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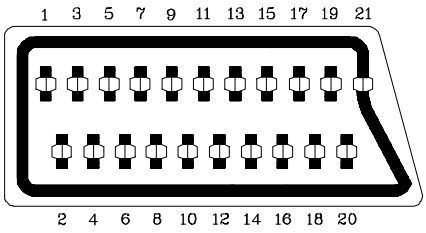
**DO NOT CHANGE ANY MODULE UNLESS THE SET IS SWITCHED OFF**
The mains supply part of the switch mode power supply's transformer is live.
Use an isolating transformer.
The receiver complies with the safety requirements.

**SAFETY PRECAUTIONS:**
The service of this TV set must be carried out by qualified persons only. Components marked with the warning symbol on the circuit diagram are critical for safety and must only be replaced with an identical component.
- Power resistor and fused resistors must be mounted in an identical manner to the original component.

**TV set switched off:**
Make short-circuit between HV-CRT clip and CRT ground layer.
Short C809 before changing IC800 and IC801 or other components in primary side of the SMPS part.

**Measurements:**
Voltage readings and oscilloscope traces are measured under the following conditions:
Antenna signal's level is 60dB at the color bar pattern from the TV pattern generator. (100% white, 75% color saturation)
Brightness, contrast, and color are adjusted for normal picture performance.
Mains supply, 220VAC, 50Hz.

**PERI-TV SOCKET**




**SCART 1 PINING**

| | |
|---|---|
| 1 Audio right output | 0.5Vrms / 1K |
| 2 Audio right input | 0.5Vrms / 10K |
| 3 Audio left output | 0.5Vrms / 1K |
| 4 Ground AF | |
| 5 Ground Blue | |
| 6 Audio left input | 0.5Vrms / 10K |
| 7 Blue input | 0.7Vpp / 75ohm |
| 8 AV switching input | 0-12VDC /10K |
| 9 Ground Green | |
| 10 - | |
| 11 Green input | 0.7Vpp / 75ohm |
| 12 - | |
| 13 Ground Red | |
| 14 Ground Blanking | |
| 15 Red input | 0.7Vpp / 75ohm |
| 16 Blanking input | 0-0.4VDC, 1-3VDC / 75 Ohm |
| 17 Ground CVBS output | |
| 18 Ground CVBS input | |
| 19 CVBS output | 1Vpp / 75ohm |
| 20 CVBS input | 1Vpp / 75ohm |
| 21 Ground | |

**SCART 2 PINING**

| | |
|---|---|
| 1 Audio right output | 0.5Vrms / 1K |
| 2 Audio right input | 0.5Vrms / 10K |
| 3 Audio left output | 0.5Vrms / 1K |
| 4 Ground AF | |
| 5 Ground Blue | |
| 6 Audio left input | 0.5Vrms / 10K |
| 7 Blue input | |
| 8 AV switching input | 0-12VDC /10K |
| 9 Ground Green | |
| 10 - | |
| 11 - | |
| 12 - | |
| 13 Ground Red | |
| 14 Ground Blanking | |
| 15 - | |
| 16 - | |
| 17 Ground CVBS output | |
| 18 Ground CVBS input | |
| 19 CVBS output | 1Vpp / 75ohm |
| 20 CVBS input | 1Vpp / 75ohm |
| 21 Ground | |

## 1. INTRODUCTION

11AK37 is a 110° chassis capable of driving 25", 28", 29", 33" 4:3 and 28", 32" 16:9 tubes at the appropriate currents. The chassis is capable of operating in PAL, SECAM and NTSC standards and multiple transmission standards as B/G, D/K, I/I', and L/L´. standards. The sound system is capable of giving 12 watts RMS output into a load of 8 ohms. One page, 7 page SIMPLETEXT, TOPTEXT, FASTTEXT and US Closed Caption is also provided. The chassis is equipped with a double-deck 42 pin scart connector for AV input/output, front-AV input, one back-AV output, one SVHS, one headphone and one subwoofer.

## 2. SMALL SIGNAL PART WITH STV2248:

STV2248 video processor is essential for realizing all small signal functions for a color TV receiver.

### 2.1 Vision IF amplifier

The vision IF amplifier can demodulate signals with positive and negative modulation. The PLL demodulator is completely alignment-free. Although the VCO (Toko-coil) of the PLL circuit is external, yet the frequency is fixed to the required value by the original manufacturer thus the Toko-coil does not need to be adjusted manually. The setting of the various frequencies (38.9 or 45.75 MHz) can be made via changing the coil itself.

### 2.2 QSS Sound circuit (QSS versions)

The sound IF amplifier is similar to the vision IF amplifier and has an external AGC de-coupling capacitor. The single reference QSS mixer is realised by a multiplier. In this multiplier the SIF signal is converted to the inter-carrier frequency by mixing it with the regenerated picture carrier from the VCO. The mixer output signal is supplied to the output via a high-pass filter for attenuation of the residual video signals. With this system a high performance hi-fi stereo sound processing can be achieved. The AM sound demodulator is realised by a multiplier. The modulated sound IF signal is multiplied in phase with the limited SIF signal. The demodulator output signal is supplied to the output via a low-pass filter for attenuation of the carrier harmonics. The AM signal is supplied to the output via the volume control.

The AM demodulated signal results from multiplying the input signal by itself, it is available on AM/FM output.

### 2.3 FM demodulator and audio amplifier (mono versions):

The FM demodulator is realized as narrow-band PLL with external loop filter, which provides the necessary selectivity without using an external band-pass filter. To obtain a good selectivity a linear phase detector and constant input signal amplitude are required. For this reason the inter-carrier signal is internally supplied to the demodulator via a gain controlled amplifier and AGC circuit. The nominal frequency of the demodulator is tuned to the required frequency (4.5/5.5/6.0/6.5 MHz) by means of a calibration circuit that uses the clock frequency of the µ-controller/Teletext decoder as a reference. The setting to the wanted frequency is realized by means of the software. It can be read whether the PLL frequency is inside or outside the window and whether the PLL is in lock or not. With this information it is possible to make an automatic search system for the incoming sound frequency. This is realized by means of a software loop that alternate the demodulator to various frequencies, then select the frequency on which a lock condition has been found. De-emphasis output signal amplitude is independent of the TV standard and has the same value for a frequency deviation of ±25 kHz at the 4.5 MHz standard and for a deviation of ±50 kHz for the other standards. When the IF circuit is switched to positive modulation the internal signal on de-emphasis pin is automatically muted. The audio control circuit contains an audio switch and volume control.

In the mono inter-carrier sound versions the Automatic Volume Leveling (AVL) function can be activated. The pin to which the external capacitor has to be connected depends on the IC version.

**2.4 Video switching**

The video processor (STV2248C) has three CVBS inputs and two RGB inputs. The first CVBS input is used for external CVBS from SCART 1, the second is used for either CVBS or Y/C from either SCART2 or BAV/FAV or SVHS, and the third one is used for internal video. The selection between both external video inputs signals is realized by means of software and hardware switches.

**2.5 Synchronization circuit**

The video processor (STV224X) performs the horizontal and vertical processing. The external horizontal deflection circuit is controlled via the Horizontal output pulse (HOUT). The vertical scanning is performed through an external ramp generator and a vertical power amplifier IC controlled by the Vertical output pulse (VOUT).

