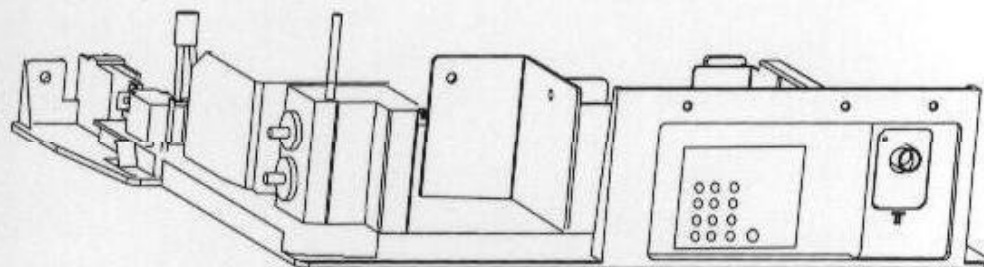


APEX

COLOR TELEVISION

SERVICE MANUAL

MODEL NO.: AT2402S/AT2402
CHASSIS NO.: CH-10C



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SAFETY INSTRUCTIONS

WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION", "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" INSTRUCTIONS BELOW.

X-RAY RADIATION PRECAUTION

1. The EHT must be checked every time the TV is serviced to ensure that the CRT does not emit X-ray radiation as result of excessive EHT voltage. The nominal EHT for this TV is 28.5KV at zero beam current (minimum brightness) operating at AC 120V. The maximum EHT voltage permissible in any operating circumstances must not exceed 31KV. When checking the EHT, use the High Voltage Check procedure in this manual using an accurate EHT voltmeter.
2. The only source of X-RAY in this TV is the CRT. To prevent X-ray radiation, the replacement CRT must be identical to the original fitted as specified in the parts list.
3. Some components used in this TV have safety related characteristics preventing the CRT from emitting X-ray radiation. For continued safety, replacement component should be made after referring the PRODUCT SAFETY NOTICE below.

SAFETY PRECAUTION

1. The TV has a nominal working EHT voltage of 27.5KV. Extreme caution should be exercised when working on the TV with the back removed.
- 1) Do not attempt to service this TV if you are not conversant with the precautions and procedures for working on high voltage equipment.
- 2) When handling or working on the CRT, always discharge the anode to the TV chassis before removing the anode cap in case of electric shock.
- 3) The CRT, if broken, will violently expel glass fragments. Use shatterproof goggles and take extreme care while handling.
- 4) Do not hold the CRT by the neck as this is a very dangerous practice.
2. It is essential that to maintain the safety of the customer all power cord forms be replaced exactly as supplied from factory.
3. Voltage exists between the hot and cold ground when the TV is in operation. Install a suitable isolating transformer of beyond rated overall power when servicing or connecting any test equipment for the sake of safety.
4. Replace blown fuses within the TV with the fuse specified in the parts list.
5. When replacing wires or components to terminals or tags, wind the leads around the terminal before soldering. When replacing safety components identified by the international hazard symbols in the circuit diagram and parts list, it must be the company-approved type and must be mounted as the original.
6. Keep wires away from high temperature components.

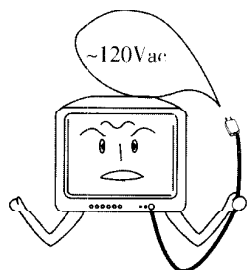
SAFETY INSTRUCTIONS (continued)

PRODUCT SAFETY NOTICE

Many electrical and mechanical components in this chassis have special safety-related characteristics. These characteristics are often passed unnoticed by a visual inspection and the X-ray radiation protection afforded by them cannot necessarily be obtained by using replacements rated at higher voltages or wattage, etc. Components which have these special safety characteristics in this manual and its supplements are identified by the international hazard symbols in the circuit diagram and parts list. Before replacing any of these components read the parts list in this manual carefully. Substitute replacement components which do not have the same safety characteristics as specified in the parts list may create X-ray radiation.

PRECAUTIONS

Power Sources—The TV set should be operated only from the type of power source indicated on the TV set or as indicated in the Service Manual. If you are not sure of the type of power supply in your home, consult your sales person or your local power company. For TV sets designed to operate from battery power, or other sources, refer to the operating instructions.

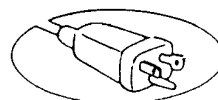


Grounding or Polarization—Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

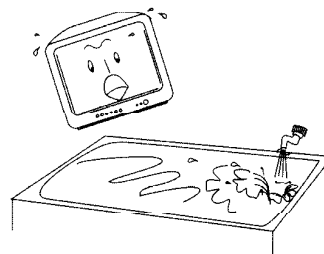


Wide blade
Lame large
Cuchilla ancha

Alternate Warnings—A three wire grounding type plug—a plug having a third (grounding) pin. This plug will only fit into grounding type power outlet.



Water and Moisture Warnings—Do not use the TV set near water—for example, near a bath tub, wash bowl, kitchen sink, or laundry tub; in a wet basement; or near a swimming pool; and the like. The TV set shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the TV set.



Ventilation—Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the TV set and to protect it from overheating, and these openings must not be blocked or covered. The openings should never be blocked by placing the TV set on a bed, sofa, rug, or other similar surface. This TV set should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided or the manufacturer's instructions have been adhered to.

SPECIFICATIONS

Television system:	NTSC-M
Channel coverage:	VHF 2~13
	UHF 14~69
	CABLE TV :MID BAND (A-8~A-1, A-I)
	SUPER BAND (J~W)
	HYPER BAND (AA~ZZ, AAA, BBB)
	ULTRA BAND (65~94, 100~125)
Channels preset:	181
Antenna input:	75Ω (unbalanced)
Picture tube:	Effective screen dimensions: 478mm×363mm (18.82×14.29 in.)
Max. audio output:	5W×2 (for AT2402 only); 5W+5W (for AT2402S only)
Power source:	~120Vac 60Hz
Weight:	31.5kg (69 lbs) (Approx.)
Dimensions(W/H/D):	660×522×458mm (25.98×20.55×18.03 in.) (Approx.)
Packing dimensions(W/H/D):	740×610×545mm (29.13×24.02×21.46 in.) (Approx.)
Rated power consumption:	125W

Designs and specifications are subject to change without notice.

KEY ICS AND ASSEMBLIES

Table 1 Key ICs and Assemblies (for AT2402S only)

Serial No.	Position No.	Model No.	Function Description
1	N301	OM8839	Small signal processor
2	N401	TDA8350AQ	Vertical output circuit
3	N402	LM317	Tri-terminal regulator
4	N601	TDA7057AQ	Sound power amplifier
5	N001	CH04T1002	Microcontroller
6	N002	AT24C04	EEPROM
7	N811	TDA4605	Switching power control circuit
8	NY01	TDA6107Q	Video amplifier
9	DS01	HEF4052	Analog switch circuit
10	DS02	HEF4053	Analog switch circuit
11	N606	TDA9859	Audio processor
12	U101	TDQ-6F2M	Tuner

Note: TDA9859 (N606) is not available in AT2402.

SIGNAL PROCESS AND SYSTEM BLOCK DIAGRAMS

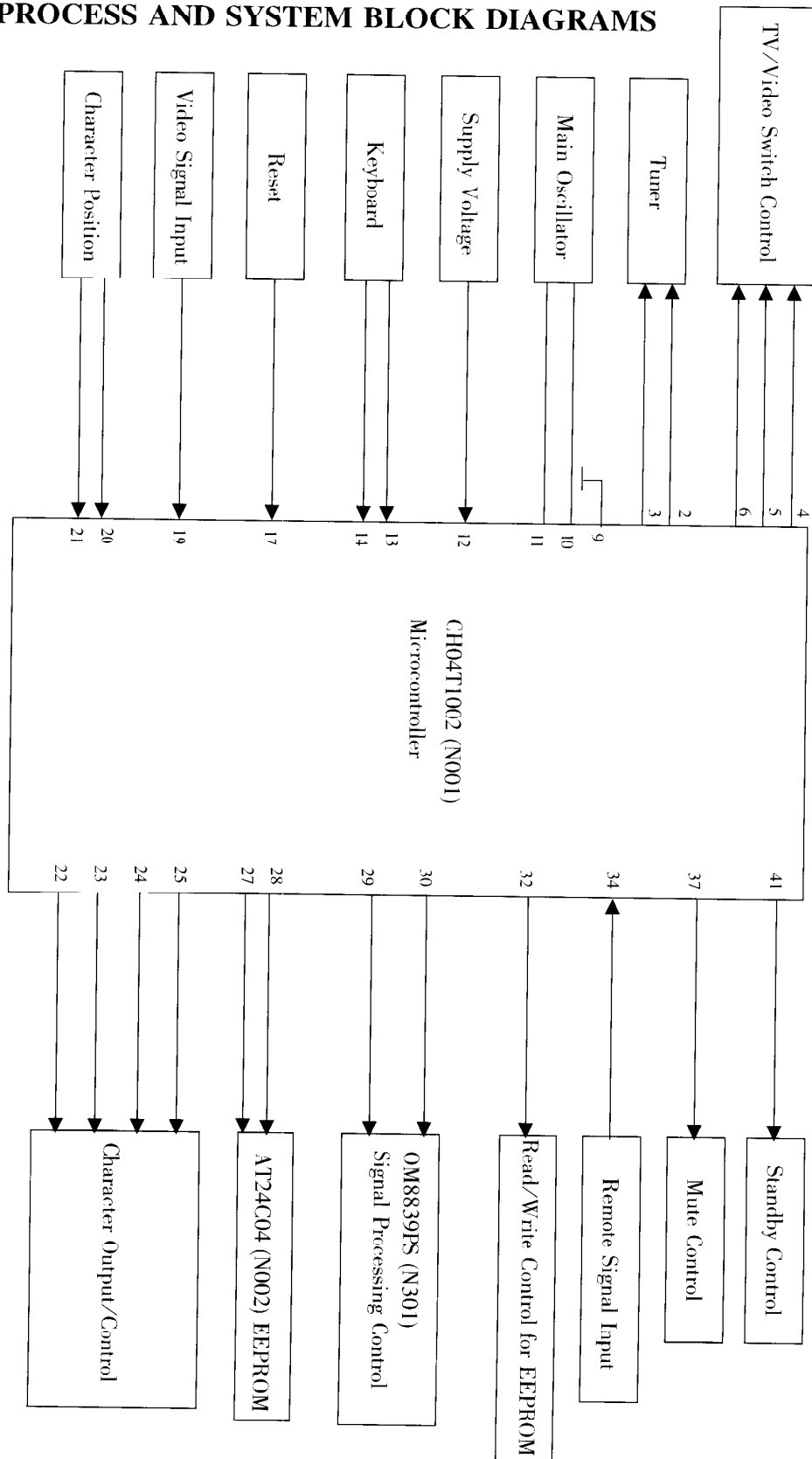


Fig.1 Block Diagram for CH-10C's Remote Control Structure

SIGNAL PROCESS AND SYSTEM BLOCK DIAGRAMS (continued)

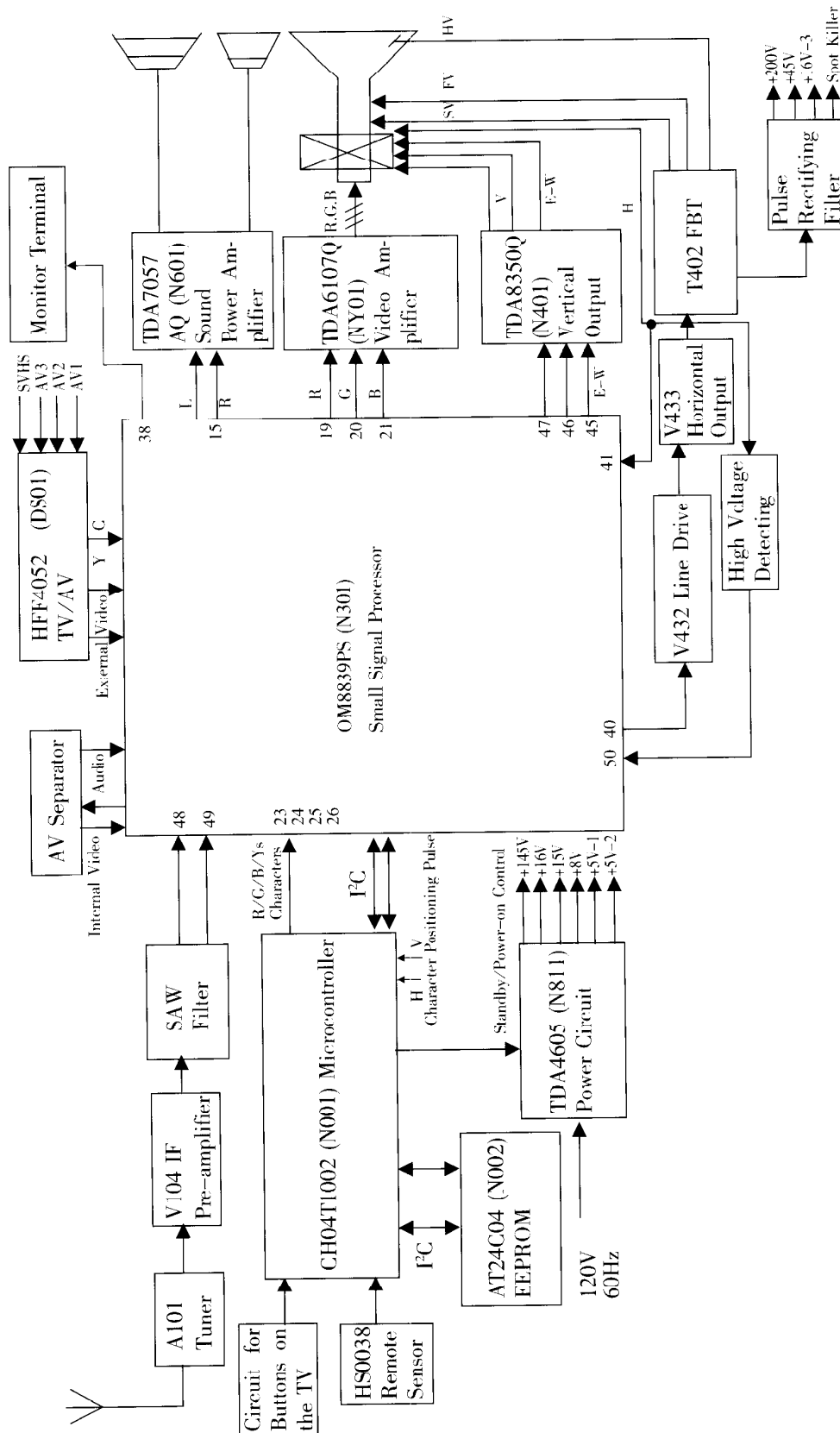


Fig. 2 Structure Block Diagram for CH-10C Chassis

SIGNAL PROCESS AND SYSTEM BLOCK DIAGRAMS (continued)

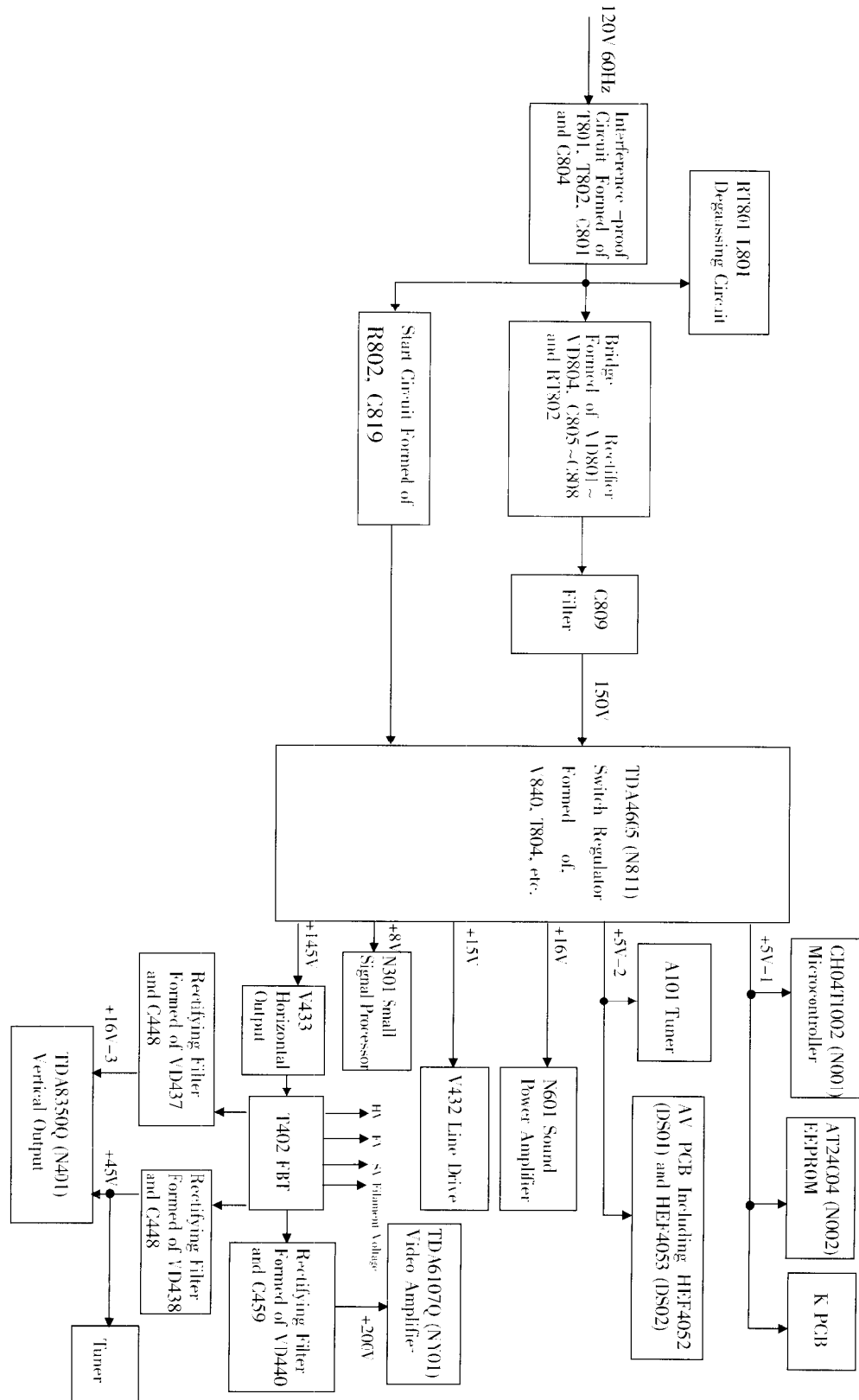


Fig. 3 Block Diagram for CH-10G Supply Voltage System

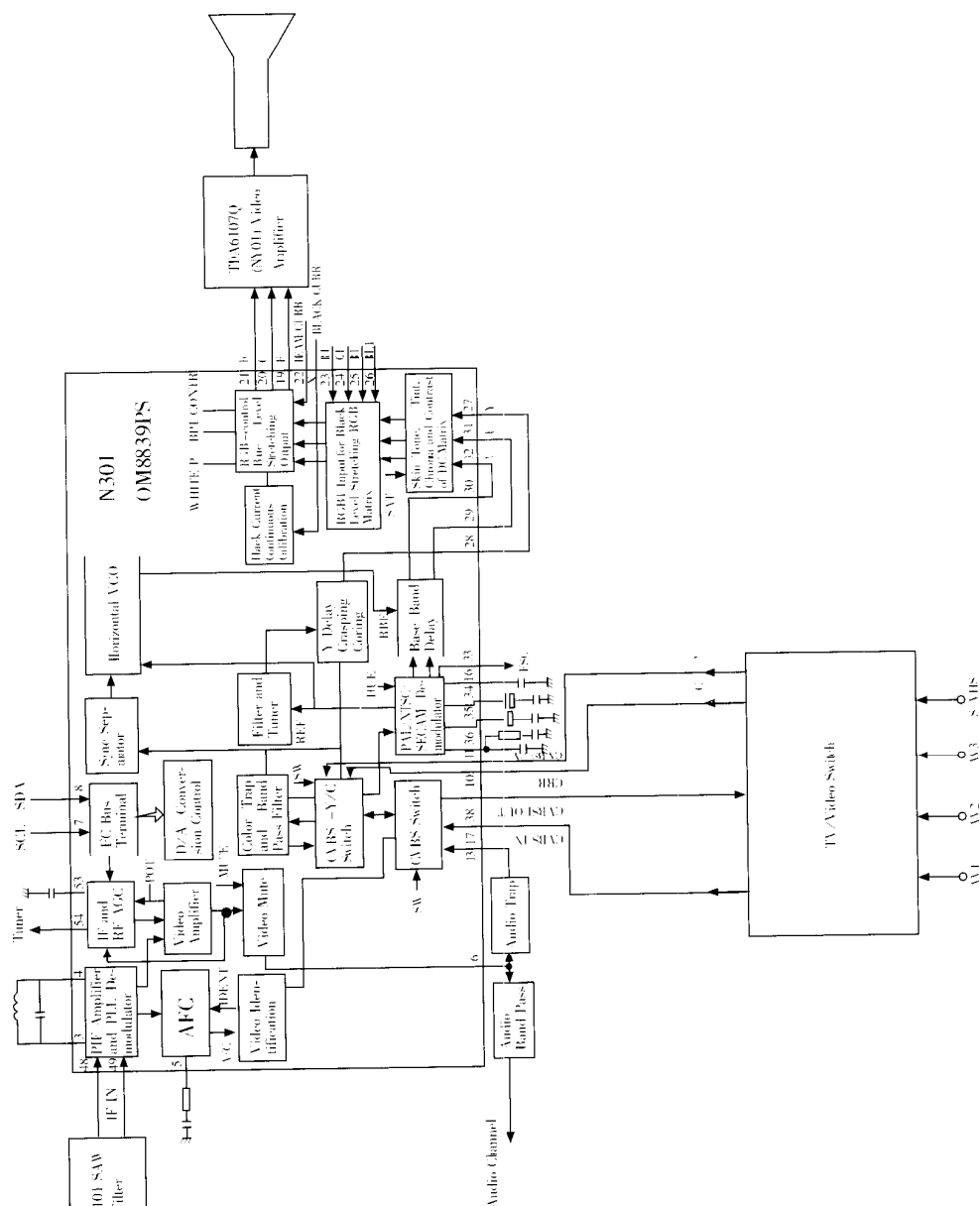


Fig. 4 Block Diagram for CH-10C Video Signal Processor

SIGNAL PROCESS AND SYSTEM BLOCK DIAGRAMS (continued)**1. Video Signal Process**

The video signal processor of CH-10C chassis consists of an A101 tuner, IF characteristic filtering circuit comprising V104, Z101, etc., N301 video channel/luminance channel/chroma channel and TDA6107Q end video amplifier as shown in Fig.4.

1) High/Intermediate frequency circuit

The RF TV signal received by the antenna is tuned, high frequency amplified and converted in A101 tuner to develop IF TV signals.

After coupled by R139 and C101, the IF TV signal is sent to the IF characteristic filter which prevents interference by neighboring channel, convenient for receiving the SIF signal and color sub-carrier IF signal to ensure good selectivity and adopting to vestigial sideband emission of the TV signal.

The IF characteristic filtering circuit comprises a V104 IF pre-amplifier, Z101 SAW filter, etc.

The IF signal output from the tuner is sent to the base of V104 after coupled by R139 and C101 to compensate insertion loss of the SAW filter after amplified by V104, then coupled to input terminal of the surface acoustic wave filter by C103. R101, R102 and R103 are bias resistors of DC operating point, C102 and R118 a feedback branch circuit to suppress self-excitation, and R117 a damping resistor to stretch frequency band of the amplifier. L102 and resonator of distributed capacitor are located near P1F to improve gain of the P1F signal.

The IF signal through the IF characteristic filtering circuit is input symmetrically into N301 by Pin48 and Pin49. In N301, the IF signals are filtered out a video signal as well as a second SIF signal after through fully IF amplifying and PLL sync detecting. Through video amplifying and video muting, the two generated signals are output from N301's Pin6.

In N301, the detected video signal are output in two ways: One set is sent to the AGC circuit to develop DC control voltage differing depending on different levels of the antenna input signal and change automatically gain of the high-frequency amplifier and IF amplifier so that amplitudes of signals output from the end IF amplifier and video detector remain unchanged, ensuring the TV normal operation and sharp and stable pictures. Externally connect N301's Pin53 to AGC filtering capacitor of the IF amplifier. P51 is a RFAGC output terminal. Start levels for the IF amplifier AGC and HF amplifier AGC are set by CPU through PC.

2) AV separator and TV/Video switch circuit

The composite video signal output from OM8839PS' Pin6 is output in two ways through V609 emitter: One set is connected to Z601 opposite to the 4.5MHz SIF trap, then input to OM8839PS' Pin13 by V204 emitter, R206, L204A and C208 for video processing. VD204 and C211 are formed into a 5V regulating filtering circuit.

Another set is input to base of V601S through the high pass filter formed of C601S, L601S and C602S, and output from V602S emitter after inverted by V601S, which is filtered out a SIF signal by Z605 band pass filter and is directly coupled to OM8839PS' Pin1.

The TV/Video switch circuit includes two parts: One part consists of a DS01 IC and DS02 IC, which selects out external video signal to Pin17 of N301 under control of KAV1, KAV2 and KAV3 signals output from N001.

VS10, VS20, VS30 are emitter followers on the AV OUT terminals, having function of AC impedance

SIGNAL PROCESS AND SYSTEM BLOCK DIAGRAMS (continued)

matching.

Another part of the TV/Video switch circuit is located in N301 as shown in Fig.5. After selected by Switch 1, the internal video signal input from Pin13 and external video signal from Pin17 are filtered out a luminance signal by the color trap to the luminance channel through switch 3; or are filtered out a chroma signal by the color band pass filter to the chroma channel through Switch 4.

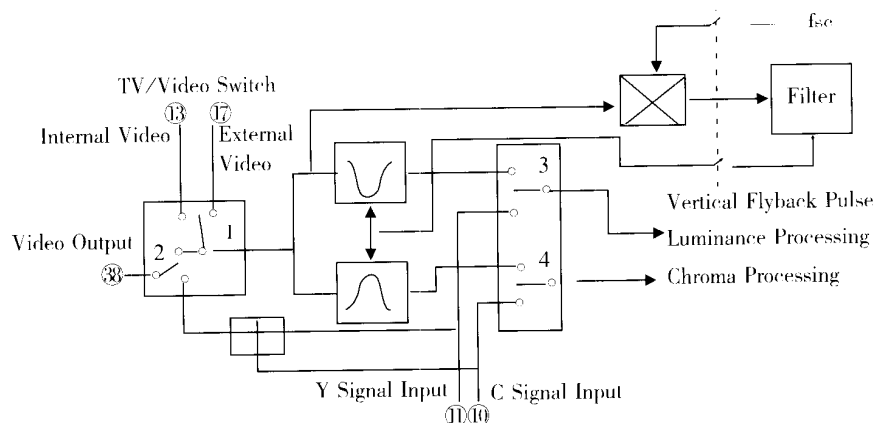


Fig. 5 N301 TV/Video Switch Circuit

The Y/C signal from the S-VIDEO terminal is switched over to Pin10 and Pin11 of N301 and sent to the luminance channel and chroma channel respectively after switched over by Switch 3 and Switch 4.

3) Luminance channel

The luminance channel of the chassis is all integrated in OM8839PS which includes a black level stretcher, definition control circuit and coring circuit besides common circuits.

OM8839PS's Pin27-Pin32 are used for connection to the ICs for improving picture quality, including a TDA9170 contrast improvement circuit, TDA9177 definition improvement circuit, TDA4556/66 chroma transient improvement circuit.

If with a chroma transient improvement circuit, properly switch luminance gain in the luminance channel to retain proper Y/C proportion as amplitude of the signal is to be improved to a certain extent after transiently improved. Therefore a gain switching bit for the luminance channel is set in sub address 03 byte of the I²C bus control data. Different level will change gain of the luminance channel, thus ensuring R, G, B output signals not to be influenced.

After processed, the luminance signal is output from Pin 28 of OM8839PS (N301) and input to the matrix circuit through Pin27.

4) Chroma channel

The chroma channel in OM8839PS includes an ACC circuit, ACL circuit, sub-carrier restorer, PAL/NTSC/SECAM demodulator, 1H baseband delay line circuit, killer identification circuit and system detector, all of which are controlled by the I²C bus. Refer to Fig. 6 about the chroma channel of the chassis.

The chroma signal selected out by the Y/C switchover switch in OM8839PS is sent to the chroma channel for chroma amplifying and being controlled by ACC and ACL, and then output in four ways: First

SIGNAL PROCESS AND SYSTEM BLOCK DIAGRAMS (continued)

set is sent to the APC circuit which discriminates the color sync signal and sub-carrier signal output from VCXO. The error signal generated herefrom controls frequency and phase of VCXO. Externally connect N301's Pin36 to the APC filtering circuit (including C223, C224 and R218), Pin34 to the 3.58MHz crystal oscillator of VCXO.

Second and third sets of chroma signals are sent into the B-Y/R-Y demodulators to demodulate out B-Y and R-Y color difference signals. Forth set is sent into the killer detector and system identification detector. The detecting result controls the chroma signal processor through the IFC bus. ACC and ACL detectors are also controlled by the IFC bus.

The demodulated R-Y and B-Y color difference signals are output from N301's Pin29 and Pin30 respectively after processed by the 1H baseband delay line, and then directly coupled to Pin31 and Pin32 of N301 through which are input into the matrix circuit.

