
- DELTA COOL BLUE
- DELTA WARM RED
- DELTA WARM GREEN
- DELTA WARM BLUE

OSD is kept to a minimum in this menu, in order to make white tone alignment possible.

The commands MENU UP and MENU DOWN are used to select the next/previous item.

The commands MENU LEFT and MENU RIGHT are used to increase/decrease the value of the selected item. The changed values will be send directly to the related hardware.

The item values are stored in NVM if this sub menu is left.

The Contrast Plus feature (black stretch) is set to OFF when the white tone submenu is entered.

5.3.3 Audio sub menu

The audio sub menu contains the following items:

- A-FM: Default value = 232 ; Do not align
- AT: Default value = 4 ; Do not align
- STEREO: Default value = 15 ; Do not align
- DUAL: Default value = 12 ; Do not align

The sound adjustments sub menu are not available in Mono sets.

The presence of an item in the menu is dependent on the selected soundboard (option SB).

The commands MENU UP and MENU DOWN are used to select the next/previous item.

The commands MENU LEFT and MENU RIGHT are used to increase/decrease the value of the selected item. The changed values will be sent directly to the related hardware.

The item values are stored in NVM if this sub menu is left.

5.3.4 Geometry sub menu

The geometry sub menu contains the following items:

- SBL : Service blanking
- VSL : Vertical slope
- VAM : Vertical amplitude
- VSH : Vertical shift
- HSH : Horizontal shift
- VSC : Vertical S correction
- H60 : Default value = 10 ; Do not align
- V60 : Default value = 12 ; Do not align
- EWC : E-W corner
- EWT : E-W trapezium
- EWP : E-W parabola
- EWW : E-W width

5.4 Error code buffer and error codes

5.4.1 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:
 1. exiting SDM or SAM with the "Standby" command on the remote control
 2. transmitting the commands "EXIT" with the DST (RC7150)
 3. transmitting the commands "DIAGNOSE-9-9-OK" with the DST.
- By leaving SDM or SAM with the mains switch, the error buffer is not reset.

5 Fault finding and repair tips

Examples:

ERROR: 0 0 0 0 0 : No errors detected

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

ERROR: 5 6 0 0 0 : Error code 6 was first detected and error code 5 is the last detected (newest) error

5.4.2 Error codes

In the case of non-intermittent faults, clear the error buffer before starting the repair to prevent "old" error codes being present. If possible check the entire contents 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.

Error 0 = No error

Error 1 = X-ray (Only for USA sets)

Error 2 = High beam current protection and E/W Horizontal protection

High beam protection active; set is switched to protection; error code 2 is placed in the error buffer; the LED will blink 2 times (repeatedly).

As the name implies, the cause of this protection is a too high beam current (bright screen with flyback lines). Check whether the +200V supply to the CRT panel is present. If the voltage is present, the most likely cause is a fault on the CRT panel. Disconnect the CRT panel to determine the cause. If the +200V voltage is not present, check R3340 (CRT panel - B), R3485 and D6485 (Horizontal Deflection - A2)

EW protection:

If this protection is active, the causes could be one of the following;

- horizontal deflection coil 5445
- linearity coil 5457
- S-correction capacitor 2466/2468
- flyback capacitor 2465
- line output stage
- short circuit of:
- flyback diode 6460
- EW transformer (bridge coil) 5465/5470 or 5463/5471 (version dependent)
- S-correction capacitor 2457
- EW power-transistor 7460 or driver-transistor 7461

Error 3 = Vertical / Frame protection

There are no pulses detected at pin 47 of the main microprocessor 7600 (panel A7).

If this protection is active, the causes could be one of the following items;

- IC 7401 is faulty
- Open circuit of vertical deflection coil
- Vlotaux +11V not present and/or Vlotaux -11V not present
- Resistor 3409

Error 4 = Sound processor I2C error (MSP3415D)

Sound processor does not respond to the micro controller

Error 5 = Bimos start-up error (POR bit)

Bimos start-up register is corrupted or the I2C line to the Bimos is always low or no supply at pin 12 of the Bimos). This error is usually detected during start-up and hence will prevent the set from starting up.

Error 6 = Bimos (TDA8844) I2C error

Note that this error may also be reported as a result of error codes 4 (in that case the Bimos might not be the actual problem)

Error 7 = 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 = Microprocessor internal RAM error

The micro controller internal RAM test indicated an error of the micro controller internal memory (tested during start-up);

Error 9 = EEPROM Configuration error (Checksum error); EEPROM is corrupted.

Error 10 = I2C error EEPROM error. NV memory (EEPROM) does not respond to the micro controller

Error 11 = I2C error PLL tuner. Tuner is corrupted or the I2C line to the Tuner is low or no supply voltage present at pin 9, pin 6 or pin 7 of the tuner.

Error 12 = Black current loop instability protection. The black current could not be stabilised. The possible cause could be a defect in one or more of the RGB amplifiers, RGB guns or RGB driving signals.

5.5 The "blinking LED" procedure

The contents of the error buffer can also be made visible via the "blinking LED" procedure. This is especially useful when there is no picture. There are two methods of access:

1. When the SDM is entered, the LED will blink the number of times, equal to the value of the last (newest) error code (repeatedly).
2. With the DST all error codes in the error buffer can be made visible. Transmit the command: "DIAGNOSE x OK" where x is the position in the error buffer to be made visible x ranges from 1, (the last (actual) error) to 6 (the first error). The LED will operate in the same way as in point 1, but now for the error code on position x.

Example:

Error code position 1 2 3 4 5

Error buffer: 8 9 5 0 0

- after entering SDM: blink (8x) - pause - blink (8x) - etc.
- after transmitting "DIAGNOSE- 2- OK" with the DST blink (9x) - pause - blink (9x) - etc.
- after transmitting "DIAGNOSE- 3- OK" with the DST blink(5x) - pause - blink(5x) - etc.
- after transmitting "DIAGNOSE- 4- OK" with the DST nothing happens

5.6 TROUBLE SHOOTING TIPS

In this paragraph some trouble shooting tips for the deflection and power supply circuitry are described. For detailed diagnostics, use the fault finding tree or use COMPAIR.

5.6.1 THE DEFLECTION CIRCUIT:

1. Check that the +VBATT (140V) is present across 2551 (A1 POWER SUPPLY). If the voltage is not present, disconnect coil 5551 (A1 Power Supply) (Horizontal deflection stage is disconnected). If the voltage is present then the fault might be caused by the deflection circuit. Possible Candidates Are:
 - Transistor 7460 is faulty
 - The driver circuit around transistor 7461 is faulty
 - No horizontal drive signal coming from the BIMOS 7250-D pin 40 (A4 - Synchronisation)
2. Note: If the Collector of 7460 is shorted to the Emitter, a tripping noise will be heard from the power supply circuit.
3. To determine whether the fault is present in the horizontal deflection circuit or in the E/W circuit (A2 - Horizontal Deflection), de-solder jumper 9465 and insert a jumper into position number 9461. This disables the E/W protection. If the basic deflection stage now works correctly (parabolic picture) then the fault is present in the E/W circuit. If there is still no horizontal deflection, then the fault is present in the basic deflection circuitry.
4. The 25V-version (26" tube) and the 27V-version (29" tube) do not have an E/W correction circuit.
5. Also don't forget the protection circuits in the line output stage. If any of these circuits are activated, the set will shut down. Depending on the protection, the led will blink according to the fault defined. In order to determine which protection circuit is active, isolation of each separate circuit is necessary. These protection circuits are:
 - High beam current protection (LED blinks repetitively 2 times) - CRT panel (B)
 - E/W Horizontal protection (LED blinks repetitively 2 times) - Horizontal deflection (A2)
 - Vertical protection (LED blinks repetitively 3 times) - Vertical deflection (A3)

5.6.2 THE POWER SUPPLY

To trouble shoot the L9.1E SMPS, first check the Vaux voltage on C2561. If this voltage is not present, check fuse F1572 and D6560. If F1572 or D6560 is not open circuit, the problem might be caused on the primary side of the switching supply. Check the output of the bridge rectifier on the C2508 for approximately 300V DC. If this voltage is missing, check the bridge rectifier 6505 and the fuse 1500. If fuse F1500 is found to be open circuit, check MOSFET 7518 to make sure that there is no short circuit present and check R3518. If the 300V DC is present on C2508, check for a start-up voltage of approx. 13V on pin 1 of IC7520. If no start-up voltage is present, check if R3510 is open; zener 6510 is a short-circuit. It is necessary to have a feedback signal from the hot primary side of switch mode transformer T5545 at pin 8 and pin 9 for the power supply to oscillate. If this start-up voltage is present on pin 1 of IC7520 and the supply is not oscillating, check R3529 and D6540.

Check for a drive signal at the gate of MOSFET 7518, square wave signal - P2. Check pin 3 of IC7520, R3525 and D6514

To determined whether OVP is active, check whether Vaux is present at C2561.

5.7 Customer Service Mode (CSM)

All L9.1E sets are equipped with the "Customer Service Mode" (CSM). CSM is a special service mode that can be activated and deactivated by the customer, following a request from the service technician/dealer perhaps during a telephone conversation to identify the status of the set. This CSM is a 'read only' mode, therefore modifications or changes while the set is in this mode are not possible.

Entering the Customer Service Mode. The Customer Service Mode can be switched on by pressing simultaneously the button (MUTE) on the remote control and any key on the control buttons (P+, P-, VOL +, VOL -) on the TV for at least 4 seconds.

When the CSM is activated:

- picture and sound settings are set to nominal levels
- "Service unfriendly modes" are ignored

Exit the Customer Service Mode.

The Customer Service Mode will switch off after:

- pressing any key on the remote control handset (except "P+" or "P-")
- switching off the TV set with the mains switch.

All settings that were changed when CSM was activated are set back to the initial values

5.7.1 The Customer Service Mode information screen

The following information is displayed on screen:

- Line number for every line (to make CSM language independent)
- Operating hours
- Software version L90BBC X.Y)
- Text "CSM" on the first line
- Error buffer contents
- Option code information
- Configuration information
- Service unfriendly modes

```

1 HHHH L90BBC-X.Y           CSM
2 CODES xx xx xx xx xx
3 OP xxx xxx xxx xxx xxx xxx
4 SYS: xxxxxxxxxxxx
5 NOT TUNED
6 TIMER
7 LOCKED
8 (HOSPITAL) (HOTEL)
9 VOL LIM <value>
    
```

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080299

Figure 5-3 : Screen lay-out Customer Service Mode

SYS: xxxxxx = xxxxxx is the SYSTEM THAT IS SET FOR THIS PRESET

NOT TUNED = no ident signal present

TIMER = (SLEEP) TIMER is activated

LOCKED = Channel/preset locked via parental lock, child lock

HOTEL = HOTEL mode activated; HOSPITAL = HOSPITAL mode activated

VOL LIM > = Volume limiter activated and set to >

5.7.2 Exit

Any key (RC or local keyboard) except "channel up" / "channel down" (standby switched to standby, mains OFF switches set off, other keys switch to normal operation)

5.8 Compar

5.8.1 Introduction

Compar (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. Compar is a further development on the DST service remote control allowing faster and more accurate diagnostics. Compar has three big advantages:

- Compar helps you to quickly get an understanding how to repair the L9.1E in short time by guiding you step by step through the repair procedures.
- Compar 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; Compar takes care of this.
- Compar speeds up the repair time since it can automatically communicate with the L9.1E (when the micro processor is working) and all repair information is directly available. When Compar is installed together with the SearchMan L9.1E electronic manual, schematics and PCBs are only a mouse-click away.

Compar consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The Compar interface box is connected to the PC via a serial or RS232 cable. In case of the L9.1E chassis, the Compar interface box and the L9.1E communicate via an I2C cable (bi-directional) and via infra red communication (uni-directional; from Compar interface box to L9.1E)

The Compar fault finding program is able to determine the problem of the defective television. Compar can gather diagnostic information in 2 ways:

1. Communication to the television (automatic)
2. Asking questions to you (manually)

Compar combines this information with the repair information in its database to find out how to repair the L9.1E.

Automatic information gathering

Reading out the error buffer, Compar can automatically read out the contents of the entire error buffer.

Diagnosis on I2C level. Compar can access the I2C bus of the television. Compar can send and receive I2C commands to the micro controller of the television. In this way it is possible for Compar to communicate (read and write) to devices on the I2C busses of the L9.1E.

Manual information gathering

Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extent. When this is not the case, Compar will guide you through the fault finding tree by asking you questions and showing you examples. You can answer by clicking on a link (e.g. text or an waveform pictures) that will bring you to the next step in the faultfinding process.

A question could be: Do you see snow? (Click on the correct answer)

YES / NO

An example can be: Measure testpoint I7 and click on the correct oscillogram you see on the oscilloscope

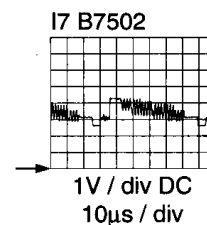


Figure 5-4

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

Additional features

Beside fault finding, Compar provides some additional features like:

- Uploading/downloading of presets
- Managing of preset lists
- Emulation of the Dealer Service Tool

5.8.2 Connecting the Compar interface

The Compar Browser software should be installed and setup before connecting Compar to the L9.1E. (See the Compar Browser Quick Reference Card for installation instructions.)

1. Connect the RS232 interface cable to a free serial (COMM) port on the PC and the Compar interface PC connector (connector marked with "PC").
2. Place the Compar interface box straight in front of the television with the infrared window (marked "IR") directed to the television LED. The distance between Compar interface and television should be between 0.3 and 0.6 meter. (Note: make sure that (also) in the service position, the Compar interface infra red window is pointed to the standby LED of the television set (no objects should block the infra red beam))
3. Connect the mains adapter to the connector marked "POWER 9V DC" on the Compar interface
4. Switch the Compar interface OFF
5. Switch the television set OFF with the mains switch
6. Remove the rear cover of the television set
7. Connect the interface cable (4822 727 21641) to the connector on the rear side of the Compar interface that is marked "I2C" (See Figure 5.6)
8. Connect the other end of the interface cable to the Compar connector on the monocarrier (see figure 5.7)
9. Plug the mains adapter in the mains outlet and switch ON the interface. The green and red LEDs light up together. The red LED extinguishes after approx. 1 second (the green LED remains lit).
10. Start-up Compar and select "File" menu, "Open..."; select "L9.1E Fault finding" and click "OK"
11. Click on the icon (fig. 5.5) to switch ON the communication mode (the red LED on the Compar interface wil light up)
12. Switch on the television set with the mains switch
13. When the set is in standby. Click on "Start-up in Compar mode from standby" in the Compar L9.1E fault finding tree, otherwise continue.


Figure 5-5

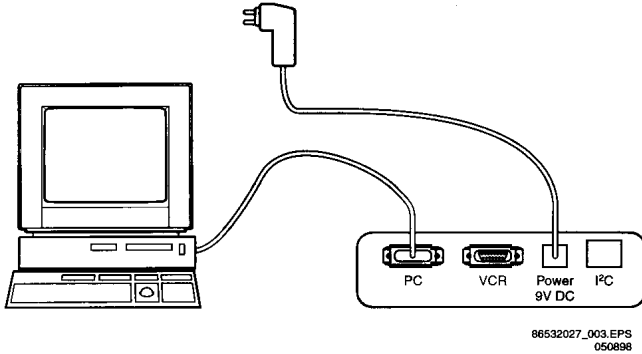


Figure 5-6

The set has now started up in Compair mode. Follow the instruction in the L9.1E fault finding tree to diagnose the set. Note that the OSD works but that the actual user control is disabled

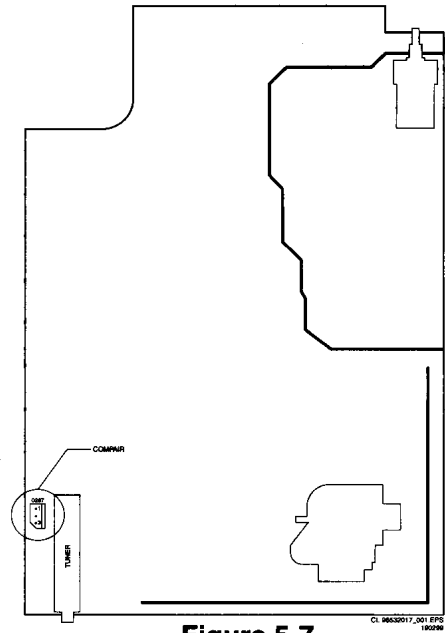


Figure 5-7

5.8.3 Preset installation

Presets can be installed in 2 ways with the L9.1E.

- Via infra red
 - only sending TO the television
 - the rearcover does NOT have to be removed

Click on "File" "Open" and select "TV - use Compair as DST" to use infra red

- Via cable
 - sending TO the television and reading FROM the television
 - the rearcover has to be removed

Click on "File" "Open" and select "L9.1E fault finding" to use the cable

Presets can be installed via menu "Tools", "Installation", "Presets".

