

## SPECIFICATIONS

Television System :

PAL - I, REMOTE CONTROL SYSTEM

Receiving Channel :

System Band	PAL - I
VHF	
UHF	21 - 69

Intermediate Frequency :

System I-F Carrier Frequency	PAL - I
Picture I-F Carrier	39.50
Sound I-F Carrier	33.50 (FM) 32.948(NICAM)
Colour Sub Carrier	34.47

(Units:MHz)

Picture Tube :

25" A59EAK01X01-ITC diagonal measured, Quick-start, In-line-gun,  
Black stripe 90° degrees deflection

Power Requirements :

AC 240 V , 50 Hz , 125 WATT

Antenna Input Impedance :

UHF : 75 Ohm unbalanced type

Speaker :

Impedance : 8 Ohm , 10W + 10W

Features :

Voltage synthesized tuning System, On-screen Display, Auto-fine Tuning,  
Dark Tube, Auto Brightness Control, 51-Key Transmitter.

### SAFETY CAUTION :

Before servicing this chassis, it is important that a service technician reads and follows the "Safety Precaution" and "Product Safety Notice" in this Service Manual.

- \* For continued X-radiation, replace the picture tube with original type.
- \* Design and specifications are subject to change without prior notice.

## For Safe Use

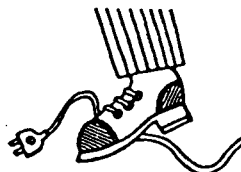
1. Read all of these instructions.
2. Save these instructions for later use.
3. Unplug this television receiver from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaning.



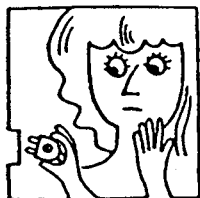
ing. This television receiver is equipped with a 3-wire grounding type plug (a plug having a third (grounding) pin). This plug will only fit into a grounding type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding plug.



10. Do not allow anything to rest on the power cord. Do not locate this television receiver where the cord will be abused by persons walking on it.



4. Do not use attachments not recommended by the television receiver manufacturer as they may cause hazards.
5. Do not use this television receiver near water for example, near a bathtub, wash-bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool, etc.
6. Do not place this television receiver on an unstable cart, stand, or table. The television receiver may fall, causing serious injury to a child or on adult, and serious damage to the appliance. Use only with a cart or stand recommended by the manufacturer, or sold with the television receiver. Wall or shelf mounting should follow the manufacturer's instructions, and should use a mounting kit approved by the manufacturer.
7. Slots and openings in the cabinet and the back or bottom are provided for ventilation, and to insure reliable operation of the television receiver and to protect it from overheating, these openings must not be blocked or covered. The openings should never be blocked by placing the television receiver should not be placed in a built-in installation such as a bookcase unless proper ventilation is provided.
8. This television receiver should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supplied to your home, consult your television dealer or local power company. For television receivers designed to operate from battery power refer to the operating instructions.



9. This television receiver is equipped with a polarized alternating-current line plug (a plug having one blade wider than the other.) This plug will fit the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug. If your television receiver has a three-wire grounding-type plug, please note the follow-

11. Follow all warnings and instructions marked on the television receiver.
12. If an outside antenna is connected to the television receiver, be sure the antenna system is grounded so as to provide some protection against voltage surges and built up static charges. Section 810 of the National Electrical Code, NFPA No. 70-1975, provides information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode. See Figure 1.

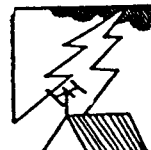
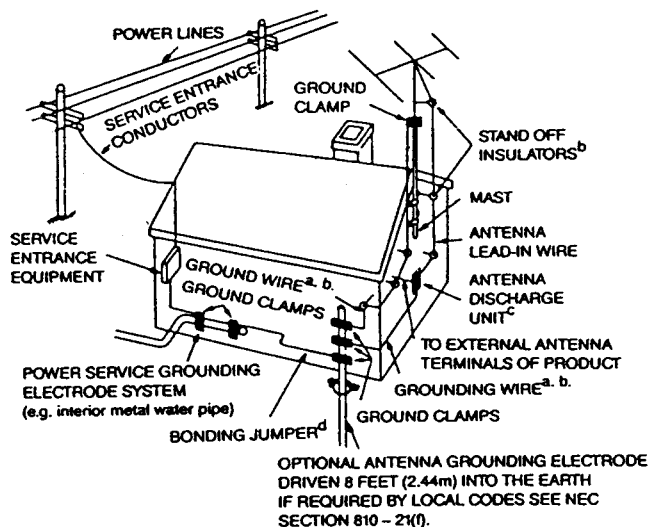


FIGURE 1.  
EXAMPLE OF ANTENNA GROUNDING ACCORDING TO NATIONAL ELECTRICAL CODE INSTRUCTIONS CONTAINED IN ARTICLE 810 —  
"RADIO AND TELEVISION EQUIPMENT"



### NOTES:

- a. Use No. 10 AWG (5.3mm<sup>2</sup>) copper, No. 8 AWG (8.4mm<sup>2</sup>) aluminum, No. 17 AWG (1.0mm<sup>2</sup>) copperclad steel or bronze wire, or larger, as a ground wire.
- b. Secure antenna lead-in and ground-wires to house with stand-off insulators spaced from 4-6 feet (1.22-1.83m) apart.
- c. Mount antenna discharge unit as close as possible to where lead-in enters house.
- d. Use jumper wire not smaller than No. 6 AWG (13.3mm<sup>2</sup>) copper, or the equivalent, when a separate antenna-grounding electrode is used.