5) RGB circuit

In OM8839PS (N301), the RGB circuit consists of a color difference matrix, primary color matrix, chroma control, tint control, contrast control, dynamic skin tone adjustment, blue level stretching, black current continuous correction (dark balance auto correction) and RGB switch circuit.

The B-Y and R-Y color-difference signals input from N301's Pin31 and Pin32 are mixed out a G-Y color-difference signal in the color-difference matrix after through controls of contrast, chroma and dynamic skin tone. Then in the primary matrix, the three color-difference signals mix with a Y luminance signal input from N301's Pin27 in a certain proportion to develop R, G, B primary color signals, which mix with character R, G, B signals and are output from Pin19, Pin20 and Pin21 to the video amplifier after through blue level stretching and dark balance correction.

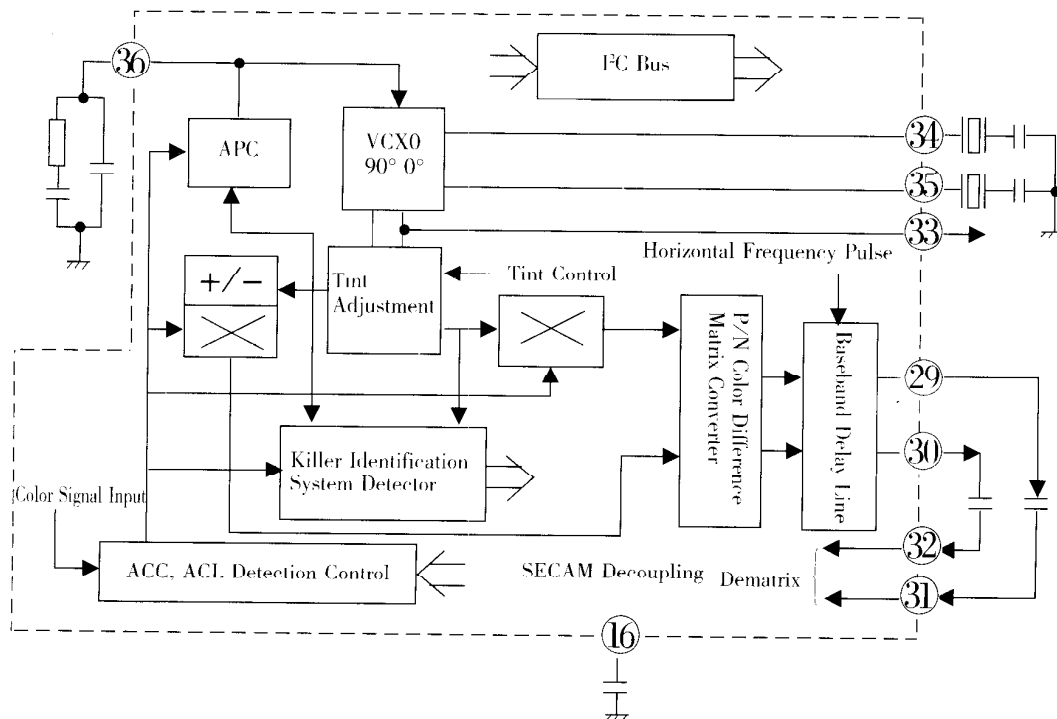


Fig. 6 Chroma Decoding Schematic Block Diagram

SIGNAL PROCESS AND SYSTEM BLOCK DIAGRAMS (continued)

6) Video amplifier

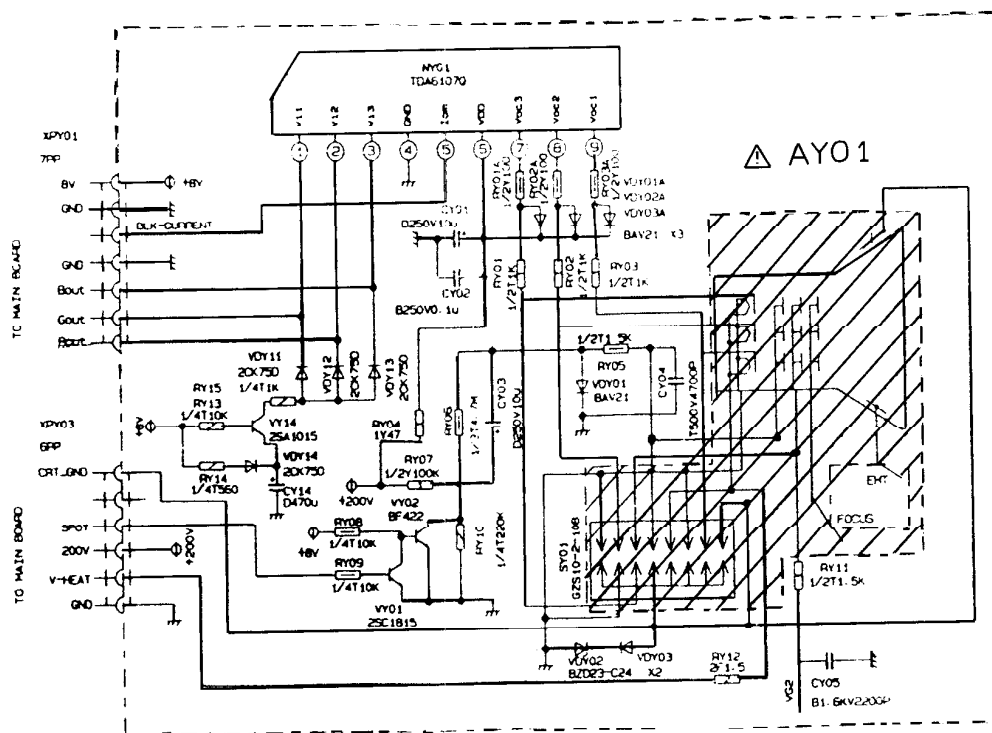


Fig. 7 Video Amplifier

The video amplifier of the chassis contains mainly TDA6107Q (NY01) as shown in Fig. 7.

B, G, R signals output from N301's Pin19, Pin20 and Pin21 are sent into the CRT RGB PCB, and then input from Pin1, Pin2 and Pin3 of TDA6107Q (NY01). After fully amplified, the three signals are output from Pin7, Pin8 and Pin9 to three cathodes of the CRT respectively to drive it to display pictures. NY01's Pin5 outputs black level detecting current to the black current continuous correcting circuit in N301's Pin18, thus completing dark balance correction.

VY14, VDY14, CY14 and VDY11~VDY13 are formed into a bleeder spot killer. Voltage supplied to CY14 is less than 8V and VY14 cuts off during normal operation, not affecting operating status of TDA6107Q. After power-off, 8V supply voltage disappears. The voltage supplied to CY14 discharges current into three input terminals through VY14. Ensure that TDA6107Q is still in operating status and beam current is discharged out as soon as possible. When voltages of the cathodes exceed 200V due to a certain factor, VDY01A~VDY03A, three overvoltage protecting diodes, conduct so that the supply voltage limits amplitude to protect IC.

VY01, VY02, CY03, VDY01, RY05, RY06 and RY07 are formed into a cut-off spot killer. Horizontal flyback pulse output from the FBT's Pin7 is rectified by VD442 and filtered by C463 to output voltage to saturate VY01 and cut off VY02. The 200V supply voltage recharges CY03 through RY07 to ensure negative voltage of CY03 0.7V and conduct VDY01. After power-off, VY01 cuts off and VY02 saturates. Without sudden change in voltage supplied to CY03 capacitor, ground its positive terminal. And connect its negative voltage (negative potential) to the grid through RY05 for changing the grid to negative potential and resulting in in-

SIGNAL PROCESS AND SYSTEM BLOCK DIAGRAMS (continued)

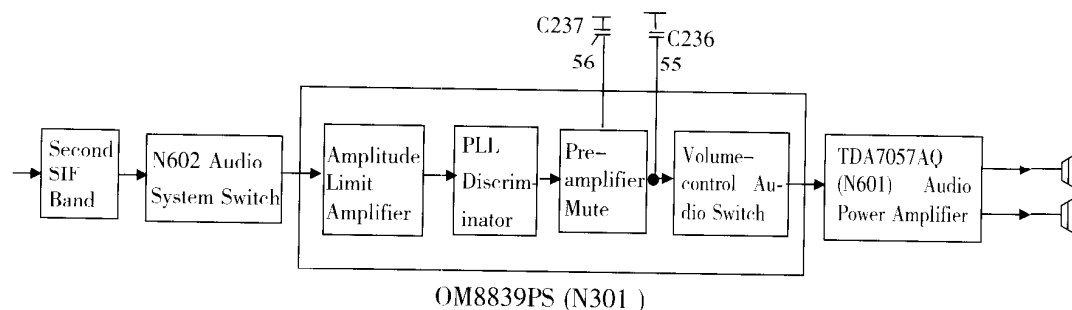


Fig. 8 Audio Signal Processor for CH-10C Chassis

creasing of potential difference between the cathode and grid, thus stopping cathode electrode emission and generating a cut-off spot killer. V_{DY02} and V_{DY03} are used to separate signal ground potential and CRT ground potential to avoid damage to components due to big fluctuation of CRT ground potential.

2. Audio Signal Process

The audio signal processor consists of a N301 (including an audio IF amplitude-limit amplifier, PLL discriminator, audio amplifier, volume control and audio switch) and TDA7057AQ (N601) audio power amplifier as shown in Fig.8.

The TV signal output from N301's Pin6 is filtered out a second SIF signal by the second SIF band pass to N301's Pin1.

The second SIF signal in N301 is further separated out an audio signal after through amplitude-limited amplifying and PLL discrimination. The demodulated audio signal is output from N301's Pin15 through amplifying, mute control, volume control and audio switch switchover, later two of which are performed by the IC. Externally connect N301's Pin55 to C236 deemphasis capacitor, and Pin56 to C237 audio decoupling capacitor.

The audio signal output from N301's Pin15 is sent to Pin3 and Pin5 of TDA7057AQ (N601) respectively. After though BTL power amplifying, R/L audio signals in N601 are output from Pin11, Pin13 and Pin8, Pin10 respectively to drive speakers to output sound.

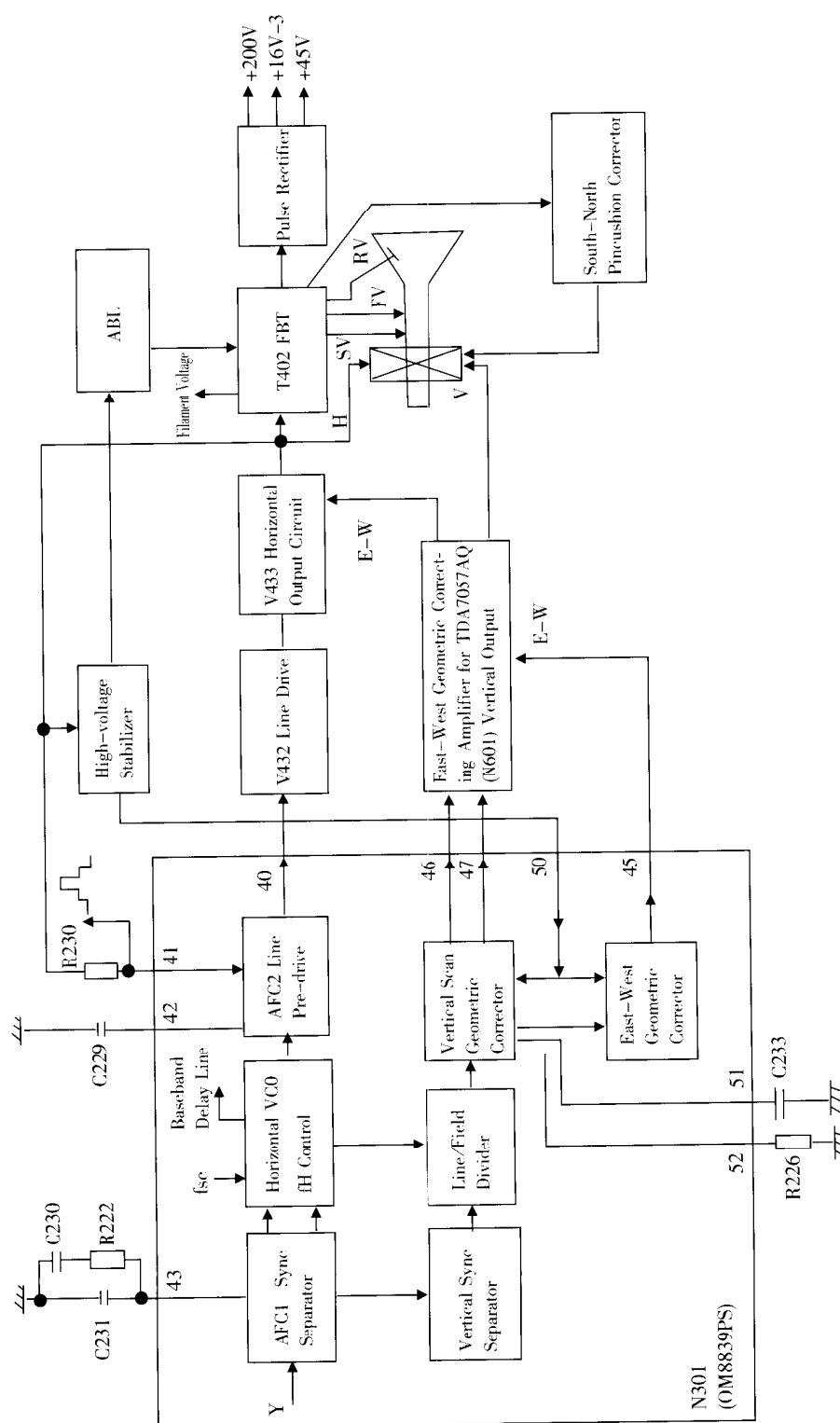
After emitted by V205 emitter and inverting amplified by V2015, the audio signal output from N301's Pin55 is sent to DS01's Pin4 on the AV PCB, and then sent to the monitor after switched over. V631 is a mute control circuit. When N001's Pin37 outputs high level, V631 is saturates and conducts. The volume control terminals of N601's Pin1 and Pin7 output low level to turn off sound. The power-off mute control circuit comprises V632, C631A, VD631A, R628A and R629A.

3. Scan Signal Process

The scan system includes horizontal/vertical scan circuits, which provides proper horizontal/vertical sawtooth current respectively synced by horizontal/vertical sync signals to the horizontal/vertical deflection yokes to control three electron beams in CRT to synchronously scan from left to right and up and down, thus ensuring correct aspect ratio and good raster in CRT.

The scan circuit of the chassis comprises a N301 scan small signal processor, line drive circuit, horizontal output circuit, vertical output circuit, high-voltage stabilizer and south-north pincushion corrector as shown in Fig. 9.

The scan small signal processor in OM8839PS (N301) functions as a sync separator, consistency detec-



SIGNAL PROCESS AND SYSTEM BLOCK DIAGRAMS (continued)

tor, horizontal oscillator, horizontal frequency AFC, line drive, vertical frequency sync and geometric corrector, overvoltage protector, vertical sawtooth generator, CRT protector preventing invalidity of vertical scanning. The following give short descriptions of fundamental operations of each circuit in N301.

- 1) Sync separator: Similar to conventional sync separators, firstly the sync separator amplifies the sync pulse signal through its controllable amplifier, compresses video signal and fixes it through its clamp level. Then the separator cuts sync pulse from first 50% sync amplitude, which is output after shaped and amplified.
- 2) Consistency detector: The circuit is used to check if the horizontal oscillating pulse is synchronous with sync pulse in signal or not. If not, the filter's time constant controlling the AFC1 control loop keeps small (in the Capture mode). Once sync, the time constant becomes big (in the Hold mode) after detected by the detector.

The detector is also used to identify receiving signals as OM8839PS adapts to multi-system small signal processing. When confirming signal system, the CPU will measure swing range of level output from the consistency detector. If the output level is within a certain threshold range within programmed time, the receiving signal is synchronous with horizontal oscillator, ensuring other circuits' normal operation and converting other circuits to the appropriate system through the I²C bus control. If exceeding the threshold, the receiving signal is non-synchronous with the horizontal oscillator and the control circuit enters the Search mode.

During search, STM (search tuning mode bit) in the I²C bus reduces sensitivity of the consistency detector to avoid the tuner stopping when the received signal is weak. With normal signal reception, pulse width of the AFC control loop switch reaches 22 μ s. If the signal output from the identify circuit includes too much noise, move the cutting level, resulting in the pulse width decreasing to 5.7 μ s and the first AFC control loop not opened. In this case, the circuit is still in the Search mode, thus reducing search sensitivity.

- 3) Horizontal oscillator: Its free oscillating frequency is twofold of horizontal frequency. During starting oscillating, its frequency is almost twice as much as that in some system. If the signal output from the identify circuit produces too much noise, move the cutting level, resulting in the pulse width decreasing. After researched and confirmed by the system, fsc sub-carrier frequency output from the crystal oscillator is divided into horizontal frequency twice as much as that in this system to control the oscillator running in the precise horizontal frequency. After 1/2 divided, the horizontal frequency is sent to the AFC1 control loop to output error voltage for controlling the voltage-control oscillator after discriminated with the sync pulse.

As OM8839PS is equipped with functions of slow cut-in and slow cut-out of the horizontal output stage, select one of two cut-in and cut-out ways according to actual situations when setting protection. In first way, fast cut-out and slow cut-in offer double horizontal frequency and lower load current to protect the horizontal output stage when the load current is too high. In second way, slow cut-out and slow cut-in discharge high voltage to protect the horizontal output stage when high voltage is too high. The two protections are completed through the I²C bus's PRD data bit switchover. The action relation between PRD bit (overvoltage input detection bit) and XPR (X ray protection bit): With XPR set to 1, X-ray protection voltage is detected too high. Only with PRD set to 1, can the

SIGNAL PROCESS AND SYSTEM BLOCK DIAGRAMS (continued)

unit enter the overvoltage protection mode. If with PRD set to 0, the unit is in the detection mode. In this case, X-ray protection may not work but the first protection may function. If overcurrent is detected, set PRD to 1 and the protection activates.

In slow cut-out way, increase beam current when starting slow cut-out to shorten discharge time (i.e. to discharge high voltage of the CRT quickly). Thus the way should be controlled by RBL (primary color blanking bit) of the PC bus to inactivate the primary color blanking, increase discharge current and shorten discharge time.

- 4) Horizontal frequency AFC: Similar to traditional operations, the AFC1 loop is used to correct horizontal frequency and signal reception sync and the AFC2 loop to correct phase between line drive pulse and flyback pulse.

- 5) Line drive: Switching on/off the FBT is mainly controlled by pulse output from TDA8843's Pin40.

When the CPU detects out reset of the supply voltage, switch off the line drive to protect the FBT. In this case, the PC bus immediately sends control data to correct the line drive signal. Switch on the line drive circuit to start slow cut-in. As the line drive pulse is formed through two AFC loops and the AFC2 loop is influenced by horizontal flyback pulse, do not activate correction and switch on the FBT when without horizontal flyback pulse. Only when horizontal flyback is fed back to OM8839PS during slow cut-in, can correction activate.

- 6) Vertical sync: OM8839PS is equipped with three vertical syncs as follows.

- ① Wide window sync is suitable for non-synchronous signal or nonstandard sync within the capture range of 244 lines~361 lines (about 45~64.5Hz).
- ② Narrow window sync is the same with identification process. When detecting out over 15 vertical sync pulses continuously, the circuit enters the narrow window sync mode in which flyback on time of the sawtooth generator is started to effectively eliminate non-synchronous generated during channel shift or system shift after the detection is completed. If vertical sync pulse is not found in continuous 6 vertical cycles, the circuit reenters the wide window sync mode.
- ③ Locking mode: The vertical sync circuit compares input sync pulse to divided vertical frequency pulse if in the narrow window sync mode. If consistent in 15 vertical sync circles, the circuit shifts to the locking mode in which the circuit remains in the vertical frequency to improve anti-interference of the circuit even if vertical sync pulse is lost occasionally. If three-circle vertical sync pulses are lost continuously, the circuit reenters the narrow window sync mode. Only with continuous three vertical sync pulses lost in the narrow window sync mode, does the circuit enter the wide window sync and search modes.

Note:

During tuning channels, the horizontal/vertical frequency dividers delay a long time from unlocked to locked again. Without improvement, the video vertical sync can't follow channels selection caused by good anti-interference. Thus NCIN bit (H/V dividing conversion bit) of the PC bus data controls speed of the counting divider so that it enters fast search counting to enhance reaction speed during channel selection.

- 7) Geometric distortion correction: Geometric distortion, east-west pincushion distortion, quadrangle distortion and trapezium distortion all are corrected by the geometric distortion corrector in

SIGNAL PROCESS AND SYSTEM BLOCK DIAGRAMS (continued)

OM8839PS together with TDA8350. Meanwhile OM8839PS can also correct S distortion (non-linearity distortion).

8) Line drive circuit and horizontal output circuit

The line drive pulse output from OM8839PS' Pin40 is coupled to grid of V432 by R434 and C431 to control V432 on/off. VD431 is a protective diode to prevent V432 from breakdown due to grid voltage lower than source potential too much during cut-off. C432 and R433 retard the rise edge and drop edge of the line drive pulse to prevent from interference due to too steep edge. VD478 and C434 cut pulse peak caused by leakage inductance of the transformer. Taking a field effect transistor as a line drive reduces power consumption and lowers supply voltage.

V436 samples beam current and functions as an electronic filter. R457, R458A, R459A and VD457A are formed into a V436 base bias circuit with bias voltage of near 3.3V. When the base potential rises or drops due to change of beam current, the current between V436's emitter and collector alters accordingly. V436's function of current amplifying results in wide control range to OM8839PS' Pin22, effectively avoiding adverse effect caused by current alteration. When V436 base voltage is lower than emitter voltage by 0.2~0.3V, the circuit starts to control beam current limit.

V437, V438 and VD439 are formed into a high voltage sampling limiter. The horizontal flyback pulse is supplied to negative of VD439 after coupled by C476, rectifying filtered by VD443, C483 and divided by R484, R485. When the voltage at this point exceeds Zener voltage of VD439 by 0.7V, VD439 inverting-conducts, and V438 and V437 conduct with conducting current direct proportional to beam current. The change of beam current results in potential alteration at this point which is fed back to OM8839PS' Pin50 to control the geometric adjuster in OM8839PS, thus high voltage alteration not affecting its operation.

VD481 and V482, etc. are formed into a two-way amplitude limiter, which stabilizes flyback pulse amplitude from OM8839PS's Pin41 to avoid damage to OM8839PS caused by increasing of pulse amplitude due to sparking. Meanwhile, the horizontal flyback pulse is sent to the CPU's Pin26 to function as a character horizontal positioning pulse after inverting-shaped by V002. R091 and R039 are base bias resistors.

After output from V438 emitter, the vertical flyback pulse output from TDA8350's Pin10 is sent into OM8839PS's Pin22 (beam current limit) to function as vertical blanking pulse; or sent to V001 base through VD120A and R090, and then sent to the CPU's Pin27 to function as character vertical positioning pulse after inverting-shaped by V001.

L433 is a horizontal linearity inductor to correct scanning linearity. R422 is a damping resistor to eliminate oscillation caused by the horizontal linearity inductor and distributed capacitor. C440 is an S correction capacitor. L432 and C471 are formed into a parallel resonator through which parabola for east-west pincushion correction from TDA8350 is loaded to negative of VD434 damping diode to correct pincushion distortion. The horizontal frequency pulse for negative of VD434 separates horizontal frequency from the vertical output stage as L432 and C471 resonate and impede horizontal frequency greatly.

C477 is serially connected with R477 and VD477, then connected into the FBT's Pin6 after paralleled with C422. Finally connect it to lower end of the horizontal linearity correction inductor after serially connected with L434 to correct M distortion of horizontal scan current.

SIGNAL PROCESS AND SYSTEM BLOCK DIAGRAMS (continued)

9) Vertical scan output and geometric distortion correction

Vertical scan output and geometric distortion correction are performed by TDA8350.

Different with traditional vertical scan output circuits, the vertical scan output circuit features bridge structure (BTL). Inverted vertical sawtooth each other are input to Pin1 and Pin2 respectively. The first differential amplifier drives two push-pull output circuits in two ways respectively. After serially connected with a resistor, the deflection yoke is connected between two push-pull output circuits. DC/AC feedback voltage fetched out from top of the serial resistor is fed back to in-phase input terminal for Pin3's second differential amplifier. The amplifier outputs in two ways symmetrically which stabilizes two push-pull output points respectively. With stable VP supply voltage, the upper push-pull output stage provides vertical scan current as large as that of conventional push-pull circuits. The lower part of the DY is connected to output terminal of the lower push-pull amplifier through a small resistor and inverting sawtooth to the input terminal, which provides inverting sawtooth voltage to the DY after amplified.

In addition, as second-half deflection current flows through the lower push-pull amplifier, the supply voltage values also VP, requiring no big capacitor serially connected with the DY to supply voltage to the second-half scan circuit, which reduces distortion and cost.

The geometric distortion correction current output from TDA8843's Pin45 is input from Pin12. Pin13 outputs reference current for the differential amplifier, which is grounded for the chassis. After amplified, the correction current is output from Pin11 to diode corrector of the FBT.

R401 and R402 are current-limiting resistors. R403 adjusts differential input amplitude and changes the resistance as well as field amplitude. C401 is a high-frequency decoupling capacitor on the input terminals. Connect 45V supply voltage to Pin8 to supply voltage to the vertical scan flyback while connecting 16V supply voltage to Pin4 to supply voltage to the vertical scan forward stroke. VD402 is an amplitude limit diode of second-half vertical sawtooth voltage. VD402A is an amplitude limit diode for vertical flyback pulse. R409 and C405 remove self-excitation during end of flyback and start of forward stroke. C407 eliminates self-excitation of the upper push-pull output. C409 is a high frequency filtering capacitor. VD401A provides DC bias to the pincushion correction circuit output terminal. C453 is a phase correction capacitor for vertical parabola.