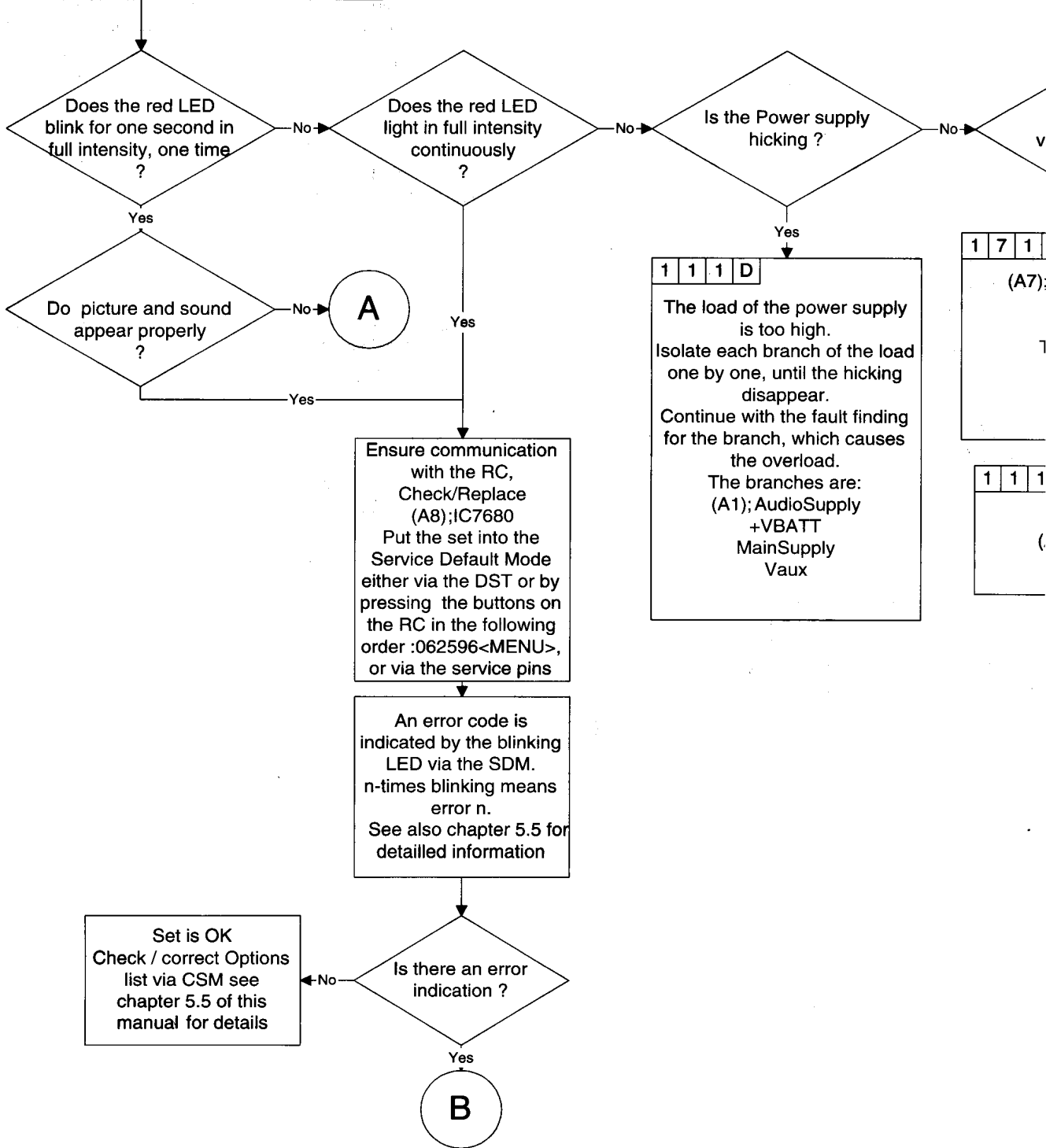
5.9 Ordering Compair

Compair order codes:

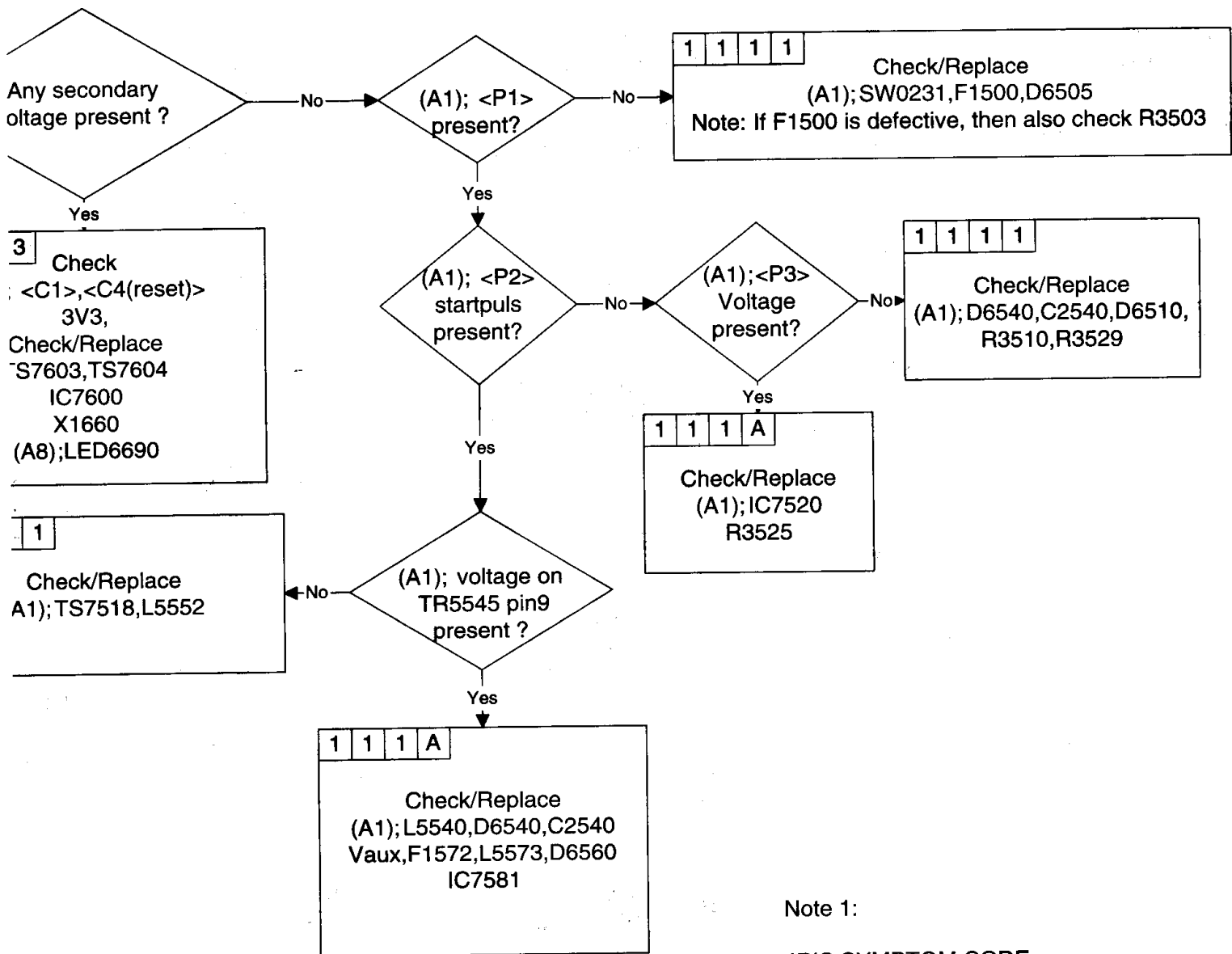
- Starterkit Compair+SearchMan software + Compair interface (excluding transformer): 4822 727 21629
- Compair interface (excluding transformer): 4822 727 21631
- Compair transformer (continental) Europe: 4822 727 21632
- Compair transformer United Kingdom: 4822 727 21633
- Starterkit Compair software: 4822 727 21634
- Starterkit SearchMan software: 4822 727 21635
- Starterkit Compair+SearchMan software: 4822 727 21636
- Compair CD (update): 4822 727 21637
- SearchMan CD (update): 4822 727 21638
- Compair interface cable (for L9.1E): 4822 727 21641

START
 Connect a pattern generator to the arial input.
 Set Patt.gen. to 475,25 MHz, colourbar, stereosound,
 PAL B/G (for France SECAM I).
 Put the Mainsswitch : on.
 In normal conditions the set will start with the Red LED
 blinking for one second in full intensity, one time then
 after a few seconds more in half intensity while the
 picture and sound will appear.

Remark :
 In normal operation the
 Red LED lights in half
 intensity and in
 standby-mode the LED
 lights in full intensity

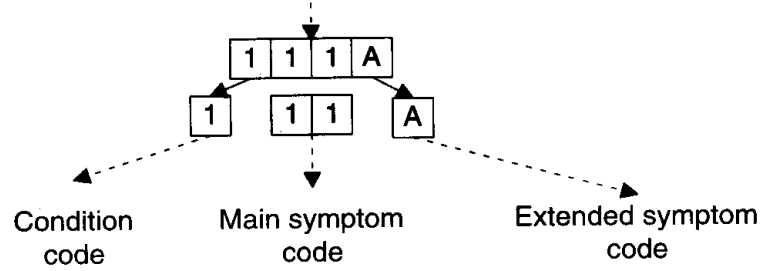


1 7 1
 (A7)
 7
 1 1 1
 ()



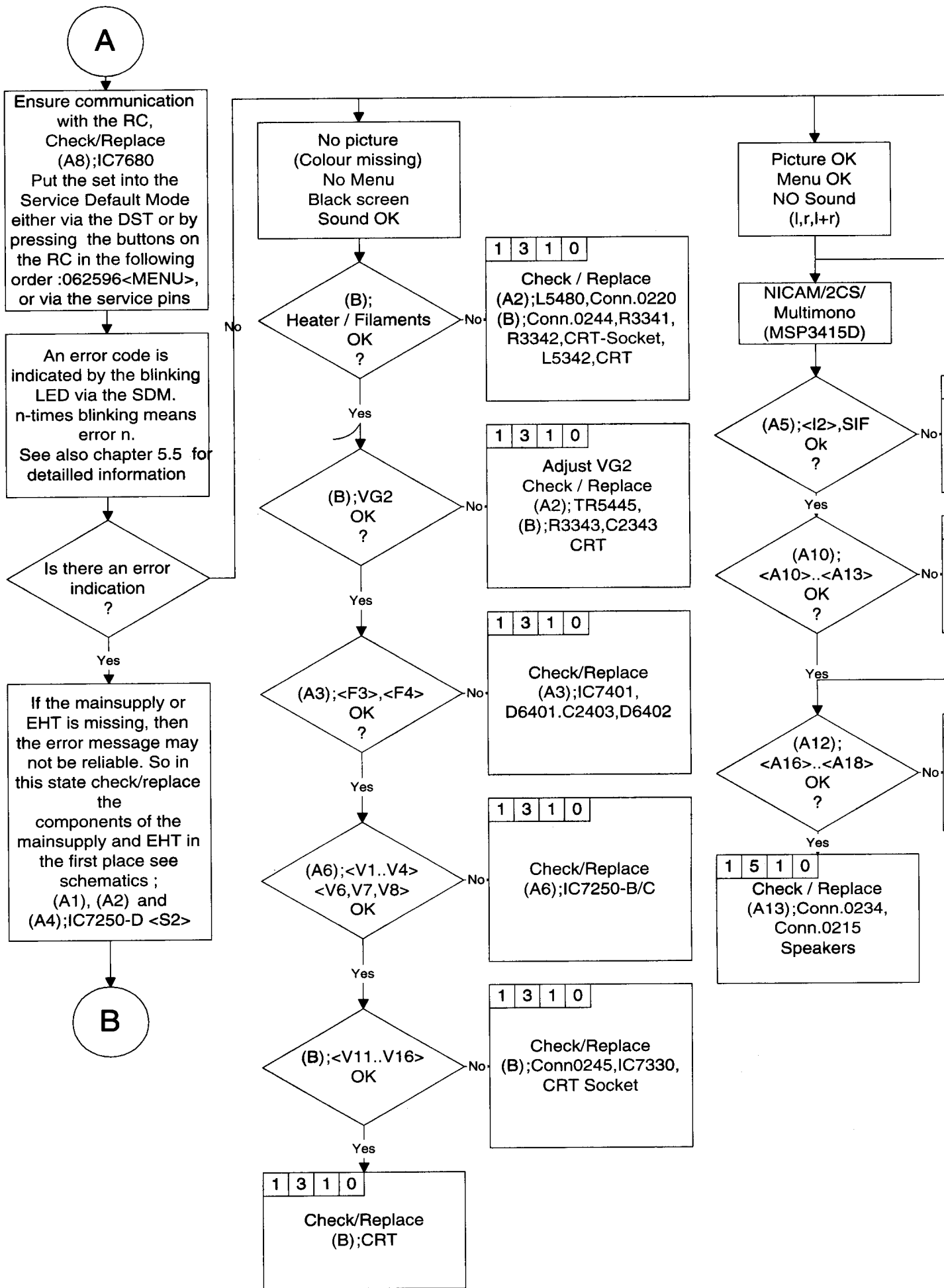
Note 1:

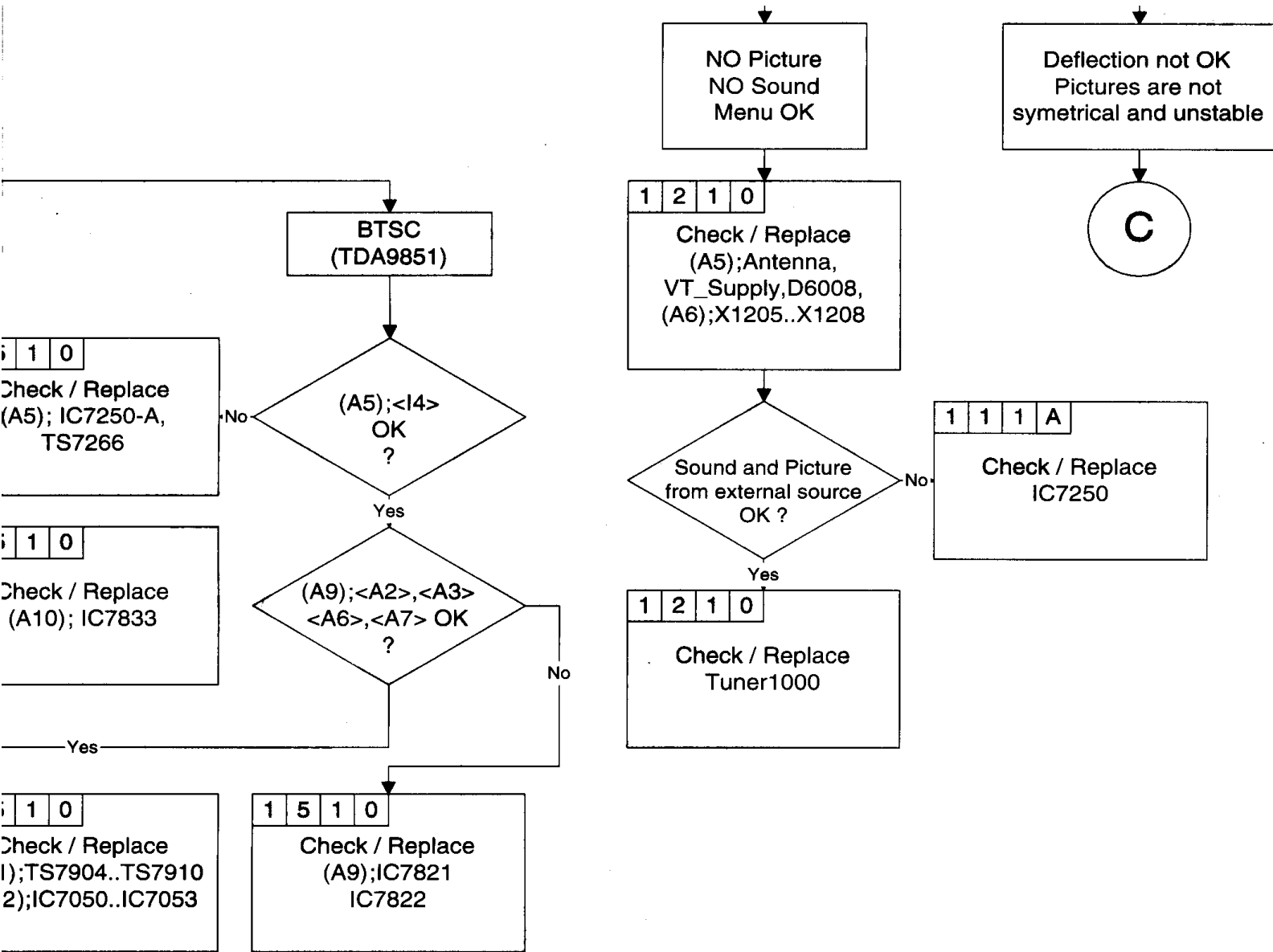
IRIS SYMPTOM CODE

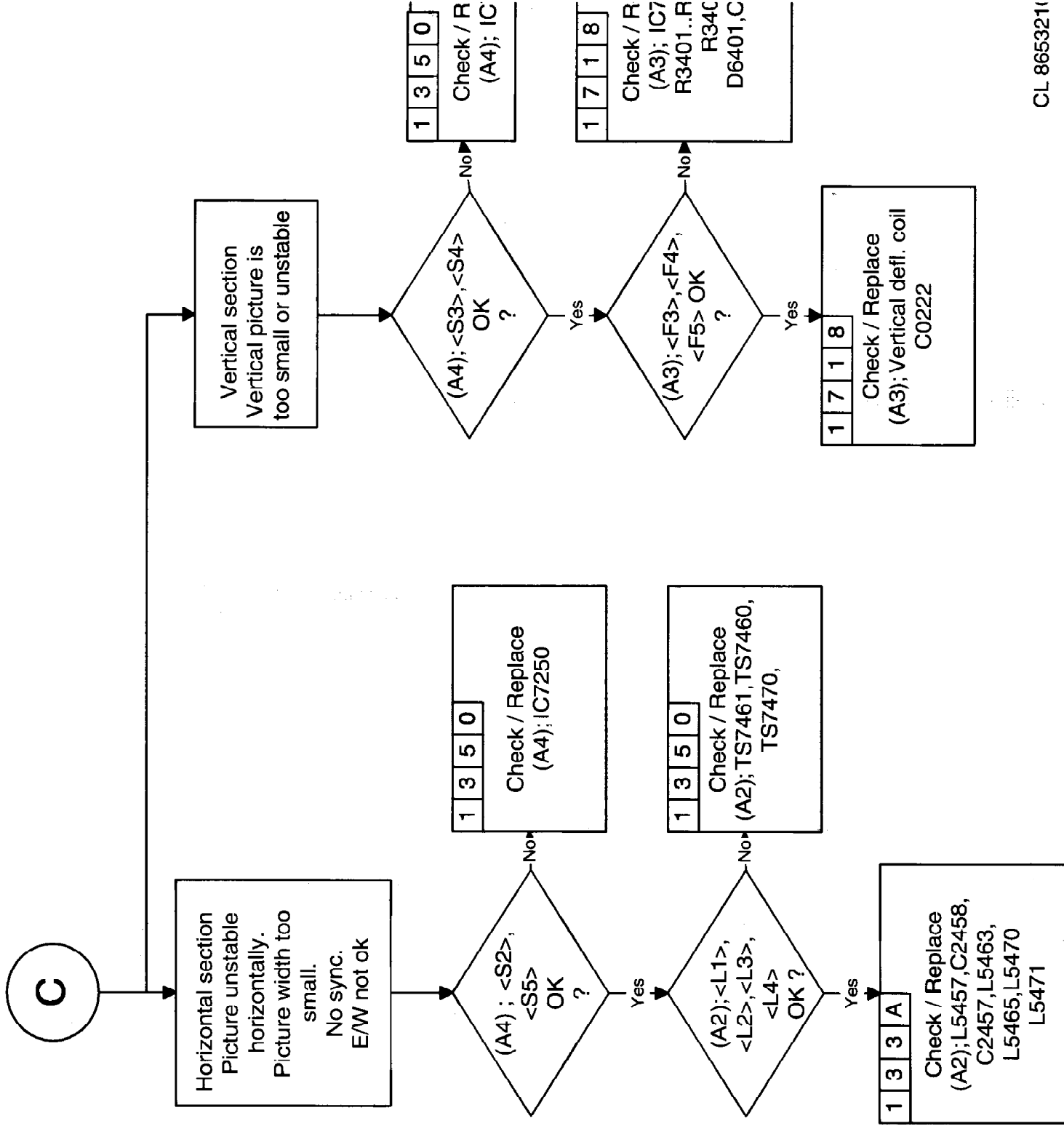


Note 2:

(A1) means Drawing A1
 <P1> means Test point P1

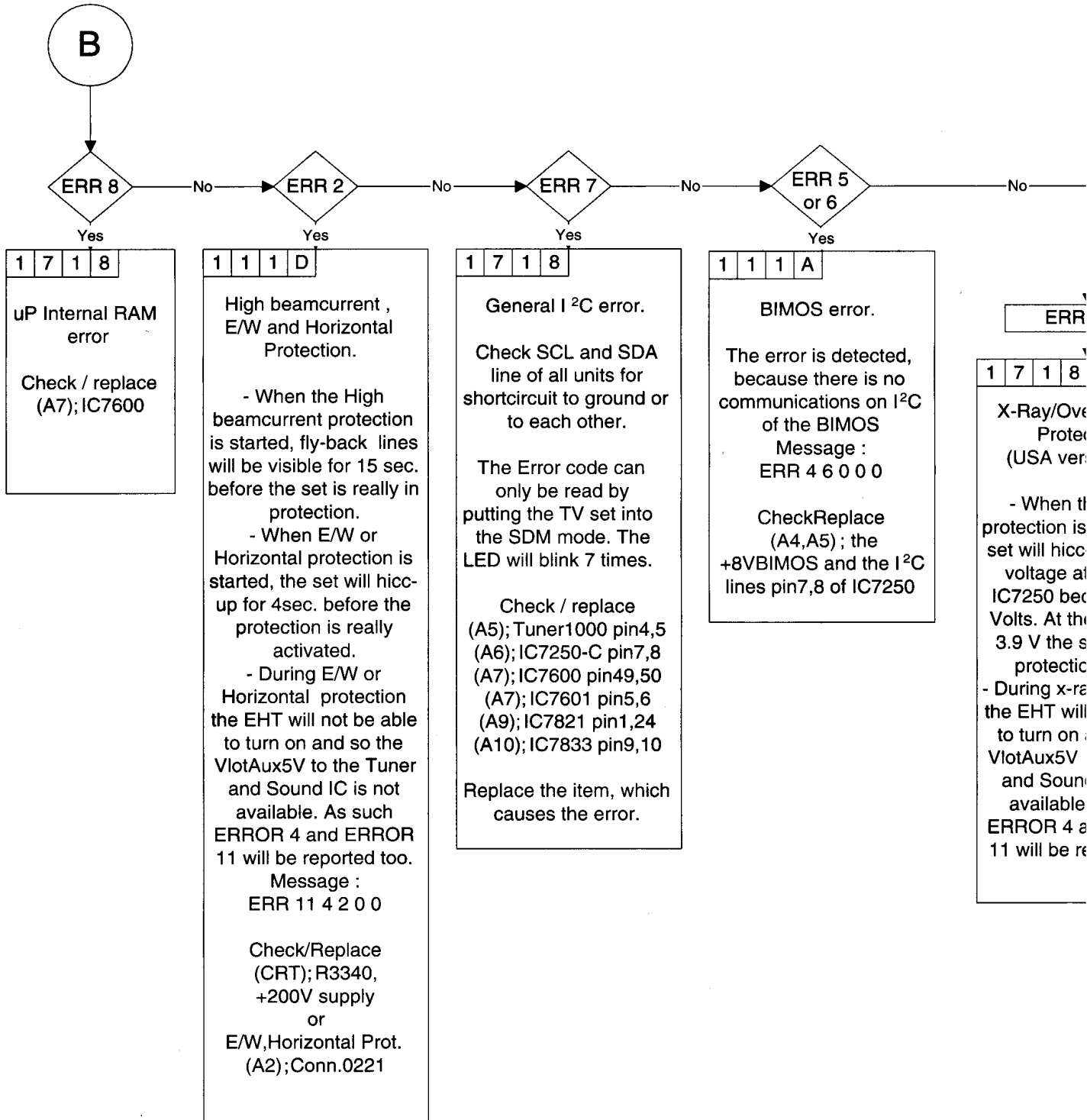




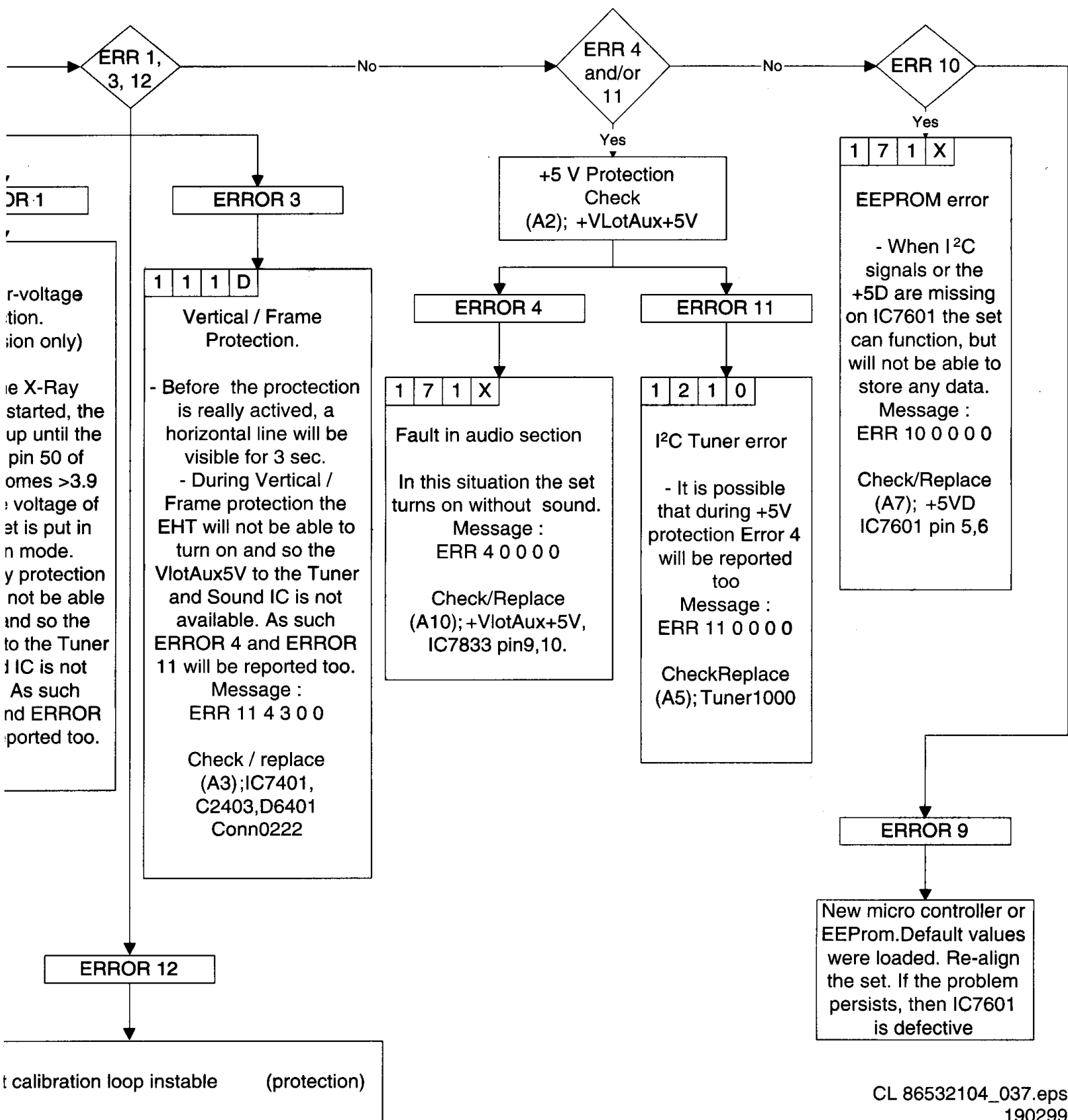


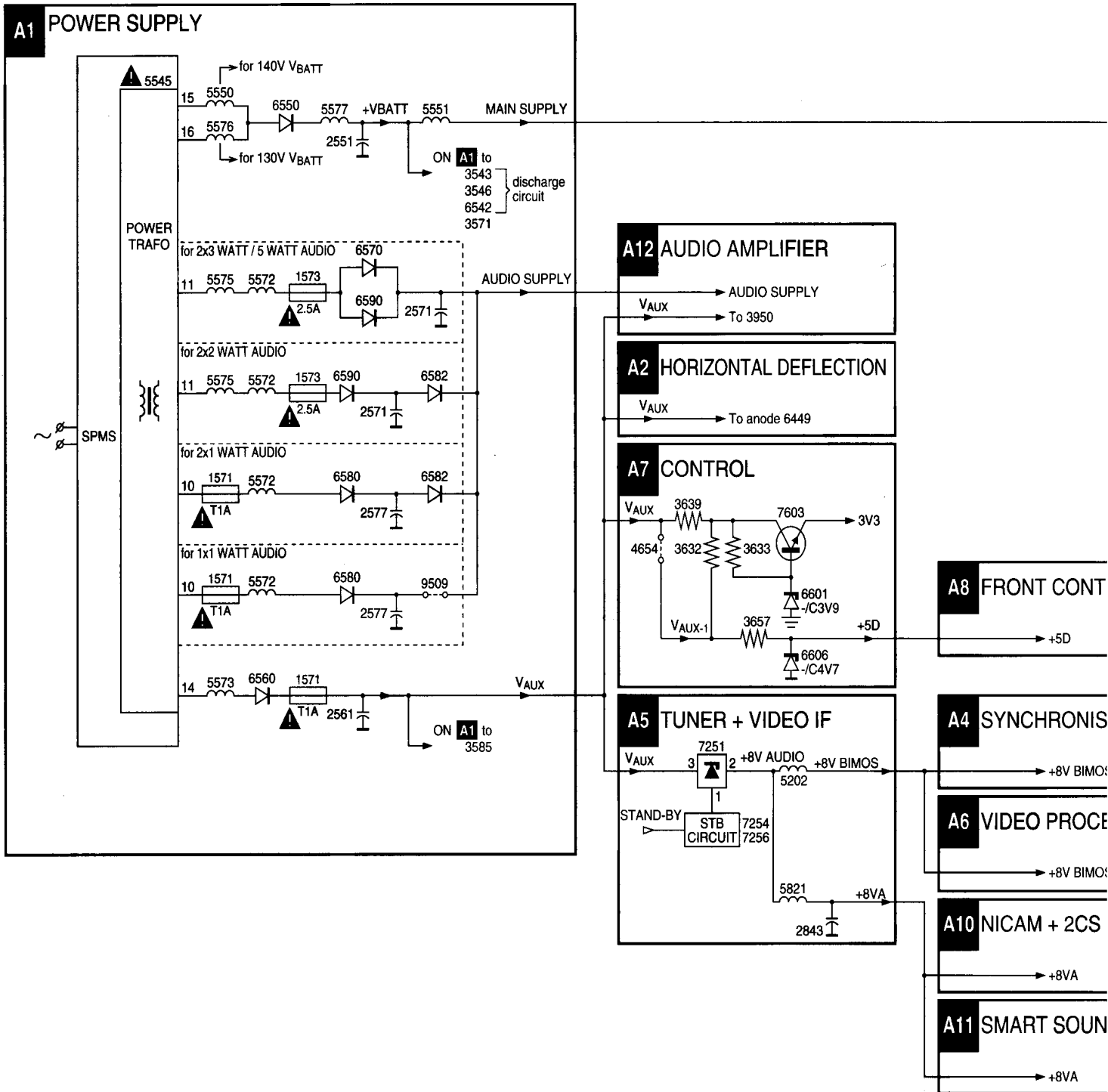
eplace
7250

eplace
'401 ,
3403,
19
2403

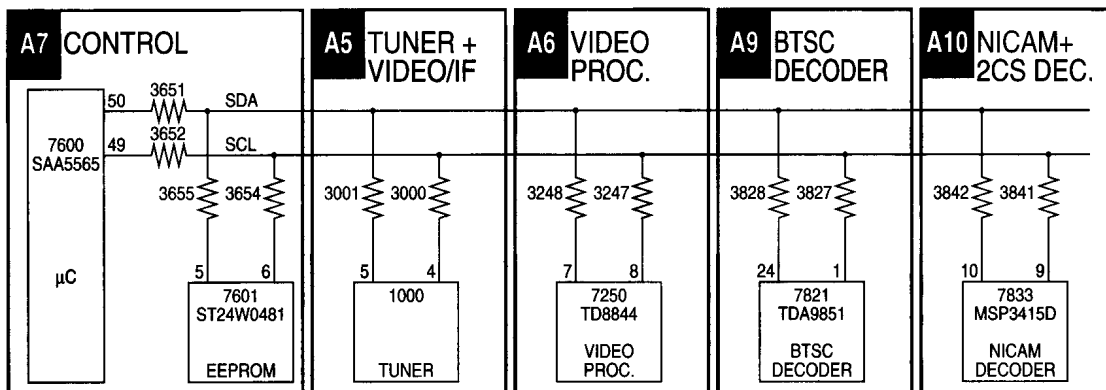


Black current

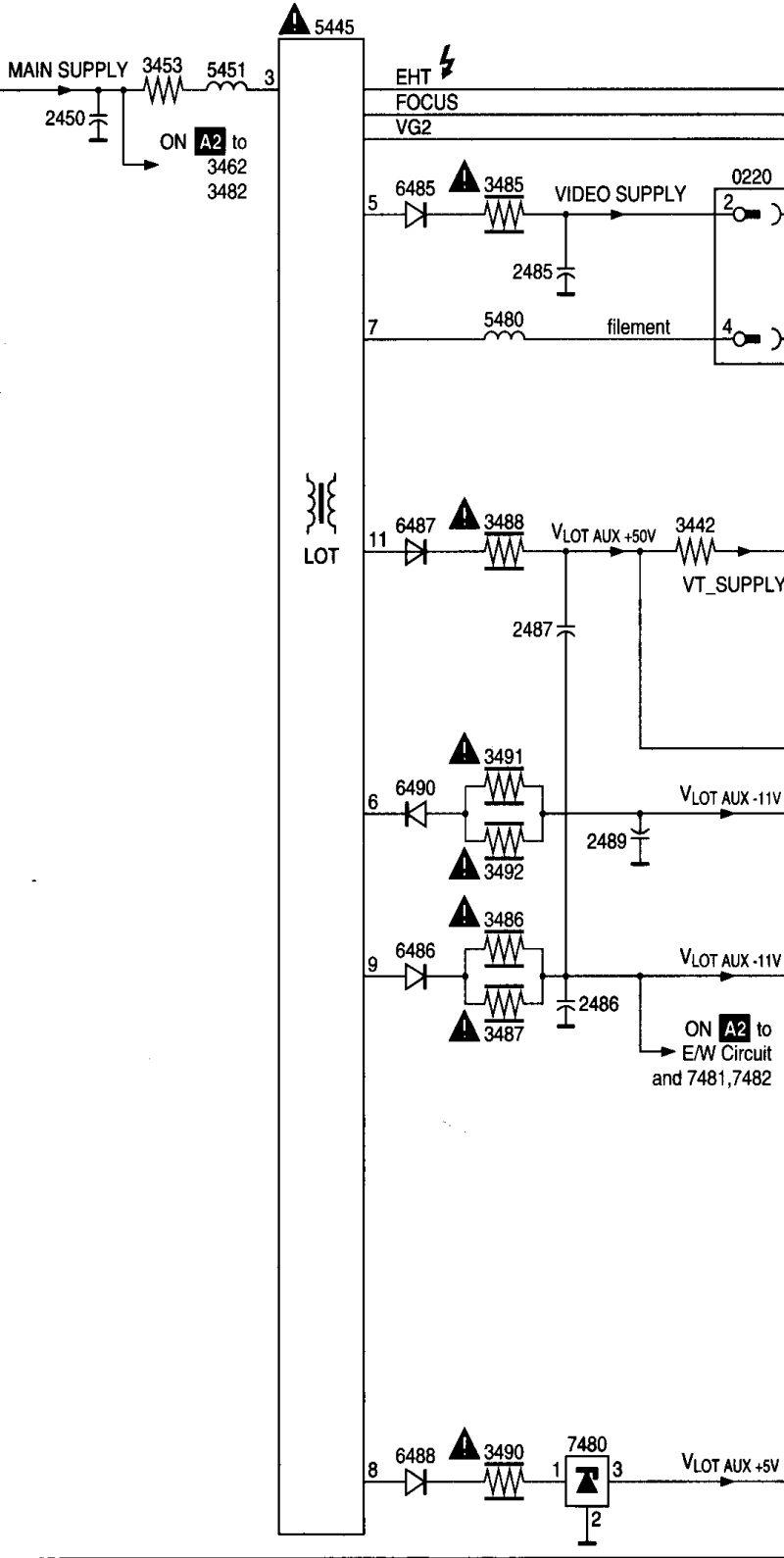




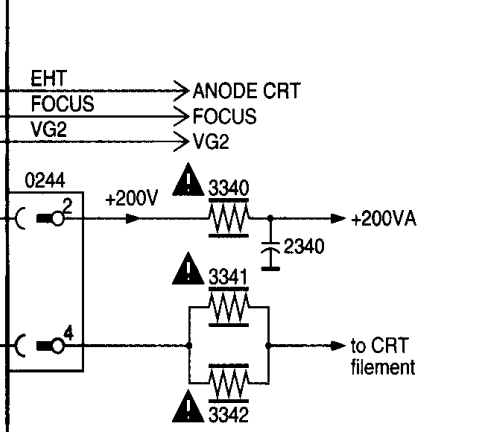
IIC BUS INTERCONNECTION DIAGRAM



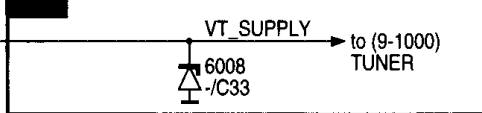
A2 HORIZONTAL DEFLECTION



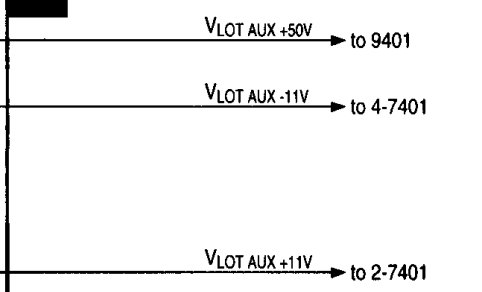
B CRT



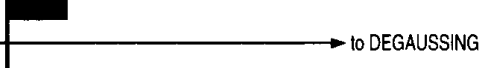
A5 TUNER



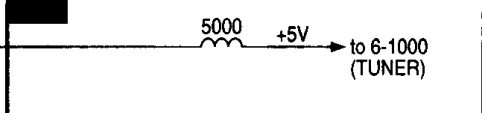
A3 VERTICAL DEFLECTION



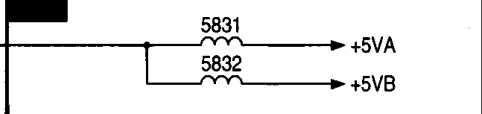
A1 POWER SUPPLY



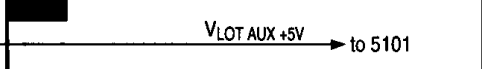
A5 TUNER + VIDEO IF



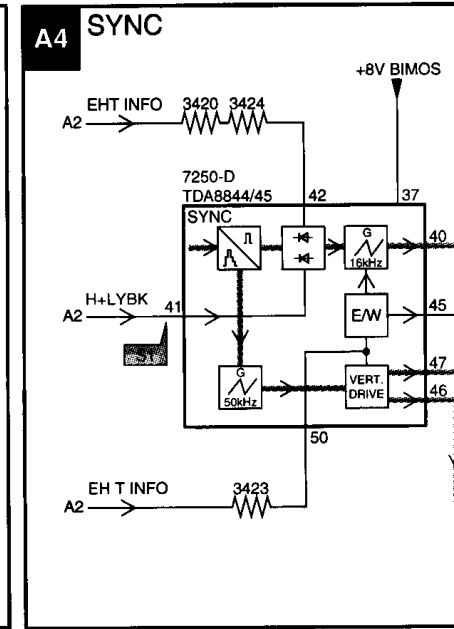
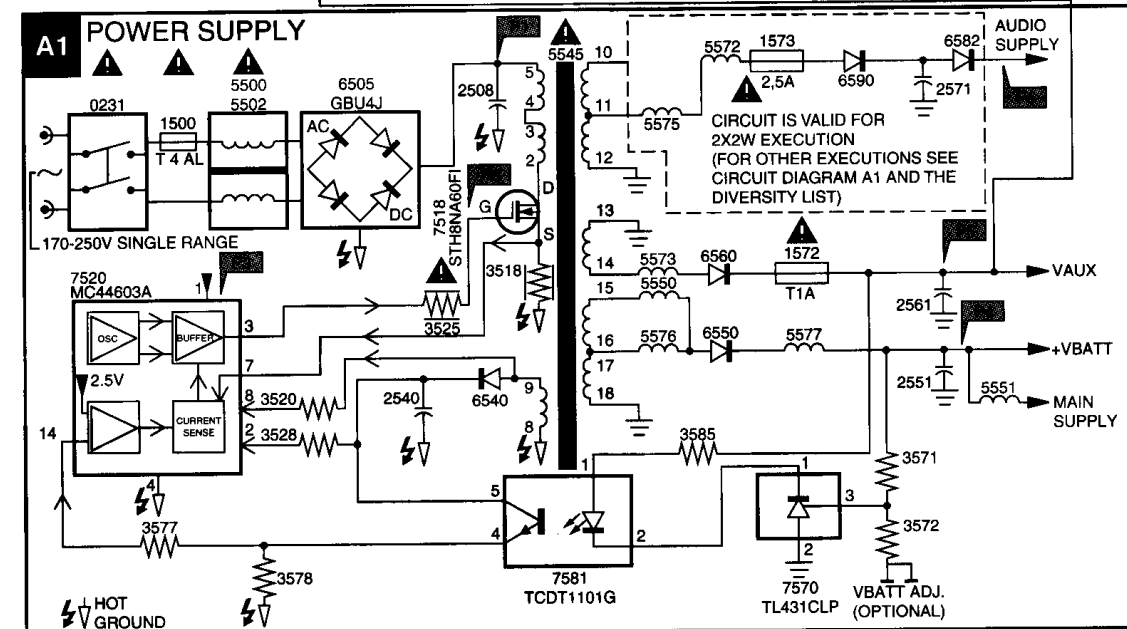
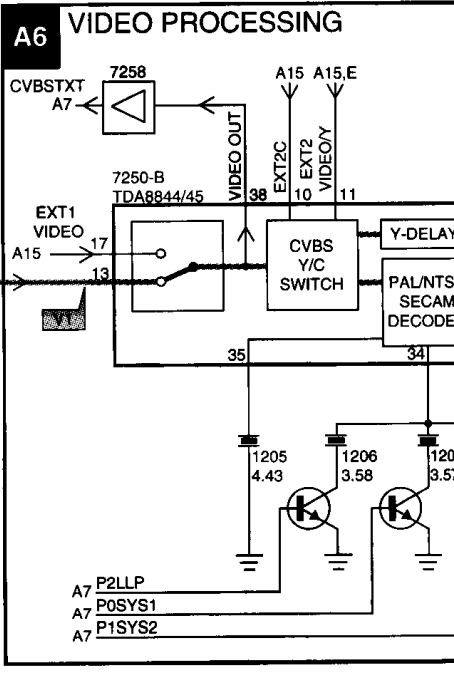
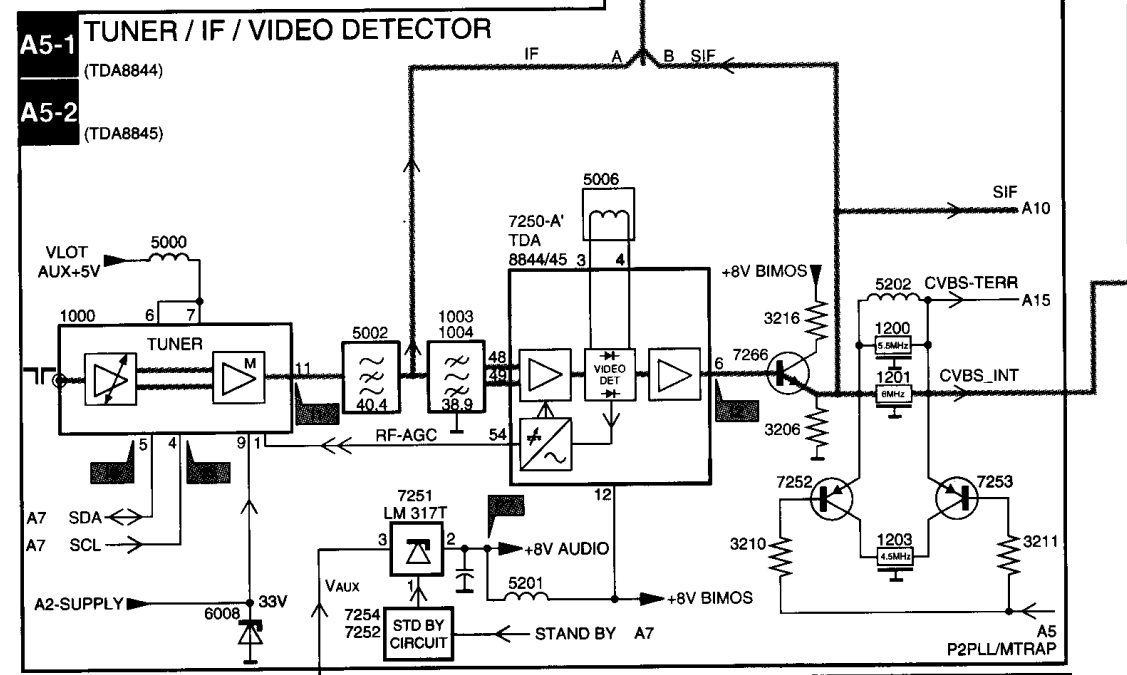
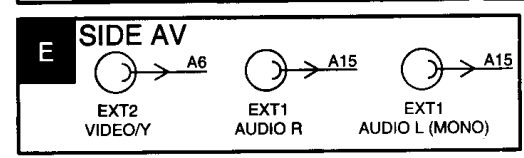
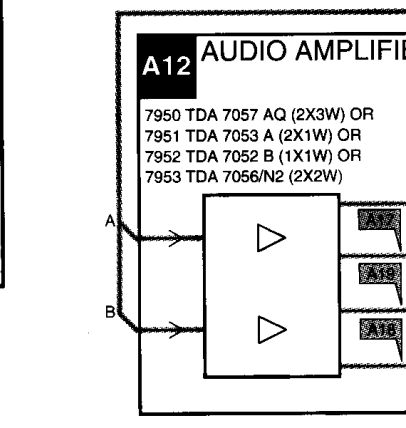
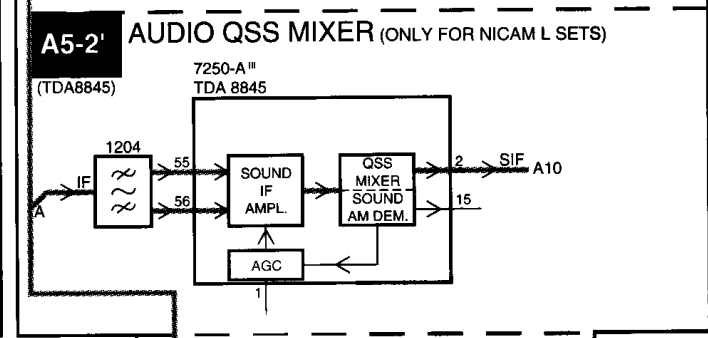
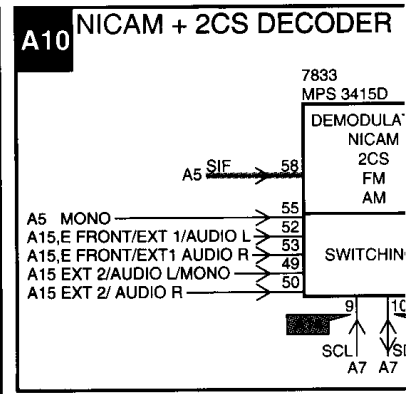
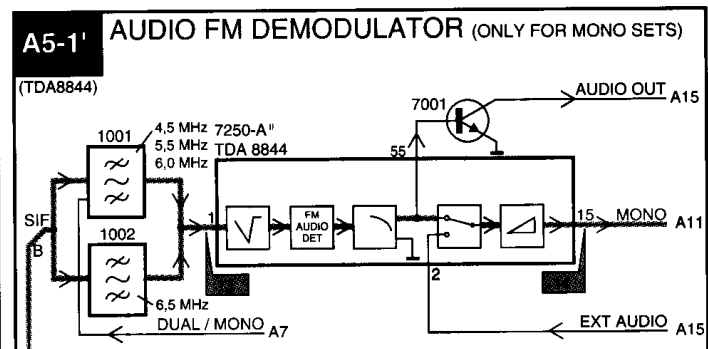
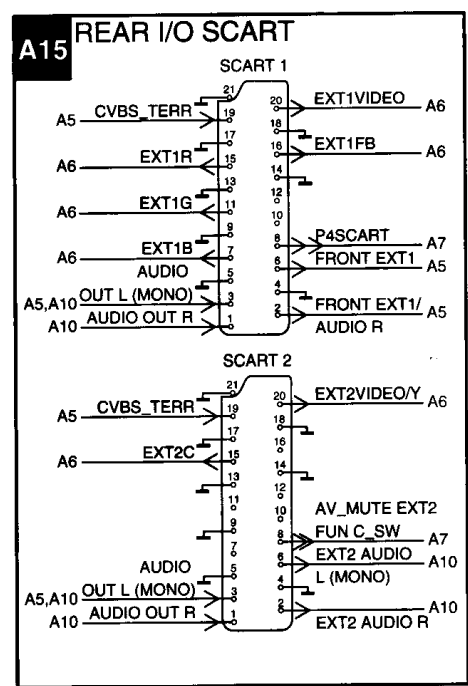
A10 NICAM + 2CS DECODER