The main components of the deflection circuit are:

• PLL1: the first phase locked loop that locks the internal line frequency reference on the CVBS input signal. It is composed of an integrated VCO (12 MHz) that requires the chroma reference frequency (4.43MHz or 3.58MHz crystal oscillator reference signal), a divider by 768, a line decoder, and a phase comparator.

• PLL2: The second phase locked loop that controls the phase of the horizontal output (Compensation of horizontal deflection transistor storage time variation). Also the horizontal position adjustment is also performed in PLL2.

• A vertical pulse extractor.

• A vertical countdown system to generate all vertical windows (vertical synchronization window, frame blanking pulses, 50/60Hz identification window...).

• Automatic identification of 50/60Hz scanning.

• PLL1 time constant control.

• Noise detector, video identification circuits, and horizontal coincidence detector.

• Vertical output stage including de-interlace function, vertical position control.

• Vertical amplitude control voltage output (combined with chroma reference output and Xtal 1 indication).

**2.6 Chroma and luminance processing:**

The chroma decoder is able to demodulate PAL, NTSC and SECAM signals.

The decoder dedicated to PAL and NTSC sub-carrier is based on a synchronous demodulator, and an Xtal PLL locked on the phase reference signal (burst).

The SECAM demodulation is based on a PLL with automatic calibration loop.

The color standard identification is based on the burst recognition.

Automatic and forced modes can be selected through the $I^2C$ bus.

NTSC tint, and auto flesh are controlled through $I^2C$ bus.

Xtal PLL can handle up to 3 crystals to work in PAL M, PAL N and NTSC M for South America.

ACC an ACC overload control the chroma sub-carrier amplitude within 26dB range. Both ACC s are based on digital systems and do not need external capacitor.

All chroma filters are fully integrated and tuned via a PLL locked on Xtal VCO signal.

A second PLL is used for accurate fine-tuning of the SECAM bell filter. This tuning is achieved during the frame blanking. An external capacitor memorizes the bell filter tuning voltage.

A base-band chroma delay-line rebuilds the missing color line in SECAM and removes transmission phase errors in PAL.

The base-band chroma delay line is clocked with 6MHz signal provided by the horizontal scanning VCO.

The luminance processor is composed of a chroma trap filter, a luminance delay line, a peaking function with noise coring feature, a black stretch circuit.
Trap filter and luminance delay lines are achieved with the use of bi-quad integrated filters, auto-aligned via a master filter phase locked loop.

**2.7 RGB output circuit:**
The video processor performs the R, G, B processing.
There are three sources:
1. Y,U,V inputs (coming from luma part (Y output), and chroma decoder outputs (R-Y, B-Y outputs).
2. External R,G,B inputs from SCART (converted internally in Y,U,V), with also the possibility to input YUV signals from a DVD player, (YUV specification is Y=0.7 V PP , U= 0.7 V PP , V = 0.7V PP for 100% color bar).
3. Internal R,G,B inputs (for OSD and Teletext display)

The main functions of the video part are:
- Y,U,V inputs with integrated clamp loop, allowing a DC link with YUV outputs,
- External RGB inputs (RGB to YUV conversion), or direct YUV inputs,
- Y,U,V switches,
- Contrast, saturation, brightness controls,
- YUV to RGB matrix,
- OSD RGB input stages (with contrast control),
- RGB switches,
- APR function,
- DC adjustment of red and green channels,
- Drive adjustments (R, G, B gain),
- Digital automatic cut-off loop control,
- Manual cut-off capability with $I^2C$ adjustments,
- Half tone, oversize blanking, external insertion detection, blue screen,
- Blanking control and RGB output stages.

**2.8 µ-Controller**
The ST92195 is the micro-controller, which is required for a color TV receiver. ST92195D1 is the version with one page Teletext and ST92195D7 is the one with 7 page Teletext. The IC has the supply voltages of 5 V and they are mounted in PSDIP package with 56 pins.
µ-Controller has the following features
- Display of the program number, channel number, TV Standard, analogue values, sleep timer, parental control and mute is done by OSD
- Single LED for standby and on mode indication
- System configuration with service mode
- 3 level logic output for SECAM and Tuner band switching

**3. TUNER**
Either a PLL or a VST tuner is used as a tuner.

UV1316 (VHF/UHF) is used as a PLL tuner. For only PAL M/N, NTSC M applications UV 1336 is used as the PLL tuner. UV 1315 (VHF/UHF) is used as a VST Tuner.

**Channel coverage of UV1316:**

| BAND | OFF-AIR CHANNELS | | CABLE CHANNELS | |
|---|---|---|---|---|
| | CHANNELS | FREQUENCY RANGE (MHz) | CHANNELS | FREQUENCY RANGE (MHz) |
| Low Band | E2 to C | 48.25 to 82.25 **(1)** | S01 to S08 | 69.25 to 154.25 |
| Mid Band | E5 to E12 | 175.25 to 224.25 | S09 to S38 | 161.25 to 439.25 |
| High Band | E21 to E69 | 471.25 to 855.25 **(2)** | S39 to S41 | 447.25 to 463.25 |

**(1).** Enough margin is available to tune down to 45.25 MHz.
**(2).** Enough margin is available to tune up to 863.25 MHz.

| **Noise** | Typical | Max. | **Gain** | Min. | Typical | Max. |
|---|---|---|---|---|---|---|
| Low band : | 5dB | 9dB | All channels : | 38dB | 44dB | 52dB |
| Mid band : | 5dB | 9dB | Gain Taper (of-air channels): | | | 8dB |
| High band : | 6dB | 9dB | | | | |

**Channel Coverage UV1336:**

| BAND | CHANNELS | FREQUENCY RANGE (MHz) |
|---|---|---|
| Low Band | 2 to D | 55.25 to 139.25 |
| Mid Band | E to PP | 145.25 to 391.25 |
| High Band | QQ to 69 | 397.25 to 801.25 |

**Noise** is typically 6dB for all channels. **Gain** is minimum 38dB and maximum 50dB for all channels.

**Channel Coverage of UV1315:**

| BAND | OFF-AIR CHANNELS | | CABLE CHANNELS | |
|---|---|---|---|---|
| | CHANNELS | FREQUENCY RANGE (MHz) | CHANNELS | FREQUENCY RANGE (MHz) |
| Low Band | E2 to C | 48.25 to 82.25 **(1)** | S01 to S10 | 69.25 to 168.25 |
| Mid Band | E5 to E12 | 175.25 to 224.25 | S11 to S39 | 231.25 to 447.25 |
| High Band | E21 to E69 | 471.25 to 855.25 **(2)** | S40 to S41 | 455.25 to 463.25 |

**(1).** Enough margin is available to tune down to 45.25 MHz.
**(2).** Enough margin is available to tune up to 863.25 MHz.

| **Noise** | Typ. | Max. | **Gain** | Min. | Typ. | Max. |
|---|---|---|---|---|---|---|
| Low band | 6dB | 9dB | All Channels | 38dB | 44dB | 50dB |
| Mid band | 6dB | 10dB | Gain Taper | | | 8dB |
| High band | 6dB | 11dB | (off-air channels) | | | |

**4. MULTISTANDARD SOUND PROCESSOR**

The MSP 34xxG is designed to perform demodulation of FM or AM-Mono TV sound. Three kinds of MSP's are used: MSP 3400G,MSP 3410G and MSP 3411G. The MSP 3400G is fully pin and software-compatible to the MSP 3410G, but is not able to decode NICAM. It is also compatible to the MSP 3411G,sound processor IC with virtual dolby sound.