IC DATA AND WAVEFORMS OF KEY POINTS

TDA 4605

Control IC for Switched-Mode Power Supplies Using MOS-Transistor

1. Features

- Fold-back characteristics provides overload protection for external components
- Burst operation under secondary short-circuit condition implemented
- Protection against open or a short of the control loop
- Switch-off if line voltage is too low (undervoltage switch-off)
- Line voltage depending compensation of fold-back point
- Soft-start for quiet start-up without noise generated by the transformer
- Chip-over temperature protection implemented(thermal shutdown)
- On-chip ringing suppression circuit against parasitic oscillations of the transformer
- AGC-voltage reduction at low load

2. Block Diagram

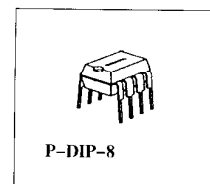
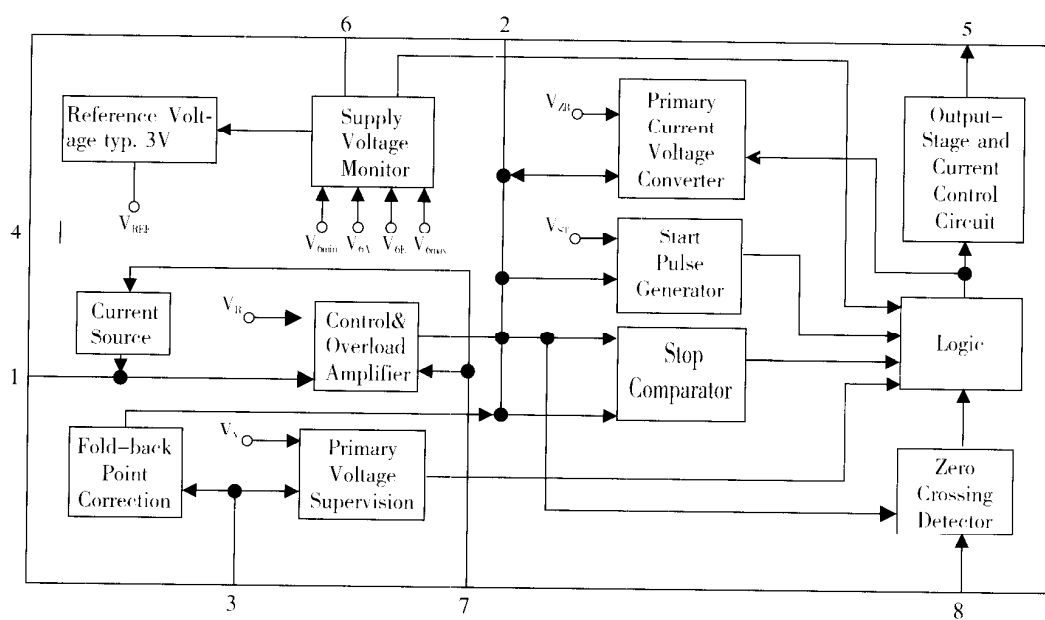


Fig. 10



UEB03855

Fig. 11

3. Refer to Table 3 about Functions and Data of the IC's Each Pin.

IC DATA AND WAVEFORMS OF KEY POINTS (continued)

CH04T1002

1. Terminal Assignment Layouts

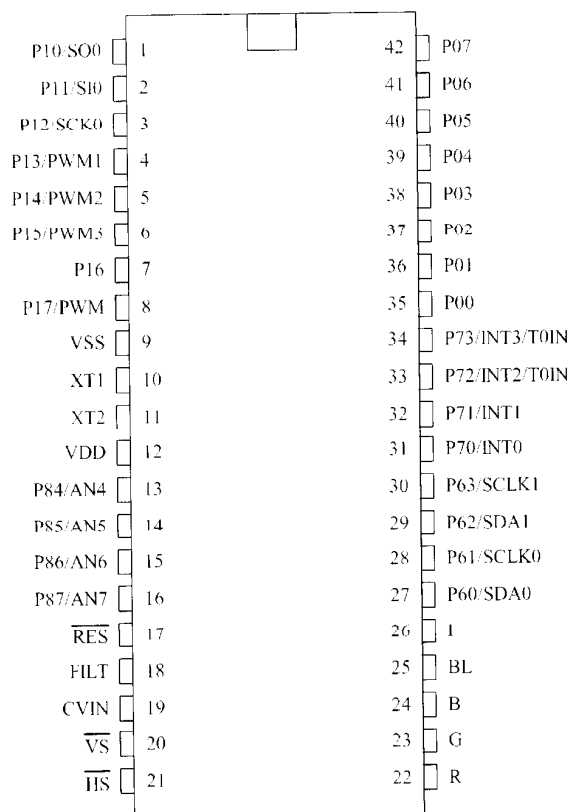


Fig. 12 CH04T1002 DIP42S Terminal Assignment Layout

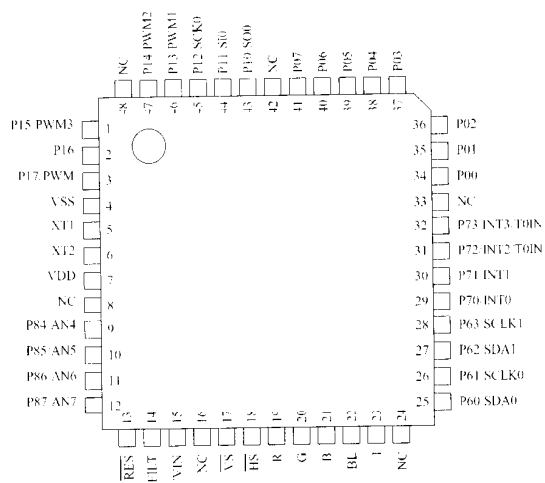


Fig. 13 CH04T1002 QIP48E Terminal Assignment Layout

IC DATA AND WAVEFORMS OF KEY POINTS (continued)

CH04T1002 (continued)

2. Terminal Function

Table 2 Terminal Function Table

Terminal	I/O	Function Description	Option	Format														
VSS	–	Negative power supply																
XT1	I	Input terminal for crystal oscillation																
XT2	O	Output terminal for crystal oscillation																
VDD	–	Positive power supply																
RES	I	Reset terminal		A														
FILT	O	Charge–pump ouput terminal		N														
CVIN	I	Image signal input terminal (available only in CH04T1002)		M														
VS	I	Vertical synchronization signal input terminal		A														
HS	I	Horizontal synchronization signal input terminal																
R	O	Red (R) output terminal of RGB image		O														
G	O	Green (G) output terminal of RGB image																
B	O	Blue (B) output terminal of RGB image																
I	O	Intensity (I) output terminal of RGB image																
BL	O	Fast blanking control signal Switch TV image and caption/OSD image signal																
Port 0	I/O	• 8–bit input/output port Input/output can be specified in nibble unit • Other functions: Hold release input Internal input	Pull–up resistor provided/not provided Output format CMOS/Nch–OD	E														
P00–P07																		
Port 1	I/O	• 8–bit input/output port Each bit can be independently programmable • Other functions: <table border="1"><tr><td>P10</td><td>SIO0 data output</td></tr><tr><td>P11</td><td>SIO0 data input/bus input/output</td></tr><tr><td>P12</td><td>SIO0 clock input/output</td></tr><tr><td>P13</td><td>PWM1 output</td></tr><tr><td>P14</td><td>PWM2 output</td></tr><tr><td>P15</td><td>PWM3 output</td></tr><tr><td>P17</td><td>Timer 1(PWM) output</td></tr></table>	P10	SIO0 data output	P11	SIO0 data input/bus input/output	P12	SIO0 clock input/output	P13	PWM1 output	P14	PWM2 output	P15	PWM3 output	P17	Timer 1(PWM) output	Output format CMOS/Nch–OD	F
P10			SIO0 data output															
P11	SIO0 data input/bus input/output																	
P12	SIO0 clock input/output																	
P13	PWM1 output																	
P14	PWM2 output																	
P15	PWM3 output																	
P17	Timer 1(PWM) output																	
P10–P17																		
Port 6	I/O	• 4–bit input/output port Each bit can be independently programmable • Other functions: <table border="1"><tr><td>P60</td><td>IIC0 data input/output</td></tr><tr><td>P61</td><td>IIC0 clock output</td></tr><tr><td>P62</td><td>IIC1 data input/output</td></tr><tr><td>P63</td><td>IIC1 clock output</td></tr></table>	P60	IIC0 data input/output	P61	IIC0 clock output	P62	IIC1 data input/output	P63	IIC1 clock output								
P60			IIC0 data input/output															
P61	IIC0 clock output																	
P62	IIC1 data input/output																	
P63	IIC1 clock output																	

Continued

IC DATA AND WAVEFORMS OF KEY POINTS (continued)

CH04T1002 (continued)

Terminal	I/O	Function Description	Option	Format																																											
Port 7	I/O	<div>•4-bit input/output port Each bit can be independently programmable</div> <div>•Other functions:</div> <table><tr><td>P70</td><td>INT0 input/HOLD release input /Nch-Tr. output for watchdog timer</td></tr><tr><td>P71</td><td>INT1 input/HOLD release input</td></tr><tr><td>P72</td><td>INT2 input/timer 0 event input</td></tr><tr><td>P73</td><td>INT3 input (noise rejection filter attached input)/timer 0 event input</td></tr></table> <div>•Interrupt receiver format vector address</div> <table><tr><th></th><th>Rising</th><th>Falling</th><th>Rising/ Falling</th><th>H level</th><th>L level</th><th>Vector</th></tr><tr><td>INT0</td><td>yes</td><td>yes</td><td>no</td><td>yes</td><td>yes</td><td>03H</td></tr><tr><td>INT1</td><td>yes</td><td>yes</td><td>no</td><td>yes</td><td>yes</td><td>0BH</td></tr><tr><td>INT2</td><td>yes</td><td>yes</td><td>yes</td><td>no</td><td>no</td><td>13H</td></tr><tr><td>INT3</td><td>yes</td><td>yes</td><td>yes</td><td>no</td><td>no</td><td>1BH</td></tr></table>	P70	INT0 input/HOLD release input /Nch-Tr. output for watchdog timer	P71	INT1 input/HOLD release input	P72	INT2 input/timer 0 event input	P73	INT3 input (noise rejection filter attached input)/timer 0 event input		Rising	Falling	Rising/ Falling	H level	L level	Vector	INT0	yes	yes	no	yes	yes	03H	INT1	yes	yes	no	yes	yes	0BH	INT2	yes	yes	yes	no	no	13H	INT3	yes	yes	yes	no	no	1BH		P70 W P71-P73 V
P70			INT0 input/HOLD release input /Nch-Tr. output for watchdog timer																																												
P71	INT1 input/HOLD release input																																														
P72	INT2 input/timer 0 event input																																														
P73	INT3 input (noise rejection filter attached input)/timer 0 event input																																														
	Rising	Falling	Rising/ Falling	H level	L level	Vector																																									
INT0	yes	yes	no	yes	yes	03H																																									
INT1	yes	yes	no	yes	yes	0BH																																									
INT2	yes	yes	yes	no	no	13H																																									
INT3	yes	yes	yes	no	no	1BH																																									
P71-P73																																															
Port 8	I I/O	<div>•1-bit input port (P83 is set only in CH04T1002)</div> <div>•4-bit input/output port(P84-P87) Each bit can be independently programmable</div> <div>•Other function:</div> <div>AD converter input port</div>		P83 B P84-P87 X																																											
P83 P84-P87																																															

- Port options can be specified independently for each bit.
- The programmable pull-up resistors are provided, depending on whether CMOS or Nch-OD (Nch open drain) is selected as the port 1 option.

3. Refer to Table 4 about Functions and Data of the IC's Each Pin.

IC DATA AND WAVEFORMS OF KEY POINTS (continued)

EEPROM AT24C04

1. Features

- Data EEPROM internally organized as 512 bytes and 32 pages×16 bytes
- Low power CMOS
- $V_{CC}=2.7$ to 5.5V operation
- Two wire serial interface bus, I²C-Bus compatible
- Filtered inputs for noise suppression with Schmitt trigger
- Clock frequency up to 400 kHz
- High programming flexibility
- Internal programming voltage
- Self timed programming cycle including erase
- Byte-write and page-write programming, between 1 and 16 bytes
- Typical programming time 6 ms(<10ms) for up to 16 bytes
- High reliability
- Endurance 10^6 cycles¹⁾
- Data retention 40 years¹⁾
- ESD protection 4000 V on all pins
- 8 pin DIP/DSO packages
- Available for extended temperature ranges
- Industrial: -40°C to $+85^{\circ}\text{C}$
- Automotive: -40°C to $+125^{\circ}\text{C}$

2. Pin Configuration

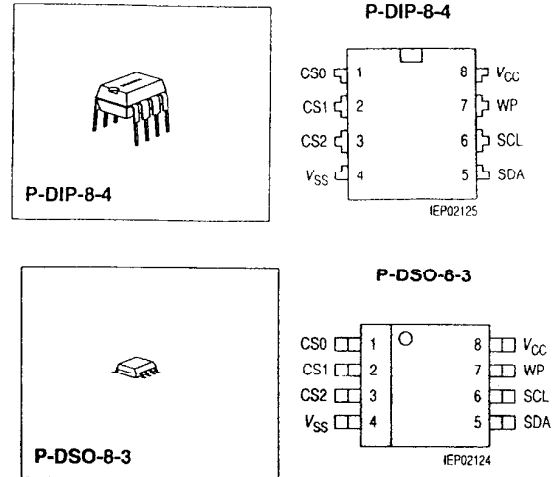


Fig. 14

4. Refer to Table 5 about Functions and Data of the IC's Each Pin

3. Block Diagram

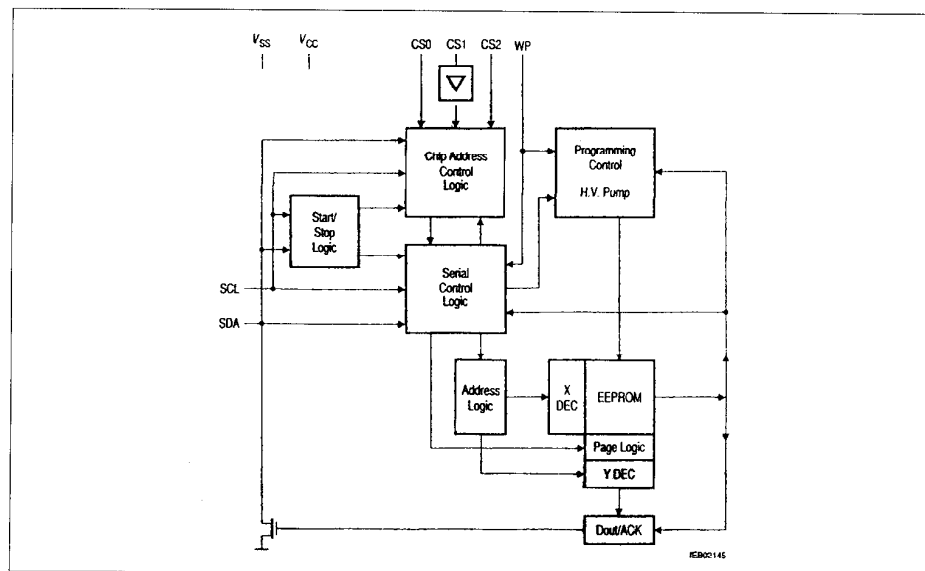


Fig. 15

IC DATA AND WAVEFORMS OF KEY POINTS (continued)**OM8839****IC-bus Controlled PAL/NTSC/SECAM TV Processors****1. Features**

The following features are available in all IC's:

- Multi-standard vision IF circuit with an alignment-free PLL demodulator without external components
- Alignment-free multi-standard FM sound demodulator (4.5 MHz to 6.5 MHz)
- Audio switch
- Flexible source selection with CVBS switch and Y (CVBS)/C input so that a comb filter can be applied
- Integrated chrominance trap circuit
- Integrated luminance delay line
- Asymmetrical peaking in the luminance channel with a (defeatable) noise coring function
- Black stretching of non-standard CVBS or luminance signals
- Integrated chroma band-pass filter with switchable centre frequency
- Dynamic skin tone control circuit
- Blue stretch circuit which offsets colours near white towards blue
- RGB control circuit with "Continuous Cathode Calibration" and white point adjustment
- Possibility to insert a "blue back" option when no video signal is available
- Horizontal synchronization with two control loops and alignment-free horizontal oscillator
- Vertical count-down circuit
- Vertical driver optimised for DC-coupled vertical output stages
- IC-bus control of various functions

2. General Description

The various versions of the TDA 884X/5X series are IC-bus controlled single chip TV processors which are intended to be applied in PAL, NTSC, PAL/NTSC and multi-standard television receivers. The N2 version is pin and application compatible with the N1 version, however, a new feature has been added which makes the N2 more attractive. The IF PLL demodulator has been replaced by an alignment-free IF PLL demodulator with internal VCO (no tuned circuit required). The setting of the various frequencies (33.4, 33.9, 38, 38.9, 45, 75 and 58.75 MHz) can be made via the IC-bus.

Because of this difference the N2 version is compatible with the N1, however, N1 devices cannot be used in an optimised N2 application. Functionally the IC series is split up in 3 categories, viz:

- Versions intended to be used in economy TV receivers with all basic functions (envelope: S-DIP 56 and QFP 64)
- Versions with additional features like E-W geometry control, H-V zoom function and YUV interface which are intended for TV receivers with 110° picture tubes (envelope: S-DIP 56)
- Versions which have in addition a second RGB input with saturation control and a second CVBS output (envelope: QFP 64)

The various type numbers are given in the table below.

3. Survey of IC Types

Envelope	S-DIP 56		QFP 64	
	Economy	Mid/High end	Economy	Mid/High end
PAL only	TDA 8840		TDA 8840H	
PAL/NTSC	TDA 8841	TDA 8843	TDA 8841H	
PAL/SECAM/NTSC	TDA 8842	TDA 8844	TDA 8842H	TDA 8854H
NTSC only	TDA 8846/46A	TDA 8847		TDA 8857H

IC DATA AND WAVEFORMS OF KEY POINTS (continued)

TDA8350Q

DC-coupled Vertical Deflection and East-West Output Circuit

1. Features

- Few external components
- Highly efficient fully DC-coupled vertical output bridge circuit
- Vertical flyback switch
- Guard circuit
- Protection against:
 - short-circuit of the output pins
 - short-circuit of the output pins to V_P

- High EMC immunity due to common mode inputs
- Temperature (thermal) protection
- East-West output stage with one single conversion resistor.

2. 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.

3. Block Diagram

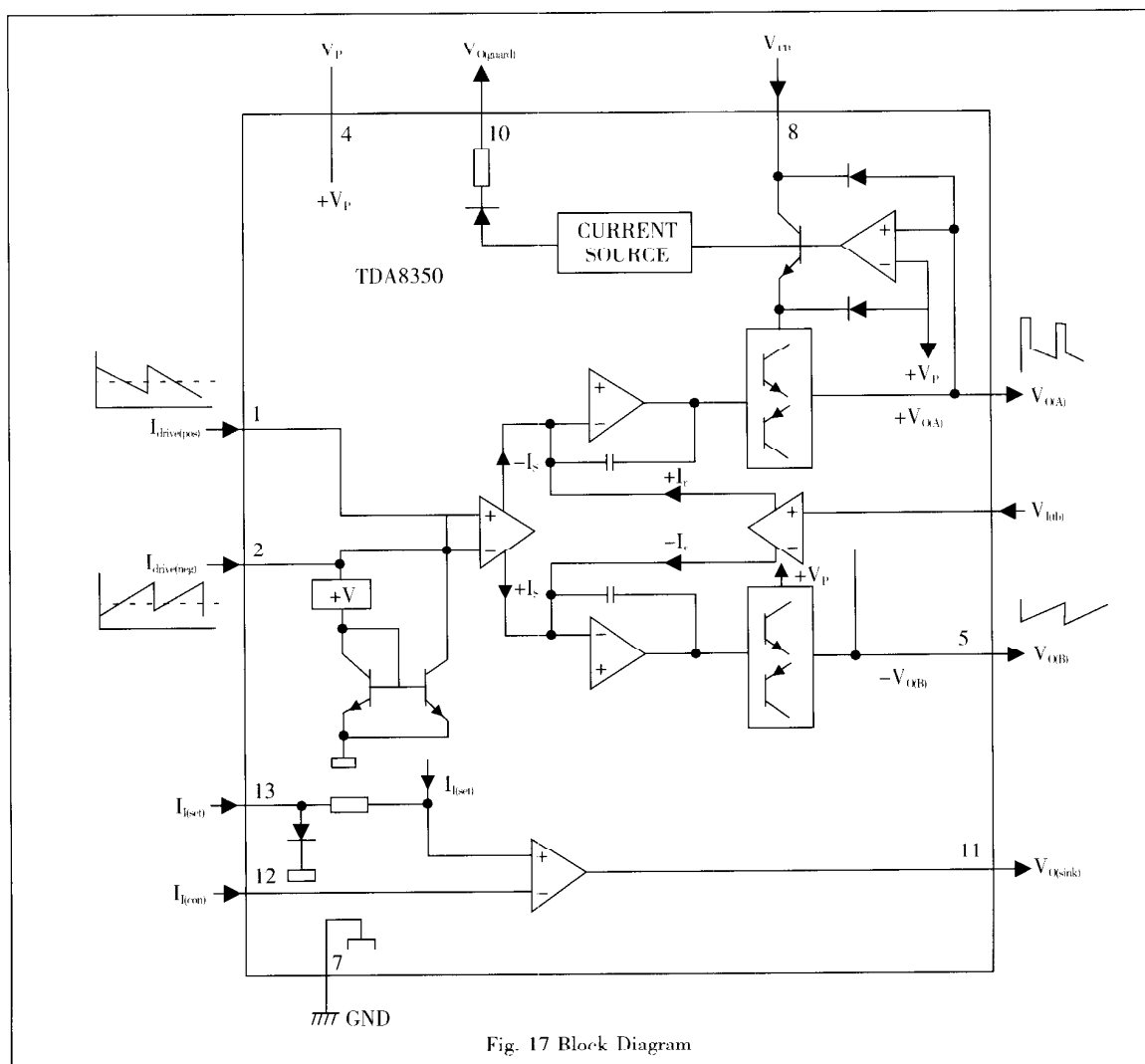


Fig. 17 Block Diagram

4. Refer to Table 7 about Functions and Data of the IC's Each Pin.

IC DATA AND WAVEFORMS OF KEY POINTS (continued)**TDA7057AQ****2x8W Stereo BTL Audio Output Amplifier with DC Volume Control****1. Features**

- DC volume control
- Few external components
- Mute mode
- Thermal protection
- Short-circuit proof
- No switch-on and switch-off clicks
- Good overall stability
- Low power consumption
- Low HF radiation
- ESD protected on all pins.

2. General Description

The TDA7057AQ is a stereo BTL output amplifier with DC volume control. The device is designed for use in TVs and monitors, but is also suitable for battery-fed portable recorders and radios.

Missing Current Limiter (MCL)

A MCL protection circuit is built-in. The MCL circuit is activated when the difference in current between the output terminal of each amplifier exceeds 100 mA (typical 300 mA). This level of 100 mA allows for single-ended headphone applications.

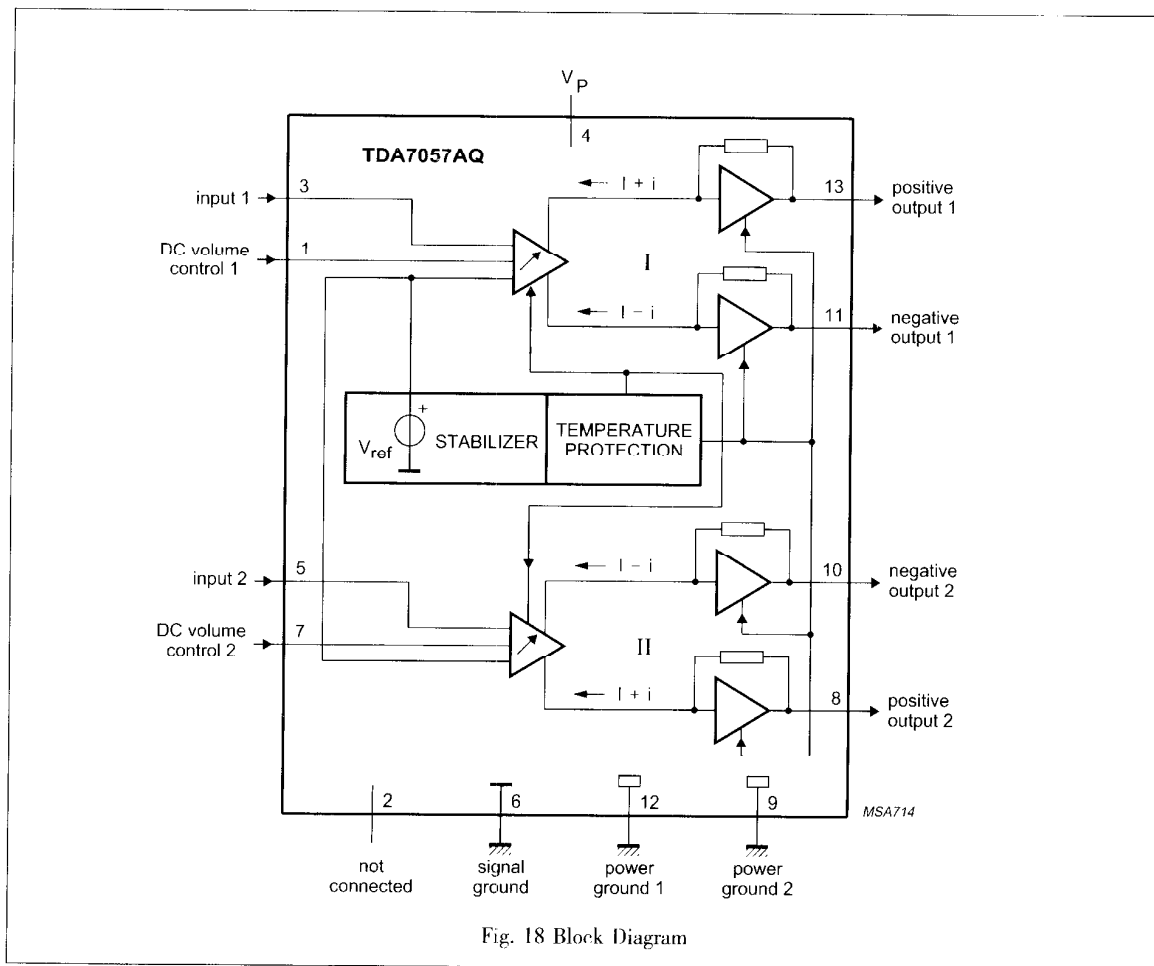
3. Block Diagram

Fig. 18 Block Diagram

4. Refer to Table 8 about Functions and Data of the IC's Each Pin.

IC DATA AND WAVEFORMS OF KEY POINTS (continued)

TDA6107Q

Triple Video Output Amplifier

1. Features

- Typical bandwidth of 5.5 MHz for an output signal of 60 V (p-p)
- High slew rate of 900 V/S
- No external components required
- Very simple application
- Single supply voltage of 200 V
- Internal reference voltage of 2.5 V
- Fixed gain of 50
- Black-Current Stabilization (BCS) circuit
- Thermal protection.

2. General Description

The TDA6107Q includes three video output amplifiers in one plastic DIL-bent-SIL 9-pin medium power (DBS9MPF) package (SOT 111-1), using high-voltage DMOS technology, and is intended to drive the three cathodes of a colour CRT directly. To obtain maximum performance, the amplifier should be used with black-current control.

3. Ordering Information

Type Number	Package		
	Name	Description	Version
TDA6107Q	DBS9MPF	Plastic DIL-bent-SIL medium power package with fin; 9 leads	SOT111-1

4. Block Diagram

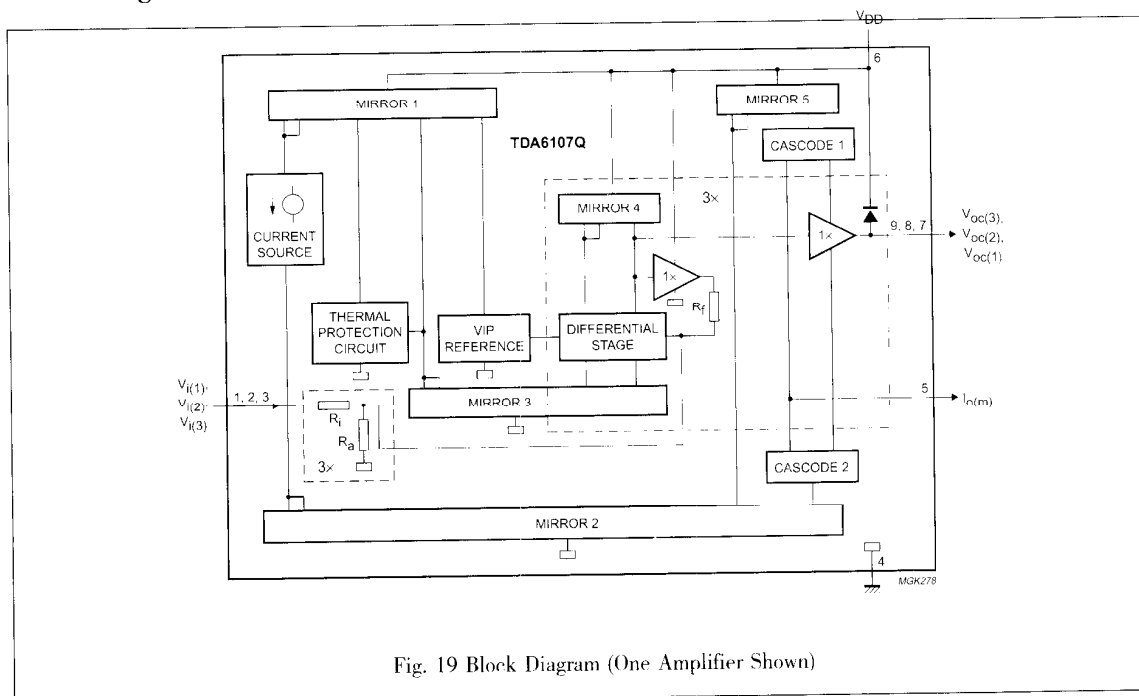


Fig. 19 Block Diagram (One Amplifier Shown)

5. Refer to Table 9 about Functions and Data of the IC's Each Pin.

IC DATA AND WAVEFORMS OF KEY POINTS (continued)

HEF4052

Dual 4-channel Analog Multiplexer/Demultiplexer

1. Description

The HEF4052 is a dual 4-channel analog multiplexer/demultiplexer with common channel select logic. Each multiplexer/demultiplexer has four independent inputs/outputs (Y_0 to Y_3) and a common input/output (Z). The common channel select logic includes two address inputs (A_0 and A_1) and an active LOW enable input (\bar{E}).

Both multiplexers/demultiplexers contain four bidirectional analog switches, each with one side connected to an independent input/output (Y_0 to Y_3) and the other side connected to a common input/output (Z).

With \bar{E} LOW, one of the four switches is selected (low impedance ON-state) by A_0 and A_1 . With \bar{E} HIGH, all switches are in the high impedance OFF-state, independent of A_0 and A_1 . V_{DD} and V_{SS} are the supply voltage connections for the digital control inputs (A_0 , A_1 and \bar{E}). The V_{DD} to V_{SS} range is 3 to 15 V. The analog inputs/outputs (Y_0 to Y_3 , and Z) can swing between V_{DD} as a positive limit and V_{EE} as a negative limit.

V_{DD} , V_{EE} may not exceed 15 V.

For operation as a digital multiplexer/demultiplexer, V_{EE} is connected to V_{SS} (typically ground).