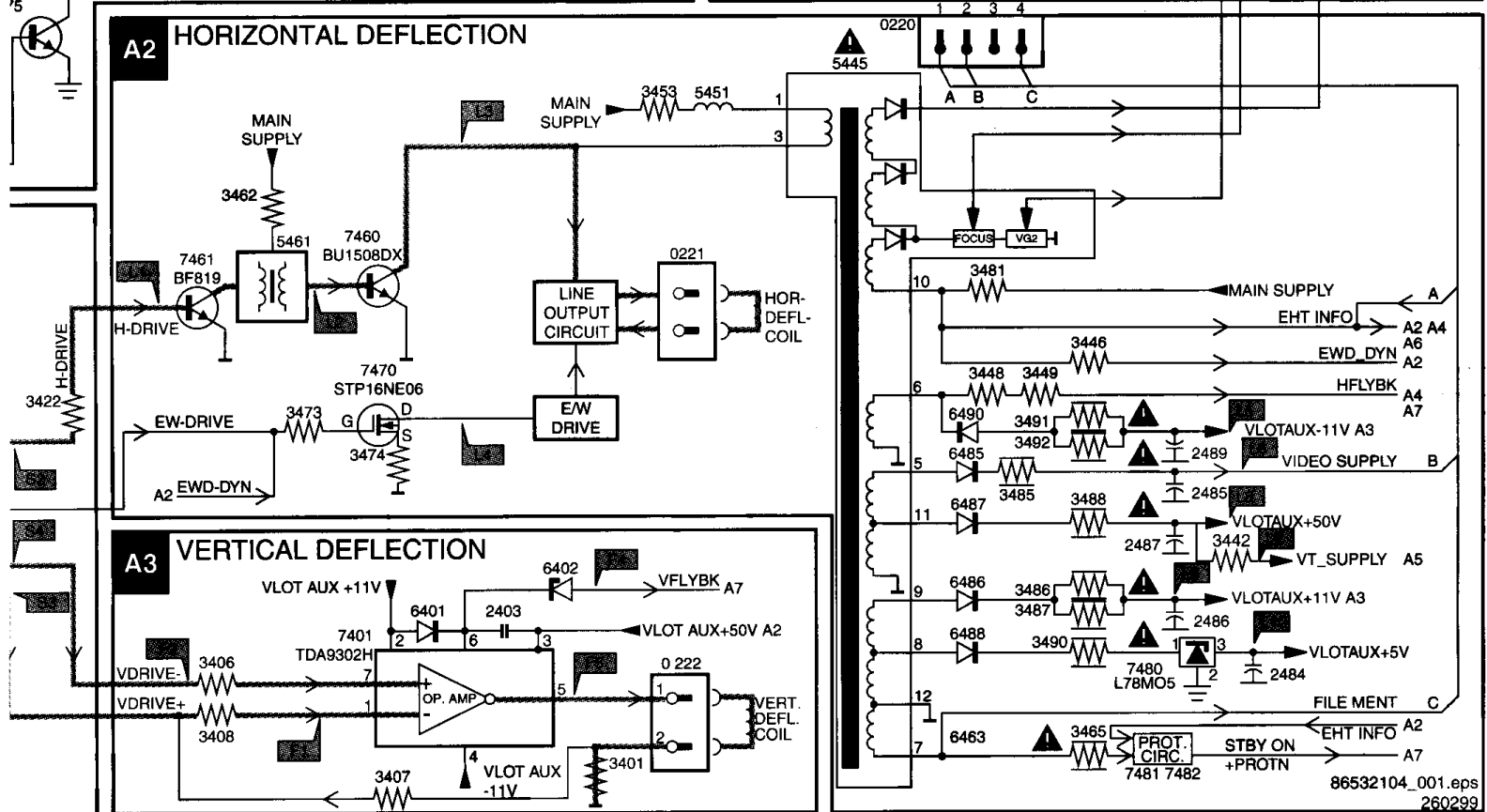
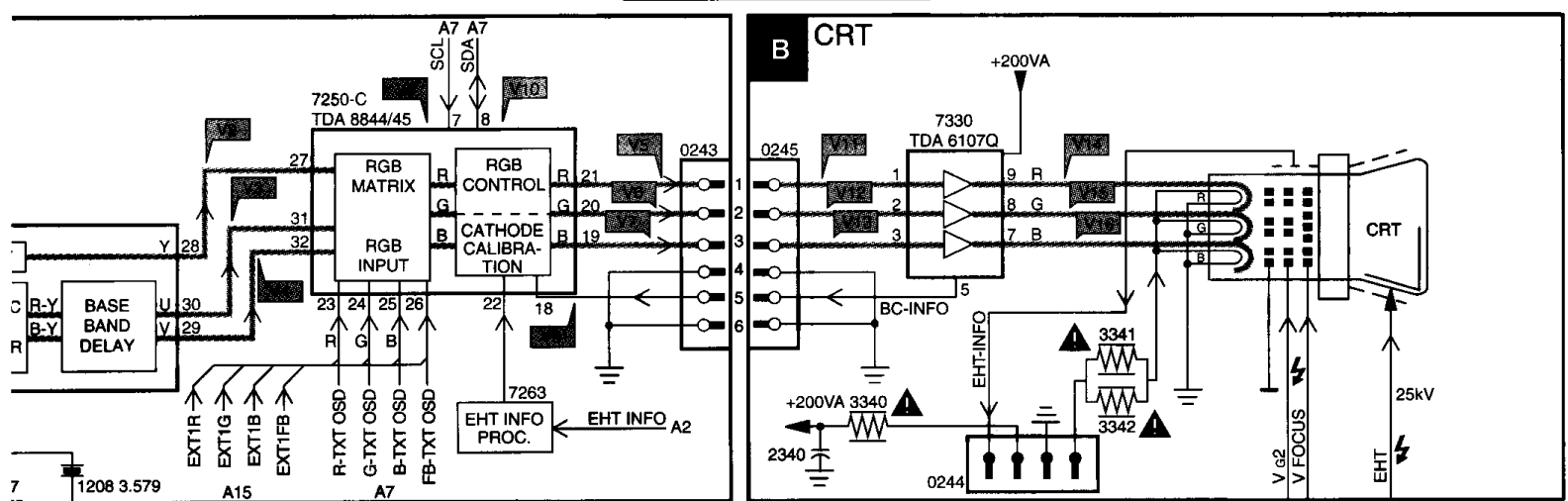
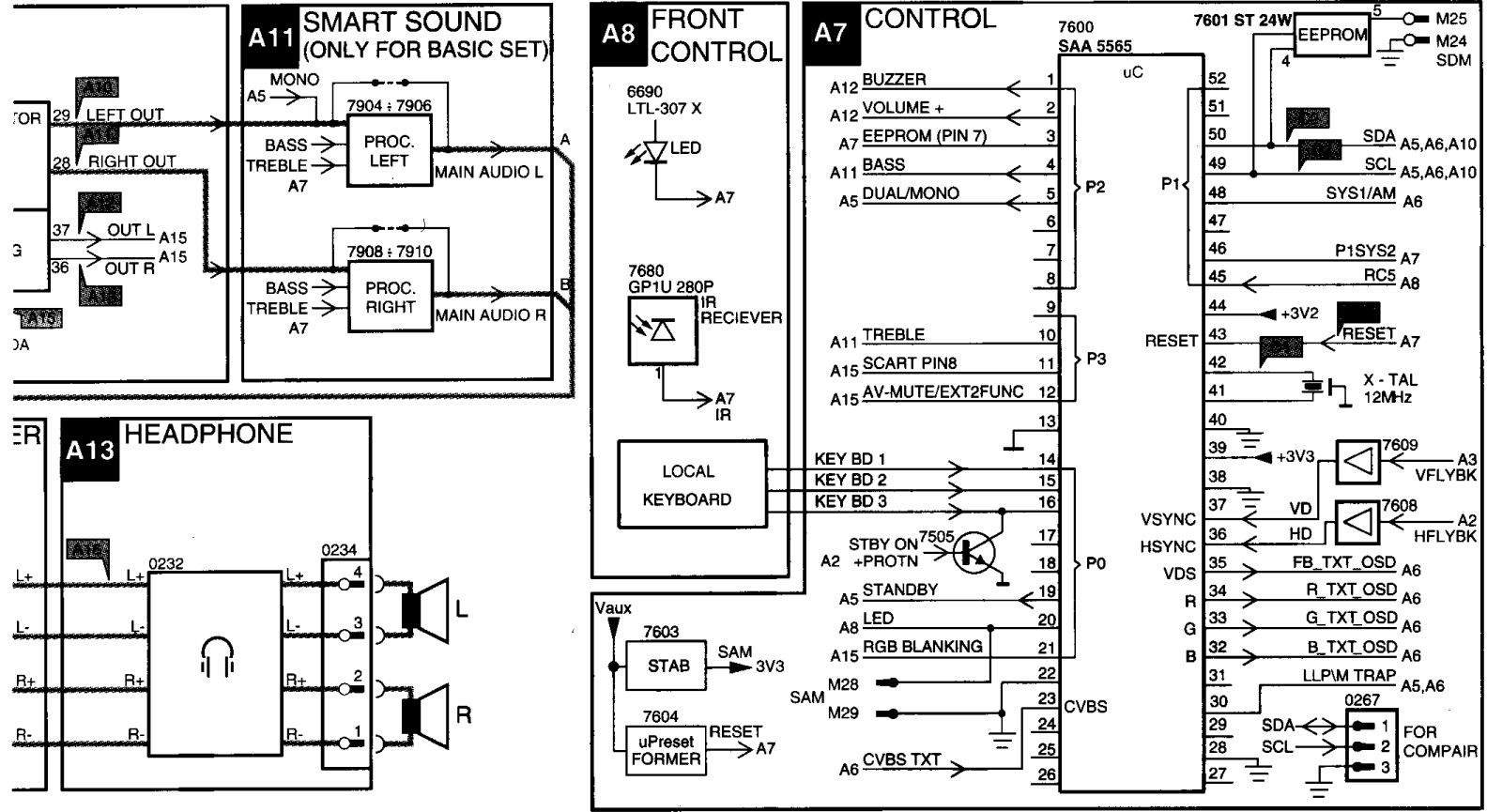