**5. SOUND OUTPUT STAGETDA7269A**

The TDA7269A is a class AB dual Audio power amplifier, specially designed for high quality sound applications as Hi-Fi music centers and TV sets. It is supplied by ±12VDC coming from two separate windings in the SMPS transformer.It gives 2x14W(THD=10%) output power into an 8ohm load.

**6. VERTICAL OUTPUT STAGE WITH STV9306**

The STV9306 is a fully $I^2C$ controlled vertical deflection IC designed for use in 110°, 4/3 or 16/9 CRT applications. It integrates both the vertical deflection and E/W correction circuitries necessary in design of a 110° chassis.

**7. VIDEO OUTPUT AMPLIFIER STV5112**

The STV5112 consists of three monolithic video output amplifiers. The amplifier can be seen as an operational amplifier with negative feedback. The advantage of negative feedback is that the amplifier characteristics do not play an important role up to certain frequencies. The internal flash diodes protect the amplifiers against flash over in the picture tube. The only protections required at the cathode outputs are a flash resistor and a spark gap.
Furthermore, the device has a high voltage power supply (VDD) and a low voltage one (VCC).

**8. POWER SUPPLY (SMPS)**

The DC voltages required at various parts of the chassis are provided by an SMPS transformer controlled by the IC MC44608 which is designed for driving, controlling and protecting switching transistor of SMPS. The transformer produces 150V for FBT input, ±12V for audio output IC, +5V and +8V for ST92195.

**9. POWER FACTOR CORRECTION**

Passive components are used for the solution of power factor correction.

**10. SERIAL ACCESS CMOS 8K EEPROM 24C08**

The 24C08 is a 8Kbit electrically erasable programmable memory (EEPROM), organized as 4 blocks of 256*08 bits. The memory is compatible with the $I^2C$ standard, two wire serial interface which uses a bi-directional data bus and serial clock.

**11. CLASS AB STEREO HEADPHONE DRIVER TDA1308**

The TDA1308 is an integrated class AB stereo headphone driver contained in a DIP8 plastic package.

**12. CLASS AB MONO SUBWOOFER DRIVER TDA7261**

The TDA7261 is a class AB dual Audio power amplifier, specially designed for high quality sound applications in mono TV chassis. It is supplied by ±12VDC.

**13. SAW FILTERS**

| **Saw filter type:** | **Model:** |
|---|---|
| **G1975M:** | PAL B/G MONO |
| **K2966M:** | PAL SECAM B/G/D/K/I MONO |
| **J1981 :** | PAL-I MONO |
| **K2958M:** | PAL-SECAM B/G-D/K (38) MONO |
| **K2962M:** | PAL-SECAM B/G/D/K/I/L/L' MONO |
| **L9653M:** | SECAM L/L' AM MONO (AUDIO IF) |
| **G3967M:** | PAL-SECAM B/G STEREO (VIDEO IF) |
| **G9353M:** | PAL-SECAM B/G STEREO (AUDIO IF) |
| **K3958M:** | PAL-SECAM B/G/D/K/I/L/L' STEREO (VIDEO IF) |
| **K9356M:** | PAL-SECAM B/G/D/K/I STEREO (AUDIO IF) |
| **K9656M:** | PAL-SECAM B/G/D/K/I/L/L' STEREO (AUDIO IF) |
| **K3958M:** | PAL I NICAM (VIDEO IF) |
| **K9356M:** | PAL I NICAM (AUDIO IF) |
| **M1962M:** | PAL M/N NTSC M MONO |
| **M3953M:** | PAL M/N NTSC M STEREO (VIDEO IF) |
| **M9370M:** | PAL M/N NTSC M STEREO (AUDIO IF) |

## IC DESCRIPTIONS AND INTERNAL BLOCK DIAGRAM

- ST92195
- STV224X
- TUNER (UV1315, UV1316, UV1336)
- TDA7269A
- STV9306
- STV5112
- MC44608
- MSP 34XXG
- 24C08
- TDA1308
- SAW FILTERS

G1975M, K2966M, K2962M, L9653M, G3962M, G9353M, K3958M, K9356M, K9656M, K6263K, K9652M,M1962M, M3953M, M9370M

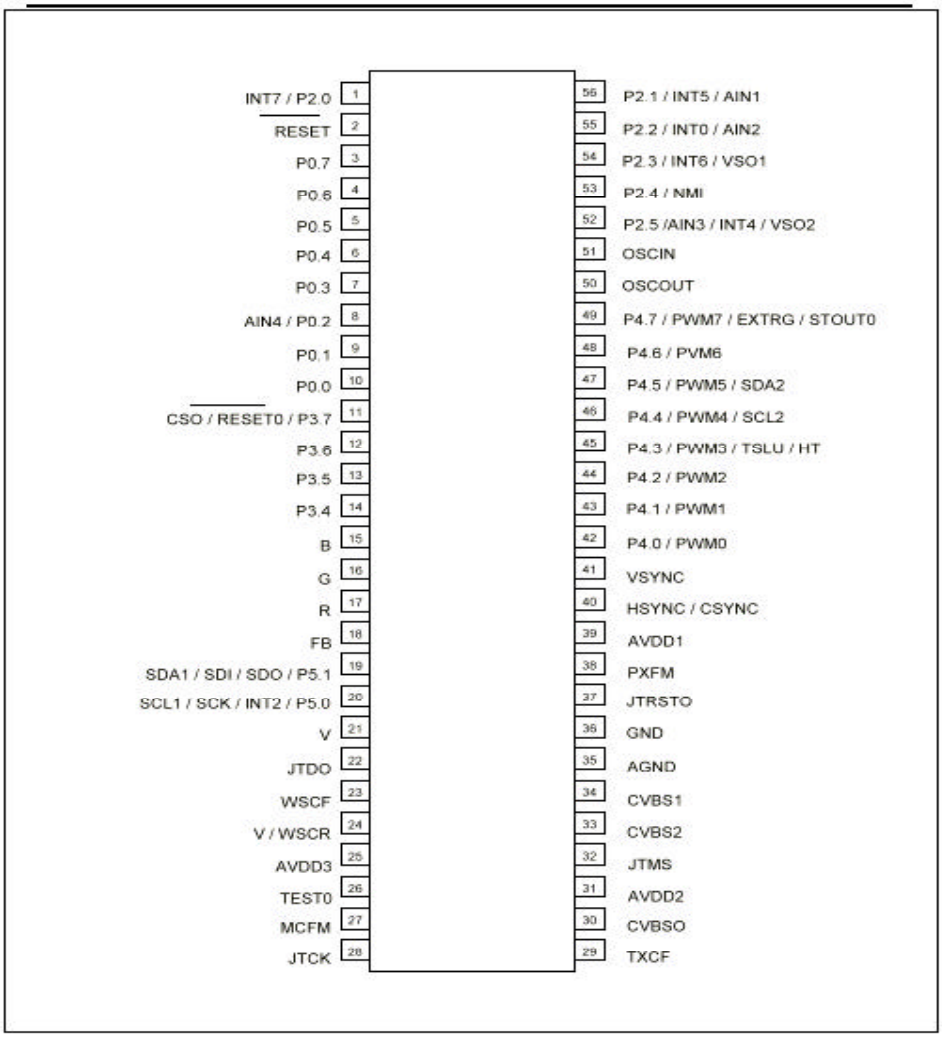
## ST92195

The ST92195 is a member of the ST9+ family of micro-controllers, completely developed and produced by SGS-THOMSON Microelectronics using a proprietary n-well HCMOS process. The nucleus of the ST92195 is the advanced Core, which includes the Central Processing Unit (CPU), the ALU, the Register File and the interrupt controller. The Core has independent memory and register buses to add to the efficiency of the code. A set of on-chip peripherals form a complete system for TV set and VCR applications:

– Voltage Synthesis
– VPS/WSS Slicer
– Teletext Slicer
– Teletext Display RAM
– OSD

Additional peripherals include a watchdog timer , a serial peripheral interface (SPI), a 16-bit timer and an A/D converter.