13. For added protection for this television receiver during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna. This will prevent damage to the receiver due to lightning and power-line surges.
14. An outside antenna system should not be located in the vicinity of overhead power lines or other electric light or power circuits, or where it can fall into such power lines or circuits. When installing an outside antenna system extreme care should be taken to keep from touching such power lines or circuits as contact with them might be fatal.
15. Do not overload wall outlets and extension cords as this can result in fire or electric shock.
16. Never push objects of any kind into this television receiver through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a fire or electric shock. Never spill liquid of any kind on the television receiver.
17. Do not attempt to service this television receiver yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.
18. Unplug this television receiver from the wall outlet and refer servicing to qualified service personnel under the following conditions:
  - a. When the power cord or plug is damaged or frayed.
  - b. If liquid has been spilled into the television receiver.
  - c. If the television receiver has been exposed to rain or water.
  - d. If the television receiver does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the television receiver to normal operation.
- e. If the television receiver has been dropped or the cabinet has been damaged.
- f. When the television receiver exhibits a distinct change in performance-this indicates a need for service.
19. When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer that have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock, or other hazards.
20. Upon completion of any service or repairs to this television receiver, ask the service technician to perform routine safety checks to determine that the television is in safe operating condition.
21. Television equipment and car combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the equipment and cart combination to overturn.



## PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These characteristics are often passed, unnoticed by visual inspection and the protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. The replacement parts which have these special safety characteristics are identified in this manual and its supplements;

electrical components having such features are identified by shading on the schematic diagram and the parts list.

Before replacing any of these components, read the parts list in this manual carefully. The use of substitute parts which do not have the same safety characteristics in the parts list may create a shock, fire, X-radiation or other hazards.

## SERVICE NOTES

1. When replacing the parts or the circuit boards, clamp the lead wires to the terminals before soldering.
2. When replacing a high wattage resistor (oxide metal film resistor) in the circuit board, keep the resistor 10 mm (1/2 in.) away from the circuit board.
3. Keep the wires away from high voltage or high temperature components.
4. If any Fuse in this TV receiver is blown, replace it with the FUSE specified in the chassis parts list.



The lighting flash and arrowhead within the triangle is a warning sign alerting you of "dangerous voltage" inside the product.

### CAUTION

RISK OF ELECTRIC SHOCK  
DO NOT OPEN

CAUTION : To reduce the risk of electric shock, do not remove cover (or back) no user serviceable parts inside. Refer servicing to qualified service personnel.



The exclamation point within the triangle is a warning sign alerting you of important instructions accompanying the product.

## X-RADIATION PRECAUTION

1. The excessive high voltage can produce potentially hazardous X-RADIATION. To avoid such hazards, the high voltage must not exceed the specified limit. The nominal value of the high voltage of this receiver is 28KV at zero beam current (minimum brightness). The high voltage must not, under any circumstances, exceed 28.5KV. Each time a receiver requires servicing, the high voltage should be checked following the HIGH VOLTAGE CHECK procedure in this manual. It is recommended that the reading of the high voltage should be recorded as a part of the service record. It is important to use an accurate and reliable high voltage meter.
2. The only source of X-RADIATION in this TV receiver is the picture tube. For continued X-RADIATION protection, the replacement tube must be exactly the same type as specified in the parts list.
3. Some parts in this receiver have special safety-related characteristics for X-RADIATION protection. For continued safety, the parts replacement should be undertaken only after referring to the PRODUCT SAFETY NOTICE.

## SAFETY PRECAUTION

**Warning:** The service should not be attempted by anyone unfamiliar with the necessary precautions in this receiver. The followings are the necessary precautions to be observed before servicing.

Since the chassis of this receiver is directly connected to the AC power line-(Hot chassis), an isolation transformer should be used during any dynamic service to avoid possible shock hazards.

1. Always discharge the picture tube anode to the CRT conductive coating before handling the picture tube. The picture tube is highly evacuated and if broken, the glass fragments will be violently expelled. Use shatterproof goggles and keep the picture tube away from the bare body while handling.
2. When replacing a chassis in the cabinet, be always certain that all the protective devices are put back in place, such as non-metallic control knobs, insulating covers, shields, isolation resistor-capacitor network, etc.

3. Before returning the set to the customer, always perform an AC leakage current check on the exposed metallic parts of the cabinet, such as antennas, terminal, screwheads, metal overlays, control shafts, etc. To be sure the set is safe to operate without danger of electrical shock. Plug the AC line cord directly to the AC outlet (do not use a line isolation transformer during this check). Use an AC voltmeter having 5000 ohm per volt or more sensitivity in the following manner. Connect a 1500 ohm 10 watt resistor, parallel by a  $0.15\mu\text{F}$ , AC type capacitor, between a good earth ground (water pipe, conduit etc.) and the exposed metallic parts, one at a time. Measure the AC voltage across the combination of 1500 ohm resistor and  $0.15\mu\text{F}$  capacitor. Reverse the AC plug at the AC outlet and repeat the AC voltage measurements for each exposed metallic part. The voltage measured must not exceed 0.3 volts RMS. This corresponds to 0.2 milliamp AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.