2. Block Diagrams

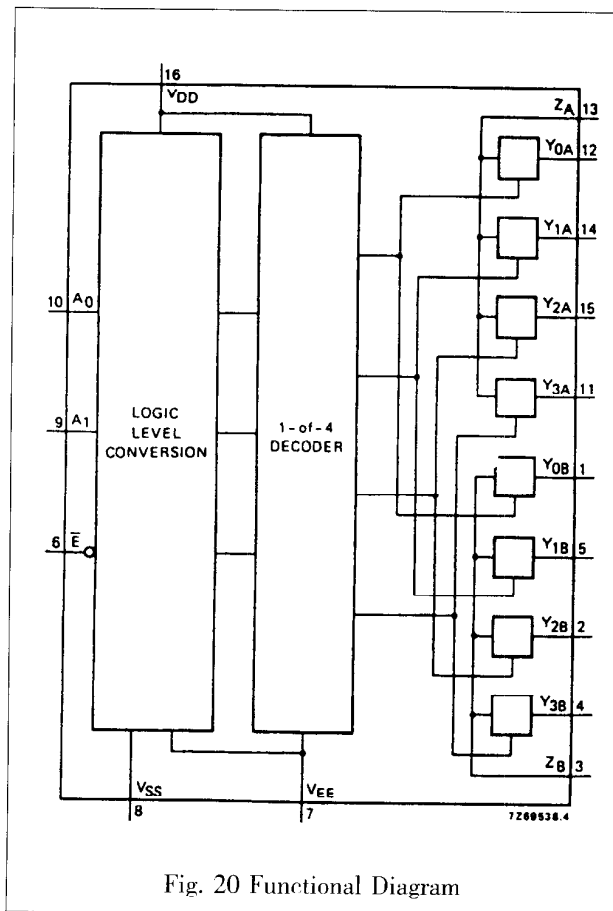


Fig. 20 Functional Diagram

Pinning

Y_{0A} to Y_{3A}	Independent inputs/outputs
Y_{0B} to Y_{3B}	Independent inputs/outputs
A_0 , A_1	Address inputs
\bar{E}	Enable input (active LOW)
Z_A , Z_B	Common inputs/outputs

Family data,

I_{DD} LIMITS category MSI

See Family Specifications

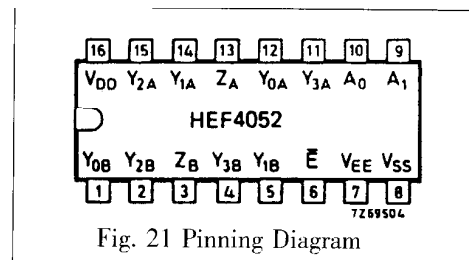


Fig. 21 Pinning Diagram

HEF4052P (N): 16-lead DIL; plastic (SOT38-1)

HEF4052D (F): 16-lead DIL; ceramic (cerdip) (SOT74)

HEF4052T (D): 16-lead SO; plastic (SOT109-1)

(): Package Designator North America

IC DATA AND WAVEFORMS OF KEY POINTS (continued)

HEF4052 (continued)

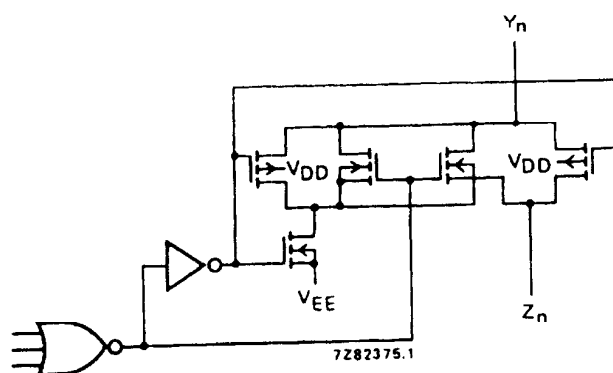


Fig. 22 Schematic Diagram (One Switch)

3. Function Table

Inputs			Channel
E	A1	A0	On
L	L	L	$Y_{0A}-Z_A; Y_{0B}-Z_B$
L	L	H	$Y_{1A}-Z_A; Y_{1B}-Z_B$
L	H	L	$Y_{2A}-Z_A; Y_{2B}-Z_B$
L	H	H	$Y_{3A}-Z_A; Y_{3B}-Z_B$
H	X	X	none

Notes

H=HIGH state (the more positive voltage)

L=LOW state (the less positive voltage)

X=state is immaterial

Ratings

Limiting values in accordance with the Absolute Maximum System(IEC 134)

Supply voltage (with reference to V_{DD}) V_{EE} -18 to +0,5 V

Note

To avoid drawing V_{DD} current out of terminal Z, when switch current flows into terminals Y, the voltage drop across the bidirectional switch must not exceed 0,4V. If the switch current flows into terminal Z, no V_{DD} current will flow out of terminals Y, in this case is no limit for the voltage drop across the switch, but the voltages at Y and Z may not exceed V_{DD} or V_{EE} .

4. Refer to Table 10 about Functions and Data of the IC's Each Pin.

IC DATA AND WAVEFORMS OF KEY POINTS (continued)

HEF4053

Triple 2-channel Analog Multiplexer/Demultiplexer

1. Description

The HEF4053 is a triple 2-channel analog multiplexer/demultiplexer with a common enable input (\bar{E}). Each multiplexer/demultiplexer has two independent inputs/outputs (Y_0 and Y_1), a common input/output (Z), and select inputs (S_n). Each also contains two-bidirectional analog switches, each with one side connected to an independent input/output (Y_0 and Y_1) and the other side connected to a common input/output (Z).

With (\bar{E}) LOW, one of the two switches is

selected (low impedance ON-state) by S_n . With \bar{E} HIGH, all switches are in the high impedance OFF-state, independent of S_A to S_C .

V_{DD} and V_{SS} are the supply voltage connections for the digital control inputs (S_A to S_C and \bar{E}).

The V_{DD} to V_{SS} range is 3 to 15V. The analog inputs/outputs (Y_0 , Y_1 and Z) can swing between V_{DD} as a positive limit and V_{EE} as a negative limit. $V_{DD}-V_{EE}$ may not exceed 15 V.

For operation as a digital multiplexer/demultiplexer, V_{EE} is connected to V_{SS} (typically ground).

2. Block Diagrams

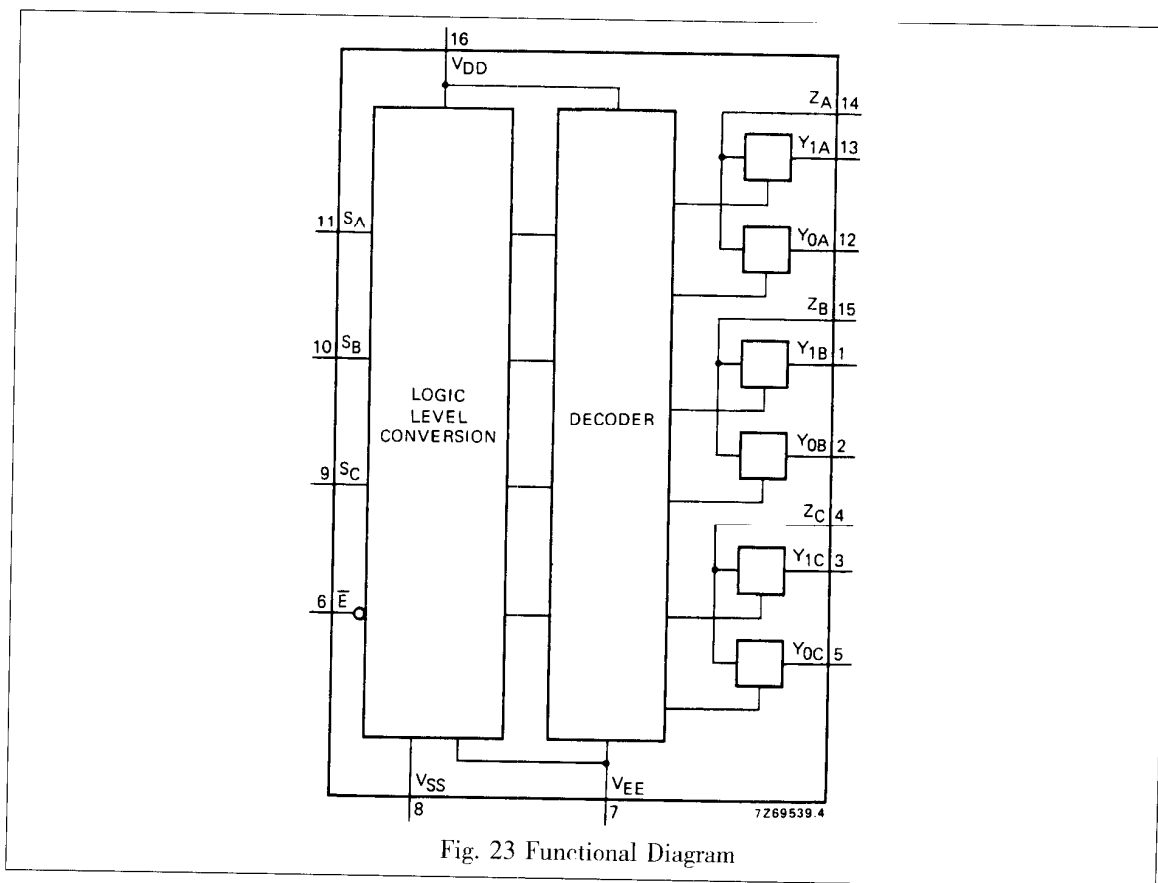


Fig. 23 Functional Diagram

IC DATA AND WAVEFORMS OF KEY POINTS (continued)

HEF4053 (continued)

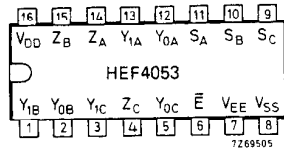


Fig. 24 Pinning Diagram

Pinning

Y_{0A} to Y_{0C}	Independent inputs/outputs
Y_{1A} to Y_{1C}	Independent inputs/outputs
S_A to S_C	Select inputs
E	Enable input (active LOW)
Z_A to Z_C	Common inputs/outputs

3. Function Table

HEF4053P(N): 16-lead DIL ; plastic
(SOT38-1)

HEF4053D(F): 16-lead DIL; ceramic
(cerdip)
(SOT74)

HEF4053T(D): 16-lead S0; plastic
(SOT109-1)

(): Package Designator North America

Inputs		Channel
E	Sn	On
L	L	$Y_{0n}-Z_n$
L	H	$Y_{1n}-Z_n$
H	X	none

Notes

H=HIGH state (the more positive voltage)

L=LOW state (the less positive voltage)

X=STATE is immaterial

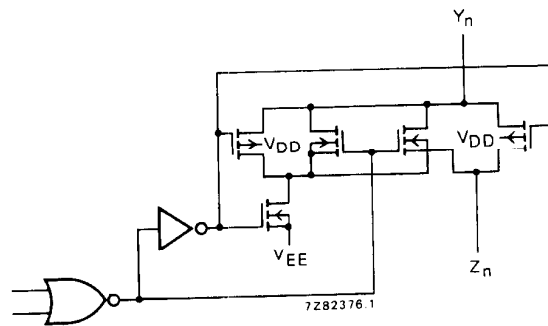


Fig. 25 Schematic Diagram (One Switch)

Ratings

Limiting values in accordance with the Absolute Maximum System(IEC 134)

Supply voltage (with reference to V_{DD}) V_{EE} -18 to +0,5 V

Note

To avoid drawing V_{DD} current out of terminal Z, when switch current flows into terminals Y, the voltage drop across the bidirectional switch must not exceed 0,4 V. If the switch current flows into terminal Z, no V_{DD} current will flow out of terminals Y, in this case there is no limit for the voltage drop across the switch, but the voltages at Y and Z may not exceed V_{DD} or V_{EE}

4. Refer to Table 11 about Functions and Data of the IC's Each Pin.

IC DATA AND WAVEFORMS OF KEY POINTS (continued)

Table 3 Functions and Service Data of TDA4605 (N811)'s Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (K Ω)	Negative Resistance (K Ω)
1	Regulation control	0.4	0.713	0.4
2	Primary current input	1.34	9.71	1.34
3	Primary voltage monitoring input	1.91	7.09	1.91
4	Ground	0	0	0
5	Drive pulse output	4.08	0.84	4.08
6	Supply voltage	0.74	16.35	4.9
7	Soft-start	2.36	8.69	6.19
8	Zero crossing input detection	0.33	6.72	5.94

Table 4 Functions and Service Data of CH04T1002 (N001)'s Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (K Ω)	Negative Resistance (K Ω)
1	Not connected	0	9.62	5.35
2	Clock line	4.89	9.56	5.08
3	Data line	4.87	9.56	5.06
4	AV1 control	5	6.84	5.22
5	AV2 control	0	6.89	5.16
6	AV3 control	0	7.28	5.29
7	Not connected	0	9.61	5.4
8	Not connected	0.92	9.6	5.4
9	Ground	0	0	0
10	Input terminal for clock oscillating signal	1.88	9.55	6.12
11	Output terminal for clock oscillating signal	2.63	9.05	6.08
12	Power supply	5	3.64	3.33
13	Button-control voltage input terminal	5	8.91	5.21
14	Button-control voltage input terminal	5	8.93	5.21
15	Not connected	5	9.45	5.45
16	Not connected	4.9	9.53	5.45
17	Reset	4.96	4.64	4.48
18	Filter	2.76	9.52	5.31
19	Video signal input terminal	3	9.51	5.92
20	Input terminal for vertical flyback pulse	4.74	8.73	5.03
21	Input terminal for horizontal flyback pulse	4.27	8.81	5.01
22	R character output terminal	0	2.08	2.08
23	G character output terminal	0	2.1	2.1
24	B character output terminal	0	2.08	2.08
25	Output terminal for fast blanking signal	0	1.97	1.97
26	Character level clamping	0	9.54	5.73
27	Clock line 0	5	7.12	4.91
28	Data line 0	5	7.12	5.18
29	Clock line 1	4.52	7.05	5.12

Continued

IC DATA AND WAVEFORMS OF KEY POINTS (continued)

30	Data line 1	4.41	7.03	5.09
31	Overload detecting input terminal	5	6.95	5.13
32	Input terminal for selectable production modes	5	9.62	5.29
33	Not connected	0	9.56	5.46
34	Remote control input	4.64	9.22	5.33
35	Not connected	0	9.58	5.4
36	Not connected	0	9.58	5.42
37	Mute	0	9.58	4.3
38	Not connected	0	9.58	5.36
39	Not connected	0	9.59	5.28
40	Not connected	0	9.59	5.36
41	Standby control	0	7.43	4.9
42	Not connected	0	9.6	5.36

Table 5 Functions and Service Data of AT24C04 (N002)'s Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (K Ω)	Negative Resistance (K Ω)
1	Address input	0	0	0
2	Address input	0	0	0
3	Address input	0	0	0
4	Common ground	0	0	0
5	Clock line	5	7.05	4.82
6	Data line	5	7.06	5.24
7	Write protect	4.99	9.58	5.49
8	Power supply	5	3.64	3.33

Table 6 Functions and Service Data of OM8839 (N301)'s Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (K Ω)	Negative Resistance (K Ω)
1	SIF signal input	0	2.21	2.21
2	External audio signal input	3.65	9.02	6.04
3	Reference frequency resonant coil terminal	0	∞	∞
4	Reference frequency resonant coil terminal	0	∞	∞
5	PLL filter	2.51	8.92	5.82
6	Video detection output	3.06	2.2	2.2
7	Clock line	4.4	7.15	5.15
8	Two-way transmission data line	4.52	7.15	5.15
9	Gap decoupling	6.7	7.52	5.68
10	SVHS chroma signal input	1.35	9	6
11	SVHS luminance signal input	3.4	9.04	5.91
12	Supply voltage	8.24	2.78	1.96
13	Composite video signal input terminal	4.32	9.15	5.94
14	Ground	0	0	0

Continued

IC DATA AND WAVEFORMS OF KEY POINTS (continued)

15	Audio signal output	3	9.24	5.98
16	Decoupling capacitor connection	0	∞	∞
17	Video input	3.4	9.12	5.94
18	Black current control input	5.81	9.22	5.88
19	Blue (B) signal output	3.04	6.19	5.2
20	Green (G) signal output	3.1	6.19	5.23
21	Red (R) signal output	3.2	6.2	5.26
22	Beam current control	2.1	8.22	6.04
23	Red (R) signal input	3.6	9.01	6.12
24	Green (G) signal input	3.61	9.01	6.12
25	Blue (B) signal input	3.6	9.01	6.12
26	Selectable primary color signal input control	0.1	1	1
27	Luminance signal input	3.26	9.25	5.87
28	Luminance signal output	3.26	9.25	5.87
29	B-Y color difference signal output	2.38	8.5	5.91
30	R-Y color difference signal output	2.37	8.5	5.91
31	B-Y color difference signal input	2.38	8.5	5.91
32	R-Y color difference signal input	2.37	8.5	5.91
33	Sub-carrier output for SECAM demodulation	0.35	6.78	5.96
34	3.58MHz crystal oscillator	2.54	8.02	6.04
35	4.43MHz crystal oscillator	2.53	8.02	6.04
36	APC low pass filter	4.99	9.37	6
37	Horizontal starting supply voltage	8.22	2.64	2.56
38	Composite video output	3.68	7.52	6.11
39	Black level stretch	4.95	9.26	4.93
40	Line drive pulse output	3.55	3.5	3.49
41	Horizontal flyback pulse input/ sandcastle pulse output	0.76	8.82	5.92
42	Line discriminator	3.66	8.81	6.04
43	Line discriminator	3.92	9.31	6.04
44	Ground	0	0	0
45	Vertical frequency parabola output	0.73	9.05	5.97
46	Field drive signal output	2.32	9.3	5.97
47	Field drive signal output	2.35	9.3	5.97
48	IF signal input	4.62	8.52	6.2
49	IF signal input	4.62	8.52	6.2
50	High voltage detection input	2.05	8.04	6.14
51	Vertical sawtooth generation	3.8	8.65	6.09
52	Vertical reference bias setting	3.9	8.89	6.05
53	AGC filter for IF amplifier	4.49	9.25	6
54	AGC output for IF amplifier	0.67	10.05	5.82
55	Audio deemphasis	2.93	8.93	6.12
56	Audio decoupling	4.02	9.37	6.08

IC DATA AND WAVEFORMS OF KEY POINTS (continued)

Table 7 Functions and Service Data of TDA8350 (N401)'s Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (K Ω)	Negative Resistance (K Ω)
1	Vertical drive input (positive)	2.32	9.4	5.84
2	Vertical drive input (negative)	2.3	9.4	5.87
3	Feedback input	8.15	5.81	4.72
4	Supply voltage	16.27	7.99	7.62
5	Output 1	8.14	5.88	4.72
6	Not connected	0	∞	∞
7	Ground	0	0	0
8	Pump supply voltage input	46.94	∞	4.29
9	Output 1	8.22	5.92	4.71
10	Guard output	0.28	8.51	5.899
11	Pincushion output	16.99	9.45	4.16
12	Pincushion input (negative)	0.25	9.12	5.93
13	Pincushion input (positive)	0	0	0

Table 8 Functions and Service Data of TDA7057AQ (N601)'s Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (K Ω)	Negative Resistance (K Ω)
1	Volume control input	1.03	6.88	6.15
2	Not connected	0	∞	∞
3	Audio R signal input	2.45	12.68	6.5
4	Supply voltage	16.18	0.46	0.46
5	Audio L signal input	2.45	12.6	6.5
6	Ground	0	0	0
7	Volume control input	1.03	6.88	6.15
8	Left channel in-phase signal output	7.64	6.48	5.6
9	Ground	0	0	0
10	Left channel inverting signal output	7.71	6.47	5.6
11	Right channel inverting signal output	7.67	6.47	5.6
12	Ground	0	0	0
13	Right channel in-phase signal output	7.79	6.48	5.6

Table 9 Functions and Service Data of TDA6017Q's Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (K Ω)	Negative Resistance (K Ω)
1	G inverting input	2.94	5.72	4.96
2	R inverting input	3	5.72	4.96
3	B inverting input	2.91	5.72	4.96
4	Ground	0	0	0
5	Black level current input	6.5	19.28	5.68
6	Supply voltage	198.65	∞	4.53
7	B output	103	∞	5.48
8	R output	98.6	∞	5.48
9	G output	100.6	∞	5.48

IC DATA AND WAVEFORMS OF KEY POINTS (continued)

Table 10 Functions and Service Data of HEF4052 (DS01)'s Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (K Ω)	Negative Resistance (K Ω)
1	Switch input	0.3	7.5	26
2	Switch input	0	7.5	26
3	Switch output	0	2.3	2.3
4	Switch input	0.4	7.5	26
5	Switch input	0	7.5	26
6	Inhibit terminal	0	0	0
7	VEE	0	0	0
8	Ground	0	0	0
9	Control signal input	3.5	10	6.3
10	Control signal input	3.5	10	6.3
11	Switch input	3	0.5	0.5
12	Switch input	3	0.5	0.5
13	Switch output	3.5	2.3	2.3
14	Switch input	2.8	0.5	0.5
15	Switch input	3	0.5	0.5
16	Supply voltage	7.8	1.5	1.5

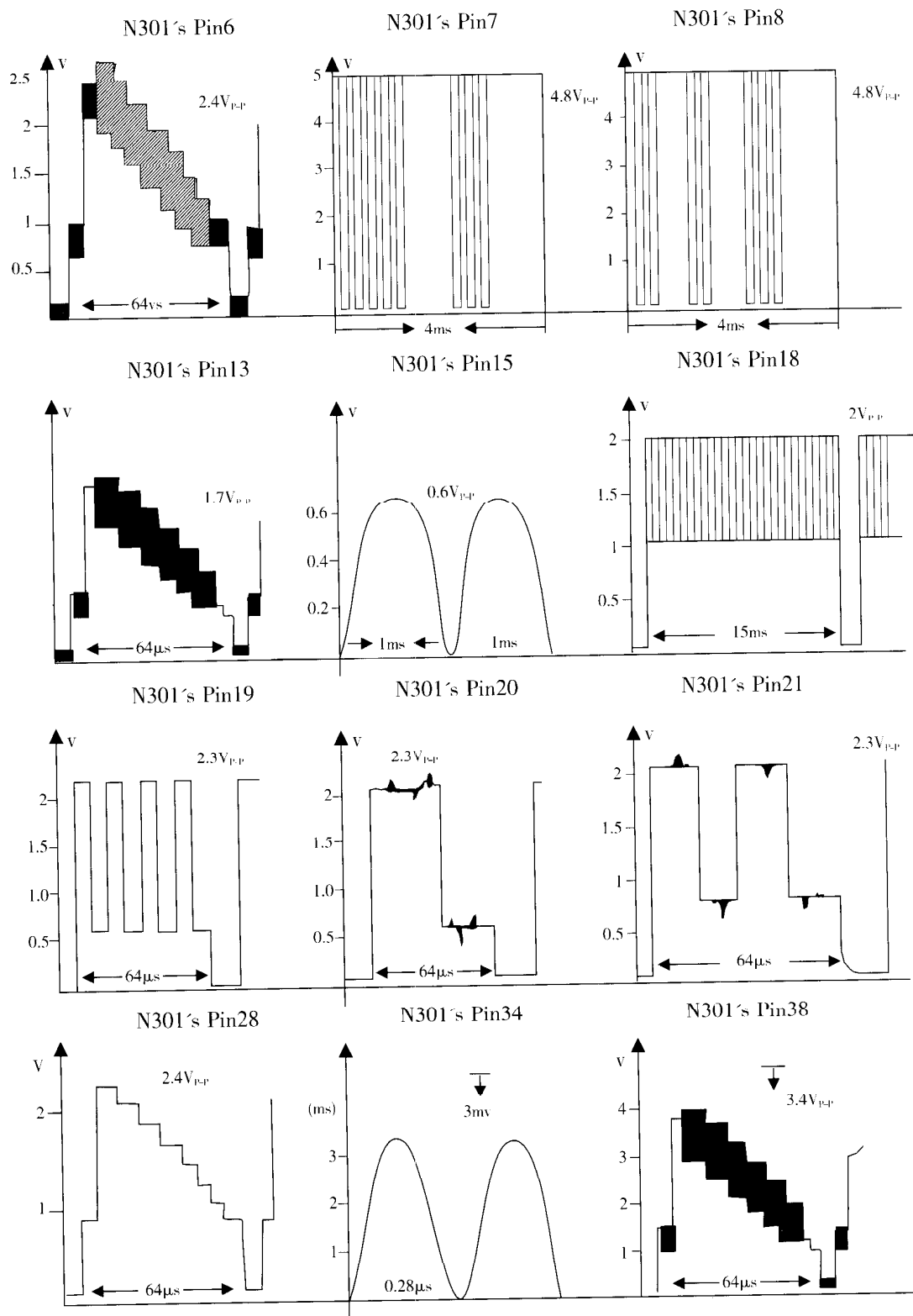
Table 11 Functions and Service Data of HEF4053 (DS02)'s Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (K Ω)	Negative Resistance (K Ω)
1	Signal input	0	9.81	6.15
2	Signal input	0	0	0
3	Signal input	0	9.81	6.15
4	Signal output	0	6.66	6.21
5	Signal input	0	0	0
6	Ground	0	0	0
7	Ground	0	0	0
8	Ground	0	0	0
9	Control signal input	0.12	7.97	5.7
10	Control signal input	0.12	7.99	5.7
11	Control signal input	4.98	7.8	5.6
12	Signal input	0	0	0
13	Signal output	0	9.81	6.15
14	Signal input	0	6.9	6.4
15	Audio output	0	6.95	6.4
16	Supply voltage	5.09	6.89	4.44

Table 12 Functions and Service Data of TDQ-6F2M's Pins

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (K Ω)	Negative Resistance (K Ω)
1	AGC	0.98	9.56	6.04
2	NC	26.73		6.85
3	NC	0.61	9.79	7.39
4	SCL	4.89	9.58	5.13
5	SDA	4.88	9.58	5.12
6	VDD	5	2.2	2.2
7	NC	4.9	2.2	2.2
8	NC	0	0	0
9	BT	30.21	∞	13.07
10	NC	0	0	0
11	IF	0	∞	∞

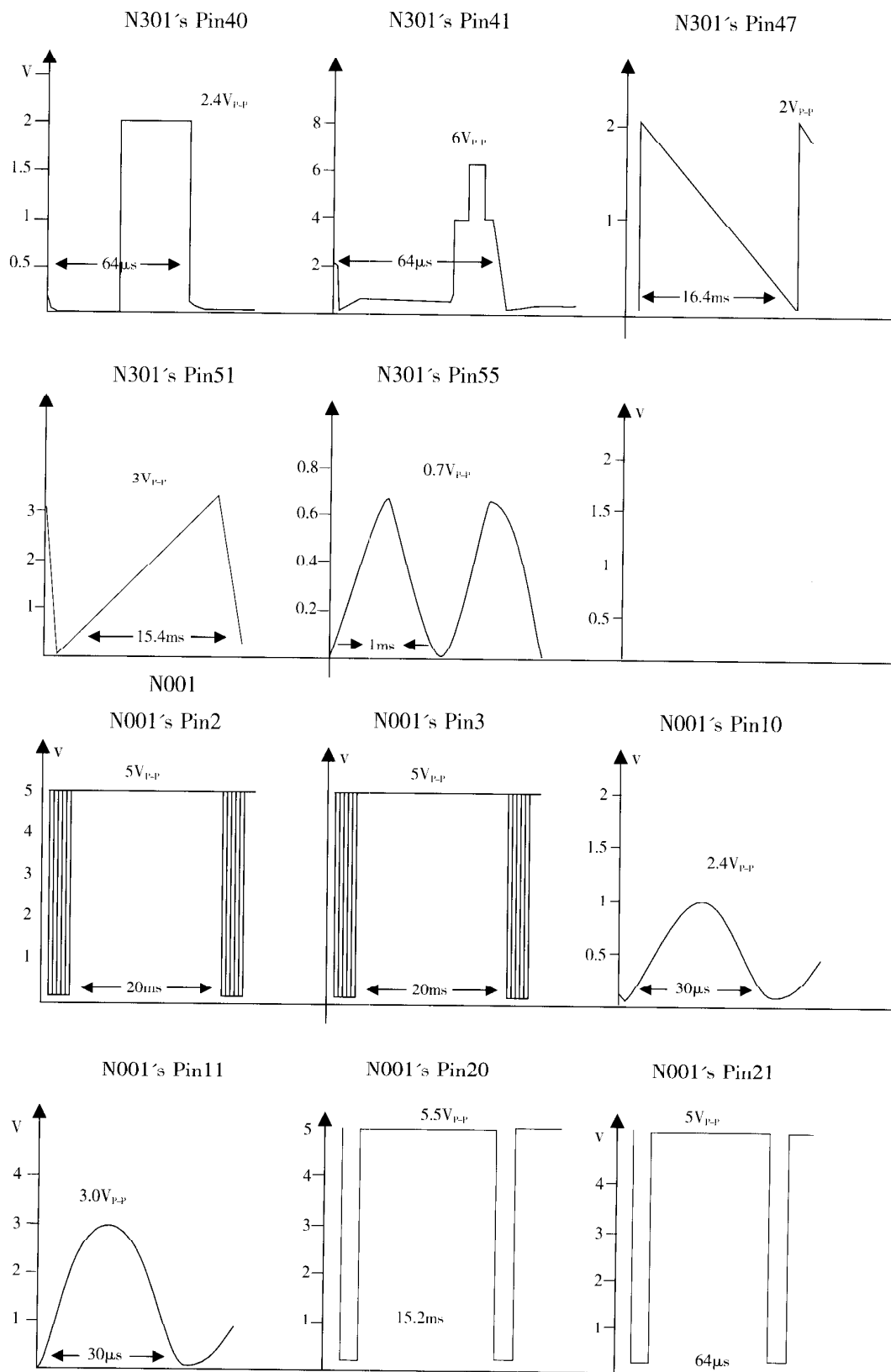
IC DATA AND WAVEFORMS OF KEY POINTS (continued)



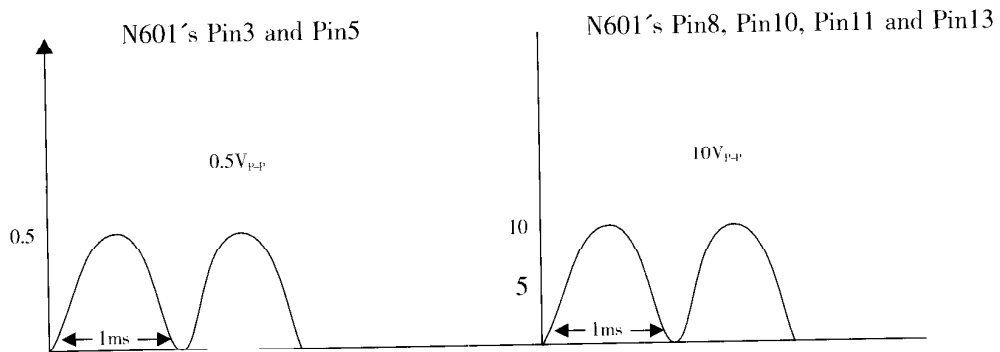
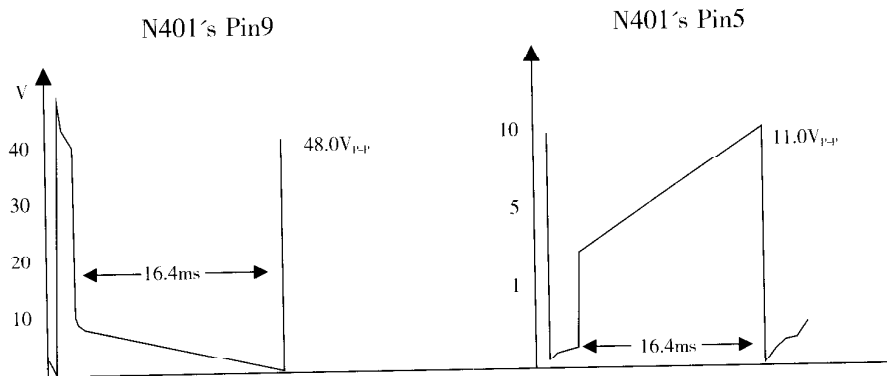
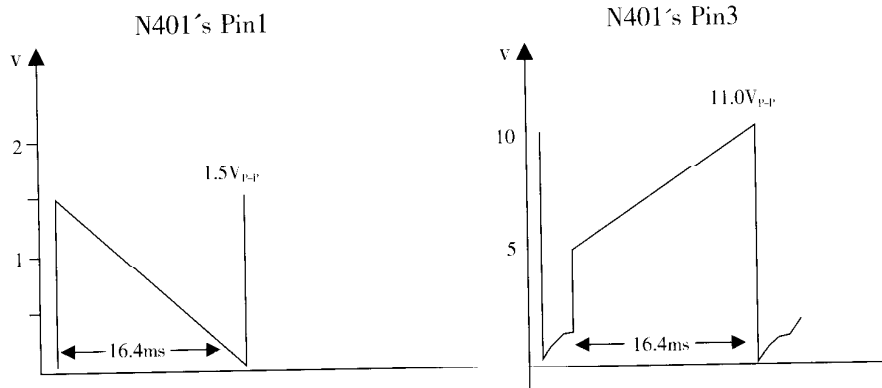
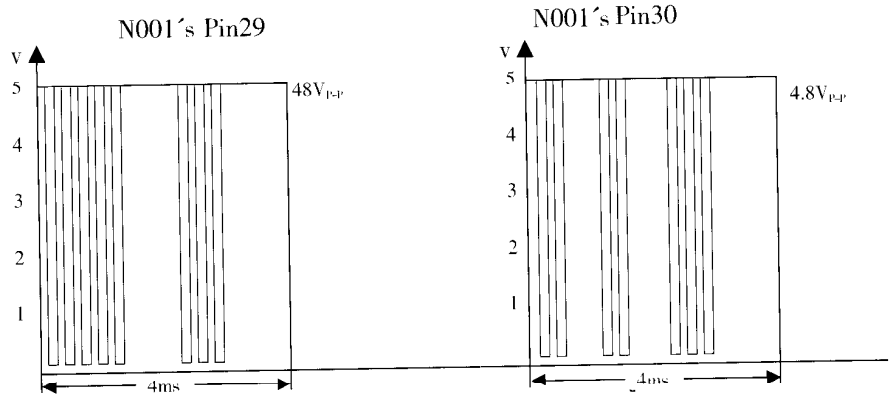
Note:

The TV receives NTSC color bar with 1KHz sine wave audio reception in Normal mode when measuring voltage and resistance with a GDM-8145 multimeter (Max. resistance: 20 K Ω , Max. DC voltage: 20V).

