

TELEVISION COLOUR



CHASSIS 11AK16

FOR ALL MODELS

(1997)

CTV 11AK16

THIS PROJECT COVERS THE DESIGN OF A COLOUR TV SET WHICH IS ABLE TO DISPLAY PICTURES TRANSMITTED IN 16 BY 9 (INCLUDING CONVENTIONAL 4 BY 3) SCREEN FORMAT. ALL MULTI SYSTEM VIDEO AND SOUND BROADCASTING STANDARDS ARE SUPPORTED BY THE FREQUENCY TUNING SYSTEM. OTHER CHARACTERISTICS ARE AS FOLLOWS: A BUILT-IN SATELLITE RECEIVER WHICH SUPPORTS 2 LNB INPUTS, PIP AND POP FEATURES WHICH ARE ABLE TO DISPLAY LIVE PICTURE UP TO 9 SCREENS AND IN DIFFERENT SIZES DUE TO A ADDITIONAL TUNER AND DECODING SYSTEM, COMB FILTER ACTION REDUCING THE CROSS-COLOUR EFFECTS, PICTURE SIGNAL IMPROVEMENT BY CTI (COLOUR TRANSIENT IMPROVEMENT) AND PICTURE BOOSTER INCREASING THE CONTRAST QUALITY OF THE PICTURE. CHASSIS OF THE TV SET IS DESIGNED TO BE IN A MODULAR SHAPE, i.e. BOARDS OF SO CALLED FEATURES ARE PLUGGED ON TO THE MAIN BOARD. TV SET HAS A MICROTTEXTCONTROLLER WHICH SUPPORTS UP TO 8 PAGES FASTEXT, TOPTXT AND HAS AN ENHANCED MENU DRIVEN USER INTERFACE RUNNING ON A I²C TYPE HARDWARE CONFIGURATION. ATS (AUTOMATIC TUNING SYSTEM) IS ALSO ONE OF THE FUNCTIONAL PARTS OF THE SOFTWARE. SERVICE MODE WHICH ENABLES THE NECESSARY ADJUSTMENTS BY I²C BUS WITH THE REMOTE TRANSMITTER IS ALSO INCLUDED. THE VERY COMMONLY USED TV PERIPHERALS SUCH AS SVHS, FRONT-AV, HEADPHONE, 2 EUROSCARTS FOR DECODING AND COPYING ARE MADE READY FOR THE USER. POWER CONSUMPTION IS LESS THAN 5W IN STAND-BY MODE TV SET ALSO IS IN COMPLIANCE WITH THE EURAPIAN NORMS FOR EMC AND SAFETY

TDA4671

Multistandard VIF-PLL

with QSS-IF and AM demodulator

GENERAL DESCRIPTION

The TDA9811 is an integrated circuit for multistandard vision IF signal processing and sound AM demodulation, with single reference QSS-IF in TV and VCR sets.

TDA8376 / 76A

Monolithic Integrated I²C-bus controlled PAL/NTSC Video-Processors

GENERAL DESCRIPTION

The TDA8376 and TDA8376A are alignment-free I²C-bus controlled video processors which contain a PAL/NTSC colour decoder, luminance processor, sync processor, RGB-control and deflection processor. The circuits have been designed for use with the baseband chrominance delay line TDA4665 and for DC-coupled vertical and East-West output stages. Both IC's are pin compatible, the difference between the TDA8376 and TDA8376A is that the latter has as additional feature a flexible horizontal and vertical zoom possibility for 16:9 applications.

The supply voltage for the IC's is 8 Volts. The IC's are available in an S-DIL envelope with 52 pins and in a QFP envelope with 64 pins.

TDA8350Q

DC-coupled vertical deflection and East-West output circuit

GENERAL DESCRIPTION

The TDA8350Q is a power circuit for use in 90° and 110° colour deflection systems for field frequencies of 50 to 120 Hz. The circuit provides a DC driven vertical deflection output circuit, operating as a highly efficient class G system and an East-West driver for sinking the diode modulator current.

SAA4981

Monolithic integrated 16:9 compressor

GENERAL DESCRIPTION

The 16:9 compressor is an IC which compresses the active part of a video line by a factor of 4/3 from e.g. 52µ to 39 µs. This is necessary to display 4:3 video software on a 16:9 tube in correct proportion. The capacitively coupled video inputs of the IC are: Y, (B-Y) and (R-Y). The synchronisation input of the IC is a line frequent reference signal HREF. The bandwidth of the IC comes up to 5 MHz and the signal delay in the IC is realized with SC-line Memories (switched Capacitors Line Memories). The output of the 16:9 compressor also has the format Y, (B-Y) and (R-Y) and provides the following two possibilities:

1. Bypass function (the input signal is not compressed)
2. Compressed video by factor 4/3 with three different fixed screen positions (left, centre and right). The luminance and chrominance of the side panels are determined by the external signals Y_SIDE, BY_SIDE and RY_SIDE.

The horizontal compression is a time discrete and amplitude continuous signal processing. This

provides pre and post filters which are realized on chip. The internal clock generation is achieved with a 54 MHz H-PLL which is Synchronized to the positive edge of the HREF signal. The function of the IC is controlled by the three control signals CTRL1, CTRL2 and CTRL3.

SAA5296

Ten page Economy Teletext and TV microcontroller

GENERAL DESCRIPTION

The SAA5296 is a 10 page teletext decoder and television microcontroller. The device decodes 525 and 625-line based World System Teletext transmissions and provides television control and OSD functions.

The teletext decoder hardware is a derivative of the SAA5290. The TV control functionality is provided by an on-chip industrial standard 80C51 microcontroller. A 10 page dynamic RAM is included on-chip providing a complete 10 page teletext decoder or OSD memory.

74HC/HCT573

OCTAL D-TYPE TRANSPARENT LATCH; 3-STATE

GENERAL DESCRIPTION

The 74HC/HCT573 are high-speed Si-gate CMOS devices and are pin compatible with low power Schottky TTL (LSTTL). They are specified in compliance with JEDEC standard no. 7A.

The 74HC/HCT573 are octal D-type transparent latches featuring separate D-type inputs for each latch and 3-state outputs for bus oriented applications. A latch enable (LE) input and an output enable (OE) input are common to all latches.

The "573" consists of eight D-type transparent latches with 3-state true outputs. When LE is HIGH, data at the D_n inputs enter the latches. In this condition the latches are $t_{\text{transparent}}$, i.e. a latch output will change state each time its corresponding D-input changes.

When LE is LOW the latches store the information that was present at the D-inputs a set-up time preceding the HIGH-to-LOW transition of LE. When OE is LOW, the contents of the 8 latches are available at the outputs. When OE is HIGH, the outputs go to the high impedance OFF-state. Operation of the OE input does not affect the state of the latches.

NMC27C512

524,288-Bit (64k x 8) UV Erasable CMOS PROM

GENERAL DESCRIPTION

The NMC27C512 is a high-speed 512k UV erasable and electrically reprogrammable CMOS EPROM, ideally suited for applications where fast turnaround, pattern experimentation and low power consumption are important requirements.

The NMC27C512 is designed to operate with a single +5V power supply with $\pm 5\%$ or $\pm 10\%$ tolerance. The CMOS design allows the part to operate over Extended and Military Temperature Ranges.

The NMC27C512 is packaged in a 28-pin dual in-line package with transparent lid. The transparent lid allows the user to expose the chip to ultraviolet light to erase the bit pattern. A new pattern can then be written electrically into the device by following the programming procedure.

This EPROM is fabricated with National's proprietary, time proven microCMOS double-poly silicon

gate technology which combines high performance and high density with low power consumption and excellent reliability.

TDA9170

TYPE COMMERCIAL : TDA9170 (nick name=PICTURE BOOSTER)

EXPERIMENTAL : N5791 (project name=PIRANHA)

GENERAL DESCRIPTION

The N5791 is a transparent analogue videoprocessor with YUV interface to the world. It offers three main luminance processing functions. Each combination of these functions can be selected. The luminance transfer is controlled in a non-linear way by the distribution, in 5 discrete histogram sections, of the luminance values measured in a picture. As a result the contrast ratio of the most important parts of the scene will be improved.