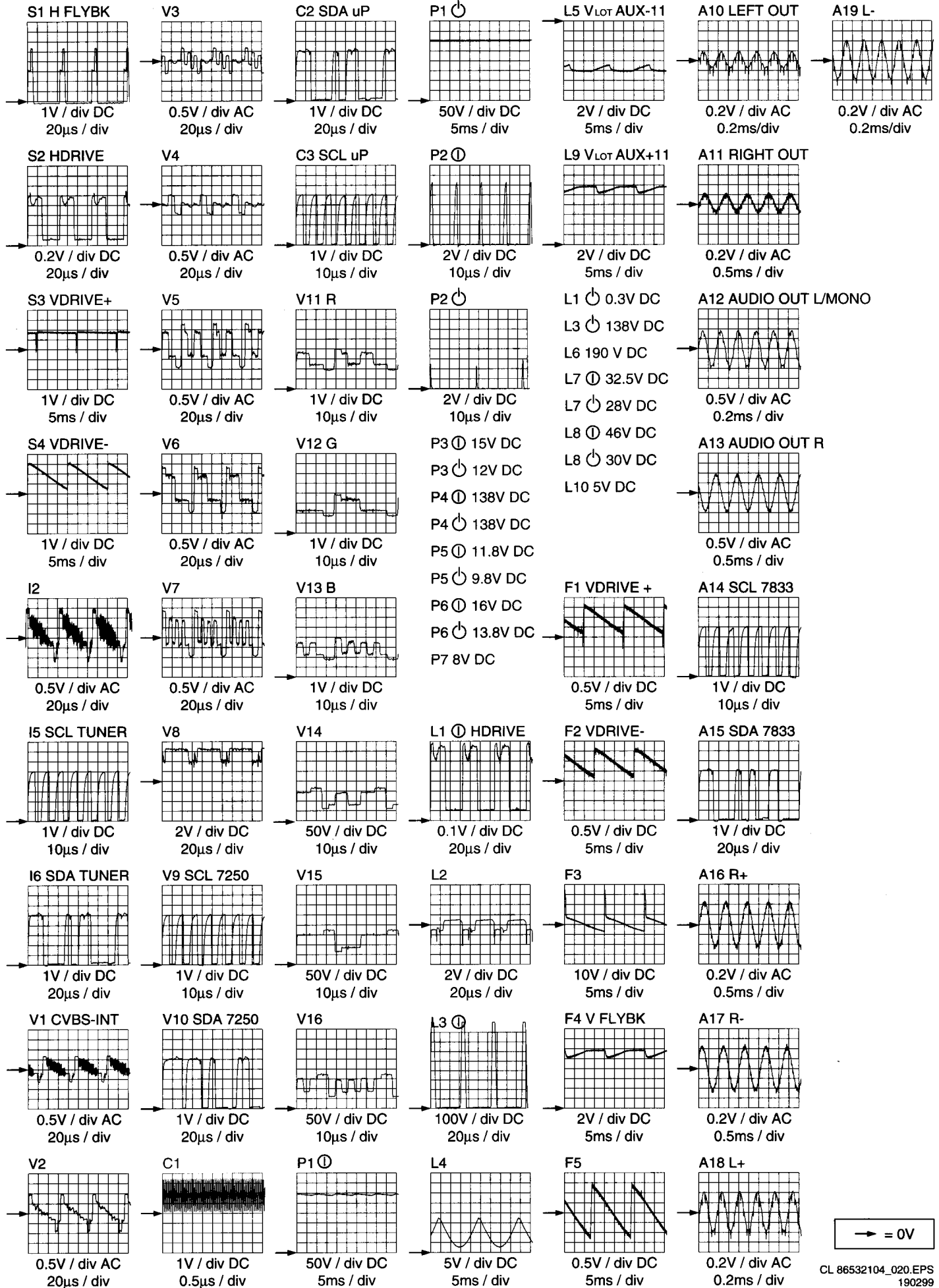
A15 REAR I/O SCART



- ROL
- ATION
- SSING
- DECODER
- D

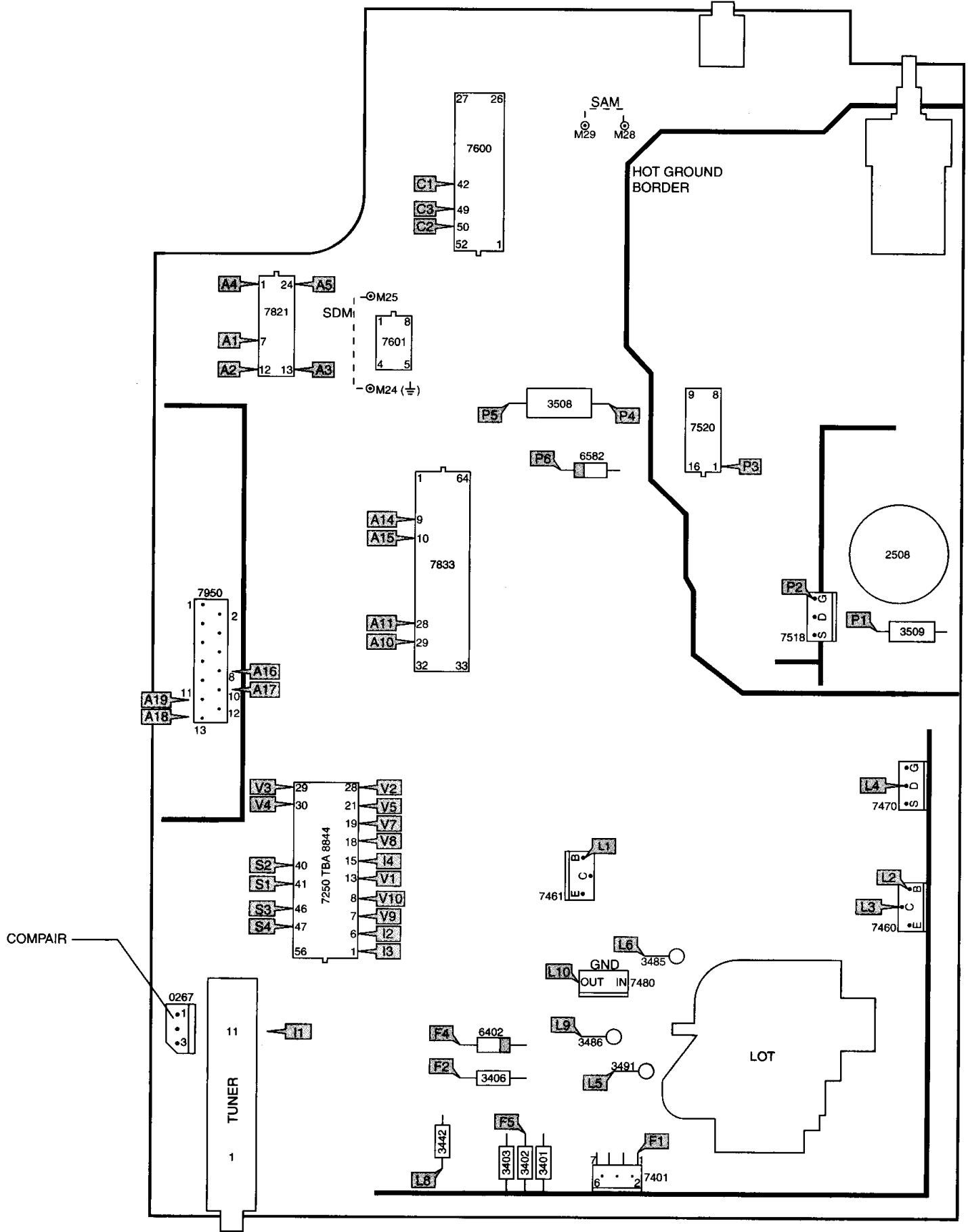




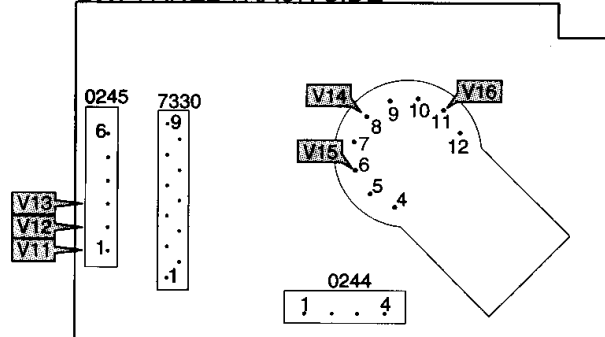


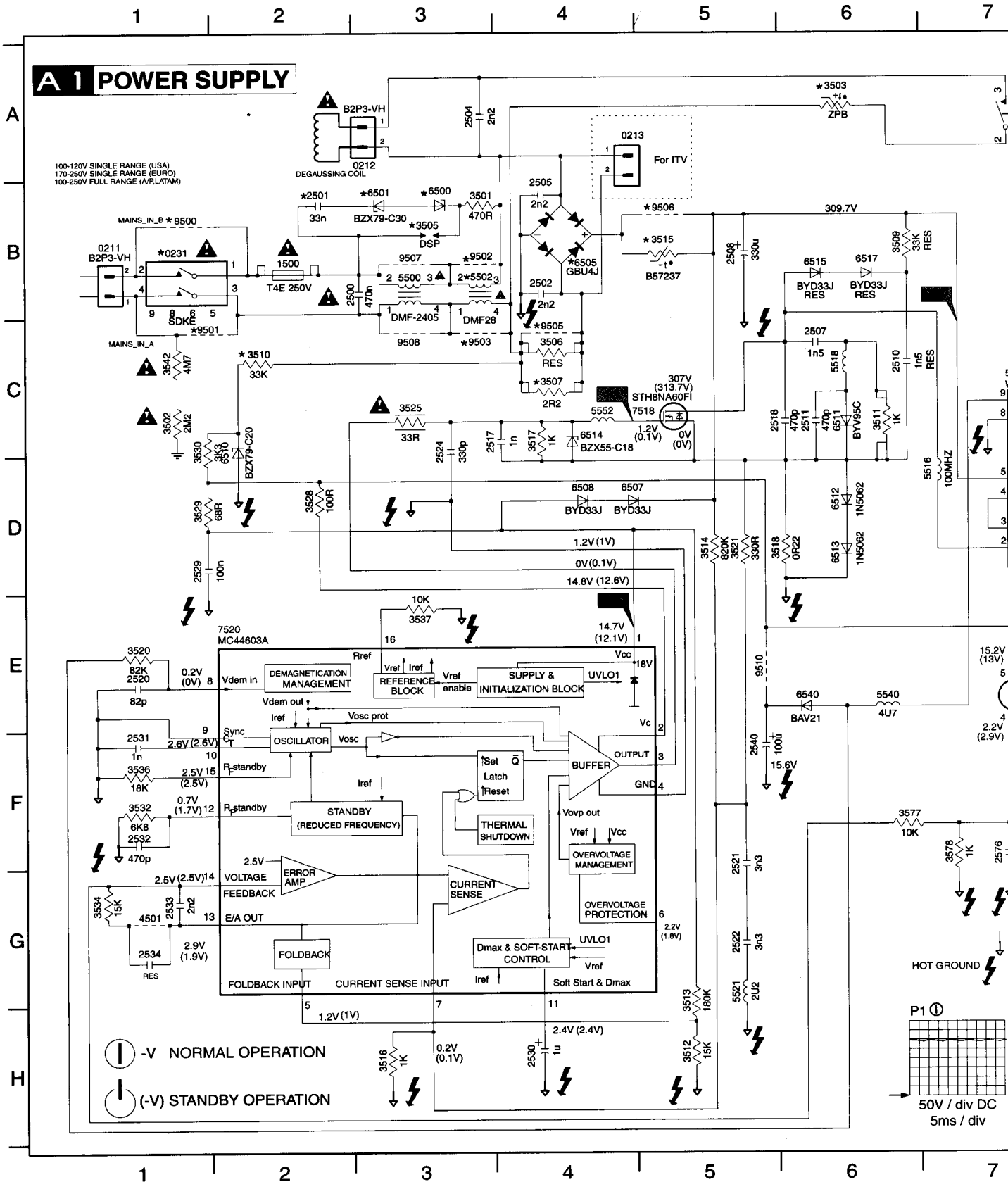
→ = 0V

MAIN PANEL COMPONENT SIDE

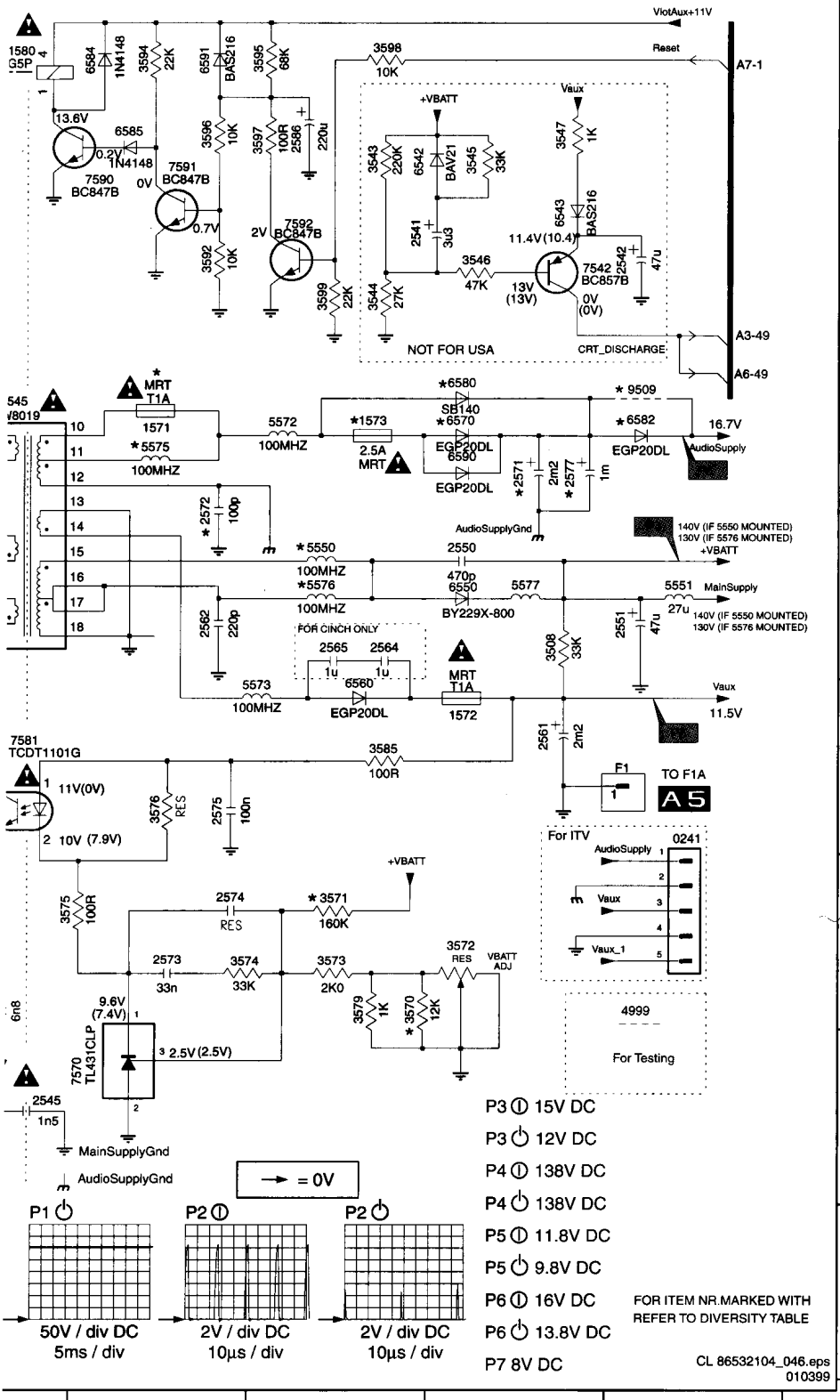


CRT PANEL TRACK SIDE





8 9 10 11



F1 E11	3596 A8
0211 B1	3597 A9
0212 A3	3598 A9
0213 A4	3599 B9
0231 B1	4501 G1
0241 E11	4999 F11
1500 B2	5500 B3
1571 C8	5502 B3
1572 E10	5516 D7
1573 C9	5518 C6
1580 A7	5521 G5
2500 B3	5540 E6
2501 B2	5545 C7
2502 B4	5550 D9
2504 A3	5551 D11
2505 A4	5552 C4
2507 C6	5572 C9
2508 B5	5573 E9
2510 C6	5575 C8
2511 C6	5576 D9
2517 C3	5577 D10
2518 C5	6500 B3
2520 E1	6501 B3
2521 F5	6505 B4
2522 G5	6507 D4
2524 C3	6508 D4
2529 D1	6510 C2
2530 H4	6511 C6
2531 F1	6512 D6
2532 F1	6513 D6
2533 G1	6514 C4
2534 G1	6515 B6
2540 F5	6517 B6
2541 B9	6540 E6
2542 B11	6542 B9
2545 G7	6543 B10
2550 D10	6550 D10
2551 D11	6560 D9
2561 E10	6570 C10
2562 D8	6580 C10
2564 D9	6582 C11
2565 D9	6584 A8
2571 C10	6585 A8
2572 D8	6590 C10
2573 F8	6591 A8
2574 F8	7518 C4
2575 E8	7520 E2
2576 F7	7542 B10
2577 C10	7570 G8
2586 A9	7581 E7
3501 B3	7590 B8
3502 C1	7591 B8
3503 A6	7592 B9
3505 B3	9500 B1
3506 C4	9501 C1
3507 C4	9502 B3
3508 D10	9503 C3
3509 B6	9505 C4
3510 C2	9506 B5
3511 C6	9507 B3
3512 H5	9508 C3
3513 G5	9509 C11
3514 D5	9510 E5
3515 B5	
3516 H3	
3517 C4	
3518 D6	
3520 E1	
3521 D5	
3525 C3	
3528 D2	
3529 D1	
3530 C1	
3532 F1	
3534 G1	
3536 F1	
3537 E3	
3542 C1	
3543 B9	
3544 B9	
3545 B10	
3546 B10	
3547 A10	
3570 F9	
3571 F9	
3572 F10	
3573 F9	
3574 F8	
3575 F8	
3576 E8	
3577 F6	
3578 F7	
3579 F9	
3585 E9	
3592 B8	
3594 A8	
3595 A9	

- P3 ⊕ 15V DC
- P3 ⊖ 12V DC
- P4 ⊕ 138V DC
- P4 ⊖ 138V DC
- P5 ⊕ 11.8V DC
- P5 ⊖ 9.8V DC
- P6 ⊕ 16V DC
- P6 ⊖ 13.8V DC
- P7 8V DC

FOR ITEM NR. MARKED WITH REFER TO DIVERSITY TABLE

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8 9 10 11

1 2 3 4 5 6

DIVERSITY TABLE FOR POWER SUPPLY

A
B
C
D
E
F

DIVERSITY TABLE FOR ALL ITEM NO. MARKED WITH *															
ITEM	FR_CIS 25I/29I AP	LR USA	FR_NONCIS AP	HR 25I/29I EUROPE	HR_CIS 25I/29I AP	PS_FR_US	PS_FR_LA	HR 25I/29I CHINA	PS_FR_NONCIS IND	ITV	140V VBATT	130V VBATT	2X3w/5w AUDIO	2X1w AUDIO	1X AUD
0231	YES	---	YES	YES	YES	---	YES	YES	---	YES	---	---	---	---	---
1571	---	---	---	---	---	---	---	---	---	---	---	---	---	T1.0A	T1
1573	---	---	---	---	---	---	---	---	---	---	---	---	T2.5A	---	---
2501	---	---	YES	---	---	---	YES	---	YES	---	---	---	---	---	---
2508	330/400V	470/200V	330/400V	220/400V	220/400V	330/400V	330/400V	220/450V	330/450V	220/400V	---	---	---	---	---
2561	3300u	1000u	3300u	3300u	3300u	1000u	3300u	3300u	3300u	---	---	---	---	---	---
2571	---	---	---	---	---	---	---	---	---	---	---	---	2200/25V	---	---
2572	---	330p	---	---	---	---	---	---	---	---	---	---	---	---	---
2577	---	---	---	---	---	---	---	---	---	---	---	---	---	1000/16V	1000
3503	220V/9R	110V/10R	220V/9R	220V/9R	220V/9R	220V/9R	220V/9R	220V/9R	---	220V/9R	---	---	---	---	---
3505	YES	YES	---	YES	YES	YES	---	YES	---	---	---	---	---	---	---
3507	---	---	---	2R2/5w	2R2/5w	---	---	2R2/5w	---	2R2/5w	---	---	---	---	---
3510	33K/3w	33K/3w	33K/3w	68K/3w	68K/3w	33K/3w	33K/3w	68K/3w	33K/3w	---	---	---	---	---	---
3515	NTC 2R5	NTC 2R5	NTC 2R5	---	---	NTC 2R5	NTC 2R5	---	NTC 2R5	---	---	---	---	---	---
3570	---	---	---	---	---	---	---	---	---	---	10K	15K	---	---	---
3571	---	---	---	---	---	---	---	---	---	---	160K	150K	---	---	---
5502	DMF2810	---	---	DMF2820	DMF2820	---	---	DMF2820	---	---	---	---	---	---	---
5550	---	---	---	---	---	---	---	---	---	---	YES	---	---	---	---
5575	---	---	---	---	---	---	---	---	---	---	---	---	YES	---	---
5576	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6500	---	---	BZX79-C30	---	---	---	BZX79-C30	---	BZX79-C30	---	---	---	---	---	---
6501	---	---	BZX79-C30	---	---	---	BZX79-C30	---	BZX79-C30	---	---	---	---	---	---
6505	GBU6JL	GBU6JL	GBU6JL	GBU4JL	GBU4JL	GBU6JL	GBU6JL	GBU4JL	GBU6JL	---	---	---	---	---	---
6570	---	---	---	---	---	---	---	---	---	---	---	---	EGP20D	---	---
6580	---	---	---	---	---	---	---	---	---	---	---	---	---	SB140	BYV2
6582	---	---	---	---	---	---	---	---	---	---	---	---	EGP20D	---	---
6590	---	---	---	---	---	---	---	---	---	---	---	---	EGP20D	---	---
9500	---	YES	---	---	---	YES	---	---	---	---	---	---	---	---	---
9501	---	YES	---	---	---	YES	---	---	---	---	---	---	---	---	---
9502	---	YES	YES	---	---	YES	YES	---	YES	---	---	---	---	---	---
9503	---	YES	YES	---	---	YES	YES	---	YES	---	---	---	---	---	---
9505	YES	YES	YES	---	---	YES	YES	---	YES	---	---	---	---	---	---
9506	---	---	---	YES	YES	---	---	YES	---	YES	---	---	---	---	---
9509	---	---	---	---	---	---	---	---	---	---	---	---	---	YES	YES