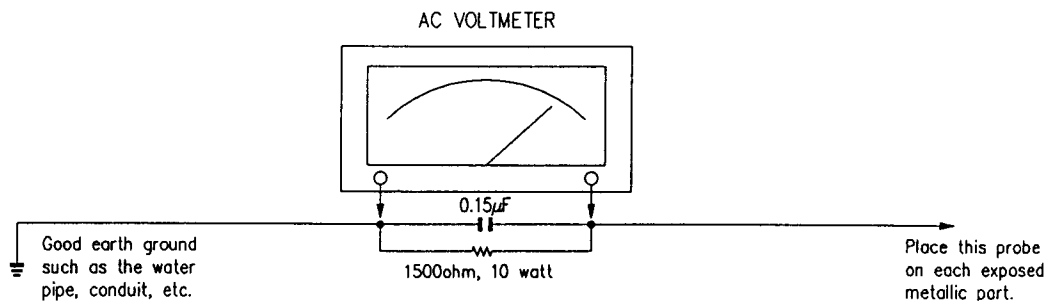


Figure 1. AC Leakage Current Check

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**MEMO**

# 1. INSTRUCTION

## 1. IC LINE UP

LOC NO	SPECIFICATION	DESCRIPTION	REMARK
TIC 01	MAB 8461P W115	TTX $\mu$ -COM	
TIC 02	SAA 5246 P/E	IVT(VIP AND TELETEXT DECODER)	
TIC 03	KM 6264 AL	S-RAM	
RIC 01	SPM-113	$\mu$ -COM	
TIC 04	74LS 241	TTX/OSD SWITCHING	
RIC 02	PCF 8582	MEMORY	
RIC 03	PCF 8582	MEMORY	
IC 101	TDA 8341	VIF	
IC 102	TDA 3857	QUASI-SPLIT SOUND PROCESSOR	
IC 201	TDA 3505	VIDEO CONTROL COMBINATION CIRCUIT	
IC 501	TDA 4650	MULTISTANDARD COLOUR DECODER	
IC 502	TDA 4660	1H DELAY	
IC 503	TDA 4565	CTI/Y-DELAY	
SIC 01	CD 4053BP	AUDIO SWITCHING	
SIC 02	CD 4053BP	VIDEO/CHROMA SWITCHING	
SIC 03	TEA 2014	TV/MIEO SWITCHING	
NIC 01	TA 8662N	QPSK DEMODULATOR	
NIC 02	SAA 7280	TDSD	
NIC 03	NE 5534	COMPARATOR	
NIC 04	74LS86	E-OR GATE	
NIC 05	TDA 1543	DAC(Digital Analog Convector)	
NIC 06	NE 5532	LPF(Low Pass Fiter)	
NIC 07	NE 5532	LPF(Low Pass Filter)	
IC 601	TDA 8415	Stereo/Dual Sound processor	
IC 602	TDA 8425	Audio Processor	
IC801	TDA 4601	Power	

LOC NO	SPECIFICATION	DISCRIPTION	Remarks
IC 301	TDA 3654	VERTICAL DRIVE	
IC 302	TDA 2579A	HORIZONTAL VERTICAL SYNC.	
IC 651	TA 8200AH	SOUND AMP	