Black restoration is available in case of a set-up in the luminance signal.

A variable gamma function after the histogram conversion offers the possibility of excellent brightness control.

For maintenance of a proper colour reproduction also the saturation of the U and V colour difference signals are controlled as function of the actual non-linearity in the luminance channel.

The N5791 concept is maximally flexible with the optional on board I2C-bus (including hardwired address select) and window control.

The supply voltage is 8 Volts. It is mounted in a 32-SDIL envelope.

TDA1521/TDA1521Q

2 X 12 W HI-FI AUDIO POWER AMPLIFIER

GENERAL DESCRIPTION

The TDA 1521/TDA 1521Q is a dual hi-fi audio power amplifier encapsulated in a 9-lead plastic power package. The device is especially designed for mains fed applications (e.g. stereo TV sound and stereo radio).

TDA8310

PAL/NTSC colour processor for

PIP applications

GENERAL DESCRIPTION

The TDA8310 is an alignment-free PAL/NTSC colour processor for Picture-in-Picture (PIP) applications. The circuit contains a vision IF amplifier, a PAL/NTSC colour decoder, horizontal and vertical synchronization and an RGB/YUV switch.

As input for the colour decoder and sync processor the demodulated IF signal can be chosen but the circuit also has a video input which automatically detects whether the incoming signal is CVBS or Y/C. The output signals for the PIP processor are:

- Luminance signal

- Colour difference signals (U and V)

- Horizontal and Vertical synchronization pulsés.

The RGB/YUV switch can select between two RGB or YUV sources, e.g. between the PIP processor and the SCART input signal.

The supply voltage for the IC is 8 V. It is available in a 52 pin SDIP package.

TEA6415C

BUS-CONTROLLED VIDEO MATRIX SWITCH

GENERAL DESCRIPTION

The main function of the IC is to switch 8 video input sources on 6 outputs.

Each output can be switched on only one of each input. On each input an alignment of the lowest level of the signal is made (bottom of synch. top for CVBS or black level for RGB signals).

Each nominal gain between any input and output is 6.5dB. For D2MAC or Chroma signal the alignment is switched off by forcing, with an external resistor bridge, $5 V_{DC}$ on the input. Each input can be used as a normal input or as a MAC or chroma input (with external resistor bridge). All the switching possibilities are changed through the BUS.

Driving 75Ω load needs an external transistor.

It is possible to have the same input connected to several outputs.

The starting configuration up on power on (power supply : 0 to 10V) is undetermined.

In this case, 6 words of 16 bits are necessary to determine one configuration. In other case, 1 word of bits is necessary to determine one configuration.

BUX86P/BUX87P

Silicon Diffused Power Transistor

GENERAL DESCRIPTION

High voltage, high speed glass passivated npn power transistors in a SOT82 envelope intended for use in converters, inverters, switching regulators, motor control systems and switching applications.

SDA9187-2X

Analog-Digital-Converter for Picture in Picture

GENERAL DESCRIPTION

The 9187-2X converts the analog output signals Y, U, V of any color decoder into the digital input signals of the PIP PLUS Processor SDA 9189X. A clock generator which is synchronized to the sync signals of the insert channel is integrated on this chip.

At the input for the channel of the inset picture an analog CVBS signal is required. An analog operating chroma decoder as well as a sync processor are generating the analog luminance-and chrominance signals Y, U, V and the horizontal and vertical sync signals of the inset picture.

Y, U and V are digitized by 6-bit flash converters and output in a format that matches the interface of the PIP-processor SDA 9189X. Furthermore, with the aid of PLL, the SDA 9187-2X generates the line locked clock LL3 (nominal 13.5 MHz) and the blanking signal BLN.

SDA9189X

Quarter PIP Processor

Preliminary Data

FEATURES

- **High System integration**

Filtering, field memory, RGB-matrix, DA-Conversion, clock generation, and control circuits

integrated on one chip.

- **4 picture sizes**

1/4th, 1/9th, 1/16th, or 1/36th of normal size

- **High resolution display**

13.5 MHz / 27 MHz display clock frequency 288 luminance and 72 chrominance pixels per inset line for picture size 1/4. 6 bit amplitude resolution for each incoming signal component. Frame mode display in single PIP modes. Horizontal and vertical filtering. Special antialias filtering for the luminance signal.

- **Single and Multi PIP display**

Up to 9 pictures of 1/36th size (8 still and 1 moving)

Up to 4 pictures of 1/16th size (3 still and 1 moving)

Up to 3 pictures of 1/9th size (2 still and 1 moving) as POP display in 16:9 TV sets (In multi PIP modes only field mode display possible)

- **Multistandard applications**

Automatic recognition of 625 lines / 525 lines standard (inset and parent channel)

Scan conversion systems as flickerfree display systems (parent channel)

Hdtv (parent channel)

- **16:9 compatibility**

Operation in 4:3 and 16:9 TV sets

4:3 inset signals on 16:9 displays (picture size 1/4 and 1/9)

16:9 inset signals on 4:3 displays (picture size 1/9 and 1/16)

- **Digital inputs**

Y, + (B-Y), + (R-Y)

Compatible with Triple ADC SDA 9187-2X

- **Analog outputs**

Y, + (B-Y), + (B-Y) or Y, - (B-Y), - (B-Y) or RGB

3 RGB-matrices: EBU, NTSC (Japan), NTSC (USA)

- **Digital to analog converter output e.g. for color decoder adjustment**

6 bit resolution

- **Freely programmable position of inset picture**

Steps of 1 pixel and 1 line

All PIP and POP positions are possible inside the standard display area

- **Programmable framing**

4096 frame colors

Variable frame width

- **Full screen background insertion**

64 background colors or transparent display (parent picture seen)

- **Wipe in / Wipe out facility**

Start and end of insertion is the lower right PIP corner

4 periods programmable

- **Freeze picture**

- **I²C Bus control**

- **Up to three ICs in one application**

Three different I²C bus addresses

Up to 3 moving pictures using 3 ICs

Up to 27 pictures of 1/36 th size

- **On-screen display of channel index**

64 characters programmable (alphanumeric and special symbols)

5 characters displayed in every PIP picture

4 different character luminance values (B-Y = R-Y = 0)

4 background luminance values (B-Y = R-Y = 0) or transparent mode (inset picture seen)

- Numerical display PLL circuit for high stability clock generation
- No necessity of PAL/SECAM delay lines when using suitable color decoders
- P-DSO-32 package / 350 mil (SMD)
- 5 V supply voltage

ST24C08, ST25C08 ST24W08, ST25W08 SERIAL ACCESS 8K (1K x 8) EEPROM

GENERAL DESCRIPTION

This specification covers a range of 8K bits I²C bus EEPROM products, the ST24/25C08 and the ST24/25W08. In the text, products are referred to as ST24/25x08, where "x" is: "C" for Standard version and "W" for Hardware Write Control version.

The ST24/25x08 are 8K electrically erasable programmable memories (EEPROM), organized as 4 blocks of 256x8 bits. The memories operate with a power supply value as low as 2.5V.

Both Plastic Dual-in-line and Plastic Small Outline packages are available.

The memories are compatible with the I²C standard, two wire serial interface which uses a bi-directional data bus and serial clock. The memories carry a built-in 4 bit, unique device identification code (1010) corresponding to the I²C bus definition. This is used together with 1 chip enable input (E) so that up to 2 x 8K devices may be attached to the I²C bus and selected individually. The memories behave as a slave device in the I²C protocol with all memory operations synchronized by the serial clock. Read and write operations are initiated by a START condition generated by the bus master. The START condition is followed by a stream of 7 bits (identification code 1010), plus one read/write bit and terminated by an acknowledge bit.