IC DATA AND WAVEFORMS OF KEY POINTS (continued)



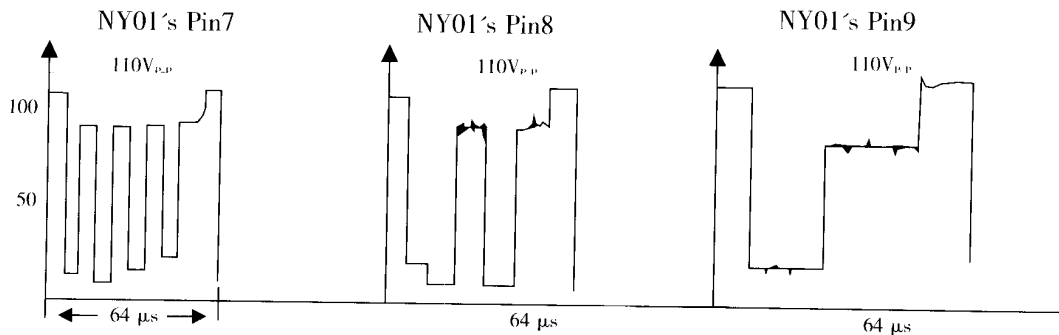
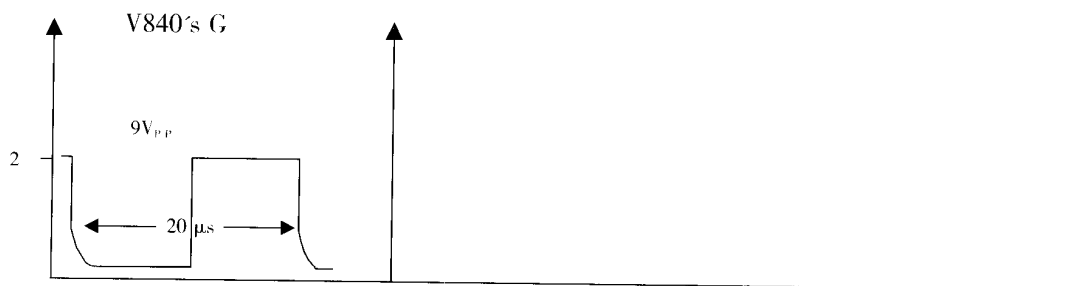
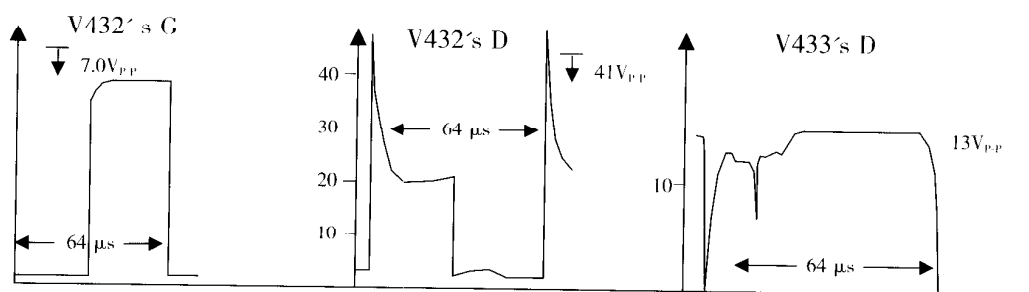
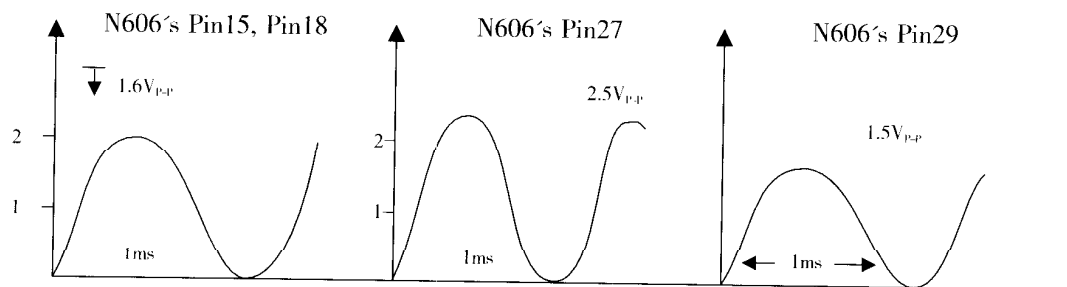
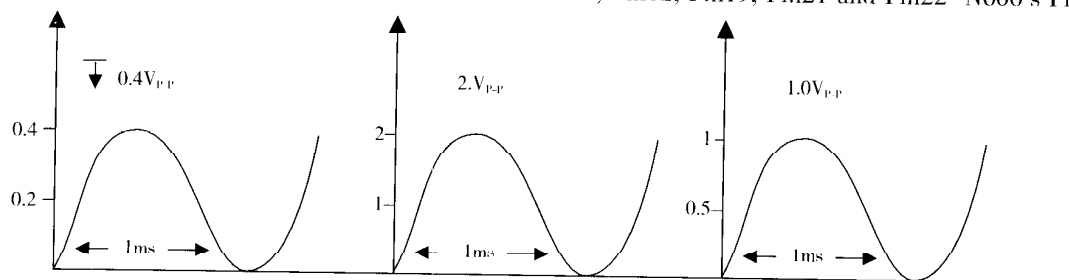
IC DATA AND WAVEFORMS OF KEY POINTS (continued)



Measure with a GOS-622G oscilloscope.

IC DATA AND WAVEFORMS OF KEY POINTS (continued)

N606's Pin3, Pin5, Pin7, Pin9 and Pin10 N606's Pin11, Pin12, Pin19, Pin21 and Pin22 N606's Pin14



IC DATA AND WAVEFORMS OF KEY POINTS (continued)

Serial No.	Type	Base (B)	Collector (C)	Emitter (E)	Serial No.	Type	Input	Reference	Output
V104	C388A	2.12	8.35	1.35	N861	LM317	11.56	7.37	8.63
V609	C1815	2.99	8.47	2.29					
V601S	C1815	2.54	6.94	1.88	N863	L7805	15.65	0	5.00
V602S	C1815	6.94	8.48	6.24					
V204	C1815	2.07	5.08	1.37	N851	C3852	(B)	(C)	(E)
V227	C1815	3.66	8.43	2.99			5.74	11.56	5.17
V432	BSN274	2.35	10.70	0	N402	LM311	15.64	7.41	8.66
V433	BV2720DF	-0.07	133.6	0					
V436	A1015	1.67	0	1.98	<div>+B voltage: 134.49V AV voltage: 16.23V Frame supply voltage: 16.73V</div>				
V437	A1015	8.53	2.05	8.53					
V438	C1815	0	8.52	0					
V001	C1815	0.06	4.73	0					
V002	C1815	0.12	4.28	0					
V009	A1015	4.33	4.96	5					
V631A	C1815	0.19	1.03	0					
V632A	A1015	8.52	-0.10	8.41					
V289	C1815	0.18	7.41	0					
V862	C1815	0.18	7.37	0					
V863	C3852	0.18	5.17	0					
V840	BVZ334	3.92	156.90	0					
VS10	C1815	2.40	5.13	1.78					
VS20	C1815	2.40	5.13	1.78					
VS30	C1815	2.98	5.13	2.32					
V217	C1815	0.35	8.53	0					

CIRCUIT ADJUSTMENTS

1. General Description

All adjustments are thoroughly checked and corrected before the TV outgoing. Therefore the TV should operate normally and deliver proper colour pictures upon installation. However, several minor adjustments may be required depending on the particular location where the TV is operated. This TV is shipped completely in carton. Carefully take out the TV from the carton and remove all packing materials. Connect the power cord into a 120V AC, 60Hz two-pin power outlet. Turn on the TV. Check and adjust all the customer controls such as brightness, contrast and colour to obtain natural colour pictures.

2. Automatic Degaussing

CIRCUIT ADJUSTMENTS (continued)

A degaussing coil is mounted around the CRT so that external degaussing after moving the TV is generally unnecessary, providing it is properly degaussed upon installation. The degaussing coil operates in about 1 second after power on. If the set is moved or faced to a different direction, the power switch must be switched off for at least 30 minutes in order that the automatic degaussing circuit operates properly. Should the chassis or parts of the cabinet become magnetized to cause poor colour purity, use an external-degaussing coil. Slowly move the degaussing coil around the screen, the sides and front of the TV and slowly withdraw the coil to a distance of about 2m before unplug it. If colour shading still exists, perform the Colour Purity Adjustment and Convergence Adjustment procedures.

3. Supply Voltage Adjustment

Caution: +B voltage has close relation to high voltage. To avoid X-ray radiation, +B voltage should be +145V.

- 1) Set RV801 to the mechanical center and AC power supply to $120 \pm 2V$.
- 2) Connect a digital voltmeter to two pins of C898, and then turn on the TV.
- 3) Receive Philips test pattern signals.
- 4) Adjust RN823 to make the voltmeter read $145 \pm 0.5V$.

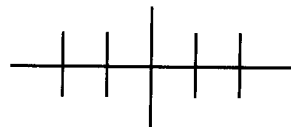
4. High Voltage Inspection

Caution: No high voltage adjustment should be done in the chassis.

- 1) Connect a precise high voltmeter to the second anode of the CRT.
- 2) Turn on the TV and set the brightness and contrast to minimum (i.e. set beam current of the CRT to zero).
- 3) The high voltage tested should be $27.5 \pm 0.5KV$.
- 4) Set the brightness to minimum or maximum, and ensure high voltage not beyond limitation of 30KV in any case.

5. Focus Adjustment

- 1) Use the remote control to set the contrast to maximum and the brightness, chroma to medium.
- 2) Set H. V. lines near Philips pattern center to thinnest with the FCB on the FBT. After finishing adjustment, ensure that no poor focusing exists near the center or around of the frame.



Before Adjusting



After Adjusting

SET-UP ADJUSTMENTS

- The following adjustments should be made when a complete realignment is required or a new CRT is installed. Perform the adjustments in order as follows.

1. Colour purity
2. Convergence
3. White Balance

Note:

The purity/convergence magnet assembly and rubber wedges need mechanical positioning. Refer to Fig. 26.

1. Colour Purity Adjustment

Note:

Before attempting any purity adjustment, the TV should be operated for at least 15 minutes.

- 1) Demagnetize the CRT and cabinet using a degaussing coil.
- 2) Set the brightness and contrast to maximum.
- 3) Receive the green raster test signals.
- 4) Loosen the clamp screw holding the deflection yoke and slide it backward or forward to display vertical green belt (zone) on the screen.
- 5) Remove the rubber wedge.
- 6) Rotate and spread the tabs of the purity magnet around the neck of the CRT until the green belt is on the centre of the screen.
- 7) Slowly move the deflection yoke forward or backward until a uniform green screen is obtained.
Tighten the clamp screw of the yoke temporarily.
- 8) Check purity of the red and blue raster.

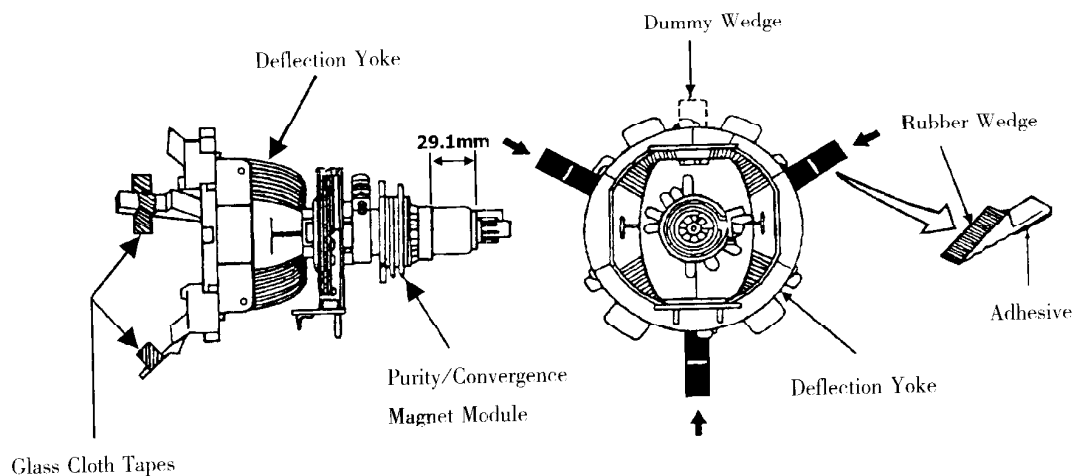


Fig. 26

SET-UP ADJUSTMENTS (continued)

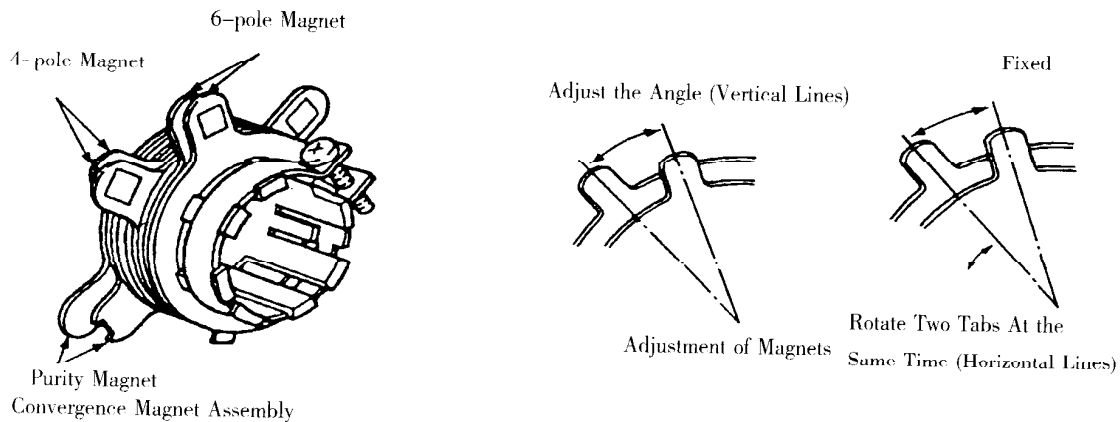


Fig. 27

2. Convergence Adjustment

Note:

Before attempting any convergence adjustment, the TV should be operated for at least 15 minutes.

• Center convergence adjustment

- 1) Receive the grille test pattern signals.
- 2) Set the brightness and contrast properly.
- 3) Adjust two tabs of the 4-pole magnet to change the angle between them and red and blue vertical lines are superimposed on the center area of the screen.
- 4) Turn both tabs at the same time keeping the angle constant to superimpose red and blue horizontal lines on the center of the screen.
- 5) Adjust two tabs of 6-pole magnet to superimpose red/blue line and green line. Adjusting the angle affects the vertical lines and rotating both magnets affects the horizontal lines.
- 6) Repeat steps 3)~5) keeping in mind red, green and blue movement. 4-pole magnet and 6-pole magnet interact each other, resulting in complicating and dot movement.

• Circumference convergence adjustment

- 1) Loosen the clamping screw of the deflection yoke slightly to allow it to tilt.
- 2) Temporarily put a wedge as shown in Fig.26. (Do not remove cover paper on adhesive part of the wedge.)
- 3) Tilt front of the deflection yoke up or down to obtain better convergence in circumference.
Push the mounted wedge into the space between the CRT and yoke to fix the yoke temporarily.
- 4) Put other wedge into bottom space and remove the cover paper to stick.
- 5) Tilt front of the deflection yoke right or left to obtain better convergence in circumference.
- 6) Keep the deflection yoke position and put another wedge in either upper space. Remove cover paper and stick the wedge on the CRT to fix the yoke.
- 7) Detach the temporarily mounted wedge and put it in another upper space. Stick it on the CRT to fix the yoke.
- 8) After fixing three wedges, recheck overall convergence.
Tighten the screw firmly to fix the yoke and check if the yoke is fixed.

SET-UP ADJUSTMENTS (continued)

9) Stick three adhesive tapes on wedges as shown in Fig. 26.

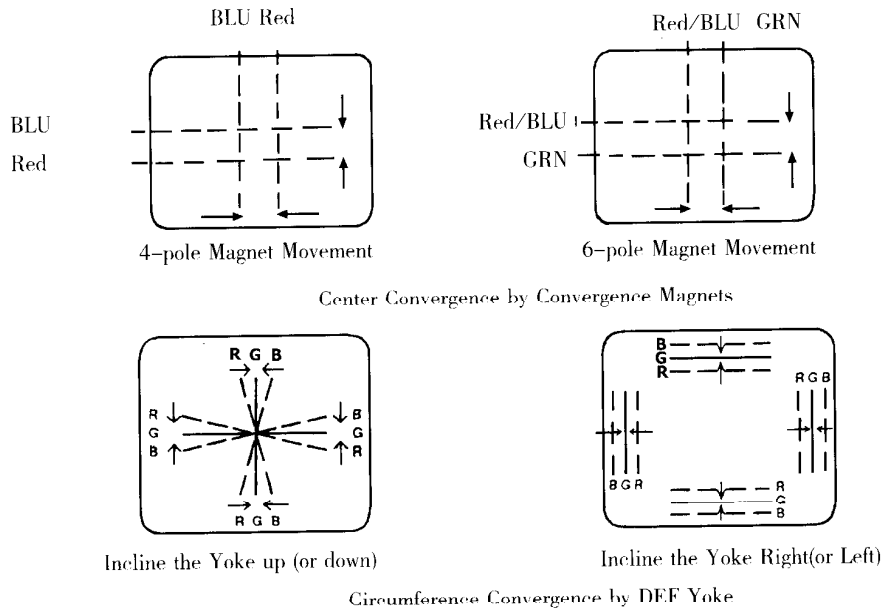


Fig. 28

SERVICE MODE AND BUS DATA

Decrease the volume to 00. Press the MUTE button on the remote control and "Mute" appears on the TV screen. Then press and hold the MUTE button on the remote control and MENU on the TV at the same time for 3 seconds and the TV enters the S mode.

Description	Data	Description	Data	Description	Data	Description	Data	Description	Data
AFW:240KHz	1	De interta	0	S CORRECT	20	AUTO ADJUST	0	OPT SPKON	0
IF-PLL	1	H shift	40	V SHIFT	32	SUB BRIGHT	27	OPT SPATIAL	1
AGC over f	9	H shift-50	32	V SHIFT-50	32	LOUDNESS	18	OPT COLOR	0
IFS	0	E/W WIDE	45	V 200M	25	CNTRST MAX	63	OPT V-CHIP	1
MOD	0	PARABOLA	32	V SCROLL	31	CNTRST MID	31	OPT CCD	1
Fixed Avd	1	E/WCORNER	63	V HALF	0	CNTRST MIN	0	OPT PWR-ON	1
Sound Mute	0	TRAPZIUM	23	SPK PRESCAL	55	COLOR CORE	31	SRCH SPEED	0
Auto Limit	0	OSDH·POS	13	AV PRESCAL	66	SPATIAL	32	ROM CORREC	0
VOLUME	0	V CENTER	31	ST SPECTRL	31	SUB TINT	31	MSP/TDA	0
Blank HOB	0	V AMP	30	ST TIM CVR	7	OPT STEREO	1		

Press the ↓ or ↑ button to select data in turn and ← or → button to decrease or increase data. Press the ⏻ button on the remote control or MAIN POWER SWITCH button on the TV to exit from the mode.

DS01 DS02 Door Turnover Control

	DS01			DS02		
	9	10	11	9	10	11
TV	H	H	↘	L	L	H
AV1	H	H	↘	L	L	H
AV2	L	L	↘	L	H	L
AV3	L	L	↘	H	L	L
S-VIDEO	L	L	↘	H	L	L

SERVICE MODE AND BUS DATA (continued)

EEPROM Data	
MENU. 00	
AFW: 240KHZ	1
IF-PLL	1
AFA: Inside	1
AFB: Helow	0
AGC	Set to the optimal mode
IFS	0
MOD	0
MENU. 01	
FLXED AUDIO	1
SOUND MUTE	0
AUTO AUDIO LIMIT	0
VOLUME	12
MENU. 02	
BLANK HOB	0
De interla	0
H shift	Set to the optimal mode
H shift-50	32
E/W WIDE	Set to the optimal mode
PARABOLA	Set to the optimal mode
E/W CORNER	Set to the optimal mode
TRAPEZIUM	Set to the optimal mode
OSD H.POS	3
MENU. 03	
VER MODE	0
VER OUT	0
OVERSCAN	1
VER Protec	0
BLANK FIX	0
V Divider	0
MENU. 04	
V CENTER	Set to the optimal mode
V AMP	Set to the optimal mode
S CORRECT	Set to the optimal mode
V SHIFT	Set to the optimal mode
VSHIFT-50	32
V ZOOM	25
V SCROLL	31
V HALF	0

SERVICE MODE AND BUS DATA (continued)

MENU. 05

WHOT P RED	31
WHIT P GRE	Set to the optimal mode
WHIT P BLU	Set to the optimal mode
AKB	1
Y-DELAY	8
CATHOD LEV	5

MENU. 06

BLUE Stret	1
BLACK Stre	1
Y-VALUE	0
SKIN ANGLE	0
SKIN TONE	1
BB LEVEL	40

MENU. 07

ACL	1
CB	0
CMB	0
BPS	0
MAT	0
SPK. PRESCL	55
AV. PRESCAL	66
ST. SPECTRL	31
ST. TIM CUR	7
AUTO ADJST	0

MENU. 08

SUB BRIGHT	31
LOUDNESS	18
CNTRST MAX	63
CNTRST MID	31
CNTRST MIN	0
COLOR Core	31
SPAHAL	32
SUB TINT	31

MENU. 09

BCO	1
XA XB	1
STB	1
POC	0
CM2.1.0	0

MENU. 10

VIM	1
STM	0
HCO	1

SERVICE MODE AND BUS DATA (continued)

EVG	0
PRD	1
COR	1
OPT.P-OFF	1
OPT.LOGO	0
MENU. 11	
OSO	1
CS1 CS0	0
BB	1
AST	1
FFI	0
EBS	1
ECO	0
OPT. AV2	1
OPT. AV3	1
OPT. DVD	0
MENU. 12	
OPT. STEREO	1 (0 for AT2402)
OPT. SPKON	0
OPT. SPATAL	1
OPT. COLOR	0
OPT. V-CHIP	1
OPT. CCD	1
OPT. PWR-ON	1
SRCH SPEED	0
ROM CORREC	0
MSP/TDA	0

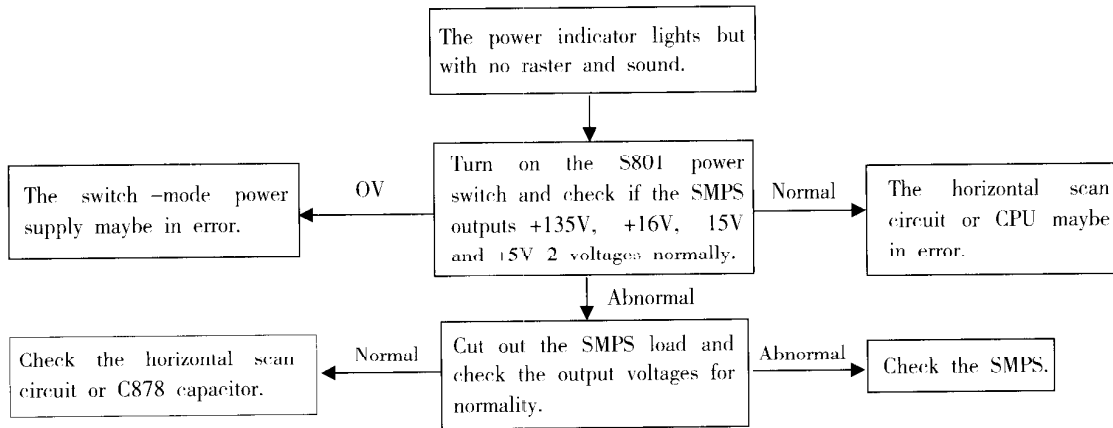
Notes:

- ① The data sheet may differ dependent on different models.
- ② The data sheet may differ dependent on different CRTs for the same model.
- ③ Do not adjust I²C data with the remote jig unless necessary.
- ④ The remote jigs on neighboring work position cannot affect each other.
- ⑤ AT2402 hasn't function of stereo, so it's not necessary to check stereo.