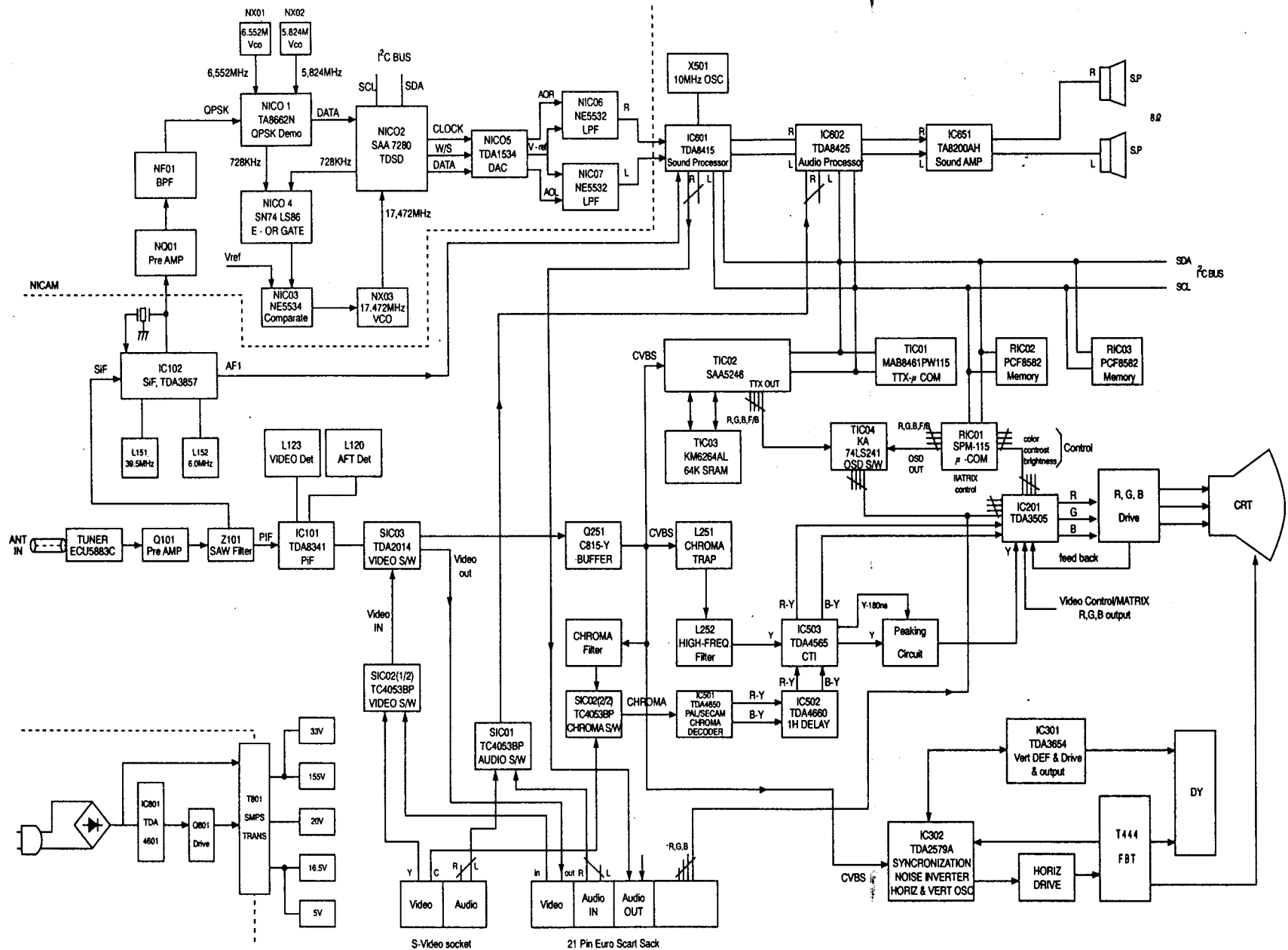
## 2. Means of Components Number Series

100 Series	TUNER/IF/AFT/AGC processing	FBT ; Flyback Trans
150 Series	SIF processing	FM ; Frequency Modulation
200 Series	Video/Luminance processing	HDT ; Horizontal Drive Trans
300 series	Vertical deflection	IC ; Integrated Circuit
400 Series	Horizontal deflection	IF ; Intermediate Frequency
500 Series	Chroma/peaking processing	IFT ; Intermediate Frequency Trans
600 Series	Sound processing	LLD ; Low Level Detector
800 Series	Ac input, power supply circuits	LPF ; Low Pass Filter
NR. NC. NL Series	NICAM sound processing	MTS ; Multi Television Sound
RR. RC. RQ. RL Series	Remocon Section	NFB ; Negative Feed Back
SR. SC. SQ. SIC Series	Video/chroma switching section	NTSC ; National Television System Comittee System
TR. TC. TIC Series	TTX processing	NVRAM ; Non-Volatile Random Access Memory
		PAL : Phase Alternating by Line System
		PCM ; Pulse Coded Modulation
		PIF ; Picture Intermediate Frequency
		PLL ; Pulse Locked Loop
		PWM ; Pulse Width Modulation
		RAM ; Random Access Memory
		RF ; Radio Frequency
		SAW ; Surface Acoustic Wave
		SIF ; Sound Intermediated Frequency
		SRPP ; Shunt Regulated Push Pull
		S/N ; Signal Noise
		TTE ; Triple Transit Echo
		VCXO ; Voltage Controlled X'tal Oscillation
		QPSK ; Quadrature Phase Shift Keying
		NICAM ; Near Instantaneous Compand Audio Multiplex
		I <sup>2</sup> C ; Inter Integrated Circuit
		DAC ; Digital Analog Convector
		TDSD ; Terrestrial Digital Sound Decoder
		BPF ; Band Pass Filter
		TTX ; Teletext
		OSD ; On-Screen Display
		SCL ; Serial Clock Line
		SDA ; Serial Data Line
		CTI ; Colour Transient Improvement

## 3. ABBREVIATION

ABCL ; Automatic Brightness Contrast Limiting	
ABL ; Automatic Beam Limiting	
AC ; Alternating Current	
ACC ; Automatic Color Control	
AFC ; Automatic Frequency Control	
AFT ; Automatic Fine tuning	
AGC ; Automatic Gain Control	
AM ; Amplitude Modulation	
APC ; Automatic Phase Control	
APL ; Average Picture Level	
AVC ; Automatic Volume Control	
DB ; Decibel	
DC ; Direct Current	
DIP ; Dual-in-line Package	
DY ; Deflection Yoke	
D/A ; Digital to Analog	
F.B ; Fast Blanking	

## 2. CHASSIS BLOCK DIAGRAM





#### 4. Normal operating mode / control operating mode

At the input of pin 2 the zero crossings of the frequency provided by the feedback coil are registered and forwarded to the control logic. Pin 3(control input, overload and "standby" recognition) receives the rectified amplitude fluctuations of the feedback coil. The regulating amplifier is 1.4mA. Depending on the internal reference voltage, the overload recognition limits in conjunction with the collector current simulator pin 4 the operating range of the control amplifier. The collector current is simulated by an external RC combination present at pin 4 and internally set threshold voltages. The largest possible collector current applicable with the switching transistor(point of return) increases in proportion to the increased capacitance(10nF). Thus the required operating range of the control amplifier is established. The range of control lies between a DC voltage clamped at 2V and a sawtooth-shaped rising AC voltage, which can vary up to the max amplitude of 4V(reference voltage). During the secondary load decreases to approx. 20 Watt, the switching frequency is increased(~50KHz) at an almost constant pulse duty factor(1:3). During the additional secondary load decreases to approx. 1 Watt, the switching frequency increases to approx. 70 kHz and the pulse duty factor to approx. 1:11. At the same time, the collector peak current is reduced to <1A.

The output levels of the control amplifier as well as those of the overload recognition and the collector current simulator are compared in the trigger and forwarded to the control logic. Via pin 5 it is possible to externally inhibit the operations of the IC. The output at pin 8 will be inhibited when voltages of  $\leq \frac{V_{ref}}{2} - 0.1 \text{ V}$  are present at pin 5.