TDA1308T Class AB stereo headphone driver

GENERAL DESCRIPTION

The TDA1308T is an integrated class AB stereo headphone driver contained in an SO8 plastic package. The device is fabricated in a 1 μm CMOS process and has been primarily developed for portable digital audio applications.

MSP3410 B Multistandard Sound Processor

Features of the Demodulator and Decoder Sections

The MSP 3410 B is designed to simultaneously perform digital demodulation and decoding of NICAM-coded TV stereo sound, as well as demodulation of FM-mono TV sound. Alternatively, two carrier FM systems according to the German or Korean terrestrial specs or the satellite specs can be processed with the MSP 3410 B.

Since it is simple and economic to demodulate AM sound carriers with conventional sound-IF-mixing units, the AM demodulation feature of the MSP will seldom be used. However, for FM carrier detection satellite operation the AM demodulation offers a powerful feature to calculate the carrier field strength, which can be used for automatic search algorithms. So the IC facilitates a first step towards multistandard capability with its very flexible application and may be used in TV-sets, satellite tuners and video recorders.

The MSP 3410 B facilitates profitable multistandard capability, offering the following advantages:

- Two selectable analog inputs (TV-and SAT-IF sources)
- Automatic Gain Control (AGC) for analog input: input range: 0.14 - 3 Vpp
- Integrated A/D converter for sound-IF inputs
- All demodulation and filtering is performed on chip and is individually programmable
- Simple realization of both digital NICAM standards (UK/Scandinavia)
- No external filter hardware is required
- Only one crystal clock (18.432 MHz) is necessary
- Pay-TV for NICAM-mode
- FM carrier level calculation for automatic search algorithms and carrier mute function
- High deviation FM-mono mode (max. deviation: approx. ± 360 kHz)

Features of the DSP-Section

- Flexible selection of audio sources to be processed
- Digital input and output interfaces via S-Bus for DMA-via AMU, and via I²S-Bus for external DSP-Processors featuring Graphic Equalizer, Surround Sound etc.
- Performance of all deemphasis systems including adaptive Wegener Panda 1 1 without external components or controlling
- Performance of D2MAC audio together with an AMU 2481
- Digitally performed FM-identification decoding and dematrixing
- Digital baseband processing: volume, bass, treble, pseudostereo and basewidth enlargement
- Simplified controlling of volume, bass, treble etc.
- Increased audio bandwidth for FM-Audio-signals (20 Hz - 15 kHz, ± 1 dB)

Features of the Analog Section

- Three selectable analog pairs of audio baseband inputs (=three SCART inputs)
 - Input level : ≤ 2 V RMS;
 - Input impedance : ≥ 25 k Ω
- One selectable analog mono input (i.e. AM sound);
 - Input level : ≤ 2 V RMS;
 - Input impedance : ≥ 10 k Ω
- Two high quality A/D converters; S/N-Ratio: ≥ 85 dB
- 20 Hz to 20 kHz bandwidth for SCART-to-SCART-copy facilities
- MAIN (loudspeaker) and AUX (headphones): two pairs of 4-fold oversampled D/A-converters
 - Output level per channel : max. 1.4 VRMS
 - Output resistance : max 5 k Ω
 - S/N-Ratio : ≥ 85 dB at maximum volume
 - Max.noise voltage in mute mode : ≤ 10 μ V (BW:20 Hz...16 kHz)
- One pair of four-fold oversampled D/A-converters supplying two selectable pairs of SCART-Outputs.
 - Output level per channel : max. 2 V RMS
 - Output resistance : max. 0.5 K Ω
 - S/N-Ratio : ≥ 85 dB (20 Hz...16kHz)

MSP3400 C

Multistandard Sound Processor

GENERAL DESCRIPTION

The 3400 C 0.8 μ CMOS version is fully pin and software compatible to the 1.0 μ MSP 3400 and MSP 3410. The main difference between the MSP 3400 C and the MSP 3410, consists of the MSP 3410 being able to decode NICAM signals.

3402PHC- 3x5 572

Hyper Band Tuner

GENERAL DESCRIPTION

The Tuner 3402 PHC - 3 x 5 572 is a TV tuner with built in IIC bus controlled phase locked loop. It is suitable for PAL and SECAM B, G, H systems. The intermediate output frequencies are 38.9 MHz (picture carrier), 33.4 MHz (sound carrier) and 34.47 MHz (colour carrier). It covers the RF range of the terrestrial TV channels 2 - S6 in the VHF low band, channel S7 - S41 in VHF high band and channel 21 - 69 in the UHF band.

The common UHF/VHF input is realized by an IEC aerial connector (75Ω).

The RF selection of each band is accomplished by means of a pre-stage and a bandfilter stage. The VHF/UHF mixer/oscillator IC (with three separate oscillator circuits) converts RF to the IF range. Part of the IC is an IF amplifier allowing to drive a following SAW filter directly (if the SAW filter input capacitance is compensated). The IF output is symmetrical.

The terminals for external connection are listed in the table below. The tuner can be directly soldered on a PCB.

The tuner combines high gain with small noise figure and fulfills the regulations according amtsblatt DBP 069/1981, EN55013, EN 55020 and VDE 0872/7.72.

SAA4961/V2

Multistandard Comb Filter

GENERAL DESCRIPTION

In TV signal processing a comb filter is used to separate the chrominance and the luminance signals from the CVBS signal without effects such as cross-luminance and cross-colour.

The comb filter SAA 4961/V2 shown in figure 3 uses two 2H delay lines together with an adaptive logical comb filter algorithm for processing the PAL standard. In case of NTSC processing two 1H delay lines are used. Effects like hanging dots or residual cross-colour, seen when using a classical comb filter algorithm, are not produced.

The switched capacitor delay lines produce three output signals 0H, 2H and 4H (NTSC: 0H, 1H, 2H). To prevent alias components resulting from the discrete time signal processing, a low-pass pre-filter is integrated in front.

Together with the transversal band-pass filters, the logical comb filter eliminates the luminance components (in the chrominance frequency band) from the chrominance signal. To eliminate cross-luminance the comb filtered chrominance frequency band) from the chrominance signal. To eliminate cross-luminance the comb filtered chrominance is now subtracted from the time compensated CVBS signal and converted by the post filtering to the continuous time domain.

Signal switches for an external SVHS signal or non-delayed CVBS signals are available: They can be controlled externally via BYP (pin3) and SSYN (pin 6).

Internal clock generation only requires a subcarrier signal (fsc or 2 x fsc). Sync separation (SYNC) is included for the generation of control signals for the delay lines.

AK16 CHASSIS MANUAL ADJUSTMENTS PROCEDURE

A) PRELIMINARY

Before starting with the alignment procedure, make sure that all the potentiometers on the chassis and also screen and focus pots are in the medium position.

B) SYSTEM VOLTAGE ADJUSTMENT

- | | |
|---------|---|
| Inputs | <ul style="list-style-type: none">◆ AC power (220V 50 Hz).◆ PAL B/G test pattern via RF
(PAL I test pattern for PAL I TV's, SECAM D/K pattern, SECAM L/L'/K' TV's). |
| Outputs | <ul style="list-style-type: none">◆ Digital voltmeter to pin 1 of PL601 |
| Display | <ul style="list-style-type: none">◆ System voltage |
| Action | <ul style="list-style-type: none">◆ Apply power. Check that The stand-by led lights.◆ Select TV mode and tune to the applied test pattern via local test keyboard. <p>Chassis should start normally.</p> <ul style="list-style-type: none">◆ Adjust all analogue controls (volume, bass, treble, brightness, contrast, colour) to minimum settings.◆ Adjust VR800 for 150 ± 0.5 Volts. |