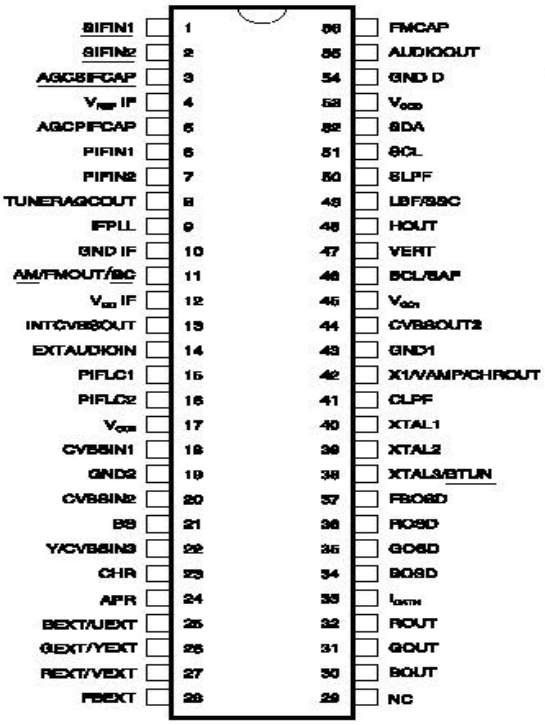
## MICROCONTROLLER PIN DESCRIPTION




## STV224X Video processor:

The STV2246/2247/2248 are fully bus controlled ICs for TV including PIF, SIF, luma, chroma and deflection processing. Used with a vertical frame booster (TDA1771 or TDA8174 for 90° chassis, STV9306 for 110° chassis), they allow the design of multi-standard (BGDKIMNLL, PAL/ SECAM/NTSC) sets with very few external components and no manual adjustments.

**PIN CONNECTIONS STV224X/8X** (SDIP56)




## UV1315, UV1316, UV1336

### General description of UV1315:

The UV1315 tuner belongs to the UV 1300 family of tuners, which are designed to meet a wide range of applications. It is a combined VHF, UHF tuner suitable for CCIR systems B/G, H, L, L', I and I'.

### Features of UV1315:

- Member of the UV1300 family small sized UHF/VHF tuners
- Systems CCIR:B/G, H, L, L', I and I'; OIRT:D/K
- Voltage synthesized tuning (VST)
- Off-air channels, S-cable channels and Hyper-band
- Standardized mechanical dimensions and pinning

| PINNING | PIN VALUE |
|---|---|
| 1. Gain control voltage (AGC) | :4.0V, Max:4.5V |
| 2. Tuning voltage | |
| 3. High band switch | :5V, Min:4.75V, Max:5.5V |
| 4. Mid band switch | :5V, Min:4.75V, Max:5.5V |
| 5. Low band switch | :5V, Min:4.75V, Max:5.5V |
| 6. Supply voltage | :5V, Min:4.75V, Max:5.5V |
| 7. Not connected | |
| 8. Not connected | |
| 9. Not connected | |
| 10. Symmetrical IF output 1 | |
| 11. Symmetrical IF output 2 | |

Band switching table:

| | Pin 3 | Pin 4 | Pin 5 |
|---|---|---|---|
| Low band | 0V | 0V | +5V |
| Mid band | 0V | +5V | 0V |
| High band | +5V | 0V | 0V |

**General description of UV1316:**

The UV1316 tuner belongs to the UV 1300 family of tuners, which are designed to meet a wide range of applications. It is a combined VHF, UHF tuner suitable for CCIR systems B/G, H, L, L', I and I'.

**Features of UV1316:**

- Member of the UV1300 family small sized UHF/VHF tuners
- Systems CCIR: B/G, H, L, L', I and I'; OIRT: D/K
- Digitally controlled (PLL) tuning via I²C-bus
- Off-air channels, S-cable channels and Hyper-band
- World standardized mechanical dimensions and world standard pinning
- Complies to "CENELEC EN55020" and "EN55013"

| **PINNING** | **PIN VALUE** |
|---|---|
| 1. Gain control voltage (AGC) | :4.0V, Max:4.5V |
| 2. Tuning voltage | |
| 3. I²C-bus address select | :Max:5.5V |
| 4. I²C-bus serial clock | :Min:-0.3V, Max:5.5V |
| 5. I²C-bus serial data | :Min:-0.3V, Max:5.5V |
| 6. Not connected | |
| 7. PLL supply voltage | :5.0V, Min:4.75V, Max:5.5V |
| 8. ADC input | |
| 9. Tuner supply voltage | :33V, Min:30V, Max:35V |
| 10. Symmetrical IF output 1 | |
| 11. Symmetrical IF output 2 | |

**General description of UV1336:**

UV1336 series is developed for reception of channels broadcast in accordance with the M, N standard.

**Features of UV1336:**

- Global standard pinning
- Integrated Mixer-Oscillator & PLL function
- Conforms to CISPR 13, FCC and DOC (Canada) regulations
- Low power consumption
- Both phono connector and 'F' connector are available

| **PINNING** | **PIN VALUE** |
|---|---|
| 1. Gain control voltage | :4.0V, Max:4.5V |
| 2. Tuning voltage | |
| 3. Address select | Max:5.5V |
| 4. Serial clock | :Min:-0.3V, Max:5.5V |
| 5. Serial data | :Min:-0.3V, Max:5.5V |
| 6. Not connected | |
| 7. Supply voltage | :5.0V, Min:4.75V, Max:5.5V |
| 8. ADC input (optional) | |
| 9. Tuning supply voltage | :33V, Min:30V, Max:35V |
| 10. Ground | |

11. IF output

## TDA7269A

### General Description of TDA7269A

The TDA7269A is a class AB dual Audio power amplifier, specially designed for high quality sound applications as Hi-Fi music centers and TV sets. Requires very few external components.

- Wide supply voltage range up to ±20V
- Split supply
- High output power; 14 + 14W @THD =10%, $R_L$ =8W,$V_S$= ±16V
- No pop at turn-on/off
- Mute (Pop free)
- Stand-by feature
- Thermal overload protection
- Short circuit protection to gnd

### PINNING

| | |
|---|---|
| 1 | - $V_S$ |
| 2 | Output1 |
| 3 | + $V_S$ |
| 4 | Output2 |
| 5 | Mute |
| 6 | - $V_S$ |
| 7 | In+(2) |
| 8 | In-(2) |
| 9 | Gnd |
| 10 | In-(1) |
| 11 | In+(1) |

## STV9306

### General description:

The STV9306 is a fully $I^2C$ controlled vertical deflection IC designed for use in 110°, 4/3 or 16/9 CRT applications. It integrates both the vertical deflection and E/W correction circuitries necessary in design of a 110° chassis.