Flip flops for controlling the base current amplifier and the base current shut-down are set in the control logic depending on the start-up circuit, the zero crossing identification as well as the release through the trigger output of pin 8. A current feedback with an external resistor( $R=0.68\Omega$ ) is present between pin 8 and pin 7. The applied value of the resistor determines the max. amplitude of the base driving current for the switching transistor.

#### 5. Protective operating mode

The base current shut-down activated by the control logic clamps the output of pin 7 to 1.6V. As a result, the drive of the switching transistor is inhibited. This protective measure is enabled if the supply voltage at pin 9 reaches  $\leq 6.7 \text{ V}$  or if voltages of  $\frac{V_{ref}}{2} - 0.1 \text{ V}$  are present at pin 5. In case of shortcircuits occurring in the secondary outputs of the switching power supply, the integrated circuit continuously monitors the fault conditions. During the secondary, completely load-free operations, only a small pulse duty factor is set. As a result, the total current consumption of the power supply is held at  $N=6 \dots 10 \text{ Watt}$  during both operating modes. After the output has been inhibited during the voltage supply of 6.7V, the reference voltage(4V) is switched off, if the voltage supply is further reduced to  $\Delta V_9 = 0.6 \text{ V}$ .

##### Protective operating mode at pin 5 during interferences

The protection against interferences such as primary undervoltages and/or secondary overvoltages(e.g. by changing the component parameters for the switching power supply unit) is realized as follows :

In case of interferences, the output pulses at pin 8 are inhibited by falling below the protective threshold  $V_5$  having a typical value of  $V_1/2$ . As a result, the current consumption is reduced( $I_9 \geq 14 \text{ mA}$  at  $V_9 = 10 \text{ V}$ ).

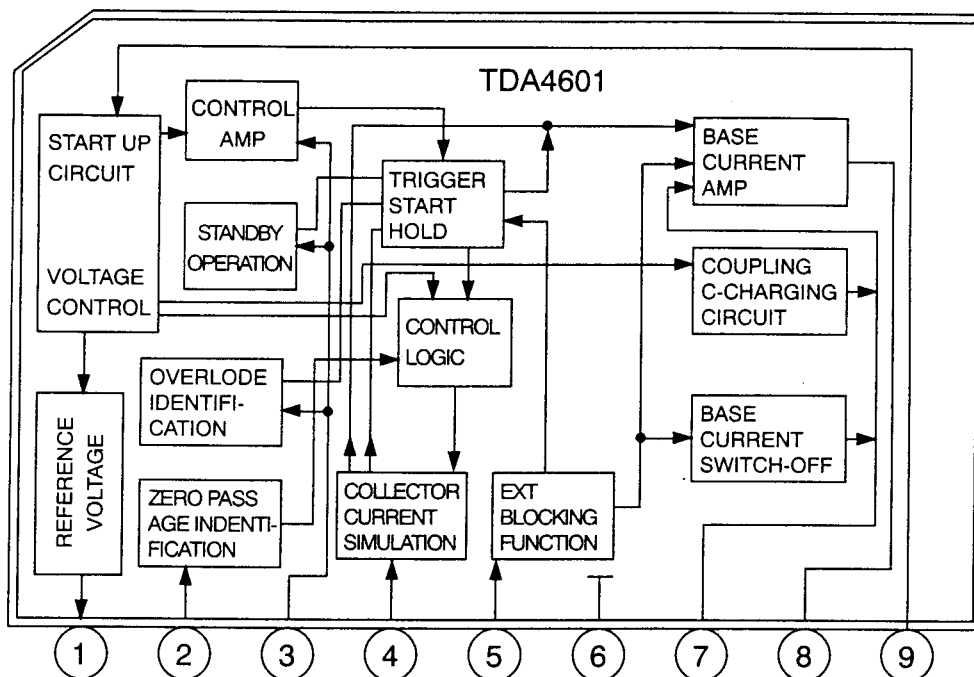
By applying a corresponding start-up resistor, the supply voltage  $V_9$  will fall below the minimal shut-down threshold(5.7V) for the reference voltage  $V_1$ .  $V_1$  will be switched off and the current consumption is further reduced to  $I_9 \leq 3.2 \text{ mA}$  at  $V_9 \leq 10 \text{ V}$ .

Because of these reductions in current consumption, the supply voltage can rise again to reach the switch-on threshold of  $V_9 \geq 12.3 \text{ V}$ . The protective threshold at pin 5 is released and the power supply unit is operable again.

In case of continuing problems of interference( $V_5 \leq V_1/2 - 0.1 \text{ V}$ ) the switch on mode is interrupted by the above described periodic protective operating mode, that is to say, pin 8 is inhibited and  $V_9$  is falling etc.