C) AFC ADJUSTMENT

- | | |
|---------|--|
| Inputs | <ul style="list-style-type: none">◆ AC power.◆ 38.9 MHz test pattern for PAL B/G, PAL-SECAM B/G or 39.5 MHz test pattern for PAL I model (90dBmV) to Z203 SAW filter input terminals. |
| Outputs | <ul style="list-style-type: none">◆ Digital Voltmeter to jumper J219 AFC test point. |
| Display | <ul style="list-style-type: none">◆ AFC Voltage. |
| Action | <ul style="list-style-type: none">◆ Adjust VL201 for 2.5 ± 0.1 Volts. TV should automatically tune to a station when search tuning is activated. |

D) AGC ADJUSTMENT

- | | |
|---------|---|
| Inputs | <ul style="list-style-type: none">◆ AC power◆ Colour Bar signal, VHF-3 Channel-12 and 60dBmV RF signal level. |
| Outputs | <ul style="list-style-type: none">◆ Digital Voltmeter to jumper J212 AGC test point.◆ Picture tube drive. |
| Display | <ul style="list-style-type: none">◆ AGC voltage on Voltmeter.◆ Picture. |
| Action | <ul style="list-style-type: none">◆ Select TV mode and tune to VHF-3 Channel-12 signal.◆ Turn preset VR201 until AGC voltage reaches its maximum level◆ Turn preset VR201 clockwise and check that meter is 1Volt below.◆ Check that picture is normal at 90dBmV signal level. |

E) FOCUS ADJUSTMENT

- | | |
|---------|--|
| Inputs | <ul style="list-style-type: none">◆ AC power◆ PAL B/G test pattern via RF input. |
| Outputs | <ul style="list-style-type: none">◆ Picture tube drive. |
| Display | <ul style="list-style-type: none">◆ Picture |
| Action | <ul style="list-style-type: none">◆ Select TV mode and tune to the signal.◆ Adjust focus potentiometer (the upper pot on the rear side of the FBT transformer) for optimum focusing. |

F) SCREEN ADJUSTMENT

Inputs	<ul style="list-style-type: none">◆ AC power◆ PAL B/G Colour Bar test pattern via RF
Outputs	<ul style="list-style-type: none">◆ 1/100 Oscilloscope probe to RGB cathodes on CRT baseboard. <p>NOTE : <u>Ground pin of probe will be connected to 3th pin (GND2) of PL901 on the CRT baseboard.</u></p>
Display	<ul style="list-style-type: none">◆ RGB ratio
Action	<ul style="list-style-type: none">◆ Select PAL B/G Colour Bar pattern using the local test keyboard and the user remote control unit.◆ Adjust all control functions (brightness, colour and contrast) to minimum settings.◆ Measure RGB cathodes via scope and find the minimum amplitude (Peak-Peak) cathode.◆ Adjust the screen potentiometer (lower pot on the rear side of FBT transformer) such that minimum cathode is 10Volt(peak-peak) on the scope.

G) HORIZONTAL SHIFT ADJUSTMENT IN 4 : 3 MODE

Inputs	<ul style="list-style-type: none">◆ AC power◆ RED PURITY test pattern via RF input.
Outputs	<ul style="list-style-type: none">◆ Picture tube drive.
Display	<ul style="list-style-type: none">◆ Picture
Action	<ul style="list-style-type: none">◆ Select TV mode and tune to the signal.◆ Select 4 : 3 mode.◆ Adjust VR400 till picture is horizontally centred. Check whether this adjustment is correct after completing Service Mode Adjustment.

11PIP16 AGC ALIGNMENT PROCEDURE

AGC ADJUSTMENT

Inputs	<ul style="list-style-type: none">◆ AC power◆ Colour Bar signal, VHF-3 Channel-12 and 60dBmV RF signal level.
Outputs	<ul style="list-style-type: none">◆ Digital Voltmeter to AGC test point on the module 11PIP16-X◆ Picture tube drive.
Display	<ul style="list-style-type: none">◆ AGC voltage on Voltmeter.◆ Picture.
Action	<ul style="list-style-type: none">◆ Select TV mode and tune to VHF-3 Channel-12 signal.◆ Turn preset VR750 until AGC voltage reaches its maximum level◆ Turn preset VR750 clockwise and check that meter is 1Volt below.◆ Check that picture is normal at 90dBmV signal level.

11SAT16 VIDEO LEVEL ALIGNMENT PROCEDURE

VIDEO LEVEL ADJUSTMENT

Inputs	<ul style="list-style-type: none">◆ AC power◆ Colour Bar signal
Outputs	<ul style="list-style-type: none">◆ 1/1 Oscilloscope probe to VIDEO test point on the module 11SAT16-X
Display	<ul style="list-style-type: none">◆ Peak-to-peak video signal level◆ Picture.
Action	<ul style="list-style-type: none">◆ Select SAT mode and tune to colour bar satellite signal.◆ Connect oscilloscope probe to test point (jumper) J105.◆ Turn preset VR101 so that video level is 650mV + 20 mV peak-to-peak.◆ Check that picture is normal

AK16 CHASSIS SERVICE MODE ADJUSTMENTS PROCEDURE

A) PRELIMINARY

All system, geometry and white balance alignments are performed by the service remote control transmitter in service mode. Before starting the service mode alignments, make sure that all manual alignments are done correctly. To start service mode alignments enter the MAIN MENU and enter service mode code 3297 by pressing digit keys. Service mode items can be selected by MENU UP and MENU DOWN actions and pressing DIGITS 0, 1, 2, and 3. Selected service mode items are adjusted by pressing MENU + and MENU - buttons. Also pressing some other keys on the service transmitter allows direct access to service mode items. In order to leave service mode and restore TV mode press TV button on the remote transmitter. Leaving service mode will save the changes.

B) HORIZONTAL PARABOLA ADJUSTMENT

Inputs	<ul style="list-style-type: none">◆ AC power◆ PAL B/G test pattern via RF
Outputs	<ul style="list-style-type: none">◆ Picture tube drive
Display	<ul style="list-style-type: none">◆ Picture
Action	<ul style="list-style-type: none">◆ Select Service mode by pressing MENU button of service transmitter.◆ Select H-PARABOLA item by using either MENU UP or MENU DOWN buttons.◆ Press MENU - or MENU + buttons till vertical lines close to the both sides of the picture frame become parallel to vertical sides of picture tube <p>Check and readjust H-PARABOLA item if the adjustment becomes improper after some other geometric adjustments are done.</p>

C) HORIZONTAL CORNER ADJUSTMENT

Inputs	<ul style="list-style-type: none">◆ AC power◆ PAL B/G test pattern via RF
Outputs	<ul style="list-style-type: none">◆ Picture tube drive
Display	<ul style="list-style-type: none">◆ Picture
Action	<ul style="list-style-type: none">◆ Select Service mode by pressing MENU button of service transmitter◆ Select H-CORNER item by using either MENU UP or MENU DOWN buttons.◆ Press MENU - or MENU + buttons till vertical lines at the corners of both sides of the picture frame become vertical and parallel to vertical corner sides of picture tube. Check and readjust H-CORNER item if the adjustment becomes improper after some other geometric adjustments are done.

D) HORIZONTAL TRAPEZIUM ADJUSTMENT

Inputs	<ul style="list-style-type: none">◆ AC power◆ PAL B/G test pattern via RF
Outputs	<ul style="list-style-type: none">◆ Picture tube drive
Display	<ul style="list-style-type: none">◆ Picture
Action	<ul style="list-style-type: none">◆ Select Service mode by pressing MENU button of service transmitter◆ Select H-TRAPEZIUM item by using either MENU UP or MENU DOWN buttons.◆ Press MENU - or MENU + buttons till vertical lines, especially lines at the sides of the picture frame became parallel to the both sides of picture tube as close as possible. Check and readjust H-TRAPEZIUM item if the adjustment becomes improper after some other geometric adjustments are done.

E) VERTICAL SLOPE ADJUSTMENT

Inputs	◆ AC power ◆ PAL B/G test pattern via RF
Outputs	◆ Picture tube drive
Display	◆ Picture
Action	◆ Select Service mode by pressing MENU button of service transmitter ◆ Select V-SLOPE item by using either MENU UP or MENU DOWN buttons. ◆ Press MENU - or MENU + buttons till the horizontal line at the centre of the test pattern will coincide with the edge of the lower half part of the blanked screen. Check and readjust V-SLOPE item if the adjustment becomes improper after some other geometric adjustments are done.