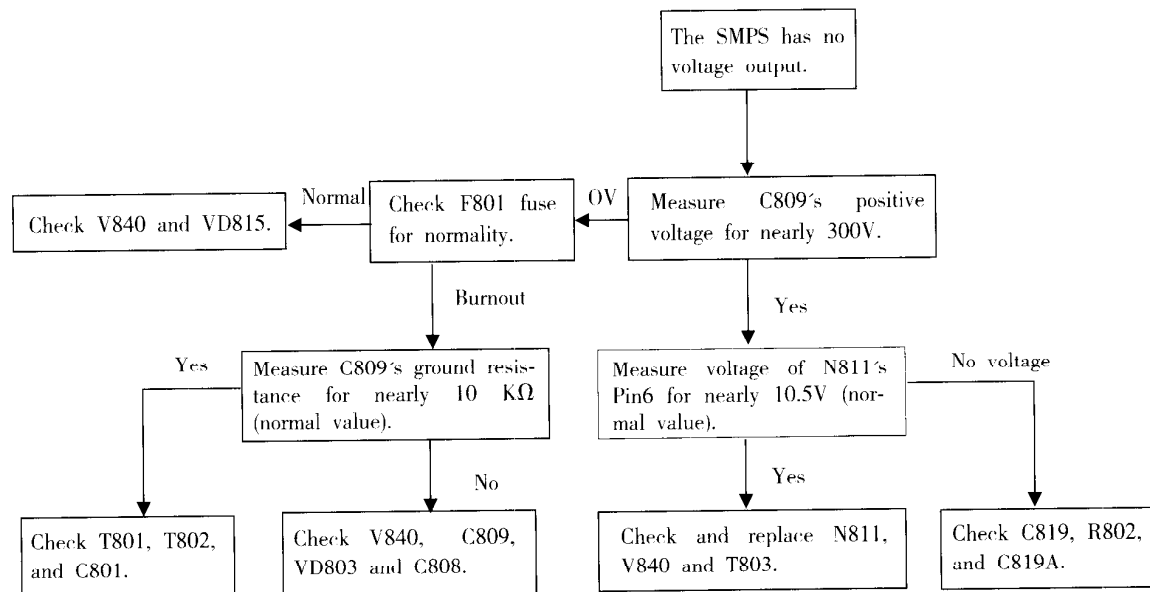
TROUBLESHOOTING FLOW CHARTS

1. Power

1.1 The power indicator lights but with no raster and sound.

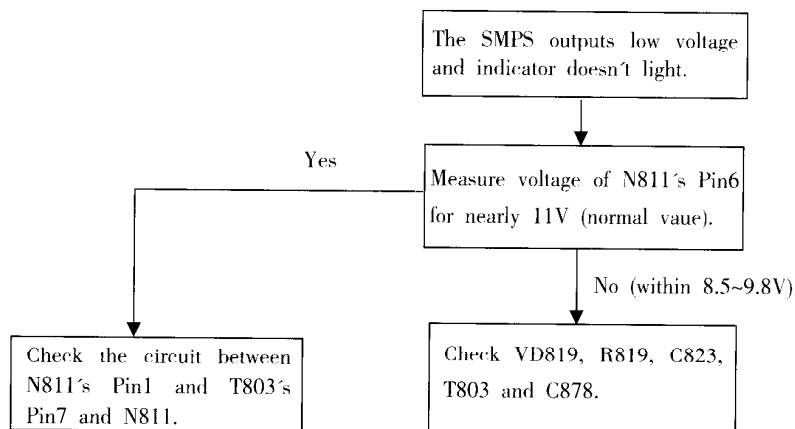


1.2 The SMPS has no voltage output.

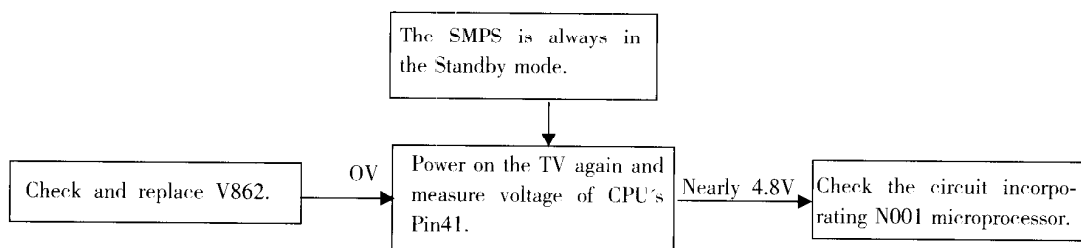


TROUBLESHOOTING FLOW CHARTS (continued)

1.3 The SMPS outputs low voltage and indicator doesn't light.

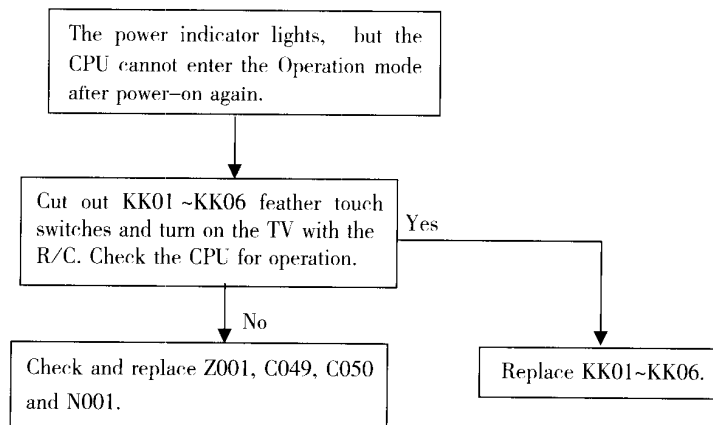


1.4 The power indicator lights, but the SMPS is still in the Standby mode.



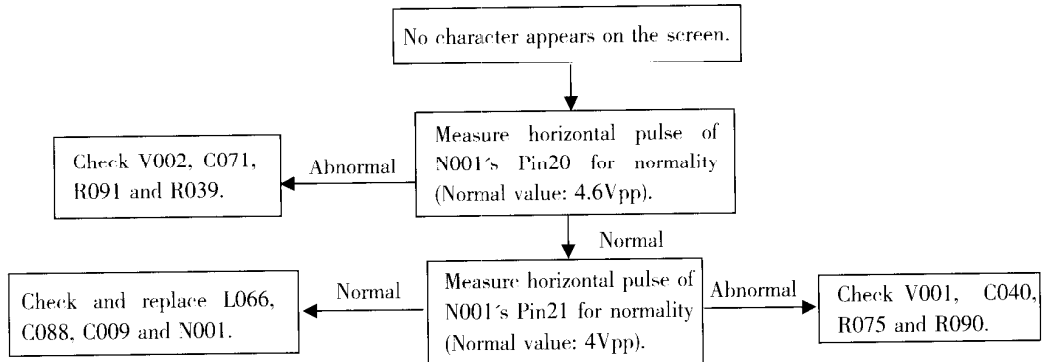
2. Control System

2.1 The power indicator lights, but the CPU cannot enter the Operation mode after power-on again.

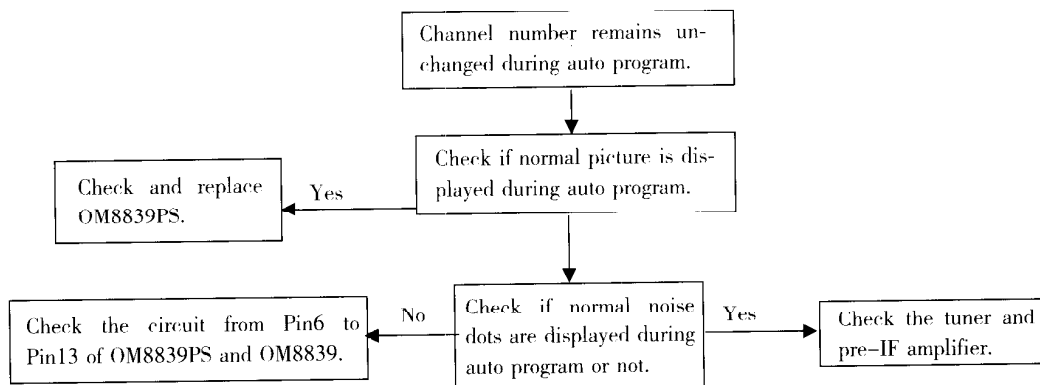


TROUBLESHOOTING FLOW CHARTS (continued)

2.2 No character appears on the screen.

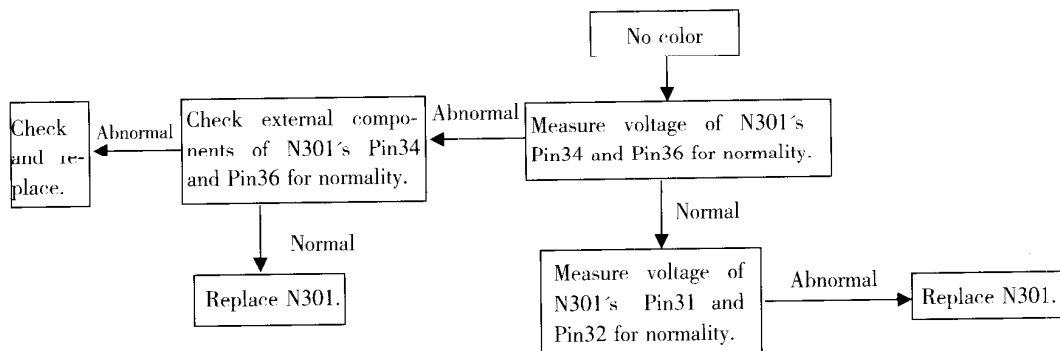


2.3 Channel number remains unchanged during auto program.



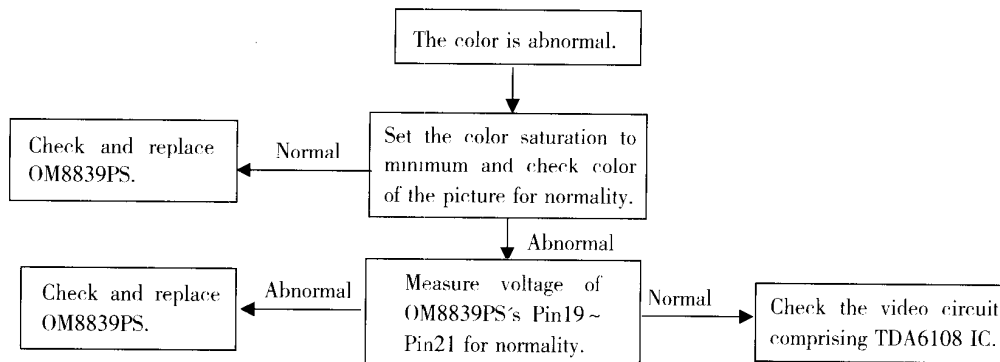
3. Video Signal Processor

3.1 No color



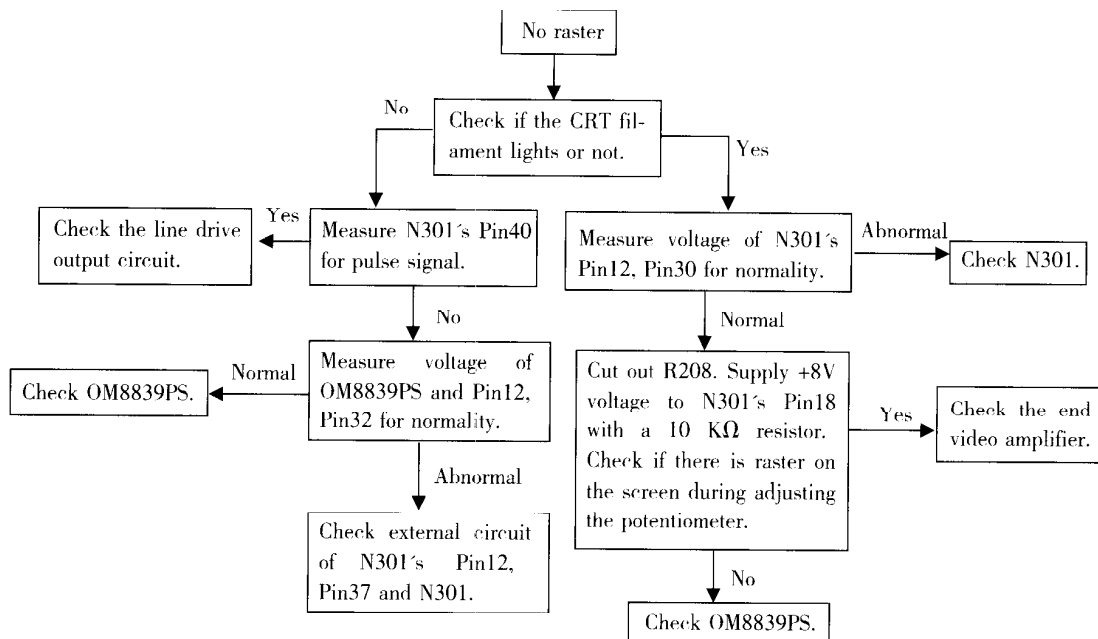
TROUBLESHOOTING FLOW CHARTS (continued)

3.2 The color is abnormal.



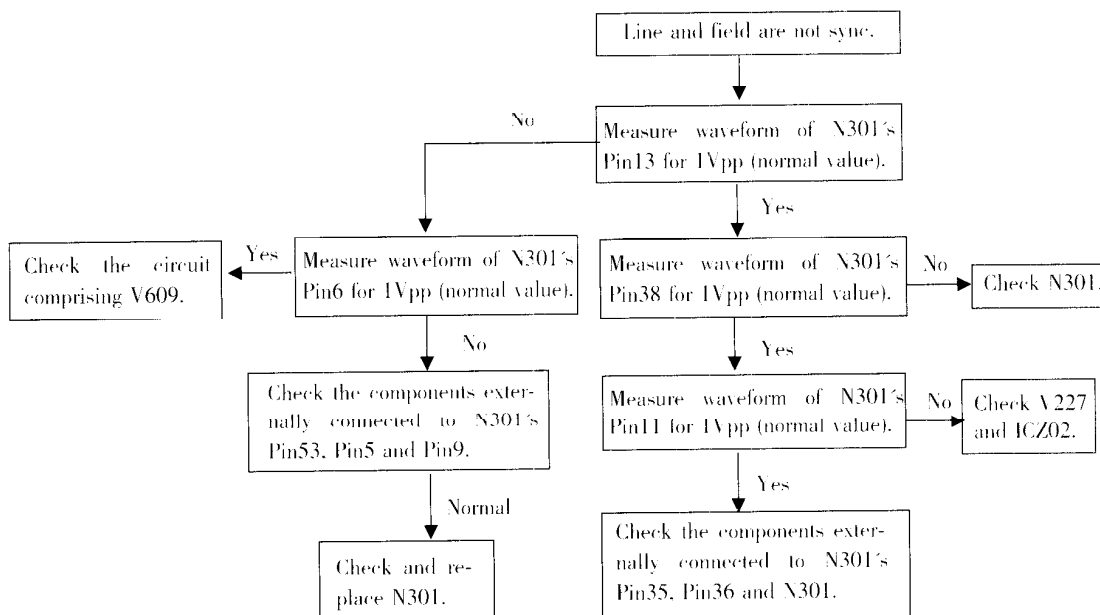
4. Horizontal/Vertical Scan Circuit

4.1 No raster

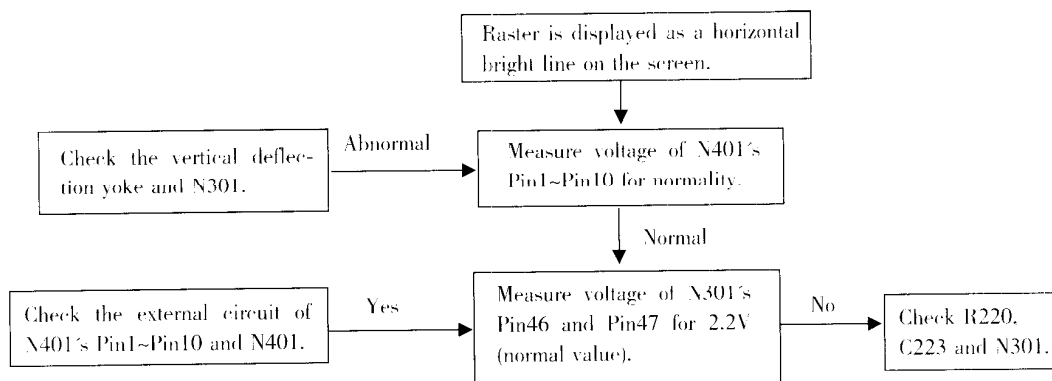


TROUBLESHOOTING FLOW CHARTS (continued)

4.2 Line and field are not sync.

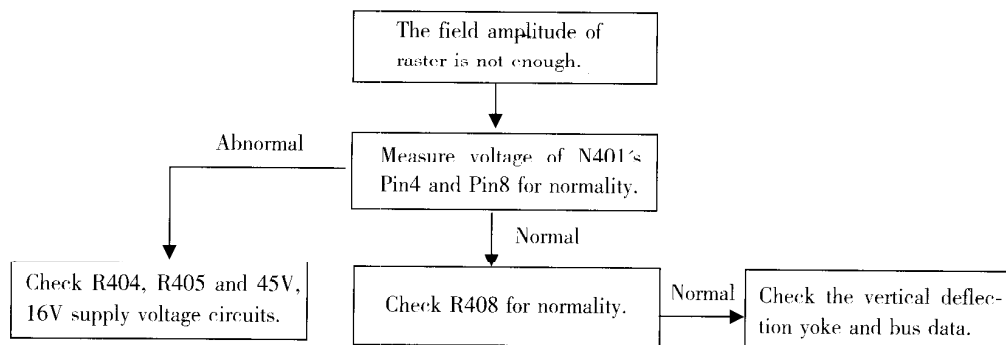


4.3 Raster is displayed as a horizontal bright line on the screen.

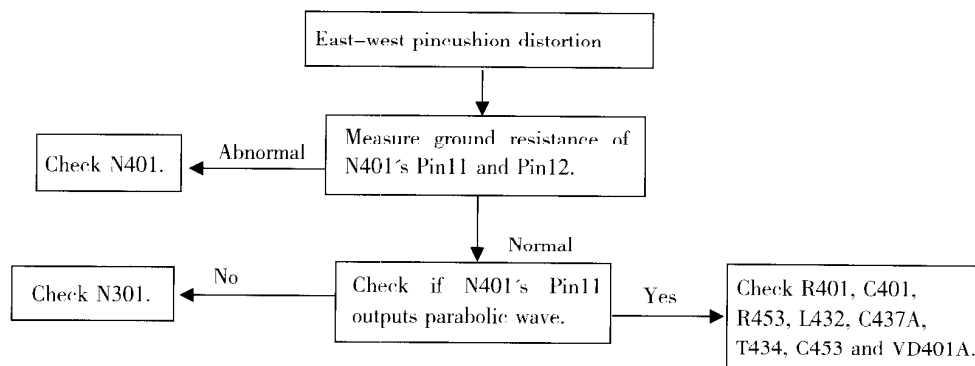


TROUBLESHOOTING FLOW CHARTS (continued)

4.4 The field amplitude of raster is not enough.

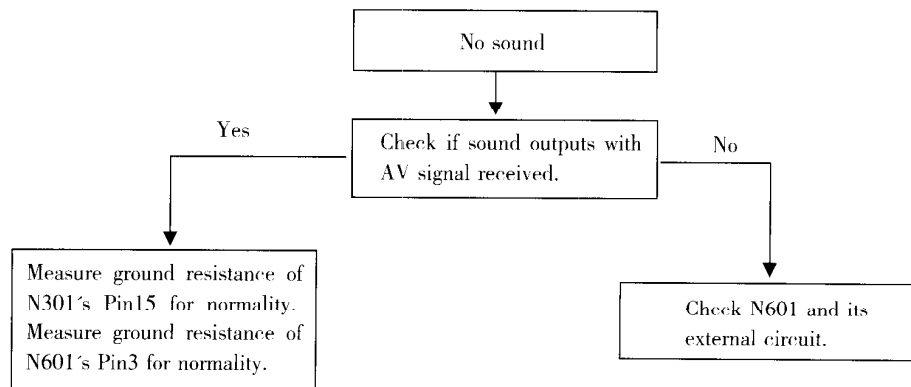


4.5 East-west pincushion distortion



5. Audio System

5.1 No sound



PARTS LIST

Position	Parts	Type
		Parts List for AT2402S only
		1. Parts on Main PCB
R101	Carbon film resistor	RT13-0.166W-10ΩJ
R101	Carbon film resistor	NAS1/6100J
R618	Carbon film resistor	RT13-0.166W-10ΩJ
R618	Carbon film resistor	NAS1/6100J
R104	Carbon film resistor	RT13-0.166W-82ΩJ
R104	Carbon film resistor	NAS1/6820J
R139	Carbon film resistor	RT13-0.166W-47ΩJ
R139	Carbon film resistor	NAS1/6470J
R240A	Carbon film resistor	RT13-0.166W-47ΩJ
R240A	Carbon film resistor	NAS1/6470J
R401	Carbon film resistor	RT13-0.166W-47ΩJ
R401	Carbon film resistor	NAS1/6470J
R402	Carbon film resistor	RT13-0.166W-47ΩJ
R402	Carbon film resistor	NAS1/6470J
R206	Carbon film resistor	RT13-0.166W-75ΩJ
R206	Carbon film resistor	NAS1/6750J
R015	Carbon film resistor	RT13-0.166W-100ΩJ
R015	Carbon film resistor	NAS1/6101J
R056	Carbon film resistor	RT13-0.166W-100ΩJ
R056	Carbon film resistor	NAS1/6101J
R060	Carbon film resistor	RT13-0.166W-100ΩJ
R060	Carbon film resistor	NAS1/6101J
R061	Carbon film resistor	RT13-0.166W-100ΩJ
R061	Carbon film resistor	NAS1/6101J
R067	Carbon film resistor	RT13-0.166W-100ΩJ
R067	Carbon film resistor	NAS1/6101J
R068	Carbon film resistor	RT13-0.166W-100ΩJ
R068	Carbon film resistor	NAS1/6101J
R077	Carbon film resistor	RT13-0.166W-100ΩJ
R077	Carbon film resistor	NAS1/6101J
R105	Carbon film resistor	RT13-0.166W-100ΩJ
R105	Carbon film resistor	NAS1/6101J
R202	Carbon film resistor	RT13-0.166W-100ΩJ
R202	Carbon film resistor	NAS1/6101J
R203	Carbon film resistor	RT13-0.166W-100ΩJ
R203	Carbon film resistor	NAS1/6101J
R205	Carbon film resistor	RT13-0.166W-100ΩJ
R205	Carbon film resistor	NAS1/6101J
R228	Carbon film resistor	RT13-0.166W-100ΩJ
R228	Carbon film resistor	NAS1/6101J
R229	Carbon film resistor	RT13-0.166W-100ΩJ

PARTS LIST (continued)

Position	Parts	Type
R229	Carbon film resistor	NAS1/6101J
R606S	Carbon film resistor	RT13-0.166W-100ΩJ
R606S	Carbon film resistor	NAS1/6101J
R204	Carbon film resistor	RT13-0.166W-150ΩJ
R204	Carbon film resistor	NAS1/6151J
R603S	Carbon film resistor	RT13-0.166W-150ΩJ
R603S	Carbon film resistor	NAS1/6151J
R017	Carbon film resistor	RT13-0.166W-180ΩJ
R017	Carbon film resistor	NAS1/6181J
R018	Carbon film resistor	RT13-0.166W-180ΩJ
R018	Carbon film resistor	NAS1/6181J
R608	Carbon film resistor	RT13-0.166W-180ΩJ
R608	Carbon film resistor	NAS1/6181J
R029	Carbon film resistor	RT13-0.166W-220ΩJ
R029	Carbon film resistor	NAS1/6221J
R619D	Carbon film resistor	RT13-0.166W-220ΩJ
R619D	Carbon film resistor	NAS1/6221J
R628A	Carbon film resistor	RT13-0.166W-220ΩJ
R628A	Carbon film resistor	NAS1/6221J
R699B	Carbon film resistor	RT13-0.166W-220ΩJ
R699B	Carbon film resistor	NAS1/6221J
R072	Carbon film resistor	RT13-0.166W-330ΩJ
R072	Carbon film resistor	NAS1/6331J
R073	Carbon film resistor	RT13-0.166W-330ΩJ
R073	Carbon film resistor	NAS1/6331J
R076	Carbon film resistor	RT13-0.166W-330ΩJ
R076	Carbon film resistor	NAS1/6331J
R207	Carbon film resistor	RT13-0.166W-330ΩJ
R207	Carbon film resistor	NAS1/6331J
RP07	Carbon film resistor	RT13-0.166W-330ΩJ
RP07	Carbon film resistor	NAS1/6331J
RP08	Carbon film resistor	RT13-0.166W-330ΩJ
RP08	Carbon film resistor	NAS1/6331J
R013	Carbon film resistor	RT13-0.166W-390ΩJ
R013	Carbon film resistor	NAS1/6391J
R201	Carbon film resistor	RT13-0.166W-390ΩJ
R201	Carbon film resistor	NAS1/6391J
R218A	Carbon film resistor	RT13-0.166W-390ΩJ
R218A	Carbon film resistor	NAS1/6391J
R020	Carbon film resistor	RT13-0.166W-470ΩJ
R020	Carbon film resistor	NAS1/6471J
R022	Carbon film resistor	RT13-0.166W-470ΩJ
R022	Carbon film resistor	NAS1/6471J

SERVICE MANUAL

PARTS LIST (continued)

Position	Parts	Type
R040	Carbon film resistor	RT13-0.166W-470ΩJ
R040	Carbon film resistor	NAS1/6471J
R041	Carbon film resistor	RT13-0.166W-470ΩJ
R041	Carbon film resistor	NAS1/6471J
R050	Carbon film resistor	RT13-0.166W-470ΩJ
R050	Carbon film resistor	NAS1/6471J
R053	Carbon film resistor	RT13-0.166W-470ΩJ
R053	Carbon film resistor	NAS1/6471J
R054	Carbon film resistor	RT13-0.166W-470ΩJ
R054	Carbon film resistor	NAS1/6471J
R065	Carbon film resistor	RT13-0.166W-470ΩJ
R065	Carbon film resistor	NAS1/6471J
R085	Carbon film resistor	RT13-0.166W-470ΩJ
R085	Carbon film resistor	NAS1/6471J
R209	Carbon film resistor	RT13-0.166W-470ΩJ
R209	Carbon film resistor	NAS1/6471J
R210	Carbon film resistor	RT13-0.166W-470ΩJ
R210	Carbon film resistor	NAS1/6471J
R211	Carbon film resistor	RT13-0.166W-470ΩJ
R211	Carbon film resistor	NAS1/6471J
R008B	Carbon film resistor	RT13-0.166W-470ΩJ
R008B	Carbon film resistor	NAS1/6471J
R108	Carbon film resistor	RT13-0.166W-680ΩJ
R108	Carbon film resistor	NAS1/6681J
R605S	Carbon film resistor	RT13-0.166W-820ΩJ
R605S	Carbon film resistor	NAS1/6821J
R607S	Carbon film resistor	RT13-0.166W-820ΩJ
R607S	Carbon film resistor	NAS1/6821J
R025	Carbon film resistor	RT13-0.166W-1KΩJ
R025	Carbon film resistor	NAS1/6102J
R038	Carbon film resistor	RT13-0.166W-1KΩJ
R038	Carbon film resistor	NAS1/6102J
R074	Carbon film resistor	RT13-0.166W-1KΩJ
R074	Carbon film resistor	NAS1/6102J
R117	Carbon film resistor	RT13-0.166W-1KΩJ
R117	Carbon film resistor	NAS1/6102J
R221	Carbon film resistor	RT13-0.166W-1KΩJ
R221	Carbon film resistor	NAS1/6102J
R281	Carbon film resistor	RT13-0.166W-1KΩJ
R281	Carbon film resistor	NAS1/6102J
R609	Carbon film resistor	RT13-0.166W-1KΩJ
R609	Carbon film resistor	NAS1/6102J
R604S	Carbon film resistor	RT13-0.166W-1KΩJ

PARTS LIST (continued)

Position	Parts	Type
R604S	Carbon film resistor	NAS1/6102J
R630A	Carbon film resistor	RT13-0.166W-1KΩJ
R630A	Carbon film resistor	NAS1/6102J
R434	Carbon film resistor	RT13-0.166W-1KΩJ
R434	Carbon film resistor	NAS1/6102J
R220	Carbon film resistor	RT13-0.166W-1KΩJ
R220	Carbon film resistor	NAS1/6102J
R118	Carbon film resistor	RT13-0.166W-1.2KΩJ
R118	Carbon film resistor	NAS1/6122J
R035	Carbon film resistor	RT13-0.166W-1.8KΩJ
R035	Carbon film resistor	NAS1/6182J
R036	Carbon film resistor	RT13-0.166W 1.8KΩJ
R036	Carbon film resistor	NAS1/6182J
R037	Carbon film resistor	RT13-0.166W-1.8KΩJ
R037	Carbon film resistor	NAS1/6182J
R103	Carbon film resistor	RT13-0.166W-1.8KΩJ
R103	Carbon film resistor	NAS1/6182J
R432	Carbon film resistor	RT13-0.166W-1.8KΩJ
R432	Carbon film resistor	NAS1/6182J
R087	Carbon film resistor	RT13-0.166W-2.2KΩJ
R087	Carbon film resistor	NAS1/6222J
R205A	Carbon film resistor	RT13-0.166W-2.2KΩJ
R205A	Carbon film resistor	NAS1/6222J
R609A	Carbon film resistor	RT13-0.166W-2.2KΩJ
R609A	Carbon film resistor	NAS1/6222J
R616	Carbon film resistor	RT13-0.166W-2.2KΩJ
R616	Carbon film resistor	NAS1/6222J
R016	Carbon film resistor	RT13-0.166W-3.3KΩJ
R016	Carbon film resistor	NAS1/6332J
R032	Carbon film resistor	RT13-0.166W-3.3KΩJ
R032	Carbon film resistor	NAS1/6332J
R058	Carbon film resistor	RT13-0.166W-3.3KΩJ
R058	Carbon film resistor	NAS1/6332J
R063	Carbon film resistor	RT13-0.166W-3.3KΩJ
R063	Carbon film resistor	NAS1/6332J
R099	Carbon film resistor	RT13-0.166W-3.3KΩJ
R099	Carbon film resistor	NAS1/6332J
R628	Carbon film resistor	RT13-0.166W-3.3KΩJ
R628	Carbon film resistor	NAS1/6332J
R634	Carbon film resistor	RT13-0.166W-3.3KΩJ
R634	Carbon film resistor	NAS1/6332J
R251	Carbon film resistor	RT13-0.166W-3.9KΩJ
R251	Carbon film resistor	NAS1/6392J

PARTS LIST (continued)