## 6. POWER IC SPECIFICATION(TDA 4601)

### 1) Block - Diagram

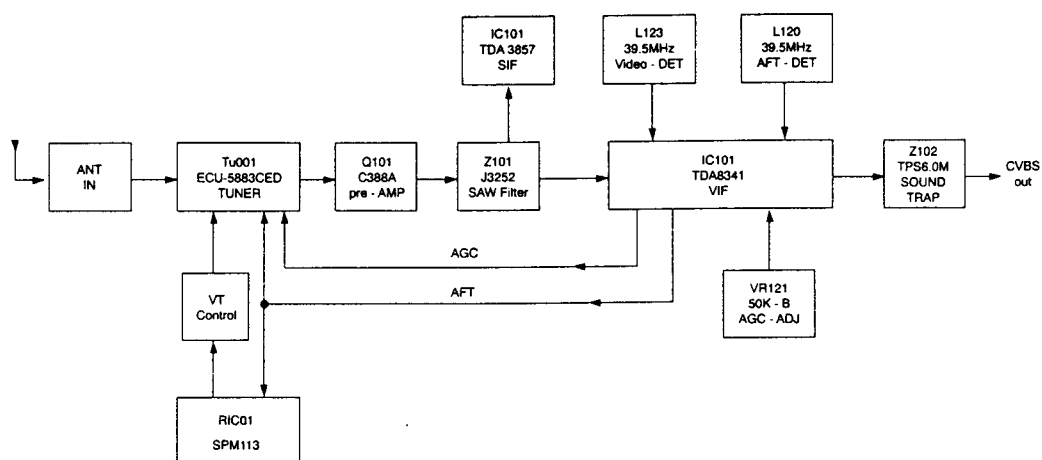


### 2) PIN FUNCTION AND MAXIMUM RATINGS.

Pin No	FUNCTION	Voltages			Currents		
		Min	Max	Unit	Min	Max	Unit
1	Vref Output	0	+6	V			
2	Zero Crossing identification	-0.6	+0.6	V	-3	+3	mA
3	Input controlled amplifier, overload amplifier	0	+3	V	-3	+3	mA
4	Collector Current Simulation	0	+8	V	0	+5	mA
5	Connection for additional protective circuit	0	+8	V	0	+5	mA
6	Ground	0	0	V			
7	DC Output	0	+20	V	-1	+1.5	A
8	Pulse Output-driving of the switching TR	0	+20	V	-1.5	0	A
9	Supply Voltage	0	+20	V			

# 4. IF SECTION

## 1. BLOCK DIAGRAM



## 2. TDA 8341 (Vision I.F) SPECIFICATION

### 1) FEATURE

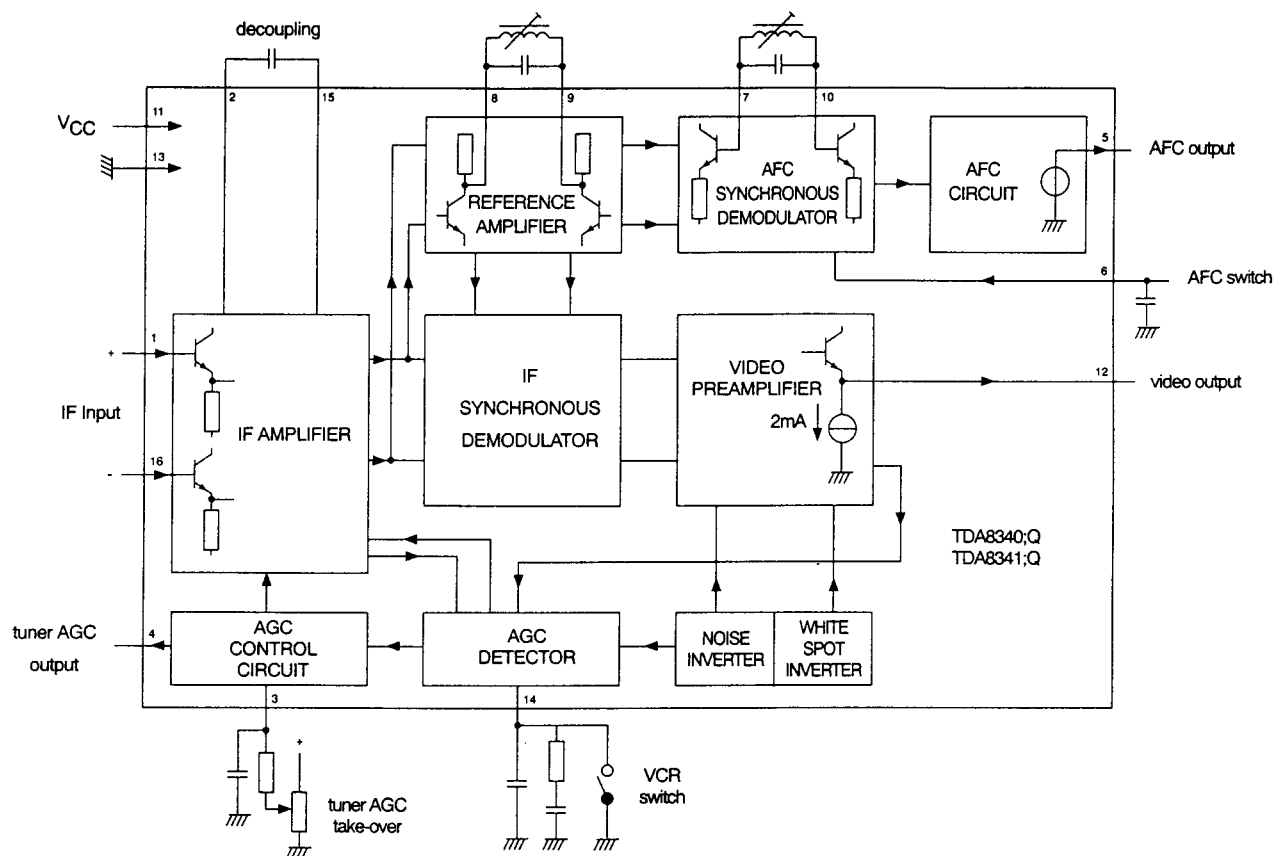
The TDA 8341 are monolithic integrated vision I.F circuits for negatively modulated video signals.