F) VERTICAL AMPLITUDE ADJUSTMENT

Inputs	◆ AC power ◆ PAL B/G test pattern via RF
Outputs	◆ Picture tube drive
Display	◆ Picture
Action	◆ Select Service mode by pressing MENU button of service transmitter ◆ Select V-AMPLITUDE item by using either MENU UP or MENU DOWN buttons. ◆ Press MENU - or MENU + buttons till horizontal black lines on both the upper and lower part of the test pattern become very close to the upper and lower horizontal sides of picture tube and nearly about to disappear. Check and readjust V-AMPLITUDE item if the adjustment becomes improper after some other geometric adjustments are done.

G) VERTICAL SLOPE CORRECTION ADJUSTMENT

Inputs	◆ AC power ◆ CROSS-HATCH B/G test pattern via RF
Outputs	◆ Picture tube drive
Display	◆ Picture
Action	◆ Select Service mode by pressing MENU button of service transmitter ◆ Select V-S.CORR. item by using either MENU UP or MENU DOWN buttons. ◆ Press MENU - or MENU + buttons till the size of squares on both the upper and lower part of test pattern become equal to the squares laying on the vertical centre of the test pattern. Check and readjust V-AMPLITUDE item if the adjustment becomes improper after some other geometric adjustments are done.

H) VERTICAL SHIFT ADJUSTMENT

Inputs	◆ AC power ◆ PAL B/G test pattern via RF
Outputs	◆ Picture tube drive
Display	◆ Picture
Action	◆ Select Service mode by pressing MENU button of service transmitter ◆ Select V-SHIFT item by using either MENU UP or MENU DOWN buttons. ◆ Press MENU - or MENU + buttons till the test pattern is vertically centred, i.e. horizontal line at the centre of the test pattern is in equal distance both to upper and lower side of the picture tube. Check and readjust V-SHIFT item if the adjustment becomes improper after some other geometric adjustments are done.

I) WHITE BALANCE ADJUSTMENT

Inputs	<ul style="list-style-type: none">◆ AC power◆ WHITE test pattern via RF
Outputs	<ul style="list-style-type: none">◆ Colour analyser (Philips PM5639)
Display	<ul style="list-style-type: none">◆ Colour temperature (X, Y) on colour analyser.
Action	<ul style="list-style-type: none">◆ Adjust all analogue functions to medium level◆ Select Service mode by pressing MENU button of service transmitter◆ Select G-GAIN item by using either MENU UP or MENU DOWN buttons.◆ Set G-GAIN at value 31.◆ Adjust R-GAIN and B-GAIN by selecting them with MENU UP or MENU DOWN and changing the values by MENU - or MENU + buttons till: $X=285\pm 10$ $Y=293\pm 10$ on the colour analyser.

J) BRIGHTNESS CONTROL ADJUSTMENT

Just skip this item, ignore its setting and continue with other adjustments if contrast booster option is not available.

K) LUMINANCE DELAY ADJUSTMENT

Inputs	<ul style="list-style-type: none">◆ AC power◆ PAL B/G test pattern via RF
Outputs	<ul style="list-style-type: none">◆ Picture tube drive
Display	<ul style="list-style-type: none">◆ Picture
Action	<ul style="list-style-type: none">◆ Select Service mode by pressing MENU button of service transmitter.◆ Select Y-DELAY item by using either MENU UP or MENU DOWN buttons.◆ Adjust Y-DELAY by pressing MENU - or MENU + buttons till the colour transients on the colour bar of the pattern become as sharper and colours between transients do not mix with each other as possible.

L) HORIZONTAL SHIFT ADJUSTMENT

Inputs	<ul style="list-style-type: none">◆ AC power◆ PAL B/G test pattern via RF
Outputs	<ul style="list-style-type: none">◆ Picture tube drive
Display	<ul style="list-style-type: none">◆ Picture
Action	<ul style="list-style-type: none">◆ Select Service mode by pressing MENU button of service transmitter.◆ Select H-SHIFT item by using either MENU UP or MENU DOWN buttons.◆ Adjust H-SHIFT item by pressing MENU - or MENU + keys till test pattern is horizontally in equal distance both to right and left sides of the picture tube. Check and readjust H-SHIFT item if the adjustment becomes im proper after some other geometric adjustments are done.

M) HORIZONTAL WIDTH ADJUSTMENT

Inputs	<ul style="list-style-type: none">◆ AC power◆ PAL B/G test pattern via RF
Outputs	<ul style="list-style-type: none">◆ Picture tube drive
Display	<ul style="list-style-type: none">◆ Picture
Action	<ul style="list-style-type: none">◆ Select Service mode by pressing MENU button of service transmitter.◆ Select H-WIDTH item by using either MENU UP or MENU DOWN buttons.◆ Adjust H-WIDTH item by pressing MENU - or MENU + buttons till no under-scan condition will happen, i.e. no white bars on the left and right side of the test pattern will be visible nor the picture will be so wide. Check and readjust H-WIDTH item if the adjustment becomes improper after some other geometric adjustments are done.

OPTION BYTES

Option bytes are selected in service mode. Enter service mode by pressing MENU button on the service transmitter. There are 4 option bytes determining the characteristics of the system. They are **Option bytes 0, 1, 2 and 3**. Pressing the corresponding digit on the service transmitter will reveal the relevant option byte and its current value in binary number format. In order to set correct option bytes for the system configuration, press MENU - or MENU + buttons till you obtain a 8-digit binary number which you determine before by checking option byte tables.

These 4 option byte tables are listed below. 'X' in the tables refers to the relevant bit which must be set to 0 or 1 according to the configuration of the system.

TABLE A Option byte 0

7	6	5	4	3	2	1	0	Option
							X	Headphones 0 : No headphones installed 1 : Headphones installed
						X		Comb Filter 0 : No comb filter installed 1 : Comb filter installed
					X			Picture tube aspect ratio 0 : 4 by 3 tube installed 1 : 16 by 9 tube installed
				X				SVHS 0 : SVHS not available 1 : SVHS available
			X					Y-amplitude level TDA9171 0 : 0.3V Y amplitude 1 : 1V Y amplitude
		X						Type of TDA8376 0 : TDA8376 1 : TDA8376A
	X							Turkish Language Setting 0 : Turkish not available 1 : Turkish available
X								Teletext E/W Setting 0 : E/W=0 1 : E/W=1

TABLE B Option byte 1

7	6	5	4	3	2	1	0	Option
						X	X	Channel table 0 0 : CCIR See "CCIR TV + Italy channel table." on page 64 0 1 : UK See "United Kingdom channel table." on page 65. 1 0 : OIRT See "OIRT channel table." on page 63. 1 1 : Reserved
				X	X			IF frequency 0 0 : 38.0 MHz 0 1 : 38.9 MHz 1 0 : 39.5 MHz 1 1 : Reserved
			X					CCIR cable channels See "CCIR cable channels." on page 64 0 : No cable channel available 1 : Cable channels included
		X						Terrestrial TV tuner type 0 : NOKIA or TEMIC 1 : PHILIPS UV916H
X	X							Reserved