### FEATURES

- FULLY $I^2C$ CONTROLLED
- DMOS POWER HALF-BRIDGE AMPLIFIER
- DC COUPLED OPERATION
- INTERNAL FLYBACK GENERATOR (UP TO 60V)
- SELF ADAPTED SAWTOOTH (50/60Hz)
- 100Hz OPERATION
- VERTICAL LINEARITY, AMPLITUDE AND CENTERING ADJUSTMENTS
- HORIZONTAL WIDTH, PINCUSHION, TRAPEZOID AND CORNER ADJUSTMENTS
- BREATHING CORRECTION
- 4/3, 16/9 CRT APPLICATION
- THERMAL PROTECTION
- LINEAR VERTICAL ZOOM FUNCTION
- E/W CLASS A OUTPUT
- LOW EXTERNAL COMPONENTS

**PINNING**

| | |
|---|---|
| 1. | SCL |
| 2. | CRAMP |
| 3. | SDA |
| 4. | CHOLD |
| 5. | SYNC |
| 6. | Vs |
| 7. | FLYBACK |
| 8. | GND |
| 9. | OUT |
| 10. | VOPS |
| 11. | EWOUT |
| 12. | SENS2 |
| 13. | EWFB |
| 14. | SENS1 |
| 15. | BREATHING |

## STV5112

**General Description:**

The STV5112 includes three video amplifiers designed with a high voltage bipolar/CMOS/DMOS technology (BCD). It drives directly the three cathodes and is protected against flashovers. Thanks to its three cathode current outputs, the STV5112 can be used with both parallel and sequential sampling applications.

Bandwidth: 8MHz TYPICAL
Supply Voltage: 220V typical
Rise and fall time: 50ns typical
CRT cathode current outputs for parallel or sequential cut-off or drive adjustment
Flashover protection
Power dissipation: 3.6W

| **PINNING** | **PIN VALUE** |
|---|---|
| 1. | BLUE INPUT |
| 2. | VCC LOW VOLTAGE |
| 3. | GREEN INPUT |
| 4. | RED INPUT |
| 5. | VDD HIGH VOLTAGE |
| 6. | RED CATHODE CURRENT |
| 7. | RED OUTPUT |
| 8. | GROUND |
| 9. | RED FEEDBACK |
| 10. | GREEN OUTPUT |
| 11. | GREEN CATHODE CURRENT |
| 12. | GREEN FEEDBACK |
| 13. | BLUE OUTPUT |
| 14. | BLUE CATHODE |
| 15. | BLUE FEEDBACK |

## MC44608

**General description:**

The MC44608 is a high performance voltage-mode controller designed for off–line converters. This high voltage circuit that integrates the start–up current source and the oscillator capacitor, requires few external components while offering a high flexibility and reliability.The device also features a very high efficiency stand–by management consisting of an effective Pulsed Mode operation. This

technique enables the reduction of the stand–by power consumption to approximately 1W while delivering 300mW in a 150W SMPS.
• Integrated start–up current source
• Loss less off–line start–up
• Direct off–line operation
• Fast start–up

**General Features**
• Flexibility
• Duty cycle control
• On chip oscillator switching frequency 40, or 75kHz
• Secondary control with few external components

**Protections**
• Maximum duty cycle limitation
• Cycle by cycle current limitation
• Demagnetization (Zero current detection) protection
• "Over VCC protection" against open loop
• Programmable low inertia over voltage protection against open loop
• Internal thermal protection

**GreenLine Controller**
• Pulsed mode techniques for a very high efficiency low power mode
• Lossless startup
• Low dV/dT for low EMI radiations

| **PINNING** | **PIN VALUE** |
|---|---|
| 1. Demagnetization | Zero cross detection voltage: 50-mV typ. |
| 2. I Sense | Over current protection voltage 1V typ. |
| 3. Control Input | Min: 7.5V Max.: 18V |
| 4. Ground | Iout $2A_{p-p}$ during scan $1.2A_{p-p}$ during flyback |
| 5. Driver | Output resistor 8.5 Ohm sink 15 Ohm source typ. |
| 6. Supply voltage | Max:16V (Operating range 6.6V-13V) |
| 7. No connection | |
| 8. Line Voltage | Min:50V Max:500V |

## MSP 34XXG

**General description:**

The MSP 34xxG family of single-chip Multi-standard Sound Processors covers the sound processing of all analog TV standards worldwide, as well as the NICAM digital sound standards. The full TV sound processing, starting with analog sound IF signal-in, down to processed analog AF-out, is performed on a single chip.

Two-carrier FM systems according to the German or Korean terrestrial specs or the satellite specs can be processed with the MSP 34x0G. Digital demodulation and decoding of NICAM-coded TV stereo sound, is done only by the MSP 3410G. The MSP 34x0G offers a powerful feature to calculate the carrier field strength, which can be used for automatic standard detection (terrestrial) and search algorithms (satellite).

The MSP 3411G has all functions of the MSP34x0G with the addition of a virtual surround sound feature. Surround sound can be reproduced to a certain extent with two loudspeakers. The MSP3411G includes our virtualizer algorithm "3D-PANORAMA" which has been approved by the Dolby Laboratories for compliance with the "Virtual Dolby Surround" technology. In addition, the MSP 34x1G includes our "PANORAMA" algorithm. The MSP34x1G has built-in automatic functions: The IC is able to detect the actual sound standard automatically (Automatic Standard

Detection). Furthermore, pilot levels and identification signals can be evaluated internally with subsequent switching between mono/ stereo/bilingual; no $I^2C$ interaction is necessary (Automatic Sound Selection).

**General Features**

- Two selectable analog inputs (TV and SAT-IF sources)
- Automatic Gain Control (AGC) for analog IF input. Input range: 0.10–3 V pp
- Integrated A/D converter for sound-IF inputs
- All demodulation and filtering is performed on chip and is individually programmable
- Easy realization of all digital NICAM standards (B/G, D/K, I & L) with MSP 3410G.
- FM demodulation of all terrestrial standards (incl. identification decoding)
- FM demodulation of all satellite standards
- No external filter hardware is required
- Only one crystal clock (18.432 MHz) is necessary
- FM carrier level calculation for automatic search algorithms and carrier mute function
- Subwoofer output with on-chip programmable low-pass and complementary high-pass filters

**DSP Section (Audio Base band Processing)**

- Flexible selection of audio sources to be processed
- Two digital input and one output interface via I 2 S bus for external DSP processors, featuring surround sound, ADR etc.
- Digital interface to process ADR (ASTRA Digital Radio) together with DRP 3510A
- Performance of all de-emphasis systems including adaptive Wegener Panda 1 without external components or controlling
- Digitally performed FM identification decoding and de-matrixing
- Digital base-band processing: volume, bass, treble, 5-band equalizer, loudness, pseudo-stereo, and base-width enlargement
- Simple controlling of volume, bass, treble, equalizer etc.