- a gain controlled wide-band I.F. amplifier, providing complete I.F. gain
- a synchronous demodulator for negative modulation
- a wide-band video amplifier
- A.F.C sample and hold circuit with on/off switch
- a tuner A.G.C output for PNP tuners
- a noise inverter and a white spot inverter to prevent ultra-black and ultra-white spots in the picture

### 2) QUICK REFERENCE DATA

Parameter	Conditions	Symbol	min	typ	max	unit
Supply Voltage		Vcc	9.4	12	13.2	V
Supply Current		In	30	42	55	mA
IF input sensitivity(Rms Value)		V <sub>1-16</sub> (rms)	20	40	80	μ V
IF gain control range		GV	-	67	-	dB
Video output Voltage (peak-to-peak value)	white signal 10% top sync	V <sub>12-13</sub> (P.P)	2.4	2.7	3.0	V
Signal- to-noise ratio	Vi=10mV	S/(S+N)	50	58	-	dB
AFC output Voltage (peak-to-peak value)		V <sub>5-13</sub> (P-P)	-	10	-	V

### 3) BLOCK DIAGRAM

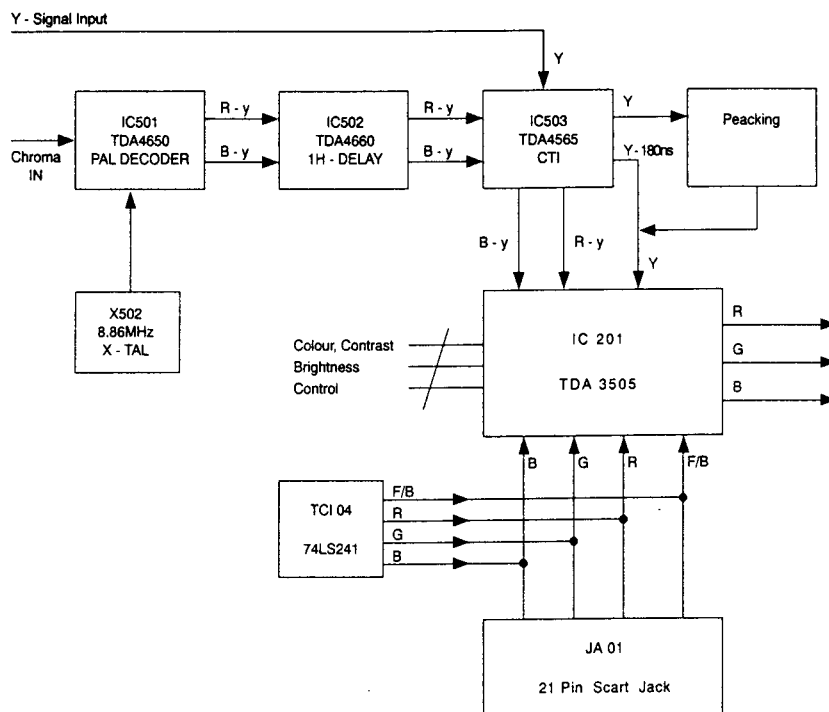


### 4) PIN DESCRIPTION

Pin	Description	Pin	Description
1	Balanced IF input	11	positive supply voltage(Vcc)
2	IF amplifier decoupling	12	Video output
3	Tuner AGC starting point adjustment	13	Ground(VEE)
4	TUNER AGC output	14	IF AGC capacitor and VCR switch
5	AFC output	15	IF amplifier decoupling
6	AFC On/Off switch and sample-and-hold capacitor	16	Balanced IF input
7	Reference carrier $\pi/2$ rad. phase shift		
8	IF picture carrier passive regeneration		
9	"		
10	Reference carrier $\pi/2$ rad. phase shift		