Position	Parts	Type
R043	Carbon film resistor	RT13-0.166W-4.7KΩJ
R043	Carbon film resistor	NAS1/6472J
R044	Carbon film resistor	RT13-0.166W-4.7KΩJ
R044	Carbon film resistor	NAS1/6472J
R059	Carbon film resistor	RT13-0.166W-4.7KΩJ
R059	Carbon film resistor	NAS1/6472J
R102	Carbon film resistor	RT13-0.166W-4.7KΩJ
R102	Carbon film resistor	NAS1/6472J
R212	Carbon film resistor	RT13-0.166W-4.7KΩJ
R212	Carbon film resistor	NAS1/6472J
R252	Carbon film resistor	RT13-0.166W-4.7KΩJ
R252	Carbon film resistor	NAS1/6472J
R280	Carbon film resistor	RT13-0.166W-6.8KΩJ
R280	Carbon film resistor	NAS1/6682J
R006	Carbon film resistor	RT13-0.166W-10KΩJ
R006	Carbon film resistor	NAS1/6103J
R007	Carbon film resistor	RT13-0.166W-10KΩJ
R007	Carbon film resistor	NAS1/6103J
R039	Carbon film resistor	RT13-0.166W-10KΩJ
R039	Carbon film resistor	NAS1/6103J
R162	Carbon film resistor	RT13-0.166W-10KΩJ
R162	Carbon film resistor	NAS1/6103J
R208	Carbon film resistor	RT13-0.166W-10KΩJ
R208	Carbon film resistor	NAS1/6103J
R223	Carbon film resistor	RT13-0.166W-10KΩJ
R223	Carbon film resistor	NAS1/6103J
R602S	Carbon film resistor	RT13-0.166W-10KΩJ
R602S	Carbon film resistor	NAS1/6103J
R629	Carbon film resistor	RT13-0.166W-10KΩJ
R629	Carbon film resistor	NAS1/6103J
R633	Carbon film resistor	RT13-0.166W-10KΩJ
R633	Carbon film resistor	NAS1/6103J
R086	Carbon film resistor	RT13-0.166W-15KΩJ
R086	Carbon film resistor	NAS1/6153J
R075	Carbon film resistor	RT13-0.166W-15KΩJ
R075	Carbon film resistor	NAS1/6153J
R222	Carbon film resistor	RT13-0.166W-15KΩJ
R222	Carbon film resistor	NAS1/6153J
R107	Carbon film resistor	RT13-0.166W-18KΩJ
R107	Carbon film resistor	NAS1/6183J
R131	Carbon film resistor	RT13-0.166W-18KΩJ
R131	Carbon film resistor	NAS1/6183J
R435	Carbon film resistor	RT13-0.166W-18KΩJ

PARTS LIST (continued)

Position	Parts	Type
R435	Carbon film resistor	NAS1/6183J
R026	Carbon film resistor	RT13-0.166W-22KΩJ
R026	Carbon film resistor	NAS1/6223J
R031	Carbon film resistor	RT13-0.166W-22KΩJ
R031	Carbon film resistor	NAS1/6223J
R055	Carbon film resistor	RT13-0.166W-22KΩJ
R055	Carbon film resistor	NAS1/6223J
R006A	Carbon film resistor	RT13-0.166W-22KΩJ
R006A	Carbon film resistor	NAS1/6223J
R007A	Carbon film resistor	RT13-0.166W-22KΩJ
R007A	Carbon film resistor	NAS1/6223J
R008A	Carbon film resistor	RT13-0.166W-22KΩJ
R008A	Carbon film resistor	NAS1/6223J
R601S	Carbon film resistor	RT13-0.166W-22KΩJ
R601S	Carbon film resistor	NAS1/6223J
R629A	Carbon film resistor	RT13-0.166W-22KΩJ
R629A	Carbon film resistor	NAS1/6223J
R634A	Carbon film resistor	RT13-0.166W-22KΩJ
R634A	Carbon film resistor	NAS1/6223J
R230	Carbon film resistor	RT13-0.166W-27KΩJ
R230	Carbon film resistor	NAS1/6273J
R225	Carbon film resistor	RT13-0.166W-33KΩJ
R225	Carbon film resistor	NAS1/6333J
R610	Carbon film resistor	RT13-0.166W-33KΩJ
R610	Carbon film resistor	NAS1/6333J
R090	Carbon film resistor	RT13-0.166W-47KΩJ
R090	Carbon film resistor	NAS1/6473J
R289C	Carbon film resistor	RT13-0.166W-47KΩJ
R289C	Carbon film resistor	NAS1/6473J
R289D	Carbon film resistor	RT13-0.166W-47KΩJ
R289D	Carbon film resistor	NAS1/6473J
R218	Carbon film resistor	RT13-0.166W-100KΩJ
R218	Carbon film resistor	NAS1/6104J
R224	Carbon film resistor	RT13-0.166W-100KΩJ
R224	Carbon film resistor	NAS1/6104J
R091	Carbon film resistor	RT13-0.166W-100KΩJ
R091	Carbon film resistor	NAS1/6104J
R446	Carbon film resistor	RT13-0.166W-150KΩJ
R446	Carbon film resistor	NAS1/6154J
R458	Carbon film resistor	RT13-0.166W-240KΩJ
R458	Carbon film resistor	NAS1/6244J
R632A	Carbon film resistor	RT13-0.166W-240KΩJ
R632A	Carbon film resistor	NAS1/6244J

SERVICE MANUAL

PARTS LIST (continued)

Position	Parts	Type
R459	Carbon film resistor	RT13-0.166W-680KΩJ
R459	Carbon film resistor	NAS1/6684J
R030	Carbon film resistor	RT13-0.166W-1MΩJ
R030	Carbon film resistor	NAS1/6105J
R064	Carbon film resistor	RT14-0.25W-4.7ΩJ
R064	Carbon film resistor	NAS1/44R7J
R289E	Carbon film resistor	RT14-0.25W-4.7ΩJ
R289E	Carbon film resistor	NAS1/44R7J
R608S	Carbon film resistor	RT14-0.25W-4.7ΩJ
R608S	Carbon film resistor	NAS1/44R7J
R440	Carbon film resistor	RT14-0.25W-47ΩJ
R440	Carbon film resistor	NAS1/4470J
R413	Carbon film resistor	RT14-0.25W-47ΩJ
R413	Carbon film resistor	NAS1/4470J
R460	Carbon film resistor	RT14-0.25W-220ΩJ
R460	Carbon film resistor	NAS1/4221J
R433	Carbon film resistor	RT14-0.25W-390ΩJ
R433	Carbon film resistor	NAS1/4391J
R456	Carbon film resistor	RT14-0.25W-1KΩJ
R456	Carbon film resistor	NAT1/4102J
R115	Carbon film resistor	RT14-0.25W-2.2KΩJ
R115	Carbon film resistor	NAT1/4222J
R412	Carbon film resistor	RT14-0.25W-10KΩJ
R412	Carbon film resistor	NAS1/4103J
R289A	Metal film resistor	RJ14-0.25W-360ΩJ
R289B	Metal film resistor	RJ14-0.25W-2KΩJ
R403	Metal film resistor	RJ14-0.25W-3KΩJ
R443	Metal film resistor	RJ14-0.25W-3.3KΩJ
R226	Metal film resistor	RJ14-0.25W-39KΩG
R453A	Metal film resistor	RJ14-0.25W-68KΩJ
R404	Metal oxide film resistor	RY21-0.5W-10ΩJ
R404	Metal oxide film resistor	MOS1/2W100J
R660	Metal oxide film resistor	RY21-0.5W-10ΩJ
R660	Metal oxide film resistor	MOS1/2W100J
R410	Metal oxide film resistor	RY21-0.5W-22ΩJ
R410	Metal oxide film resistor	MOS1/2W220J
R442	Metal oxide film resistor	RY21-1W-1KΩJ
R442	Metal oxide film resistor	MOS1W102J
R637	Metal oxide film resistor	RY21-2W-1ΩJ
R637	Metal oxide film resistor	MOS2W1R0J
R401A	Metal oxide film resistor	RY21-2W-33ΩJ
R401A	Metal oxide film resistor	MOS2W330J
R449	Fuse resistor	RF10-0.5W-0.27ΩJ

SERVICE MANUAL

PARTS LIST (continued)

Position	Parts	Type
R450	Fuse resistor	RF10-0.5W-0.68Ω
R453	Fuse resistor	RF10-0.5W-0.68Ω
R448	Fuse resistor	RF11-2W-1Ω
C221	Ceramic capacitor	CC1-63V-06a-C-18PFG
C049	Ceramic capacitor	CC1-63V-06a-C-30PFG
C050	Ceramic capacitor	CC1-63V-06a-C-30PFG
C252	Ceramic capacitor	CC1-63V-06a-C-33PFJ
C601S	Ceramic capacitor	CC1-63V-06a-C-75PFJ
C602S	Ceramic capacitor	CC1-63V-06a-C-75PFJ
C035	Ceramic capacitor	CC1-63V-08a-C-100PFJ
C036	Ceramic capacitor	CC1-63V-08a-C-100PFJ
C037	Ceramic capacitor	CC1-63V-08a-C-100PFJ
C038	Ceramic capacitor	CC1-63V-08a-C-100PFJ
C040	Ceramic capacitor	CC1-63V-08a-C-100PFJ
C036	Ceramic capacitor	CC1-63V-08a-C-100PFJ
C060	Ceramic capacitor	CC1-63V-08a-C-100PFJ
C071	Ceramic capacitor	CC1-63V-08a-C-100PFJ
C215	Ceramic capacitor	CC1-63V-08a-C-100PFJ
C401	Ceramic capacitor	CC1-63V-08a-C-100PFJ
C461	Ceramic capacitor	CC1-63V-08a-SL 220PFJ
C205	Ceramic capacitor	CT1-63V-06a-2B4-1000PFK
C240	Ceramic capacitor	CT1-63V-06a-2B4-1000PFK
C241	Ceramic capacitor	CT1-63V-06a-2B4-1000PFK
C280A	Ceramic capacitor	CT1-63V-06a-2B4-1000PFK
CK09	Ceramic capacitor	CT1-63V-06a-2B4-1000PFK
CK10	Ceramic capacitor	CT1-63V-06a-2B4-1000PFK
C251	Ceramic capacitor	CT1-63V-06a-2B4-1500PFK
C231	Ceramic capacitor	CT1-63V-08a-2B4-2200PFK
C401B	Ceramic capacitor	CT1-63V-08a-2B4-2200PFK
C101	Ceramic capacitor	CT1-63V-08c-2B4-4700PFK
C103	Ceramic capacitor	CT1-63V-08c-2B4-4700PFK
C236	Ceramic capacitor	CT1-63V-08c-2B4-4700PFK
C656	Ceramic capacitor	CT1-63V-08c-2B4-4700PFK
C661A	Ceramic capacitor	CT1-63V-08c-2B4-4700PFK
C102	Ceramic capacitor	CT1-63V-08a-2F4-10nFZ
C105	Ceramic capacitor	CT1-63V-08a-2F4-10nFZ
C104A	Ceramic capacitor	CT1-63V-08a-2F4-10nFZ
C114	Ceramic capacitor	CT1-63V-08a-2F4-10nFZ
C120A	Ceramic capacitor	CT1-63V-08a-2F4-10nFZ
C432	Ceramic capacitor	CT1-63V-08a-2F4-10nFZ
C671	Ceramic capacitor	CT1-63V-08a-2F4-10nFZ
C673	Ceramic capacitor	CT1-63V-08a-2F4-10nFZ
C289C	Ceramic capacitor	CT1-63V-08a-2F4-10nFZ

PARTS LIST (continued)

Position	Parts	Type
C603S	Ceramic capacitor	CT1-63V-08a-2F4-10nFZ
C051	Ceramic capacitor	CT1-63V-12a-2F4-0.022μFZ
C063	Ceramic capacitor	CT1-63V-12a-2F4-0.022μFZ
C066	Ceramic capacitor	CT1-63V-12a-2F4-0.022μFZ
C106	Ceramic capacitor	CT1-63V-12a-2F4-0.022μFZ
C212	Ceramic capacitor	CT1-63V-12a-2F4-0.022μFZ
C213	Ceramic capacitor	CT1-63V-12a-2F4-0.022μFZ
C214	Ceramic capacitor	CT1-63V-12a-2F4-0.022μFZ
C225	Ceramic capacitor	CT1-63V-12a-2F4-0.022μFZ
C235	Ceramic capacitor	CT1-63V-12a-2F4-0.022μFZ
C668	Ceramic capacitor	CT1-63V-12a-2F4-0.022μFZ
C676	Ceramic capacitor	CT1-63V-12a-2F4-0.022μFZ
C451	Ceramic capacitor	CT1-500V-06C-2B4-220PFK
C452	Ceramic capacitor	CT1-500V-06C-2B4-220PFK
C458	Ceramic capacitor	CT1-500V-06C-2B4-220PFK
C471	Ceramic capacitor	CT1-500V-10c-2B4-1000PFK
C224	Polyester film capacitor	CL21X-50V-4700PFJ
C229	Polyester film capacitor	CL21X-50V-4700PFJ
C405	Polyester film capacitor	CL21X-50V-0.01μFJ
C407	Polyester film capacitor	CL21X-50V-0.01μFJ
C202	Polyester film capacitor	CL21X-50V-0.022μFJ
C667	Polyester film capacitor	CL21X-50V-0.033μFJ
C675	Polyester film capacitor	CL21X-50V-0.033μFJ
C201	Polyester film capacitor	CL21X-50V-0.1μFJ
C204	Polyester film capacitor	CL21X-50V-0.1μFJ
C207	Polyester film capacitor	CL21X-50V-0.1μFJ
C223	Polyester film capacitor	CL21X-50V-0.1μFJ
C227A	Polyester film capacitor	CL21X-50V-0.1μFJ
C228	Polyester film capacitor	CL21X-50V-0.1μFJ
C233	Polyester film capacitor	CL21X-50V-0.1μFJ
C401A	Polyester film capacitor	CL21X-50V-0.1μFJ
C403	Polyester film capacitor	CL21X-50V-0.1μFJ
C409	Polyester film capacitor	CL21X-50V-0.1μFJ
C460	Polyester film capacitor	CL21X-50V-0.1μFJ
C654	Polyester film capacitor	CL21X-50V-0.1μFJ
C658	Polyester film capacitor	CL21X-50V-0.1μFJ
C660	Polyester film capacitor	CL21X-50V-0.1μFJ
C663	Polyester film capacitor	CL21X-50V-0.1μFJ
C665	Polyester film capacitor	CL21X-50V-0.1μFJ
C209	Polyester film capacitor	CL21X-50V-0.22μFJ
C232	Polyester film capacitor	CL21X-50V-0.22μFJ
C406	Polyester film capacitor	CL21X-50V-0.22μFJ
C662	Polyester film capacitor	CL21X-50V-0.22μFJ

PARTS LIST (continued)

Position	Parts	Type
C666	Polyester film capacitor	CL21X-50V-0.22μFJ
C669	Polyester film capacitor	CL21X-50V-0.22μFJ
C670	Polyester film capacitor	CL21X-50V-0.22μFJ
C671A	Polyester film capacitor	CL21X-50V-0.22μFJ
C672	Polyester film capacitor	CL21X-50V-0.22μFJ
C674	Polyester film capacitor	CL21X-50V-0.22μFJ
C208	Polyester film capacitor	CL21X-50V-0.47μFJ
C210	Polyester film capacitor	CL21X-50V-0.47μFJ
C234	Polyester film capacitor	CL21X-50V-0.47μFJ
C434	Polyester film capacitor	CL21X-50V-0.47μFJ
C479	Polyester film capacitor	CL21X-250V-0.1μFJ
C475	Polypropylene capacitor	CBB21 160V-0.056μFJ
C476	Polypropylene capacitor	CBB81-1.6KV-2200PFJ
C072	Aluminum electrolytic capacitor	CD110-16V-10μFM
C237	Aluminum electrolytic capacitor	CD110-16V-10μFM
C431	Aluminum electrolytic capacitor	CD110-16V-10μFM
C617	Aluminum electrolytic capacitor	CD110-16V-10μFM
C676A	Aluminum electrolytic capacitor	CD110-16V-10μFM
C104	Aluminum electrolytic capacitor	CD110-16V-22μFM
C107	Aluminum electrolytic capacitor	CD110X-16V-47μFM
C211	Aluminum electrolytic capacitor	CD110X-16V-47μFM
C462	Aluminum electrolytic capacitor	CD110X-16V-47μFM
C604S	Aluminum electrolytic capacitor	CD110X-16V-47μFM
C661	Aluminum electrolytic capacitor	CD110X-16V-47μFM
C062	Aluminum electrolytic capacitor	CD110X-16V-100μFM
C206	Aluminum electrolytic capacitor	CD110X-16V-100μFM
C226	Aluminum electrolytic capacitor	CD110X-16V-100μFM
C664	Aluminum electrolytic capacitor	CD110X-16V-100μFM
C631A	Aluminum electrolytic capacitor	CD110X-16V-220μFM
C115	Aluminum electrolytic capacitor	CD110X-16V-220μFM
C289A	Aluminum electrolytic capacitor	CD110X-16V-470μFM
C289B	Aluminum electrolytic capacitor	CD110X-25V-1000μFM
C404	Aluminum electrolytic capacitor	CD110X-25V-1000μFM
C449	Aluminum electrolytic capacitor	CD110X-25V-1000μFM
C480	Aluminum electrolytic capacitor	CD110X-25V-1000μFM
C666A	Aluminum electrolytic capacitor	CD110X-25V-1000μFM
C008	Aluminum electrolytic capacitor	CD110-50V-0.47μFM
C227	Aluminum electrolytic capacitor	CD110-50V-1μFM
C230	Aluminum electrolytic capacitor	CD110-50V-1μFM
C634A	Aluminum electrolytic capacitor	CD110-50V-1μFM
C203	Aluminum electrolytic capacitor	CD110-50V-2.2μFM
C280	Aluminum electrolytic capacitor	CD110-50V-2.2μFM
C009	Aluminum electrolytic capacitor	CD110-50V-10μFM

PARTS LIST (continued)

Position	Parts	Type
C108	Aluminum electrolytic capacitor	CD110X-50V-47 μ FM
C402A	Aluminum electrolytic capacitor	CD110X-63V-22 μ FM
C448	Aluminum electrolytic capacitor	CD110X-63V-47 μ FM
C477	Aluminum electrolytic capacitor	CD110-250V-1 μ FM
C450	Aluminum electrolytic capacitor	CD288-250V-10 μ FM
C459	Aluminum electrolytic capacitor	CD110X-250V-10 μ FM
C453	Aluminum electrolytic capacitor	CDS-50V-1 μ FM
L206	Fixed inductor	LGA0307-22 μ HK
L219	Fixed inductor	LGA0307-22 μ HK
R106	Fixed inductor	LGB0606-56 μ HJ
L102	Fixed inductor	LGB0606-0.33 μ HK
L601S	Fixed inductor	LGB0606-8.2 μ HJ
L617	Fixed inductor	LGB0606-8.2 μ HJ
L432	Fixed inductor	LCT-14mH-K
T434	Fixed inductor	LCT-1.5mH-K
L401	Feed-through inductor	TEM2011
L402	Feed-through inductor	TEM2011
L431	Feed-through inductor	TEM2011
T431	Line drive transformer	BCT-8(JUB4.739.003)
VD111	Diode	2CK75D
VD111	Diode	1N4148
VD112	Diode	2CK75D
VD112	Diode	1N4148
VD113	Diode	2CK75D
VD113	Diode	1N4148
VD457A	Diode	2CK75D
VD457A	Diode	1N4148
VD631A	Diode	2CK75D
VD631A	Diode	1N4148
VD634A	Diode	2CK75D
VD634A	Diode	1N4148
VD431	Diode	2CK75D
VD431	Diode	1N4148
VD478	Diode	2CK75D
VD478	Diode	1N4148
VD481	Diode	2CK75D
VD481	Diode	1N4148
VD482	Diode	2CK75D
VD482	Diode	1N4148
VD402	Diode	BAV21
VD402A	Diode	BAV21
VD475	Diode	BAV21
VD632C	Diode	BAV21

PARTS LIST (continued)

Position	Parts	Type
VD632D	Diode	BAV21
VD437	Diode	2CZRU2
VD438	Diode	2CZRU2
VD440	Diode	2CZRU2
VD477	Diode	BYV26D
VD433	Diode	BY359F-1500
VD433A	Diode	BY359
VD434	Diode	BYW96D
VD434	Diode	BYW96E
VD008	Diode	W05Z3.6A
VD204	Diode	W05Z5.1B
VD401A	Diode	BZD23-C33
VD401A	Diode	BZT03-C33
V009	Triode	3CG1015-Y
V009	Triode	2SA1015-Y
V009	Triode	2PA1015GR
V201	Triode	3CG1015-Y
V201	Triode	2SA1015-Y
V201	Triode	2PA1015GR
V436	Triode	3CG1015-Y
V436	Triode	2SA1015-Y
V436	Triode	2PA1015GR
V632A	Triode	3CG1015-Y
V632A	Triode	2SA1015-Y
V632A	Triode	2PA1015GR
V001	Triode	3DG1815-Y
V001	Triode	2SC1815-Y
V001	Triode	2PC1815GR
V002	Triode	3DG1815-Y
V002	Triode	2SC1815-Y
V002	Triode	2PC1815GR
V204	Triode	3DG1815-Y
V204	Triode	2SC1815-Y
V204	Triode	2PC1815GR
V227	Triode	3DG1815-Y
V227	Triode	2SC1815-Y
V227	Triode	2PC1815GR
V289	Triode	3DG1815-Y
V289	Triode	2SC1815-Y
V289	Triode	2PC1815GR
V289D	Triode	3DG1815-Y
V289D	Triode	2SC1815-Y
V289D	Triode	2PC1815GR

PARTS LIST (continued)

Position	Parts	Type
V609	Triode	3DG1815-Y
V609	Triode	2SC1815-Y
V609	Triode	2PC1815GR
V601S	Triode	3DG1815-Y
V601S	Triode	2SC1815-Y
V601S	Triode	2PC1815GR
V602S	Triode	3DG1815-Y
V602S	Triode	2SC1815-Y
V602S	Triode	2PC1815GR
V631A	Triode	3DG1815-Y
V631A	Triode	2SC1815-Y
V631A	Triode	2PC1815GR
V104	Triode	3DG388ATM
V104	Triode	2SC388ATM
V104	Triode	KSC388C-Y
V432	Field effect transistor	BSN274
V432	Field effect transistor	BSN304
N001	IC	CH04T1002
N002	IC	AT24C08
N301	IC	OM8839-N2
N401	IC	TDA8350Q-N6
N402	IC	LM317T
N601	IC	TDA7057AQ
N606	IC	TDA9859
VD114	IC	μPC574J
VD114	IC	CW574CS
VD114	IC	KA33V
Z001	Crystal oscillator	JA18D-32.768KHz
Z202	Crystal oscillator	JA18A1-3.579545MHz
A101	Electronic tuner	TDQ-6F2-M(JUB2.891.005-2)
Z101	Surface acoustic wave filter	M1958M
Z605	Ceramic filter	SFSH4.5MCH
Z605	Ceramic filter	SFSRA4M50CF00-B0
Z601	Ceramic trap	XT4.5MB
Z601	Ceramic trap	TPSRA4M50B00-B0
		Auto jumper
R261	Jumper	5mm
R262	Jumper	5mm
R263	Jumper	5mm
W020	Jumper	5mm
W211	Jumper	5mm
W220	Jumper	5mm

PARTS LIST (continued)

Position	Parts	Type
W252	Jumper	5mm
W429	Jumper	5mm
W430	Jumper	5mm
W431A	Jumper	5mm
W472	Jumper	5mm
W605	Jumper	5mm
W606	Jumper	5mm
W616	Jumper	5mm
R109	Jumper	7.5mm
R212A	Jumper	7.5mm
W001	Jumper	7.5mm
W005	Jumper	7.5mm
R006B	Jumper	7.5mm
R007B	Jumper	7.5mm
W010	Jumper	7.5mm
W015	Jumper	7.5mm
W022	Jumper	7.5mm
W023	Jumper	7.5mm
W024	Jumper	7.5mm
W025	Jumper	7.5mm
W029	Jumper	7.5mm
W030	Jumper	7.5mm
W031	Jumper	7.5mm
W033	Jumper	7.5mm
W039	Jumper	7.5mm
W043	Jumper	7.5mm
W054	Jumper	7.5mm
W057	Jumper	7.5mm
W064	Jumper	7.5mm
W083	Jumper	7.5mm
W090	Jumper	7.5mm
W092	Jumper	7.5mm
W092A	Jumper	7.5mm
W104	Jumper	7.5mm
W105	Jumper	7.5mm
W112	Jumper	7.5mm
W130	Jumper	7.5mm
W134	Jumper	7.5mm
W138	Jumper	7.5mm
W151	Jumper	7.5mm
W152	Jumper	7.5mm
W210	Jumper	7.5mm

PARTS LIST (continued)

Position	Parts	Type
W216	Jumper	7.5mm
W217	Jumper	7.5mm
W219	Jumper	7.5mm
W222	Jumper	7.5mm
W223	Jumper	7.5mm
W227	Jumper	7.5mm
W228	Jumper	7.5mm
W229	Jumper	7.5mm
W230A	Jumper	7.5mm
W235	Jumper	7.5mm
W251	Jumper	7.5mm
W258	Jumper	7.5mm
W276	Jumper	7.5mm
W280	Jumper	7.5mm
W285	Jumper	7.5mm
W403	Jumper	7.5mm
W422	Jumper	7.5mm
W424	Jumper	7.5mm
W450	Jumper	7.5mm
W601	Jumper	7.5mm
W613	Jumper	7.5mm
W614	Jumper	7.5mm
W619	Jumper	7.5mm
W623	Jumper	7.5mm
W626	Jumper	7.5mm
W647	Jumper	7.5mm
VD212	Jumper	10mm
W002	Jumper	10mm
W003	Jumper	10mm
W009	Jumper	10mm
W009A	Jumper	10mm
W016	Jumper	10mm
W030B	Jumper	10mm
W031B	Jumper	10mm
W063	Jumper	10mm
W067	Jumper	10mm
W081C	Jumper	10mm
W082C	Jumper	10mm
W085	Jumper	10mm
W091	Jumper	10mm
W103	Jumper	10mm
W109	Jumper	10mm

PARTS LIST (continued)

Position	Parts	Type
W118A	Jumper	10mm
W214	Jumper	10mm
W221	Jumper	10mm
W246	Jumper	10mm
W248	Jumper	10mm
W249	Jumper	10mm
W256A	Jumper	10mm
W304A	Jumper	10mm
W305A	Jumper	10mm
W401	Jumper	10mm
W445	Jumper	10mm
W619A	Jumper	10mm
W620A	Jumper	10mm
L204A	Jumper	10mm
VD120A	Jumper	10mm
VD031	Jumper	12.5mm
VD032	Jumper	12.5mm
VD033	Jumper	12.5mm
VD034	Jumper	12.5mm
W010B	Jumper	12.5mm
W018B	Jumper	12.5mm
W021	Jumper	12.5mm
W101	Jumper	12.5mm
W102	Jumper	12.5mm
W203	Jumper	12.5mm
W204A	Jumper	12.5mm
W205	Jumper	12.5mm
W206	Jumper	12.5mm
W210A	Jumper	12.5mm
W232B	Jumper	12.5mm
W268	Jumper	12.5mm
W274	Jumper	12.5mm
W275	Jumper	12.5mm
W282	Jumper	12.5mm
W283	Jumper	12.5mm
W402	Jumper	12.5mm
W431	Jumper	12.5mm
W476	Jumper	12.5mm
W034	Jumper	15mm
W036	Jumper	15mm
W037	Jumper	15mm
W044	Jumper	15mm

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PARTS LIST (continued)

Position	Parts	Type
W055	Jumper	15mm
W072	Jumper	15mm
W084	Jumper	15mm
W219A	Jumper	15mm
W219B	Jumper	15mm
W278	Jumper	15mm
W444	Jumper	15mm
W464	Jumper	15mm
W495	Jumper	15mm
W615	Jumper	15mm
W051	Jumper	17.5mm
W052	Jumper	17.5mm
W079	Jumper	17.5mm
W081	Jumper	17.5mm
W082	Jumper	17.5mm
W406	Jumper	17.5mm
W407	Jumper	17.5mm
W437	Jumper	17.5mm
W496	Jumper	17.5mm
W610	Jumper	17.5mm
W611	Jumper	17.5mm
W612	Jumper	17.5mm
W421	Jumper	17.5mm
W004	Jumper	20mm
W006	Jumper	20mm
W032	Jumper	20mm
W049	Jumper	20mm
W050	Jumper	20mm
W080B	Jumper	20mm
W081B	Jumper	20mm
W107	Jumper	20mm
W116	Jumper	20mm
W118	Jumper	20mm
W131	Jumper	20mm
W132	Jumper	20mm
W215	Jumper	20mm
W286	Jumper	20mm
W288	Jumper	20mm
W417	Jumper	20mm
W419	Jumper	20mm
W439	Jumper	20mm
W451	Jumper	20mm

PARTS LIST (continued)