TABLE C Option byte 2

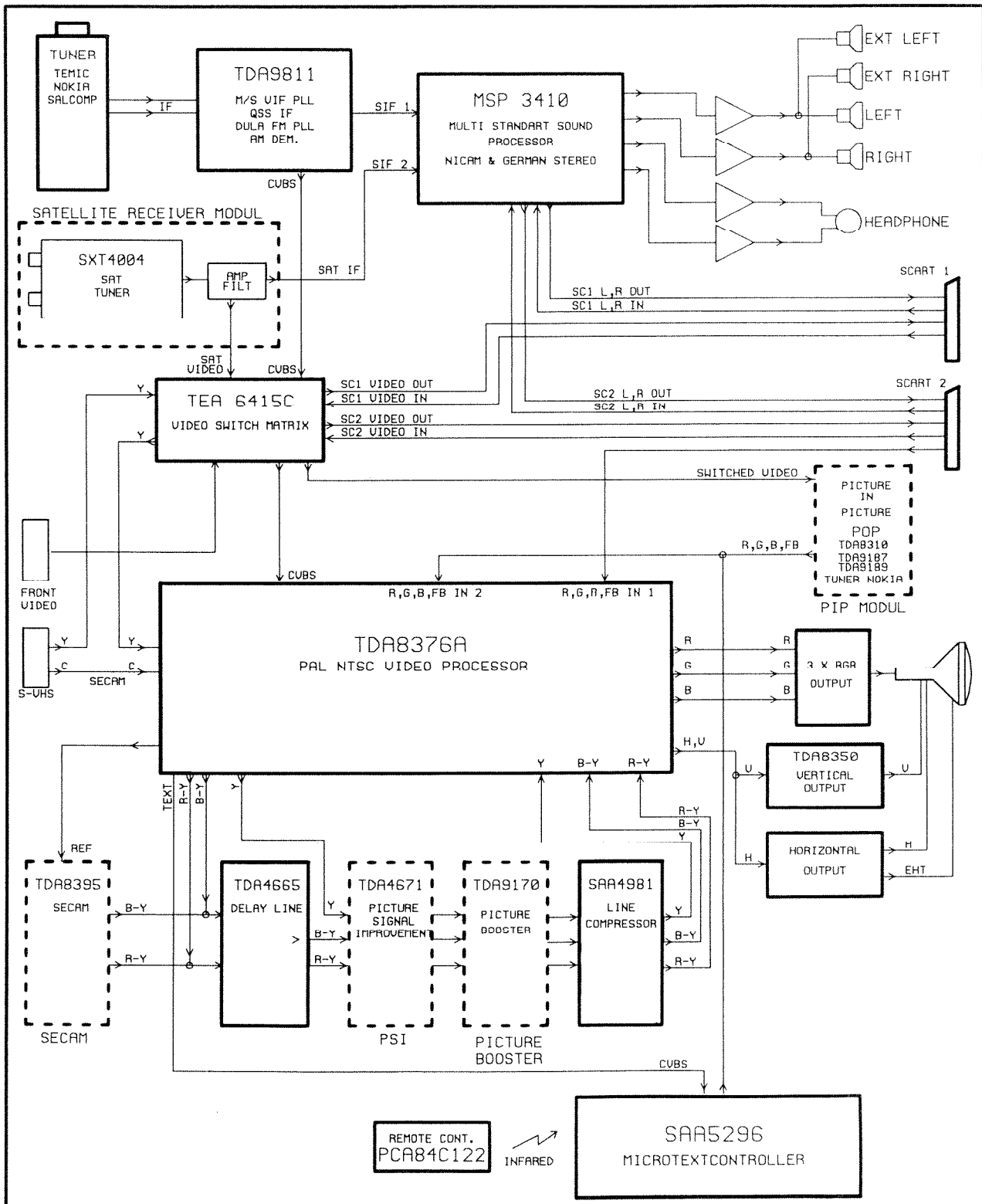
7	6	5	4	3	2	1	0	Option
							X	PAL-BG 0 : Disabled 1 : Enabled
						X		PAL-DK 0 : Disabled 1 : Enabled
					X			PAL-I 0 : Disabled 1 : Enabled
				X				SECAM-BG 0 : Disabled 1 : Enabled
			X					SECAM-DK 0 : Disabled 1 : Enabled
		X						SECAM-L/L' 0 : Disabled 1 : Enabled
	X							NTSC-M 0 : Disabled 1 : Enabled
X								NTSC-BG 0 : Disabled 1 : Enabled

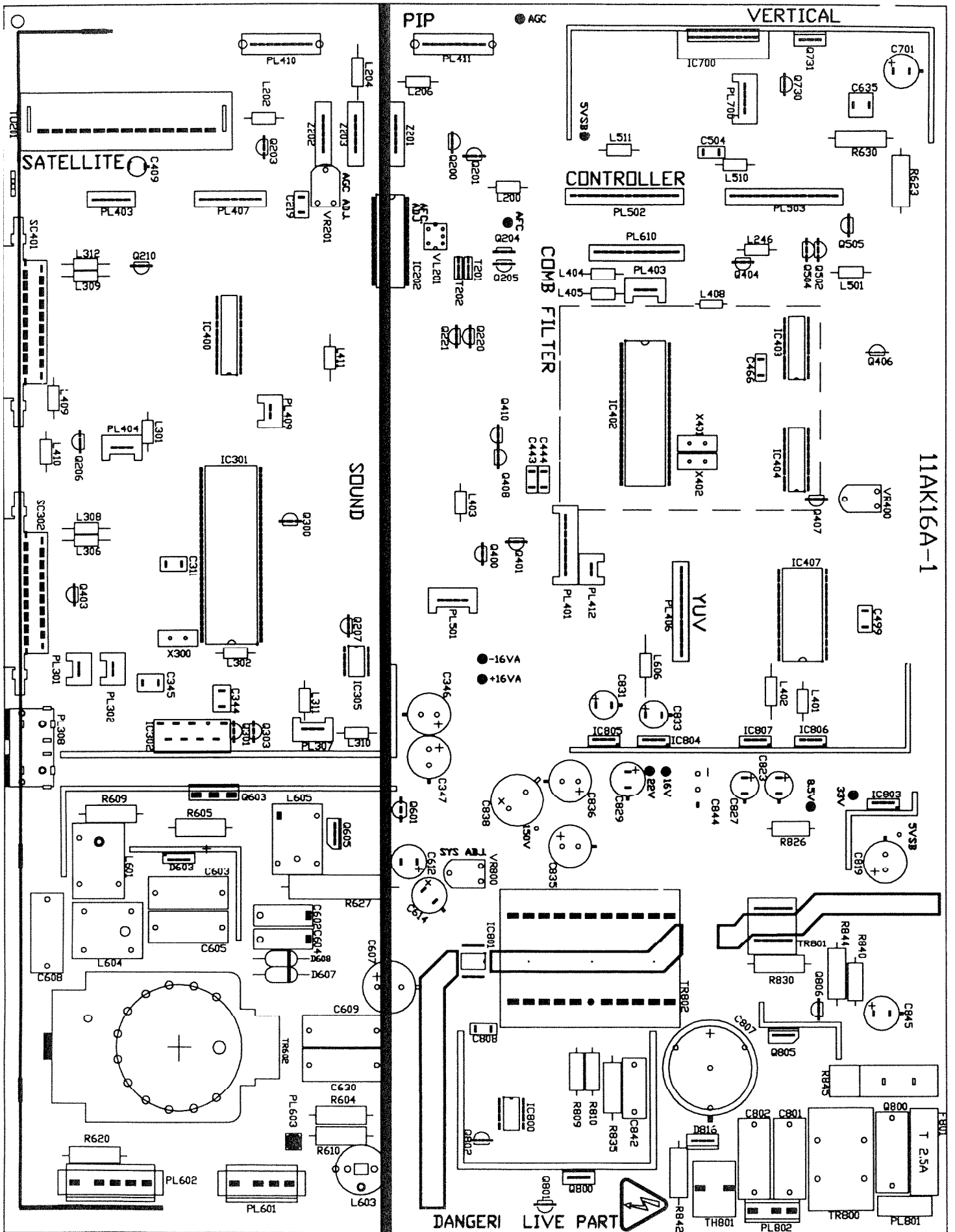
TABLE D Option byte 3

7	6	5	4	3	2	1	0	Option
						X	X	<i>Reserved</i>
					X			Number of LNB inputs 0 : Tuner with 1 LNB input installed 1 : Tuner with 2 LNB inputs installed
				X				Bandwidth switching 0 : Satellite tuner has a fixed bandwidth 1 : Satellite tuner bandwidth is switchable (27/36 MHz)
			X					Minimum satellite tuner input frequency 0 : 900 MHz 1 : 700 MHz
		X						Maximum satellite tuner input frequency 0 : 2060 MHz 1 : 2160 MHz
X	X							<i>Reserved</i>

NOTE : Reserved bits must be zero !...