1 2 3 4 5 6

DIVERSITY TABLE FOR HORIZONTAL DEFLECTION

			DIVERSITY TABLE FOR ALL ITEM NO. MARKED WITH •						
IO	2X2w AUDIO	INDIA SVBW006ER	ITEM	PHILIPS TUBE 25"/28" BLD EAST-WEST	HUA FEI TUBE 25" EAST-WEST	PHILIPS TUBE 25"/28" BLS EAST-WEST	PHILIPS TUBE 25V (26") NO EAST-WEST	PHILIPS TUBE 27V (29") NO EAST-WEST	PHILIPS TUBE 27V (29") EAST-WEST
0A	---	---	2451	15n	15n	15n	15n	15n	15n/12n China
	---	---	2457	390n	390n	390n	390n	390n	360n
	T2.5A	T2.5A	2463	1n	1n	820p	470p	680p	820p/1n China
	---	---	2464	---	---	---	---	---	2u2
	---	---	2465	9n1	9n1	9n1	10n	10n	10n
	---	---	2466	10n	10n	10n	---	---	---
	2200/25V	2200/25V	2467	---	---	---	---	---	22n
16V	---	---	2468	18n	18n	18n	---	---	33n
	---	---	2470	470p	470p	470p	---	---	470p
	---	---	2471	470n	470n	470n	---	---	---
	---	---	2472	2u2	2u2	2u2	---	---	2u2
	---	---	2473	47u	47u	47u	---	---	47u
	---	---	2475	560n	560n	510n	---	---	---
	---	---	425 (A4)	56k	56k	56k	150k	120k	150k
	---	---	3452	33R	33R	33R	22R	22R	22R
	---	---	3453	---	---	---	4R7	4R7	---
	---	---	3470	33k	33k	33k	---	---	33k
	---	---	3471	220k	220k	220k	---	---	---
	YES	YES	3472	100k	100k	120k	---	---	82k
	---	---	3473	1k	1k	1k	---	---	1k
	---	---	3474	3R3	3R3	3R3	---	---	4R7
	---	---	3475	3R3	3R3	3R3	---	---	4R7
	---	---	3477	100R	100R	100R	---	---	100R
	---	---	3479	330R	330R	330R	---	---	330R
-200	---	EGP20D	3481/82	Refer to	part list	videocontrol	Depends on	country.	
	EGP20	EGP20	5445	242253102325	312813820681	242253102324	242253102326	242253102326	242253102326
	EGP20D	EGP20D							
	---	---	5451	33uH	33uH	33uH	USA:242253102327	China:312813820691	312813820691
	---	---	5457	312813853111	312813853111	312813853111	312813853241	312813853241	312813853241
	---	---	5463	---	---	---	---	---	312813834021
	---	---	5465	312813834011	312813834011	312813834011	---	---	---
	---	---	5470	311233830531	311233830531	311233830531	---	---	---
	---	---	5471	---	---	---	---	---	1nH
	---	---	5480	33uH	56uH	33uH	27uH	27uH	27uH/47uH China
	---	---	6461	BYW95C/20	BYW95C/20	BYW95C/20	---	---	BYW95C/20
	---	---	6470	BZX79-C9V1	BZX79-C9V1	BZX79-C9V1	---	---	BZX79-C9V1
	---	---	6471	1N4148	1N4148	1N4148	---	---	---
	---	---	6472	1N4148	1N4148	1N4148	---	---	1N4148
	---	---	6473	BZX79-C39	BZX79-C39	BZX79-C39	---	---	---
	---	---	7470	STP16NE	STP16NE	STP16NE	---	---	STP16NE
	---	---	9453	YES	YES	YES	---	---	YES
	---	---	9460	---	---	---	YES	YES	YES
	---	---	9461	---	---	---	YES	YES	---
	---	---	9462	YES	YES	YES	---	---	---
	---	---	9463	---	---	---	---	---	YES
	---	---	9464	YES	YES	YES	---	---	---

A

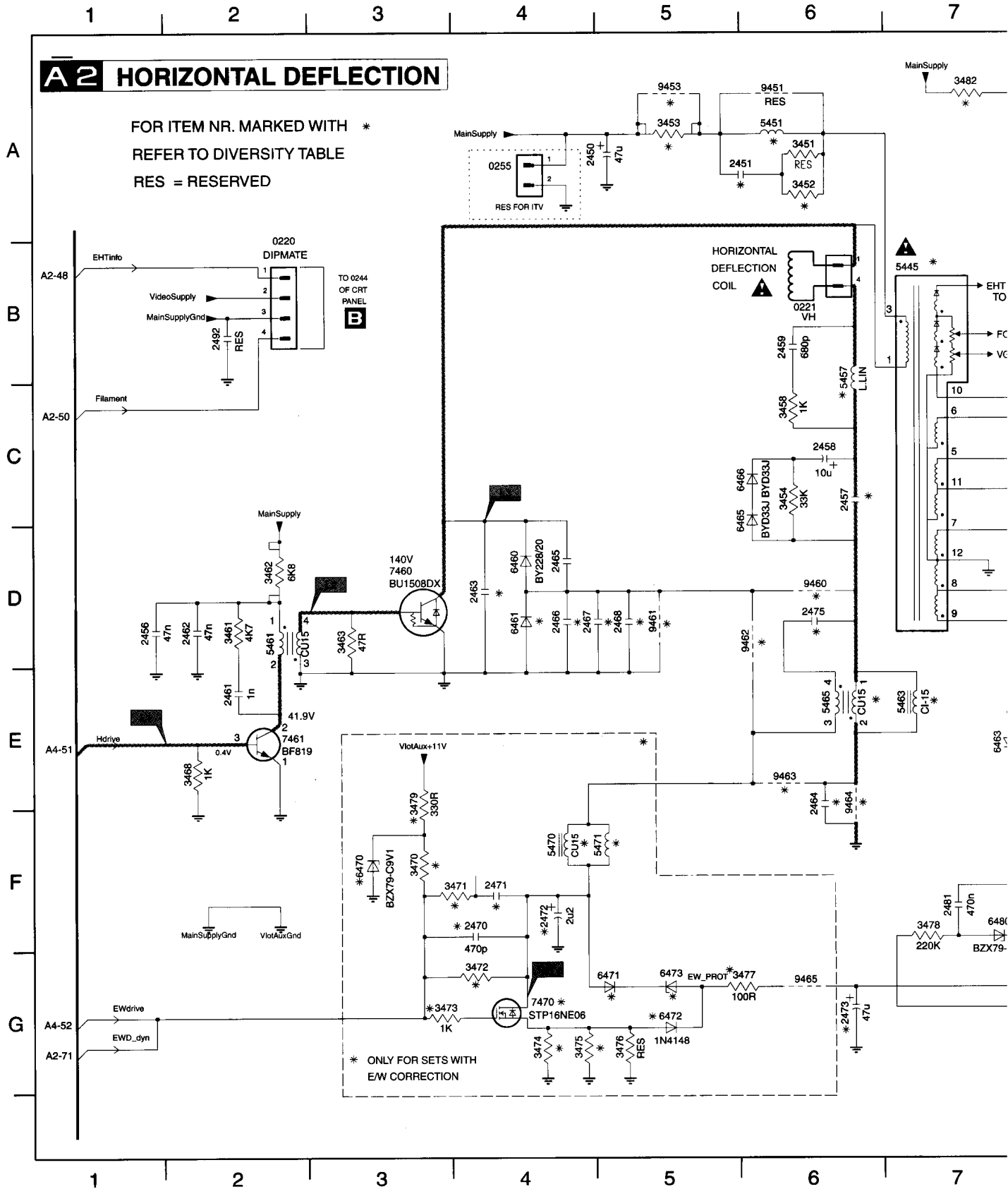
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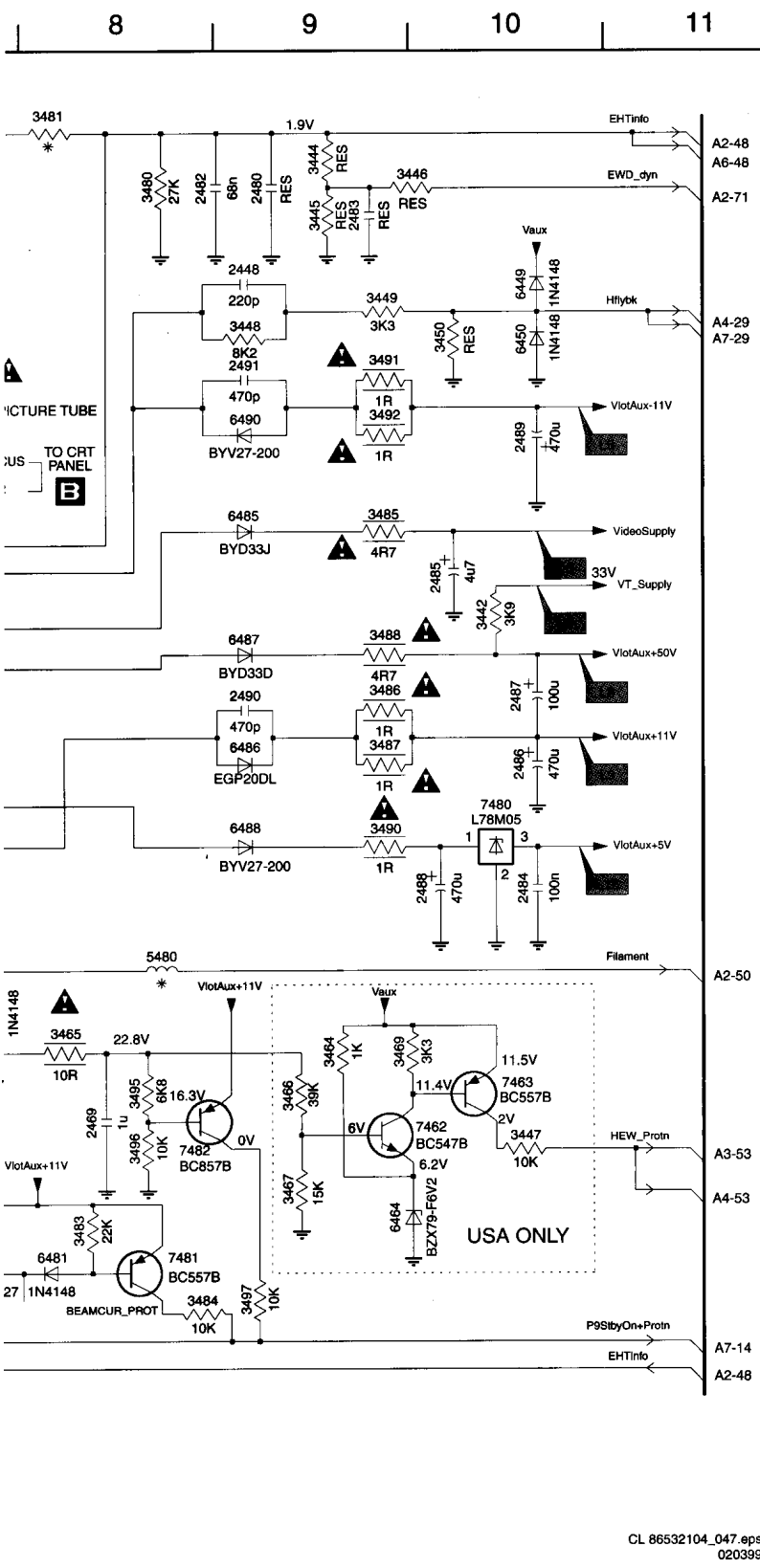
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D

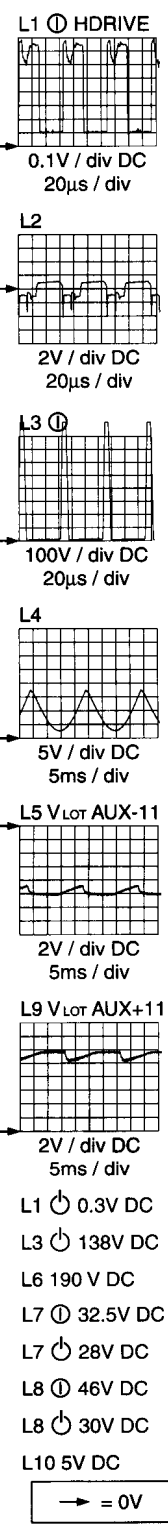
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F





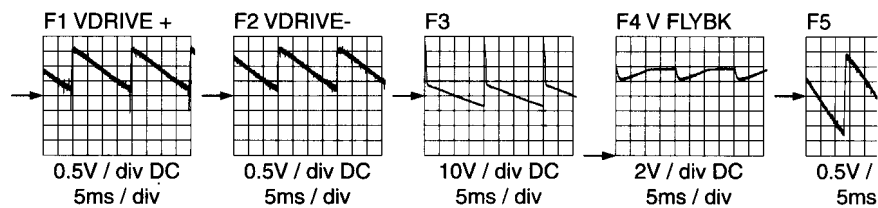
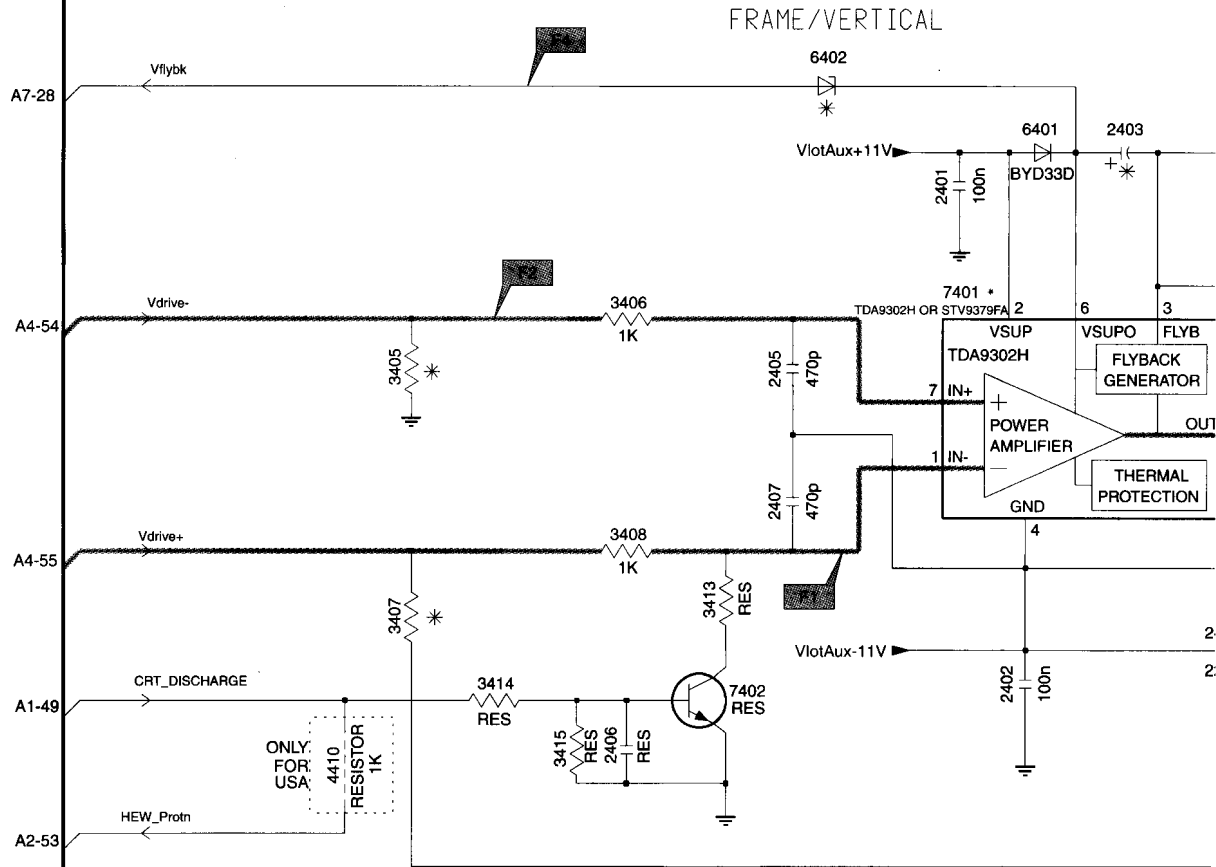
- 0220 B2
- 0221 B6
- 0255 A4
- 2448 A9
- 2450 A5
- 2451 A6
- 2456 D1
- 2457 C6
- 2458 C6
- 2459 B6
- 2461 E2
- 2462 D2
- 2463 D4
- 2464 E6
- 2465 D4
- 2466 D4
- 2467 D5
- 2468 D5
- 2469 F8
- 2470 F4
- 2471 F4
- 2472 F4
- 2473 G6
- 2475 D6
- 2480 A9
- 2481 F7
- 2482 A9
- 2483 A9
- 2484 D10
- 2485 C10
- 2486 D10
- 2487 C10
- 2488 D10
- 2489 B10
- 2490 C9
- 2491 B9
- 2492 B2
- 3442 C10
- 3444 A9
- 3445 A9
- 3446 A10
- 3447 F10
- 3448 A9
- 3449 A9
- 3450 B10
- 3451 A6
- 3452 A6
- 3453 A5
- 3454 C6
- 3458 C6
- 3461 D2
- 3462 D2
- 3463 D3
- 3464 E9
- 3465 E8
- 3466 E9
- 3467 F9
- 3468 E2
- 3469 E10
- 3470 F3
- 3471 F4
- 3472 G4
- 3473 G4
- 3474 G4
- 3475 G4
- 3476 G5
- 3477 G6
- 3478 F7
- 3479 E3
- 3480 A8
- 3481 A8
- 3482 A7
- 3483 F8
- 3484 G9
- 3485 B9
- 3486 C9
- 3487 D9
- 3488 C9
- 3490 D9
- 3491 B9
- 3492 B9
- 3495 E8
- 3496 F8
- 3497 G9
- 5445 B7
- 5451 A6
- 5457 B6
- 5461 D2
- 5463 E7
- 5465 E6
- 5470 F4
- 5471 F5
- 5480 E8
- 6449 A10
- 6450 B10
- 6460 D4
- 6461 D4
- 6463 E7
- 6464 F10
- 6465 C6
- 6466 C6
- 6470 F3
- 6471 G5
- 6472 G5
- 6473 G5
- 6480 F7
- 6481 F8
- 6485 B9
- 6486 D9
- 6487 C9
- 6488 D9
- 6490 B9
- 7460 D3
- 7461 E2
- 7462 F10
- 7463 E10
- 7470 G4
- 7480 D10
- 7481 F8
- 7482 F8
- 9451 A6
- 9453 A5
- 9460 D6
- 9461 D5
- 9462 D6
- 9463 E8
- 9464 E6
- 9465 G6