**Analog Section**

- four selectable analog pairs of audio base-band inputs (= four SCART inputs) input level: =<2 V RMS , input impedance: >=25 kΩ
- one analog mono input (i.e. AM sound): input level: =<2 V RMS , input impedance: >=15 kΩ
- two high-quality A/D converters, S/N-Ratio: >=85 dB
- 20 Hz to 20 kHz bandwidth for SCART-to-SCART copy facilities

## 24CO8

**General description:**

The 24C16 is a 8Kbit electrically erasable programmable memory (EEPROM), organized as 4 blocks of 256 * 08 bits. The memory operates with a power supply value as low as 2.5V.

**Features:**

- Minimum 1 million ERASE/WRITE cycles with over 10 years data retention
- Single supply voltage:4.5 to 5.5V
- Two wire serial interface, fully I²C-bus compatible
- Byte and Multi-byte write (up to 8 bytes)
- Page write (up to 16 bytes)
- Byte, random and sequential read modes
- Self timed programming cycle

| PINNING | PIN VALUE | |
|---|---|---|
| 1. Write protect enable | :0V | |
| 2. Not connected | :0V | |
| 3. Chip enable input | :0V | |
| 4. Ground | :0V | |
| 5. Serial data address input/output | :Input LOW voltage: | Min:-0.3V, Max:0.3*Vcc |
| | :Input HIGH voltage: | Min:0.7*Vcc, Max:Vcc+1 |
| 6. Serial clock | :Input LOW voltage: | Min:-0.3V, Max:0.3*Vcc |
| | :Input HIGH voltage: | Min:0.7*Vcc, Max:Vcc+1 |
| 7. Multibyte/Page write mode | :Input LOW voltage: | Min:-0.3V, Max:0.5V |
| | :Input HIGH voltage: | Min:Vcc-0.5, Max:Vcc+1 |
| 8. Supply voltage | :Min:2.5V, Max:5.5V | |

## TDA1308

**Features:**

- Wide temperature range
- Excellent power supply ripple rejection
- Low power consumption
- Short-circuit resistant
- High performance
- high signal-to-noise ratio
- low distortion

| PINNING | PIN VALUE |
|---|---|
| 1. Output A (Voltage swing) | :Min:0.75V, Max:4.25V |
| 2. Inverting input A | :Vo(clip):Min:1400mVrms |
| 3. Non-inverting input A | :2.5V |
| 4. Ground | :0V |
| 5. Non-inverting input B | :2.5V |
| 6. Inverting input B | :Vo(clip):Min:1400mVrms |
| 7. Output B (Voltage swing) | :Min:0.75V, Max:4.25V |
| 8. Positive supply | :5V, Min:3.0V, Max:7.0V |

## TDA7261

**General Description of TDA7261**

The TDA7261 is a class AB dual Audio power amplifier, specially designed for high quality sound applications in mono TV sets.

– Wide supply voltage range up to 50V ABS max.
– Split supply
– High output power;25W @THD =10%, $R_L$ =8W,$V_S$= ±20V
– No pop at turn-on/off
– Mute (Pop free)
– Stand-by feature
– Thermal overload protection
– Short circuit protection to gnd

**PINNING**

1. N.C.
2. + $V_S$
3. Output
4. Mute/Stby
5. - $V_S$
6. In
7. GND
8. N.C.

## Saw filter's list:

| | | VIDEO | AUDIO |
|---|---|---|---|
| MONO | PAL BG | G1975M | |
| | PSBG DK | K2966M | |
| | PAL II' | J1981 | |
| | PSBGDKK' II' | K2966M | |
| | PSBGDKK' LL' | K2962M | L9653 |

| | | VIDEO | AUDIO |
|---|---|---|---|
| STR | PAL BG | G3967M | G9353M |
| | PAL II' | K3958M | K9356 |
| | PSBGDKK' II' | K3958M | K9356 |
| | PSBGDKK' LL' | K3958M | K9656 |

**PINNING**

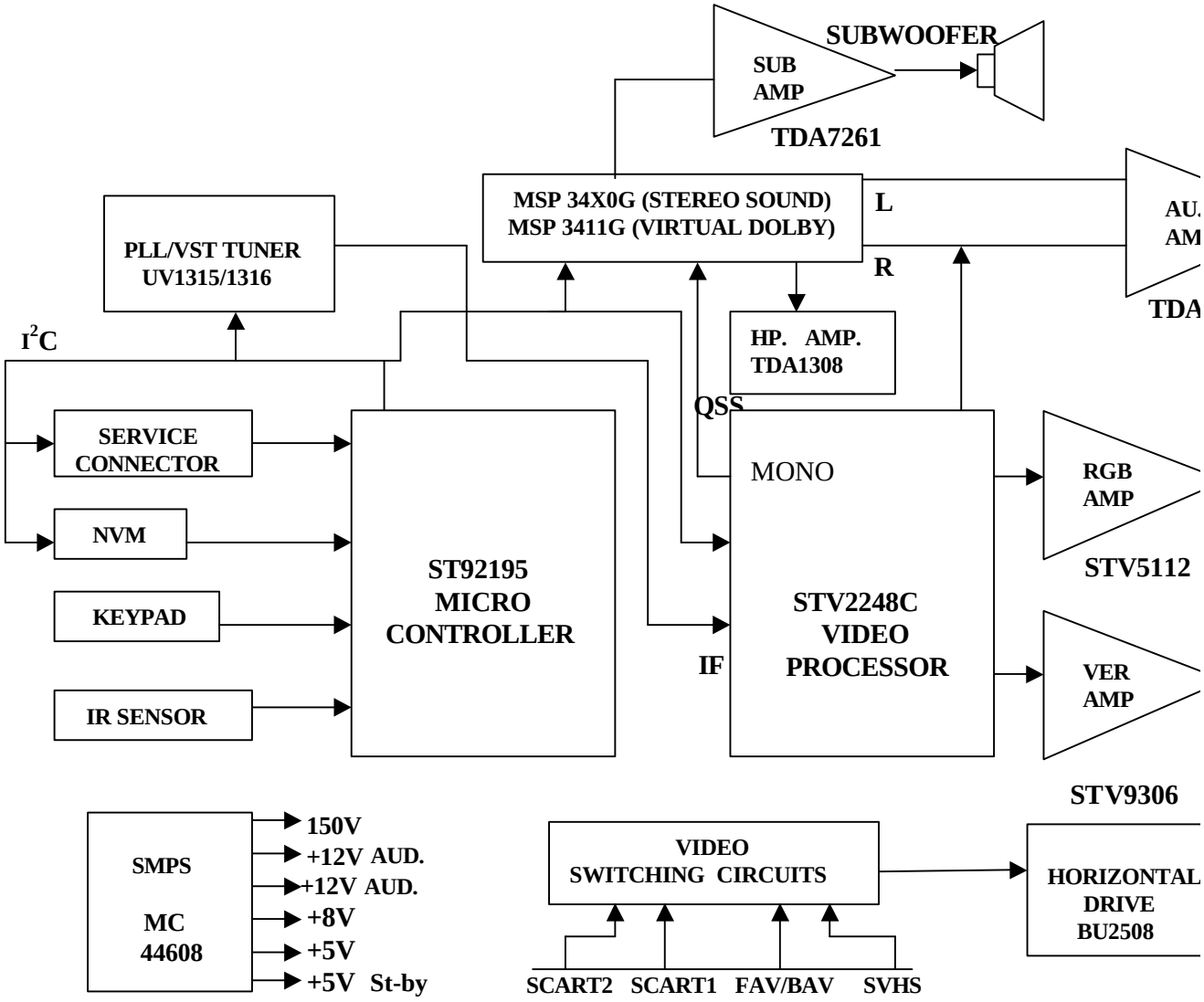
1. Input
2. Input-ground
3. Chip carrier-ground
4. Output
5. Output