GENERAL BLOCK DIAGRAM OF CHASSIS 11AK16





M.ASSY.AK16

C231	3051000126	CAP CER 10PF 50V D CH	DZ602	3570006200	DIODE ZENER 6.2V 1/2W
C602	3032243058	CAP MKP 220NF 250V M	DZ603	3570006800	DIODE ZENER 6.8V
C603	3033328078	CAP MKP 3.3NF 2KV %3.5	DZ700	3571947000	DIODE ZENER 47V
C604	3021235038	CAP KP 12NF 630V J	DZ701	3570033000	DIODE ZENER 33V (5MA)
C607	3084701458	CAP EL 47UF 250V M (HR)	DZ702	3570002700	DIODE ZENER 2.7V
C608	3033344038	CAP MKP 330NF 400V J	DZ800	3571909100	DIODE ZENER 9.1V ZPD
C609	3034743038	CAP MKP 470NF 250V J	DZ801	3571902400	DIODE ZENER 2.4V ZTE
C800	3011041558	CAP MKT 100NF 250V M AC	DZ802	3571947000	DIODE ZENER 47V
C801	3011041558	CAP MKT 100NF 250V M AC	DZ803	3571933000	DIODE ZENER 33V UZT 33B
C802	3011041558	CAP MKT 100NF 250V M AC	DZ804	3571927001	DIODE ZENER 27V (ZTK)
C803	3201021156	CAP CER 1NF 1KV M B	DZ805	3570007500	DIODE ZENER 7.5V (20MA)
C804	3201021156	CAP CER 1NF 1KV M B	DZ808	3571947000	DIODE ZENER 47V
C805	3201021156	CAP CER 1NF 1KV M B	F801	3807250050	FUSE 2.5A 250V 5*20MM
C806	3201021156	CAP CER 1NF 1KV M B	IC202	3621598110	IC TDA9811
C807	3102211656	CAP EL 220UF 400V M (FOR 28")	IC202	3621598110	IC TDA9811
C837	3201011156	CAP CER 100PF 1KV M	IC301	3621934100	IC MSP3410
C838	3084701458	CAP EL 47UF 250V M (HR)	IC302	3621515211	IC TDA1521Q
C841	3202227458	CAP CER 2.2NF 4KV M	IC305	3621513080	IC TDA1308
C842	3023335044	CAP PP 33NF 630V K	IC400	3621664150	IC TEA6415C
C843	3032215048	CAP MPP 0.22NF 630V K	IC402	3621583760	IC TDA8376/N1
C844	3081020554	CAP EL 1000UF 35V M	IC403	3621583951	IC TDA8395 N2
C860	3201021156	CAP CER 1NF 1KV M B	IC404	3621546050	IC TDA4605/V4
C861	3201021156	CAP CER 1NF 1KV M B	IC407	3621549810	IC SAA4981
CC1	4930200101	CONN.ASSY.FOR PIP TUNER	IC700	3621583511	IC TDA8351/N5
D201	3531941480	DIODE 1N4148	IC800	3621846051	IC TDA4605-3
D202	3531941480	DIODE 1N4148	IC801	3621100800	IC CQY80NG (OPT.COUPLER)
D301	3531941480	DIODE 1N4148	IC803	3621678050	IC L7805CV SGS
D305	3531941480	DIODE 1N4148	IC804	3620678081	IC LM7808
D400	3531941480	DIODE 1N4148	IC805	3620978120	IC MC7812CT
D401	3531941480	DIODE 1N4148	IC806	3621678050	IC L7805CV SGS
D402	3531941480	DIODE 1N4148	IC807	3621678050	IC L7805CV SGS
D403	3531941480	DIODE 1N4148	L601	4015150018	FIXED COIL INJECTION 15MH
D405	3531941480	DIODE 1N4148	L604	4014100019	FIXED COIL 1MH (BRIDGE)
D407	3531941480	DIODE 1N4148	L801	4010000009	FERIT BAR 6*20MM AK16
D408	3531941480	DIODE 1N4148	PL308	3863060003	EXTERNAL SPEAKER JACK
D409	3531941480	DIODE 1N4148	Q207	3611502400	TR BF240
D410	3531941480	DIODE 1N4148	Q601	3611502740	TR BSN274 (FET)
D411	3531941480	DIODE 1N4148	Q603	3611505081	TR BU508A
D600	3551900330	DIODE BYD33J	Q605	3611508580	TR BF858
D601	3531941480	DIODE 1N4148	Q731	3611600940	TR BDW94B
D602	3531941480	DIODE 1N4148	Q800	3611800910	TR BUZ91A
D603	3611600320	DIODE DMV32B	Q801	3611903370	TR BC337
D605	3551901590	DIODE BA159	Q804	3611903370	TR BC337
D606	3551901570	DIODE BA157	Q805	3611500870	TR BUX87P
D607	3551901570	DIODE BA157	R318	3361593134	RES FUSE 3W 1.5R
D608	3551901570	DIODE BA157	R319	3361593134	RES FUSE 3W 1.5R
D609	3531941480	DIODE 1N4148	R432	3323930467	RES MF 1/4W 39K F
D610	3531941480	DIODE 1N4148	R605	3361593134	RES FUSE 3W 1.5R
D611	3531941480	DIODE 1N4148	R609	3363302134	RES FUSE 33R 2W J
D613	3531941480	DIODE 1N4148	R621	3363380437	RES FUSE 1/4W 0.33R J
D703	3531941480	DIODE 1N4148	R622	3364790437	RES FUSE 1/4W 4.7R J
D800	3551902070	DIODE RL207	R623	3363302134	RES FUSE 33R 2W J
D801	3551902070	DIODE RL207	R624	3362280237	RES FUSE 1/2W 0.22R J
D802	3551902070	DIODE RL207	R639	3362280237	RES FUSE 1/2W 0.22R J
D803	3551902070	DIODE RL207	R705	3362700237	RES FUSE 1/2W 27R J
D805	3531941480	DIODE 1N4148	R706	3364781137	RES FUS 0.47R 1W J
D806	3531941480	DIODE 1N4148	R714	3364790437	RES FUSE 1/4W 4.7R J
D807	3531941480	DIODE 1N4148	R803	3323010457	RES MF 1/4W 300R G
D808	3531941480	DIODE 1N4148	R817	3362280237	RES FUSE 1/2W 0.22R J
D809	3531941480	DIODE 1N4148	R827	3363380437	RES FUSE 1/4W 0.33R J
D810	3551500261	DIODE BYM26D	R828	3363380437	RES FUSE 1/4W 0.33R J
D810/1	4010000019	FERRITE BAR 5*8	R833	3374750237	RES MG 1/2W 4.7M J
D810/2	4010000019	FERRITE BAR 5*8	R836	3363380437	RES FUSE 1/4W 0.33R J
D811	3551500953	DIODE BYW95A	R837	3362280237	RES FUSE 1/2W 0.22R J
D812	3551500953	DIODE BYW95A	R839	3362280237	RES FUSE 1/2W 0.22R J
D813	3550827200	DIODE BYV27-200	R845	3382297130	RES WW 7W 2R2
D814	3550827200	DIODE BYV27-200	R849	3364781137	RES FUS 0.47R 1W J
D815	3550827200	DIODE BYV27-200	T201	3780105500	FILTER SER TRAP TPS 5.5MHZ
D816	3671501370	TRIAC BT137 600V	T202	3780106500	FILTER SER TRAP TPS 6.5MHZ
D817	3551901590	DIODE BA159	TH801	3391803000	THERM.PTC DEGAUSS DUAL 250V
D818	3531941480	DIODE 1N4148	TR601	4031205110	TRF FBT (AK16)
DZ301	3571903600	DIODE ZENER 3.6V ZPD	TR801	4041205111	TRF SOPS
DZ601	3570006200	DIODE ZENER 6.2V 1/2W	TR802	4041205112	TRF SMPS AK16 LOW AUDIO VOL.