Position	Parts	Type
W644	Jumper	20mm
W124	Jumper	22.5mm
		Manual jumper
W028	Jumper	12.5mm
		2. Parts on Power PCB
R819	Carbon film resistor	RT14-0.25W-4.7ΩJ
R819	Carbon film resistor	NAS1/44R7J
R820	Carbon film resistor	RT14-0.25W-47ΩJ
R820	Carbon film resistor	NAS1/4470J
R825	Carbon film resistor	RT14-0.25W-47ΩJ
R825	Carbon film resistor	NAS1/4470J
RK09	Carbon film resistor	RT14-0.25W-180ΩJ
RK09	Carbon film resistor	NAS1/4181J
R817	Carbon film resistor	RT14-0.25W-270ΩJ
R817	Carbon film resistor	NAS1/4271J
RK07	Carbon film resistor	RT14-0.25W-330ΩJ
RK07	Carbon film resistor	NAS1/4331J
R852	Carbon film resistor	RT14-0.25W-1.8KΩJ
R852	Carbon film resistor	NAS1/4182J
R821	Carbon film resistor	RT14-0.25W-1.2KΩJ
R821	Carbon film resistor	NAS1/4122J
R814	Carbon film resistor	RT14-0.25W-10KΩJ
R814	Carbon film resistor	NAS1/4103J
R816	Carbon film resistor	RT14-0.25W-6.2KΩJ
R816	Carbon film resistor	NAS1/4622J
R818	Carbon film resistor	RT14-0.25W-10KΩJ
R818	Carbon film resistor	NAS1/4103J
R864	Carbon film resistor	RT14-0.25W-33KΩJ
R864	Carbon film resistor	NAS1/4333J
RK08	Carbon film resistor	RT14-0.25W-33KΩJ
RK08	Carbon film resistor	NAS1/4333J
R813	Metal film resistor	RJ14-0.25W-820KΩJ
R863	Metal film resistor	RJ14-0.25W-360ΩG
R862	Metal film resistor	RJ14-0.25W-2KΩG
R812	Glass glazed resistor	RI40-0.5W-300KΩJ
R877	Metal oxide film resistor	RY21-2W-470ΩJ
R877	Metal oxide film resistor	MOS2W471J
R878	Metal oxide film resistor	RY21-2W-22KΩJ
R878	Metal oxide film resistor	MOS2W223J
R802	Metal oxide film resistor	RY21-2W-33KΩJ
R802	Metal oxide film resistor	MOS2W333J
R815	Metal oxide film resistor	RY21-3W-10KΩJ

SERVICE MANUAL

PARTS LIST (continued)

Position	Parts	Type
R815	Metal oxide film resistor	MOS3W103J
R815A	Metal oxide film resistor	RY21-3W-10KΩJ
R815A	Metal oxide film resistor	MOS3W103J
R881	Fuse resistor	RF10-0.5W-0.27ΩJ
R871	Fuse resistor	RF10-1W-0.27ΩJ
R872	Fuse resistor	RF10-1W-0.27ΩJ
RP801	Glass glazed potentiometer	232224413225(VR68-1W-2.2MΩJ
RP801	Glass glazed potentiometer	RI81-1W-2.2M
RP823	Glass glazed potentiometer	WI06-2Y-0.125W-2KΩ-A
RP823	Glass glazed potentiometer	VG067TL1B2KΩ
RT801	Thermistor	232266296709/PH96709-7Ω
RT802	Thermistor	S237/4.7/M
C818	Ceramic capacitor	CT1-63V-06a-2B4-1000PFK
C861	Ceramic capacitor	CT1-63V-08a-2F4-0.01μFZ
CK08	Ceramic capacitor	CT1-63V-08a-2F4-0.01μFZ
C871	Ceramic capacitor	CT1-500V-06c-2B4-470PFK
C873	Ceramic capacitor	CT1-500V-06c-2B4-470PFK
C881	Ceramic capacitor	CT1-500V-06c-2B4-470PFK
C805	Ceramic capacitor	CT1-500V-12c-2E4-2200PFM
C806	Ceramic capacitor	CT1-500V-12c-2E4-2200PFM
C807	Ceramic capacitor	CT1-500V-12c-2E4-2200PFM
C808	Ceramic capacitor	CT1-500V-12c-2E4-2200PFM
C844	Ceramic capacitor	CT81-250VAC-2E4-2200PFM
C844A	Ceramic capacitor	CT81-250VAC-2E4-2200PFM
C844B	Ceramic capacitor	CT81-250VAC-2E4-2200PFM
C840	Ceramic capacitor	CT81-2KV-10c-2B4-470PFK
C812	Polyester film capacitor	CL21X-50V-4700PFJ
C819A	Polyester film capacitor	CL21X-50V-0.1μFJ
C826	Polyester film capacitor	CL21X-50V-0.22μFJ
C801	Polypropylene capacitor	222233550104
C815	Polypropylene capacitor	CBB13-630V-0.022μF1
CK07	Aluminum electrolytic capacitor	CD110X-16V-47μFM
C853	Aluminum electrolytic capacitor	CD110X-16V-220μFM
C862	Aluminum electrolytic capacitor	CD110X-16V-220μFM
C864	Aluminum electrolytic capacitor	CD110X-16V-220μFM
C819	Aluminum electrolytic capacitor	CD110X-25V-100μFM
C820	Aluminum electrolytic capacitor	CD110X-25V-100μFM
C882	Aluminum electrolytic capacitor	CD110X-25V-220μFM
C872	Aluminum electrolytic capacitor	CD110X-25V-1000μFM
C874	Aluminum electrolytic capacitor	CD110-25V-1000μFM
C823	Aluminum electrolytic capacitor	CD110-50V-1μFM
C878	Aluminum electrolytic capacitor	CD289H-200V-330μFM
C878	Aluminum electrolytic capacitor	CD293H-200V-330μFM

PARTS LIST (continued)

Position	Parts	Type
C878	Aluminum electrolytic capacitor	LLK2D331MHS
C809	Aluminum electrolytic capacitor	CD289-200V-820 μ FM
L875	Fixed inductor	LGB0312-1 μ HK
L875	Fixed inductor	TRF9229-1 μ HM
L819	Fixed inductor	LGB0606-5.6 μ HJ
L872	Fixed inductor	TLN2026-11 μ HK
L874	Fixed inductor	TLN2026-11 μ HK
L876	Fixed inductor	TLN3142D-95 μ HK
L871	Feed-through inductor	TEM2000
L873	Feed-through inductor	TEM2000
L840	Feed-through inductor	TEM2011
T801	Line filter	TRF3196
T802	Line filter	LCL-F11
A801	Degaussing coil	XC-25
T803	Switch transformer	BCK-25405L(JUB4.726.033)
XS801	Power cord	RVVZ-CH2-W160-TJC1-3Y
S801	Power switch	KDC-A04-MU151
F801	Delay fuse	U/C/T 51S 125V 5A
VD823	Diode	2CK75D
VD823	Diode	1N4148
VD861	Diode	2CK75D
VD861	Diode	1N4148
VD863	Diode	2CK75D
VD863	Diode	1N4148
VD819	Diode	BAV21
VD871	Diode	2CZRU2
VD881	Diode	2CZRU2
VD815	Diode	BYV26D
VD872	Diode	2CZRU4Z
VD873	Diode	BYM26D
VD801	Diode	Z5A6
VD802	Diode	Z5A6
VD803	Diode	Z5A6
VD804	Diode	Z5A6
VD851	Diode	W05Z5.6C
VD840	Diode	W05Z15B
V851	Triode	2SC3852
V862	Triode	3DG1815-Y
V862	Triode	2SC1815-Y
V862	Triode	2PC1815GR
V840	Triode	IRFIB5N65A
VDK03	Diode	FG5RD
NK07	IC	HS0038

PARTS LIST (continued)

Position	Parts	Type
NK07	IC	HS0038A
NK07	IC	HS0038A2
N811	IC	TDA4605
N811	IC	TDA4605-3
N861	IC	LM317T
N863	IC	L78L05ACZ
W811	Jumper	5mm
W808	Jumper	10mm
W802	Jumper	12.5mm
W806	Jumper	12.5mm
W801	Jumper	15mm
W803	Jumper	15mm
W809	Jumper	15mm
W813	Jumper	15mm
W810	Jumper	20mm
		3. Parts on AV PCB
RS30	Carbon film resistor	RT13-0.166W-75ΩJ
RS30	Carbon film resistor	NAS1/6750J
RS01	Carbon film resistor	RT13-0.166W-100ΩJ
RS01	Carbon film resistor	NAS1/6101J
RS02	Carbon film resistor	RT13-0.166W-100ΩJ
RS02	Carbon film resistor	NAS1/6101J
RS03	Carbon film resistor	RT13-0.166W-100ΩJ
RS03	Carbon film resistor	NAS1/6101J
RS03A	Carbon film resistor	RT13-0.166W-100ΩJ
RS03A	Carbon film resistor	NAS1/6101J
RS04	Carbon film resistor	RT13-0.166W-100ΩJ
RS04	Carbon film resistor	NAS1/6101J
RS05	Carbon film resistor	RT13-0.166W-100ΩJ
RS05	Carbon film resistor	NAS1/6101J
RS06	Carbon film resistor	RT13-0.166W-100ΩJ
RS06	Carbon film resistor	NAS1/6101J
RS06A	Carbon film resistor	RT13-0.166W-100ΩJ
RS06A	Carbon film resistor	NAS1/6101J
RS07	Carbon film resistor	RT13-0.166W-100ΩJ
RS07	Carbon film resistor	NAS1/6101J
RS08	Carbon film resistor	RT13-0.166W-100ΩJ
RS08	Carbon film resistor	NAS1/6101J
RS09	Carbon film resistor	RT13-0.166W-100ΩJ
RS09	Carbon film resistor	NAS1/6101J
RS09A	Carbon film resistor	RT13-0.166W-100ΩJ

PARTS LIST (continued)

Position	Parts	Type
RS09A	Carbon film resistor	NAS1/6101J
RS12	Carbon film resistor	RT13-0.166W-100ΩJ
RS15	Carbon film resistor	NAS1/6101J
RS15A	Carbon film resistor	RT13-0.166W-100ΩJ
RS15A	Carbon film resistor	NAS1/6101J
RS16	Carbon film resistor	RT13-0.166W-100ΩJ
RS16	Carbon film resistor	NAS1/6101J
RS16A	Carbon film resistor	RT13-0.166W-100ΩJ
RS16A	Carbon film resistor	NAS1/6101J
RS01A	Carbon film resistor	RT13-0.166W-1KΩJ
RS01A	Carbon film resistor	NAS1/6102J
RS02A	Carbon film resistor	RT13-0.166W-1KΩJ
RS02A	Carbon film resistor	NAS1/6102J
RS04A	Carbon film resistor	RT13-0.166W-1KΩJ
RS04A	Carbon film resistor	NAS1/6102J
RS05A	Carbon film resistor	RT13-0.166W-1KΩJ
RS05A	Carbon film resistor	NAS1/6102J
RS07A	Carbon film resistor	RT13-0.166W-1KΩJ
RS07A	Carbon film resistor	NAS1/6102J
RS08A	Carbon film resistor	RT13-0.166W-1KΩJ
RS08A	Carbon film resistor	NAS1/6102J
RS31	Carbon film resistor	RT13-0.166W-1KΩJ
RS31	Carbon film resistor	NAS1/6102J
RS11	Carbon film resistor	RT13-0.166W-1.5KΩJ
RS11	Carbon film resistor	NAS1/6152J
RS21	Carbon film resistor	RT13-0.166W-1.5KΩJ
RS21	Carbon film resistor	NAS1/6152J
RS12	Carbon film resistor	RT13-0.166W-47KΩJ
RS12	Carbon film resistor	NAS1/6473J
RS13	Carbon film resistor	RT13-0.166W-47KΩJ
RS13	Carbon film resistor	NAS1/6473J
RS22	Carbon film resistor	RT13-0.166W-47KΩJ
RS22	Carbon film resistor	NAS1/6473J
RS23	Carbon film resistor	RT13-0.166W-47KΩJ
RS23	Carbon film resistor	NAS1/6473J
CS01A	Ceramic capacitor	CT1-63V-06a-2B4-1000PFK
CS02A	Ceramic capacitor	CT1-63V-06a-2B4-1000PFK
CS04A	Ceramic capacitor	CT1-63V-06a-2B4-1000PFK
CS05A	Ceramic capacitor	CT1-63V-06a-2B4-1000PFK
CS07A	Ceramic capacitor	CT1-63V-06a-2B4-1000PFK
CS08A	Ceramic capacitor	CT1-63V-06a-2B4-1000PFK
CS03	Polyester film capacitor	CL21X-50V-0.04/μFJ
CS06	Polyester film capacitor	CL21X-50V-0.047μFJ

SERVICE MANUAL

PARTS LIST (continued)

Position	Parts	Type
CS09	Polyester film capacitor	CL21X-50V-0.047μFJ
CS19	Polyester film capacitor	CL21X-50V-0.22μFJ
CS21	Polyester film capacitor	CL21X-50V-0.01μFJ
CS10A	Polyester film capacitor	CL21X-50V-0.1μFJ
CS14A	Polyester film capacitor	CL21X-50V-0.1μFJ
CS20A	Polyester film capacitor	CL21X-50V-0.1μFJ
CS01	Aluminum electrolytic capacitor	CD110X-16V-10μFM
CS02	Aluminum electrolytic capacitor	CD110X-16V-10μFM
CS04	Aluminum electrolytic capacitor	CD110X-16V-10μFM
CS05	Aluminum electrolytic capacitor	CD110X-16V-10μFM
CS07	Aluminum electrolytic capacitor	CD110X-16V-10μFM
CS08	Aluminum electrolytic capacitor	CD110X-16V-10μFM
CS10	Aluminum electrolytic capacitor	CD110X-16V-10μFM
CS20	Aluminum electrolytic capacitor	CD110X-16V-10μFM
CS14	Aluminum electrolytic capacitor	CD110X-16V-100μFM
VS10	Triode	3DG1815-Y
VS10	Triode	2SC1815-Y
VS10	Triode	2PC1815GR
VS20	Triode	3DG1815-Y
VS20	Triode	2SC1815-Y
VS20	Triode	2PC1815GR
VS30	Triode	3DG1815-Y
VS30	Triode	2SC1815-Y
VS30	Triode	2PC1815GR
DS01	IC	HEF4053BP
DS01	IC	HCF4053BE
DS01	IC	MC14053BCP
DS02	IC	HEF4053BP
DS02	IC	HCF4053BE
DS02	IC	MC14053BCP
XS01	S-VIDEO terminal	PH-S-CH10
XS02	AV terminals	AV-4-12CH
	Auto jumper	Auto jumper
RS61	Jumper	5mm
RS62	Jumper	5mm
RS69	Jumper	5mm
RS70	Jumper	5mm
RS72	Jumper	5mm
RS71	Jumper	5mm
RS76	Jumper	5mm
RS77	Jumper	5mm
CS30	Jumper	5mm

SERVICE MANUAL

PARTS LIST (continued)

Position	Parts	Type
RS14	Jumper	7.5mm
RS33	Jumper	7.5mm
RS64	Jumper	7.5mm
RS74	Jumper	7.5mm
WS01	Jumper	7.5mm
WS02	Jumper	7.5mm
WS03	Jumper	7.5mm
WS09	Jumper	7.5mm
WS10A	Jumper	7.5mm
WS15	Jumper	7.5mm
WS16	Jumper	7.5mm
WS17	Jumper	7.5mm
WS18	Jumper	7.5mm
WS19	Jumper	7.5mm
WS20	Jumper	7.5mm
WS22	Jumper	7.5mm
WS23A	Jumper	7.5mm
WS24	Jumper	7.5mm
WS24A	Jumper	7.5mm
WS25	Jumper	7.5mm
WS26	Jumper	7.5mm
RS32		7.5mm
WS13	Jumper	10mm
WS27	Jumper	10mm
WS28	Jumper	10mm
RS73	Jumper	12.5mm
WS61	Jumper	12.5mm
WS06	Jumper	15mm
WS11	Jumper	15mm
		4. Parts on CRT RGB PCB
RY01A	Carbon film resistor	RT14-0.25W-330ΩJ
RY01A	Carbon film resistor	NAS1/4331J
RY02A	Carbon film resistor	RT14-0.25W-330ΩJ
RY02A	Carbon film resistor	NAS1/4331J
RY03A	Carbon film resistor	RT14-0.25W-330ΩJ
RY03A	Carbon film resistor	NAS1/4331J
RY10	Carbon film resistor	RT14-0.25W-560KΩJ
RY10	Carbon film resistor	NAS1/4564J
RY11	Glass glazed resistor	RI40-0.5W-1.5KΩK

SERVICE MANUAL

PARTS LIST (continued)

Position	Parts	Type
RY05	Glass glazed resistor	RI40-0.5W-1.5KΩK
RY01	Glass glazed resistor	RI40-0.5W-2.7KΩK
RY02	Glass glazed resistor	RI40-0.5W-2.7KΩK
RY03	Glass glazed resistor	RI40-0.5W-2.7KΩK
RY04	Metal oxide film resistor	RY21-1W-68ΩJ
RY04	Metal oxide film resistor	MOS1W680J
RY04A	Fuse resistor	RF10-0.5W-47ΩJ
RY12	Fuse resistor	RF11-2W-3.3ΩJ
CY04	Ceramic capacitor	CT1-500V-14c-2B4-4700PFK
CY02	Polyester film capacitor	CL21X-250V-0.1μFJ
CY05	Polypropylene capacitor	CBB81-1.6KV-2200PFJ
CY01	Aluminum electrolytic capacitor	CD110X-250V-10μFM
CY01	Aluminum electrolytic capacitor	UVR2E100MPAANH
CY01A	Aluminum electrolytic capacitor	CD110X-250V-10μFM
CY01A	Aluminum electrolytic capacitor	UVR2E100MPAANH
VDY01A	Diode	BAV21
VDY02A	Diode	BAV21
VDY03A	Diode	BAV21
VDY01	Diode	2CZ5295G
NY01	IC	TDA6108IF
NY01	IC	TDA6107Q
WY12	Jumper	7.5mm
WY04	Jumper	7.5mm
		5. Parts on Control Buttons PCB
RK52	Carbon film resistor	RT13-0.166W-5.1KΩJ
RK52	Carbon film resistor	NAS1/6512J
RK56	Carbon film resistor	RT13-0.166W-5.1KΩJ
RK56	Carbon film resistor	NAS1/6512J
RK51	Carbon film resistor	RT13-0.166W-10KΩJ
RK51	Carbon film resistor	NAS1/6103J
RK54	Carbon film resistor	RT13-0.166W-10KΩJ
RK54	Carbon film resistor	NAS1/6103J
RK53	Carbon film resistor	RT13-0.166W-15KΩJ
RK53	Carbon film resistor	NAS1/6153J
RK55	Carbon film resistor	RT13-0.166W-15KΩJ
RK55	Carbon film resistor	NAS1/6153J
KK01	Feather touch switch	KA1L6x5x7.5-22
KK02	Feather touch switch	KA1L6x5x7.5-22
KK03	Feather touch switch	KA1L6x5x7.5-22
KK04	Feather touch switch	KA1L6x5x7.5-22
KK05	Feather touch switch	KA1L6x5x7.5-22
KK06	Feather touch switch	KA1L6x5x7.5-22

SERVICE MANUAL

PARTS LIST (continued)

Position	Parts	Type
		6. Parts on Speakers
BC601	Electric speaker	YDT516-A1-10W-8Ω
BC602	Electric speaker	YDT516-A1-10W-8Ω
		7. Data on CRT
		1) Mount the following parts if using Shanghai Novel CRT.
R458A	Carbon film resistor	RT13-0.166W-9.1KΩJ
R458A	Carbon film resistor	NAS1/6912J
R459A	Carbon film resistor	RT13-0.166W-9.1KΩJ
R459A	Carbon film resistor	NAS1/6912J
R457	Carbon film resistor	RT13-0.166W-8.2KΩJ
R457	Carbon film resistor	NAS1/6822J
R437	Metal oxide film resistor	RY21-1W-68ΩJ
R437	Metal oxide film resistor	MOS1W680J
R477	Metal oxide film resistor	RY21-1W-4.7KΩJ
R477	Metal oxide film resistor	MOS1W472J
RY12	Fuse resistor	RF10-2W-2.2ΩJ
R405	Metal oxide film resistor	RY21-2W-1ΩJ
R405	Metal oxide film resistor	MOS2W1R0J
R408	Metal oxide film resistor	RY21-0.5W-1.8ΩJ
R408	Metal oxide film resistor	MOS1/2W1R8J
R407	Metal oxide film resistor	RY21-0.5W-1.5ΩJ
R407	Metal oxide film resistor	MOS1/2W1R5J
R409	Metal oxide film resistor	RY21-2W-150ΩJ
R409	Metal oxide film resistor	MOS2W151J
R471	Metal oxide film resistor	RY21-2W-10ΩJ
R471	Metal oxide film resistor	MOS2W100J
C436	Ceramic capacitor	CT81-2KV-14c-2B4-1500PFK
C472	Polyester film capacitor	CL21X-50V-0.1μFJ
C437A	Ceramic capacitor	CT81-2KV-10c-2B4-560PFK
C437	Polypropylene capacitor	CBB81-1.6KV-0.012μFH
C439	Polypropylene capacitor	CBB13-630V-0.015μFH
C440	Polypropylene capacitor	CBB13-400V-0.33μFJ
C442	Polypropylene capacitor	CBB13-400V-0.47μFJ
V433	Triode	BU2508DX
T402	FBT	BSC68E
L433	Horizontal linearity adjuster	HXT30(JU4.756.022)
SY01	GZS CRT socket	GZS10-2-108
SY01	GZS CRT socket	GZS10-2-AC3
AY01	25" CRT	64SX505Y22-DC02

PARTS LIST (continued)

Position	Parts	Type
		2) If adopting Changsha LG CRT, the parts change on basis of those with Shanghai Novel CRT as follows.
		Remove the following parts.
RY12	Fuse resistor	RF10-2W-1.8ΩJ
C440	Polypropylene capacitor	CBB13-400V-0.33μFJ
C442	Polypropylene capacitor	CBB13-400V-0.47μFJ
AY01	25" CRT	64SX505Y22-DC02
		Add the following parts.
RY12	Fuse resistor	RF10-2W-1.2ΩJ
C440	Polypropylene capacitor	CBB13-400V-0.39μFJ
C442	Polypropylene capacitor	CBB13-400V-0.39μFJ
AY01	25" CRT	A59KY1.220X08
		Parts list of AT2402 is shown as follows.
		AT2402 changes the following parts on basis of AT2402S.
		1. Parts on Main PCB
		Remove the following parts.
R628	Carbon film resistor	RT13-0.166W-8.2KΩJ
R628	Carbon film resistor	NAS1/6332J
R634	Carbon film resistor	RT13-0.166W-8.2KΩJ
R634	Carbon film resistor	NAS1/6332J
R280	Carbon film resistor	RT13-0.166W-6.8KΩJ
R280	Carbon film resistor	NAS1/6682J
C676	Ceramic capacitor	CT1-63V-12a-2F4-0.022μFZ
C668	Ceramic capacitor	CT1-63V-12a-2F4-0.022μFZ
C671	Ceramic capacitor	CT1-63V-08a-2F4-10nFZ
C673	Ceramic capacitor	CT1-63V-08a-2F4-10nFZ
C675	Polyester film capacitor	CL21X-50V-0.033μFJ
C667	Polyester film capacitor	CL21X-50V-0.033μFJ
C665	Polyester film capacitor	CL21X-50V-0.1μFJ
C660	Polyester film capacitor	CL21X-50V-0.1μFJ
C663	Polyester film capacitor	CL21X-50V-0.1μFJ
C666	Polyester film capacitor	CL21X-50V-0.22μFJ
C669	Polyester film capacitor	CL21X-50V-0.22μFJ
C670	Polyester film capacitor	CL21X-50V-0.22μFJ
C672	Polyester film capacitor	CL21X-50V-0.22μFJ
C674	Polyester film capacitor	CL21X-50V-0.22μFJ
C662	Polyester film capacitor	CL21X-50V-0.22μFJ
C661	Aluminum electrolytic capacitor	CD110X-16V-47μFM
C664	Aluminum electrolytic capacitor	CD110X-16V-100μFM
N606	IC	TDA9859

PARTS LIST (continued)

Position	Parts	Type
W276	Jumper	7.5mm
W623	Jumper	7.5mm
W619	Jumper	7.5mm
W626	Jumper	7.5mm
W246	Jumper	10mm
W304A	Jumper	10mm
W305A	Jumper	10mm
W010B	Jumper	12.5mm
W018B	Jumper	12.5mm
W288	Jumper	20mm
W286	Jumper	20mm
		Add the following parts.
R205S	Carbon film resistor	RT13-0.166W-150ΩJ
R205S	Carbon film resistor	NAS1/6151J
R201S	Carbon film resistor	RT13-0.166W-1KΩJ
R201S	Carbon film resistor	NAS1/6102J
R204S	Carbon film resistor	RT13-0.166W-560ΩJ
R204S	Carbon film resistor	NAS1/6561J
R628	Carbon film resistor	RT13-0.166W-8.2KΩJ
R628	Carbon film resistor	NAS1/68221J
R634	Carbon film resistor	RT13-0.166W-8.2KΩJ
R634	Carbon film resistor	NAS1/68221J
R203S	Carbon film resistor	RT13-0.166W-10KΩJ
R203S	Carbon film resistor	NAS1/6103J
R202S	Carbon film resistor	RT13-0.166W-27KΩJ
R202S	Carbon film resistor	NAS1/6273J
C202S	Aluminum electrolytic capacitor	CD110-16V-10μFM
R280	Carbon film resistor	RT13-0.166W-82KΩJ
R280	Carbon film resistor	NAS1/6823J
V201S	Triode	3DG1815-Y
V201S	Triode	2SC1815-Y
V201S	Triode	2PC1815GR
V205	Triode	3DG1815-Y
V205	Triode	2SC1815-Y
V205	Triode	2PC1815GR
		Auto jumper
W633	Jumper	5mm
W130A	Jumper	7.5mm
R153A	Jumper	7.5mm
W106A	Jumper	10mm
W631	Jumper	10mm
W131A	Jumper	12.5mm

PARTS LIST (continued)

Position	Parts	Type
W153	Jumper	17.5mm
W117A	Jumper	17.5mm
W106	Jumper	20mm
W117	Jumper	20mm
W225	Jumper	20mm
		2. Parts on AV PCB
		Remove the following parts.
RS02	Carbon film resistor	RT13-0.166W-100ΩJ
RS02	Carbon film resistor	NAS1/6101J
RS05	Carbon film resistor	RT13-0.166W-100ΩJ
RS05	Carbon film resistor	NAS1/6101J
RS08	Carbon film resistor	RT13-0.166W-100ΩJ
RS08	Carbon film resistor	NAS1/6101J
RS12	Carbon film resistor	RT13-0.166W-47KΩJ
RS12	Carbon film resistor	NAS1/6473J
RS13	Carbon film resistor	RT13-0.166W-47KΩJ
RS13	Carbon film resistor	NAS1/6473J
RS02A	Carbon film resistor	RT13-0.166W-1KΩJ
RS02A	Carbon film resistor	NAS1/6102J
RS05A	Carbon film resistor	RT13-0.166W-1KΩJ
RS05A	Carbon film resistor	NAS1/6102J
RS08A	Carbon film resistor	RT13-0.166W-1KΩJ
RS08A	Carbon film resistor	NAS1/6102J
RS11	Carbon film resistor	RT13-0.166W-1.5KΩJ
RS11	Carbon film resistor	NAS1/6152J
CS02A	Ceramic capacitor	CT1-63V-06a-2B4-1000PFK
CS05A	Ceramic capacitor	CT1-63V-06a-2B4-1000PFK
CS08A	Ceramic capacitor	CT1-63V-06a-2B4-1000PFK
CS02	Aluminum electrolytic capacitor	CD110X-16V-10μFM
CS05	Aluminum electrolytic capacitor	CD110X-16V-10μFM
CS08	Aluminum electrolytic capacitor	CD110X-16V-10μFM
CS10	Aluminum electrolytic capacitor	CD110X-16V-10μFM
DS01	IC	HEF4053BP
DS01	IC	HCF4053BE
DS01	IC	MC14053BCP
XS02	AV terminals	AV-4-12CH
VS10	Triode	3DG1815-Y
RS61	Jumper	5mm
RS62	Jumper	5mm
RS70	Jumper	5mm
RS76	Jumper	5mm
RS77	Jumper	5mm

PARTS LIST (continued)

Position	Parts	Type
WS15	Jumper	7.5mm
WS10A	Jumper	7.5mm
		Add the following parts.
RS81	Carbon film resistor	RT13-0.166W-100ΩJ
RS81	Carbon film resistor	NAS1/6101J
RS82	Carbon film resistor	RT13-0.166W-510ΩJ
RS82	Carbon film resistor	NAS1/6511J
RS83	Carbon film resistor	RT13-0.166W-4.7KΩJ
RS83	Carbon film resistor	NAS1/6472J
RS84	Carbon film resistor	RT13-0.166W-4.7KΩJ
RS84	Carbon film resistor	NAS1/6472J
DS01	IC	HEF4052RP
DS01	IC	MC14052BCP
DS01	IC	HCF4052BE
XS02	AV terminals	AVW-43-8
VS70	Triode	3DG1815-Y
VS70	Triode	2SC1815-Y
VS70	Triode	2PC1815GR
VS71	Triode	3CG1015-Y
VS71	Triode	2SA1015-Y
VS71	Triode	2PA1015GR
VS72	Triode	3CG1015-Y
VS72	Triode	2SA1015-Y
VS72	Triode	2PA1015GR
		Auto jumper
RS65	Jumper	5mm
RS66	Jumper	5mm
RS67	Jumper	5mm
RS68	Jumper	5mm
WS10	Jumper	7.5mm
WS21A	Jumper	7.5mm
WS22A	Jumper	7.5mm
WS12	Jumper	7.5mm
WS21	Jumper	7.5mm
WS23	Jumper	7.5mm
RS75	Jumper	7.5mm
WS01A	Jumper	10mm
WS02A	Jumper	10mm
WS03A	Jumper	10mm