A 3 VERTICAL DEFLECTION

A
B
C
D
E
F
G

1 2 3 4 5 6



1 2 3 4 5 6

7 8 9 10 11

0222 E8
 2401 C5
 2402 E6
 2403 C6
 2404 C7
 2405 D5
 2406 E4
 2407 D5
 2409 E7
 3401 F7
 3402 F8
 3403 F8
 3405 D3
 3406 C4
 3407 E3
 3408 D4
 3409 D7
 3410 E8
 3411 E8
 3413 E4
 3414 E3
 3415 E4
 4410 E3
 6401 C6
 6402 B5
 6403 D7
 6404 D7
 7401 C5
 7401A B11
 7402 E4
 9401 C7

A

B

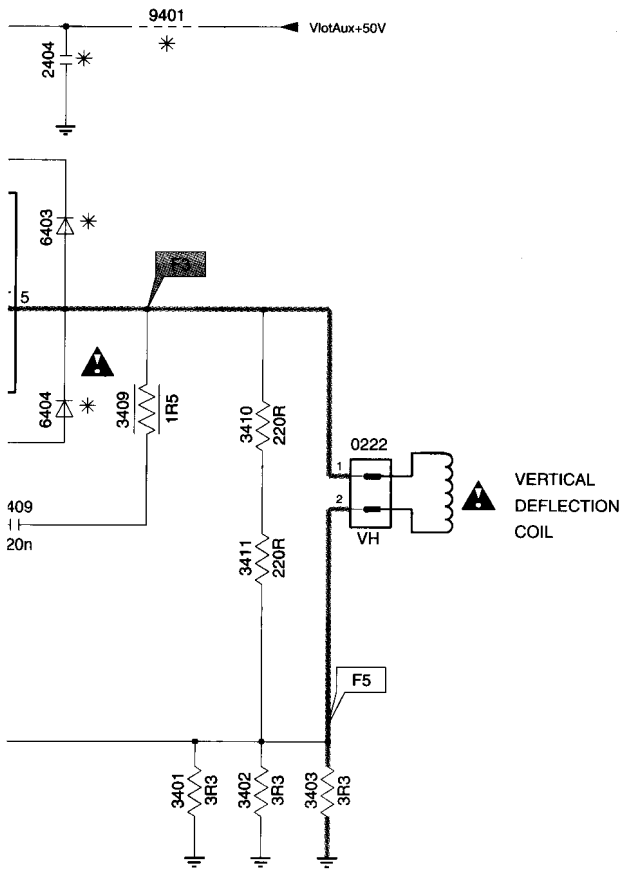
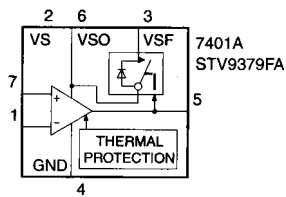
C

D

E

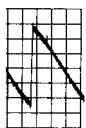
F

G



DIVERSITY TABLE FOR ALL ITEM NO. MARKED WITH *

ITEM	TUBES WITH SADDLE COIL (BLD / BLS / HF)	TUBES WITH TOROID COIL (25V / 27V / NON PH.)
2403	100u	---
2404	---	220n
3405	2k2	1k8
3407	2k2	1k8
6402	BZX79-C18	BZX79-C33
6403	---	BYD33D
6404	---	BYD33D
7401	TDA9302H	STV9379FA
9401	---	YES

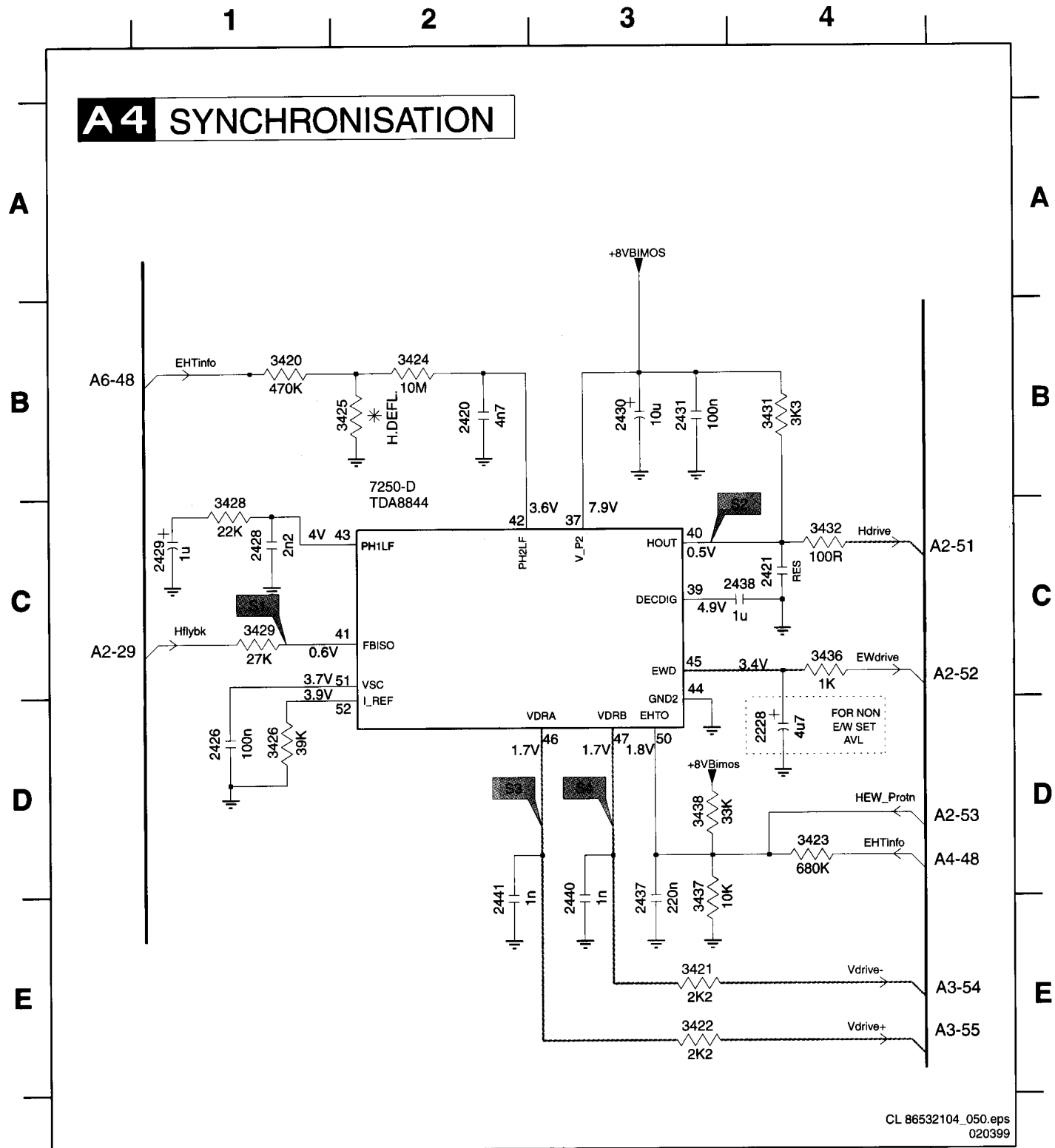


div DC / div

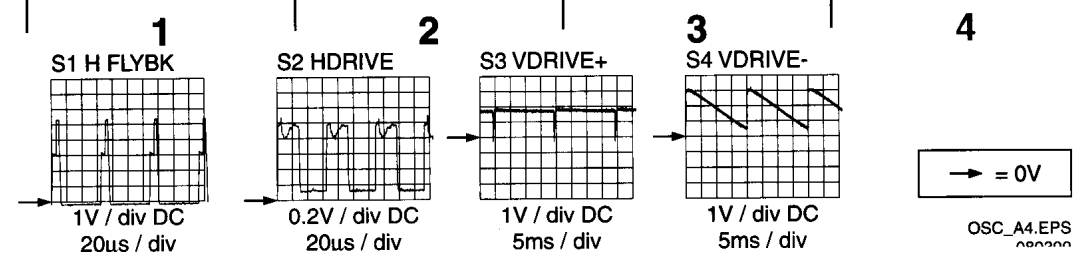
→ = 0V

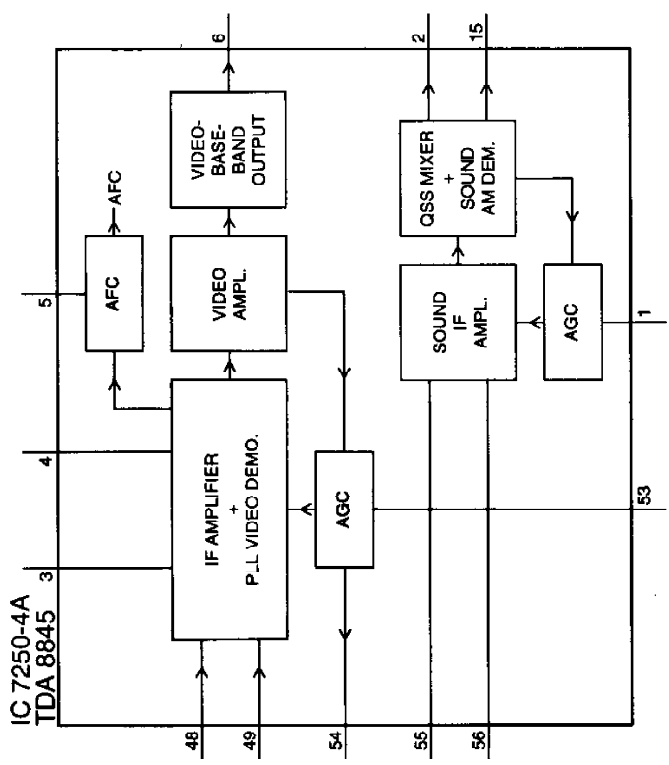
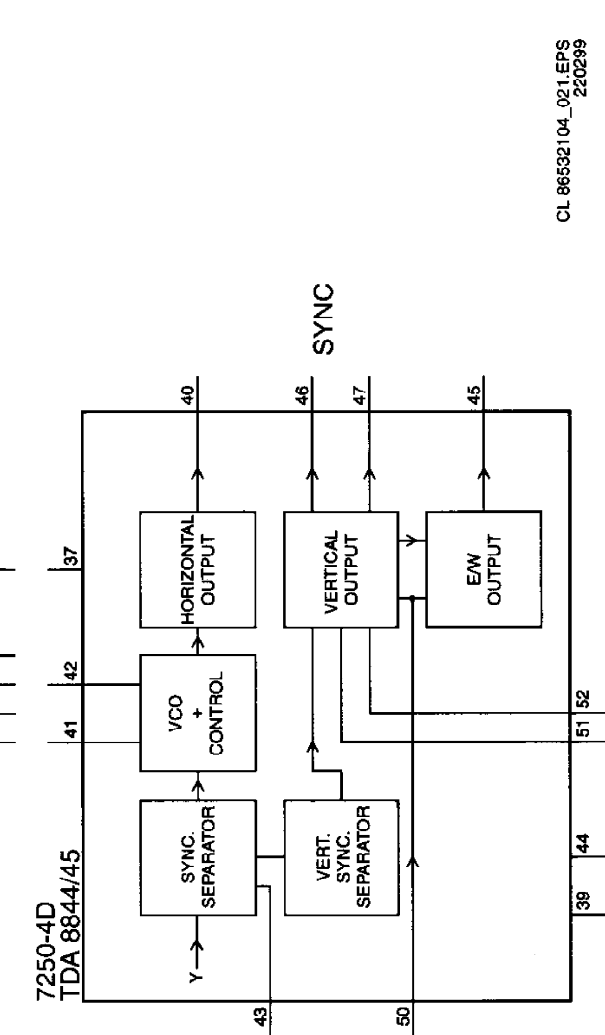
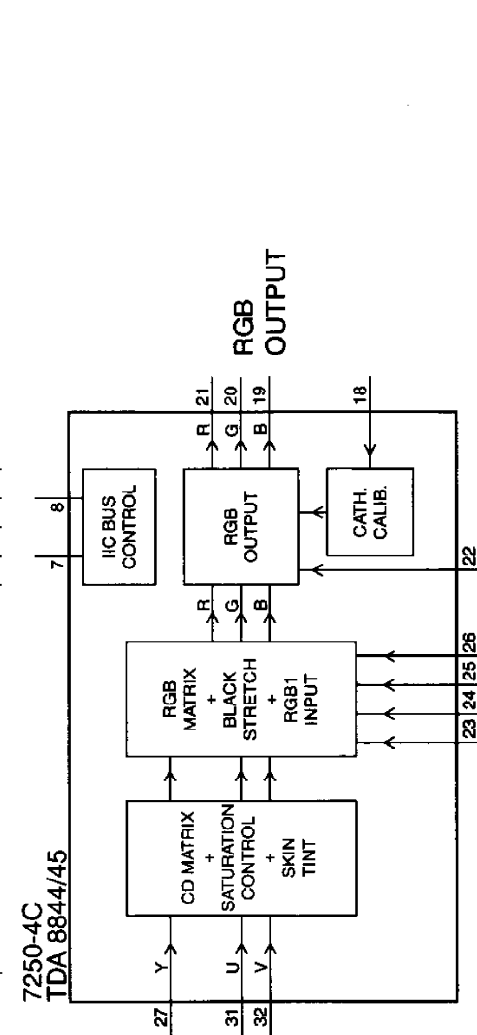
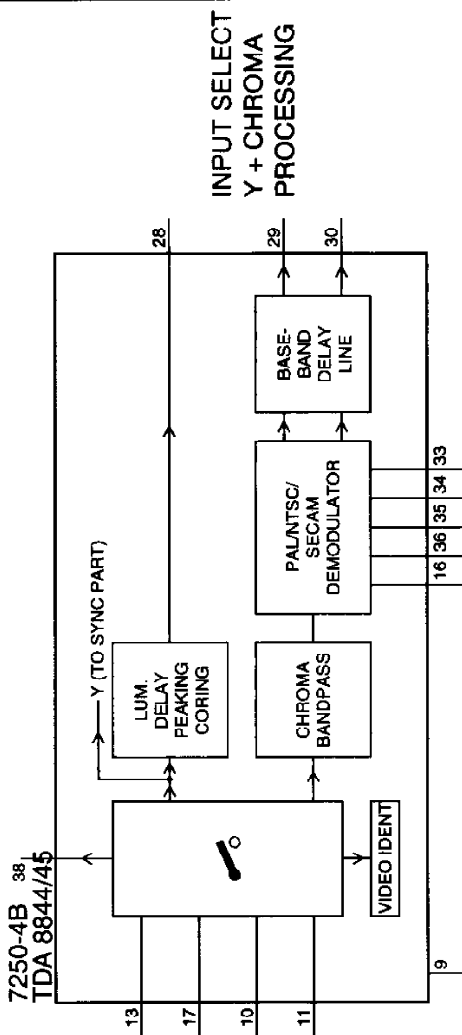
7 8 9 10 11

2228 D4	2426 D1	2430 B3	2438 C4	3420 B1	3423 D4	3426 D1	3431 B4	3437 E3
2420 B2	2428 C1	2431 B3	2440 E3	3421 E3	3424 B2	3428 C1	3432 C4	3438 D3
2421 C4	2429 C1	2437 E3	2441 E2	3422 E3	3425 B2	3429 C1	3436 C4	7250-D B2



CL 86532104_050.eps
020399





OR