**K9656M, L9653M**

**PINNING**

1. Input
2. Switching Input
3. Chip carrier-ground
4. Output
5. Output

## GENERAL BLOCK DIAGRAM of 11AK37



# AK37/TITANIUM SERVICE MENU

## SERVICE ADJUSTMENTS

| | Parameter | Notes |
|---|---|---|
| **OSD** | OSD Horizontal Position | |
| **IF1** | IF Coarse Adjust | |
| **IF2** | IF Fine Adjust | |
| **IF3** | IF Coarse Adjust for L-Prime | |
| **IF4** | IF Fine Adjust for L-Prime | |
| **AGC** | Automatic Gain Control | |
| **VLIN** | Vertical Linearity | |
| **VS1A** | Vertical Size for 50 Hz / 4:3 ( AK30 ) | |
| **VS1B** | Vertical Size for 50 Hz / 16:9 ( AK30 ) | |
| **VP1** | Vertical Position for 50 Hz ( AK30 ) | |
| **HP1** | Horizontal Position for 50 Hz ( AK30 ) | |
| **VS2A** | Vertical Size for 60 Hz / 4:3 ( AK30 ) | |
| **VS2B** | Vertical Size for 60 Hz / 16:9 ( AK30 ) | |
| **VP2** | Vertical Position for 60 Hz ( AK30 ) | |
| **HP2** | Horizontal Position for 60 Hz ( AK30 ) | |
| **RGBH** | RGB Horizontal Shift Offset | CVBS – RGB Horizontal position compensation |
| **VSOF** | Vertical Size Offset for 60 Hz ( AK37 ) | |
| **VPOF** | Vertical Position Offset for 60 Hz ( AK37 ) | |
| **HSOF** | Horizontal Size Offset for 60 Hz ( AK37 ) | |
| **HPOF** | Horizontal Position Offset for 60 Hz ( AK37 ) | |
| **HTOF** | Horizontal Trap Correction Offset for 60 Hz ( AK37 ) | |
| **WR** | White Point Adjust for RED | |
| **WG** | White Point Adjust for GREEN | |
| **WB** | White Point Adjust for BLUE | |
| **BR** | Bias for RED | |
| **BG** | Bias for GREEN | |
| **APR** | APR Threshold | |
| **FMP1** | FM Prescaler when AVL is OFF | STEREO ONLY |
| **NIP1** | NICAM Prescaler when AVL is OFF | STEREO ONLY |
| **SCP1** | SCART Prescaler when AVL is OFF | STEREO ONLY |
| **FMP2** | FM Prescaler when AVL is ON | STEREO ONLY |

| | | |
|---|---|---|
| **NIP2** | NICAM Prescaler when AVL is ON | STEREO ONLY |
| **SCP2** | SCART Prescaler when AVL is ON | STEREO ONLY |
| **S1V** | SCART1 Volume | STEREO ONLY |
| **S2V** | SCART2 Volume | STEREO ONLY |
| **F1H** | High Byte of crossover frequency for VHF1-VHF3 | Meaningful for only PLL Tuner |
| **F1L** | Low Byte of crossover frequency for VHF1-VHF3 | Meaningful for only PLL Tuner |
| **F2H** | High Byte of crossover frequency for VHF3-UHF | Meaningful for only PLL Tuner |
| **F2L** | Low Byte of crossover frequency for VHF3-UHF | Meaningful for only PLL Tuner |
| **BS1** | Band Switch Byte for VHF1 | Meaningful for only PLL Tuner |
| **BS2** | Band Switch Byte for VHF3 | Meaningful for only PLL Tuner |
| **BS3** | Band Switch Byte for UHF | Meaningful for only PLL Tuner |
| **CB** | Control Byte | Meaningful for only PLL Tuner |
| **OP1** | Option 1 (see the Option List) | |
| **OP2** | Option 2 (see the Option List) | |
| **OP3** | Option 3 (see the Option List) | |
| **OP4** | Option 4 (see the Option List) | |
| **OP5** | Option 5 (see the Option List) | |
| **TX1** | Teletext Option 1 (see the Option List) | |
| **GEOM** | Geometry Option (see the Option List) ( AK37 ) | |

# OPTION LIST

## *OP1 – Peripheral Options*

| 7 | | | | | | | | NOT USED |
|---|---|---|---|---|---|---|---|---|
| | 6 | | | | | | | 1, Display "AV-3" as "F-AV"<br>0, Display "AV-3" as "B-AV" |
| | | 5 | | | | | | 1, Turn back TV mode after the last AV (with AV key)<br>0, Turn back first AV mode after the last AV |
| | | | 4 | | | | | 1, SVHS is available in AV key stream<br>0, SVHS is NOT available in AV key stream |
| | | | | 3 | | | | 1, RGB is available in AV key stream<br>0, RGB is NOT available in AV key stream |
| | | | | | 2 | | | 1, AV-3 is available in AV key stream<br>0, AV-3 is NOT available in AV key stream |
| | | | | | | 1 | | 1, AV-2 is available in AV key stream<br>0, AV-2 is NOT available in AV key stream |
| | | | | | | | 0 | 1, AV-1 is available in AV key stream<br>0, AV-1 is NOT available in AV key stream |

## *OP2 – Reception Standard Options*

| 7 | | | | | | | | 1, 3-button keyboard (V-, P+, V+)<br>0, 4/5 button keyboard (V-, V+, P-, P+, Menu) |
|---|---|---|---|---|---|---|---|---|
| | 6 | | | | | | | 1, L/L 'is available<br>0, L/L 'is not available |
| | | 5 | | | | | | 1, I is available<br>0, I is not available |
| | | | 4 | | | | | 1, DK is available<br>0, DK is not available |
| | | | | 3 | | | | 1, BG is available<br>0, BG is not available |
| | | | | | 2 | | | 1, 3D PANORAMA is visible<br>0, DOLBY VIRTUAL is visible |
| | | | | | | 1 | | 1, for SECAM LLP, EXT MONO INPUT is available<br>0, inner demodulation is available for SECAM LLP |
| | | | | | | | 0 | 1, LOW POWER is available<br>0, LOW POWER is not available |

### *OP3 – Video Options*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7 | 6 | | | | | | | Xtal Configuration<br>00, 1 Xtal PAL 4.43<br>01, 2 Xtal PAL/NTSC 4.43/3.58<br>10, 1 Xtal PAL/SEC/NTSC 4.43<br>11, 2 Xtal PAL/SEC/NTSC 4.43/3.58 |
| | | 5 | | | | | | 1, Enable Blue back when no signal in AV modes<br>0, No blue back in AV modes |
| | | | 4 | | | | | 1, White Insertion is ON<br>0, White Insertion is OFF |
| | | | | 3 | | | | 1, Blue Background when no signal<br>0, Disable Blue Background |
| | | | | | 2 | | | 1, Semi-transparent background for menu<br>0, Solid Menu background for menu |
| | | | | | | 1 | | 1, Black Stretch is ON<br>0, Black Stretch is OFF |
| | | | | | | | 0 | 1, APR is ON<br>0, APR is OFF |