TU101	3924123305	TUNER SK1110P1	2046200010	PIP B.ASSY.PIP16 WO/PAL
VL201	4021253042	ADJ.COIL 270NH Q=50 (T2)	D700	3531941488 DIODE 1N4148 SMD
VR201	3342231210	RES ADJ 0.15W 22K M VER	D701	3531941488 DIODE 1N4148 SMD
VR400	3341041210	RES ADJ 0.15W 100K M VER.	D702	3531941488 DIODE 1N4148 SMD
VR800	3342521210	RES ADJ 2.5K 0.15W M VER	Q706	3611908488 TR BC848B SMD
X300	3840418420	XTAL 18.432MHZ	Q750	3611908488 TR BC848B SMD
X401	3840144310	XTAL 4.433619 MHZ	Q751	3611908488 TR BC848B SMD
Z201	3750294530	FILTER SAW OFWK9453	Q754	3611908488 TR BC848B SMD
Z202	3750239530	FILTER SAW OFWK3953	Q755	3611908488 TR BC848B SMD
Z203	3750239620	FILTER SAW G3962	Q756	3611908488 TR BC848B SMD
	2006505060	HEATSINK ASSY.16-W/PIP / W/SAT	Q757	3611908488 TR BC848B SMD
	2006505020	HEATSINK ASSY.16-SMPS (1)	Q760	3611908488 TR BC848B SMD
	2006505040	HEATSINK ASSY.16-HORIZONTAL	Q761	3611908488 TR BC848B SMD
	2006505050	HEATSINK ASSY.16-AUDIO	Q762	3611908488 TR BC848B SMD
	2006505070	HEATSINK ASSY.16-SMPS (2)	Q752	3611908588 TR BC858B SMD
	2006505080	HEATSINK ASSY.16 REG(2) IC803	Q753	3611908588 TR BC858B SMD
	2006505090	HEATSINK ASSY.16-D603	Q759	3611908588 TR BC858B SMD

2032010010 CONTROL B.ASSY.MC16

D504	3531941488	DIODE 1N4148 SMD
D505	3531941488	DIODE 1N4148 SMD
DZ503	3571903600	DIODE ZENER 3.6V ZPD
DZ501	3571905100	DIODE ZENER 5.1V ZPD
DZ502	3571905100	DIODE ZENER 5.1V ZPD
Q506	3611908488	TR BC848B SMD
Q508	3611908488	TR BC848B SMD
Q509	3611908488	TR BC848B SMD
IC501	3620005210	IC NM27C512
IC503	3620005730	IC 74HCT573
IC500	3621552969	IC SAA5296 SMD
IC502	3621624081	IC 24C08
X500	3840112020	XTAL 12MHZ

2038009960 CRT B.ASSY.TP16

C932	3201021156	CAP CER 1NF 1KV M B
C929	3201024148	CAP CER 1NF 2KV K B
R973	3361021137	RES FUSE 1W 1K J
D901	3531941480	DIODE 1N4148
D902	3531941480	DIODE 1N4148
D906	3531941480	DIODE 1N4148
D907	3531941480	DIODE 1N4148
D908	3531941480	DIODE 1N4148
Q914	3611504210	TR BF421
Q915	3611504210	TR BF421
Q916	3611504210	TR BF421
Q917	3611504220	TR BF422
Q918	3611504220	TR BF422
Q919	3611504220	TR BF422
Q910	3611508710	TR BF871
Q911	3611508710	TR BF871
Q912	3611508710	TR BF871

2038009960 CRT B.ASSY.TP16

C932	3201021156	CAP CER 1NF 1KV M B
C929	3201024148	CAP CER 1NF 2KV K B
R973	3361021137	RES FUSE 1W 1K J
D901	3531941480	DIODE 1N4148
D902	3531941480	DIODE 1N4148
D906	3531941480	DIODE 1N4148
D907	3531941480	DIODE 1N4148
D908	3531941480	DIODE 1N4148
Q914	3611504210	TR BF421
Q915	3611504210	TR BF421
Q916	3611504210	TR BF421
Q917	3611504220	TR BF422
Q918	3611504220	TR BF422
Q919	3611504220	TR BF422
Q910	3611508710	TR BF871
Q911	3611508710	TR BF871
Q912	3611508710	TR BF871

D700	3531941488	DIODE 1N4148 SMD
D701	3531941488	DIODE 1N4148 SMD
D702	3531941488	DIODE 1N4148 SMD
Q706	3611908488	TR BC848B SMD
Q750	3611908488	TR BC848B SMD
Q751	3611908488	TR BC848B SMD
Q754	3611908488	TR BC848B SMD
Q755	3611908488	TR BC848B SMD
Q756	3611908488	TR BC848B SMD
Q757	3611908488	TR BC848B SMD
Q760	3611908488	TR BC848B SMD
Q761	3611908488	TR BC848B SMD
Q762	3611908488	TR BC848B SMD
Q752	3611908588	TR BC858B SMD
Q753	3611908588	TR BC858B SMD
Q759	3611908588	TR BC858B SMD
VR750	3341031210	RES ADJ 0.15W 10K M VER
IC750	3621583100	IC TDA8310
IC751	3621583951	IC TDA8395 N2
IC752	3621891879	IC SDA9187-2X
IC753	3621891899	IC SDA9189X
Z750	3750239620	FILTER SAW G3962
X751	3840144310	XTAL 4.433619 MHZ
X752	3840420520	XTAL REZ 20.48MHZ
TU750	3924123303	TUNER 3402/PIP

2047400000 SAT.RECEIVER B.ASSY.SAT01 2LNB

R146	3321810457	RES MF 1/4W 182R G
VR101	3341021100	RES ADJ 0.15W 1K M VER
Q101	3611501360	TR BD136
Q102	3611501360	TR BD136
Q103	3611908488	TR BC848B SMD
Q104	3611908488	TR BC848B SMD
Q105	3611908488	TR BC848B SMD
Q106	3611908488	TR BC848B SMD
Q107	3611908488	TR BC848B SMD
Q108	3611908488	TR BC848B SMD
Q110	3611908488	TR BC848B SMD
Q111	3611908488	TR BC848B SMD
Q112	3611908488	TR BC848B SMD
Q113	3611908488	TR BC848B SMD
Q114	3611908488	TR BC848B SMD
Q115	3611908488	TR BC848B SMD
Q116	3611908488	TR BC848B SMD
Q117	3611908488	TR BC848B SMD
Q118	3611908488	TR BC848B SMD
Q119	3611908488	TR BC848B SMD
Q121	3611908488	TR BC848B SMD
Q122	3611908488	TR BC848B SMD
Q124	3611908488	TR BC848B SMD
Q125	3611908488	TR BC848B SMD
Q126	3611908488	TR BC848B SMD
Q127	3611908488	TR BC848B SMD
Q109	3611908588	TR BC858B SMD
Q120	3611908588	TR BC858B SMD
Q123	3611908588	TR BC858B SMD
IC102	3620040940	IC HEF4094B
IC101	3621624081	IC 24C08
IC104	3650003170	IC LM317T
TU101	3926143300	TUNER SXT4004

2046100320 YUV B.ASSY.YUV16 ONLY CTI

Q10	3611908488	TR BC848B SMD
Q11	3611908488	TR BC848B SMD
Q12	3611908488	TR BC848B SMD
Q14	3611908488	TR BC848B SMD
IC10	3621546710	IC TDA4671/V1

2046800320 COMP FILTER B.ASY.CF16 W/SVHS

IC101	3621549610	IC SAA4961/V2
-------	------------	---------------