## *OP4 – TV Features*

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 1, Headphone is available (for STEREO models)<br>0, Headphone is not available |
| | | | | | | | | 1, Arabic/Persian is Available in Menu Languages (for A, D, E, F, and later)<br>0, Arabic/Persian is NOT Available in Menu Languages |
| | | | | | | | | 1, Hebrew is Available in Menu Languages (for A, D, E, F, and later)<br>0, Hebrew is NOT Available in Menu Languages |
| | | | | | | | | 1, Hotel Mode can be activated<br>0, Hotel Mode can not be activated |
| | | | | | | | | 1, No Signal Timer is enabled<br>0, No Signal Timer is disabled |
| | | | | | | | | For PLL Tuner<br>1, Frequency based search<br>0, Channel table based search<br>*(No meaning for for VST Tuner)* |
| | | | | | | | | 1, 3-band tuning (VHF1, VHF3, UHF)<br>0, 1-band tuning (only UHF) |
| | | | | | | | | 1, Extra 200 msec blanking for VST<br>0, no-extra blanking |

## *OP5 – Channel Tables*

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 1, Extra 150 msec blanking more for VST (if OP4.b0 = 1, to SECAM color problem)<br>0, no-extra blanking |
| | | | | | | | | 1, 'Programme" item in AUTOSTORE menu is visible<br>0, 'Programme" item in AUTOSTORE menu is invisible |
| | | | | | | | | 1, Force both channel on even no carrier ( carrier mute disable )<br>0, Default value after reset |
| | | | | | | | | 1, French OS Channel Table is available<br>0, French OS Channel Table is not available |
| | | | | | | | | 1, French Channel Table is available<br>0, French Channel Table is not available |
| | | | | | | | | 1, England Channel Table is available<br>0, England Channel Table is not available |
| | | | | | | | | 1, East Europe Channel Table is available<br>0, East Europe Channel Table is not available |
| | | | | | | | | 1, West Europe Channel Table is available<br>0, West Europe Channel Table is not available |

### *TX1 – Teletext Options*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7 | | | | | | | | 1, Auto APS after Stand-By<br>0, no APS after Stand-By |
| | 6 | | | | | | | RESERVED (must be 0) |
| | | 5 | 4 | 3 | | | | Teletext Language Groups<br>000, Group 1 – West<br>(English, French, Swedish, Czech, German, Portuguese, Italien, Rumanian)<br>001, Group 2 – West/East<br>(Polish, French, Swedish, Czech, German, Serbian, Italien, Rumanian)<br>010, Group 3 – West/Turkish<br>(English, French, Swedish, Turkish, German, Portuguese, Italien, Rumanian)<br>011, Group 4 – East/Cyrillic<br>(English, Cyrillic, Swedish, Czech, German, Serbian, Lettish, Rumanian)<br>100, Group 5 – Arabic<br>(English, French, Swedish, Turkish, German, Hebrew, Italien, Arabic) |
| | | | | | 2 | 1 | 0 | Device type selection<br>000, EPROM M6 A<br>001, ROM H5 P<br>010, ROMLESS H5 P<br>011, EPROM M6 R<br>100, ROM M6 R<br>101, OSDEPROM M6 R<br>110, ROM M6 P<br>111, Read Auto Gain Table for the device from EEPROM |

## *GEOM – Geometry Options ( for AK37 )*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7 | | | | | | | | NOT USED |
| | 6 | | | | | | | 1, SVHS audio input in FAV/BAV in<br>0, SVHS in AV2 |
| | | 5 | | | | | | 1, AK37 adjustment values are valid ( default for AK37 )<br>0, AK30 adjustment value are valid |
| | | | 4 | | | | | 1, ZOOM mode is available<br>0, ZOOM mode is not available |
| | | | | 3 | | | | 1, SUBTITLE mode is available<br>0, SUBTITLE mode is not available |
| | | | | | 2 | | | 1, CINEMA mode is available<br>0, CINEMA mode is not available |
| | | | | | | 1 | | 1, 14:9 mode is available<br>0, 14:9 mode is not available |
| | | | | | | | 0 | 1, Tube Format16:9<br>0, Tube Format 4:3 |

**TUNER SETTINGS**

| | VHF1-VHF3 | VHF3-UHF | AK30 SERVICE MENU ITEMS | | | | |
|---|---|---|---|---|---|---|---|
| | Frq. (Mhz) | Frq. (Mhz) | F1H | F1L | F2H | F2L | BS1 |
| **Philips UV1316S MK3** | 156,25 MHz | 441,25 MHz | 00001100 | 00110010 | 00011110 | 00000010 | 00000001 |
| **Thomson CTT5020** | 114,25 MHz | 401,25 MHz | 00001001 | 10010010 | 00011011 | 10000010 | 00000011 |
| **Samsung TECC2949PG28B** | 170,25 MHz | 465,25 MHz | 00001101 | 00010010 | 00011111 | 10000010 | 00000001 |
| **Samsung TECC2949PG35B** | 170,25 MHz | 449,25 MHz | 00001101 | 00010010 | 00011110 | 10000010 | 00000001 |
| **Alps TEDE9X226A** | 142,25 MHz | 425,25 MHz | 00001011 | 01010010 | 00011101 | 00000010 | 00000001 |
| **Alps TEDE9-004A** | 149,25 MHz | 424,25 MHz | 00001011 | 11000010 | 00011100 | 11110010 | 00000001 |

| Explanations | |
|---|---|
| F1H | High byte of VHF1-VHF3 cross-over frequency |
| F1L | Low byte of VHF1-VHF3 cross-over frequency |
| F2H | High byte of VHF3-UHF cross-over frequency |
| F2L | Low byte of VHF3-UHF cross-over frequency |
| BS1 | Band switching byte for VHF1 |
| BS2 | Band switching byte for VHF3 |
| BS3 | Band switching byte for UHF |
| CB | Control byte |

# AK37/TITANIUM – Languages Groups

**GROUP 1 - WEST**

- ENGLISH
- FRENCH
- SWEDISH
- CZECH
- GERMAN
- PORTUGUESE
- ITALIAN
- RUMANIAN

**GROUP 2 – WEST / EAST**

- POLISH
- FRENCH
- SWEDISH
- CZECH
- GERMAN
- SERBIAN
- ITALIAN
- RUMANIAN

**GROUP 3 – WEST / TURKEY**

- ENGLISH
- FRENCH
- SWEDISH
- TURKISH
- GERMAN
- PORTUGUESE
- ITALIAN
- RUMANIAN

**GROUP 4 – EAST / CYRILLIC**

- ENGLISH
- CYRILLIC
- SWEDISH
- CZECH
- GERMAN
- SERBIAN
- LETTISH
- RUMANIAN

## GROUP 5 - ARABIC

- ENGLISH
- FRENCH
- SWEDISH
- TURKISH
- GERMAN
- HEBREW
- ITALIAN
- ARABIC

### Using Remo te Control Buttons

**RED** : Is used to switch AVL to ON or OFF mode on service menu.
**GREEN** : Is used to enter the geometry menu.
**YELLOW** : Is used to prepare the system for screen adjustments.
**BLUE** : Is used for automatic IF and AGC adjustments.
**TTX Update** : Is used to change the picture mode.