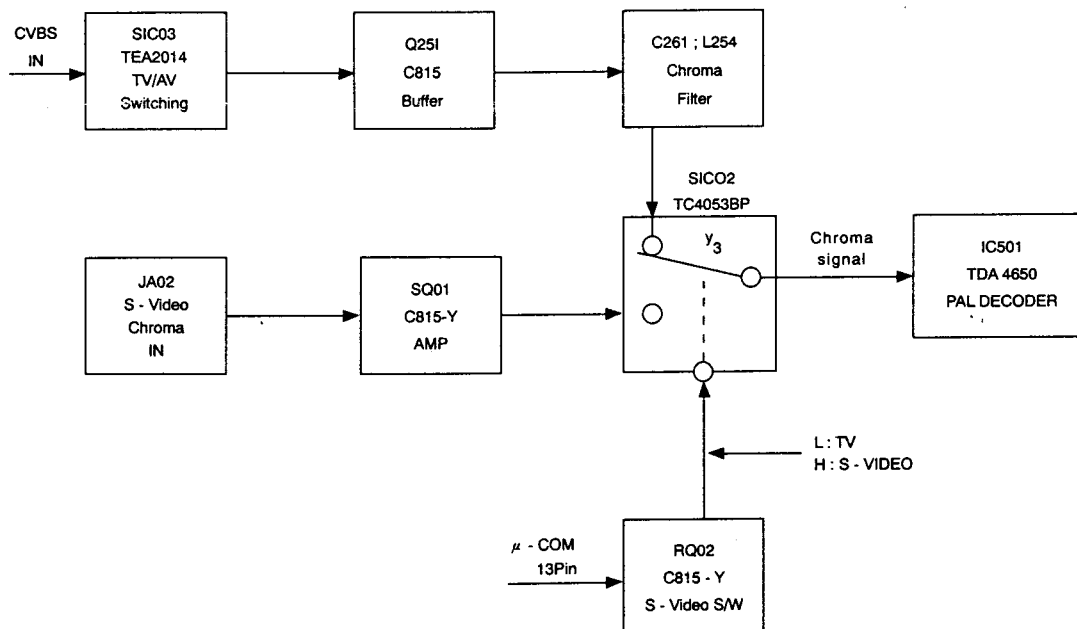
# 5. CHROMA & VIDEO SECTION

## 1. BLOCK - DIAGRAM



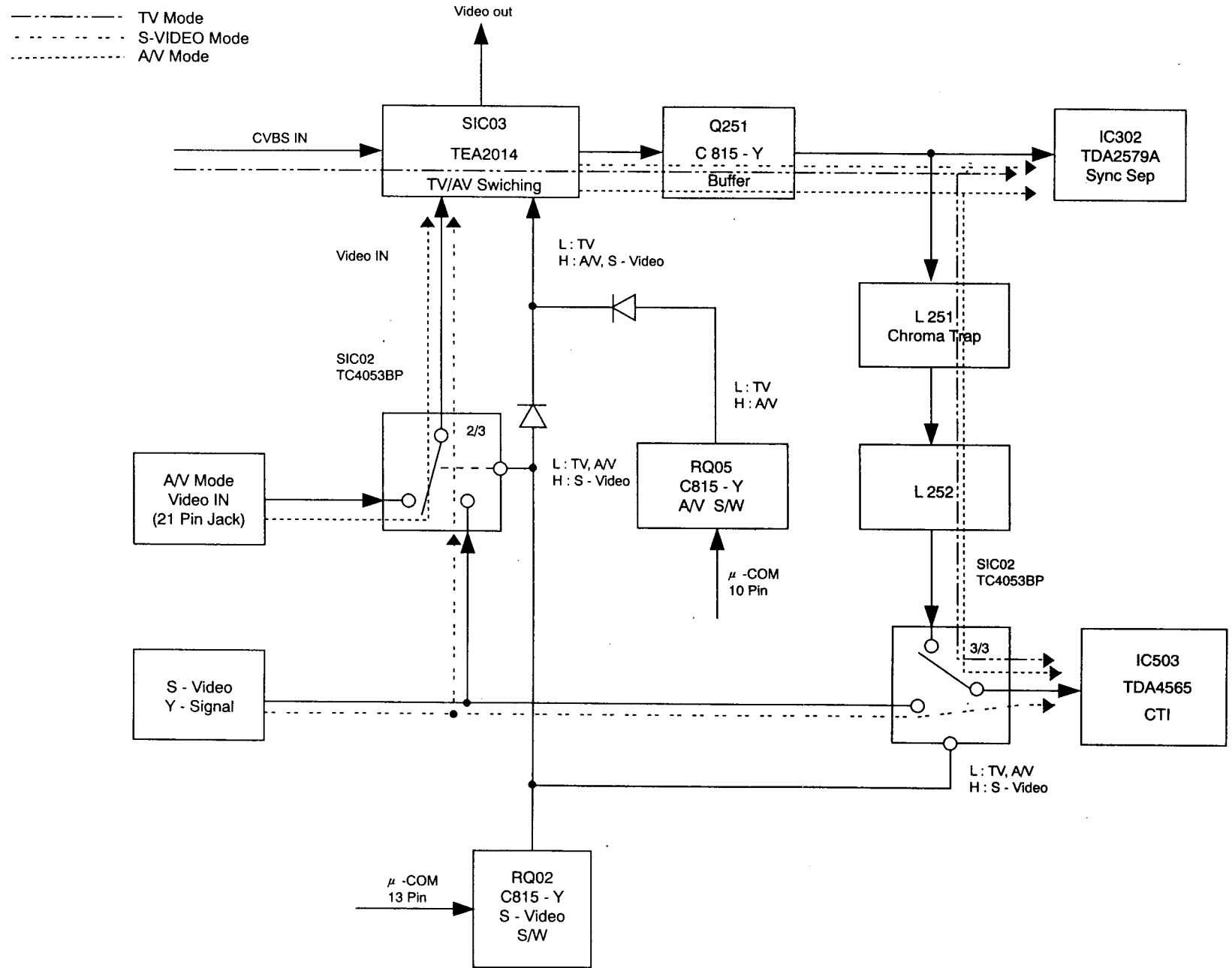
## 2. S-VIDEO & TV/AV chroma signal processing

### - BLOCK DIAGRAM



### 3. S-VIDEO & TV/AV Y-Signal processing

#### - BLOCK DIAGRAM



#### 4. SEMICONDUCTOR SPECIFICATION

##### 1) MULTISTANDARD COLOUR DECODER(TDA 4650)

###### a) GENERAL description

The TDA4650 is a monolithic integrated multistandard colour decoder for PAL, SECAM, NTSC 3.58MHz and NTSC 4.43MHz standards with negative colour difference output signals. It is prepared for a followed switch capacitor delay line TDA 4650.

###### b) FEATURE

###### chrominance part

- Gain controlled chrominance amplifier for all standards
- ACC rectifier circuits controlled by system scanning
- Burst blanking stage for PAL and NTSC

###### Demodulator part

- PAL/NTSC : Quadrature demodulator with a colour subcarrier reference.  
PAL switching stage(disabled for NTSC)  
phase shifting stage(disabled for PAL)

- SECAM : Limiter for SECAM signal.

Quadrature demodulator with one external reference circuit clamping stage for blanked line and line/field flyback deemphasis

- internal filtering of residual subcarrier and output stages with low impedance controlled by system recognizing and colour killer stage.

###### Identification part

- Automatic standard recognition by sequential inquiry
- Delay for colour on and scanning on
- Reliable SECAM identification by PAL priority and 50/60Hz recognition(SECAM)
- Four switching voltages output stages for

###### chrominance filter and display

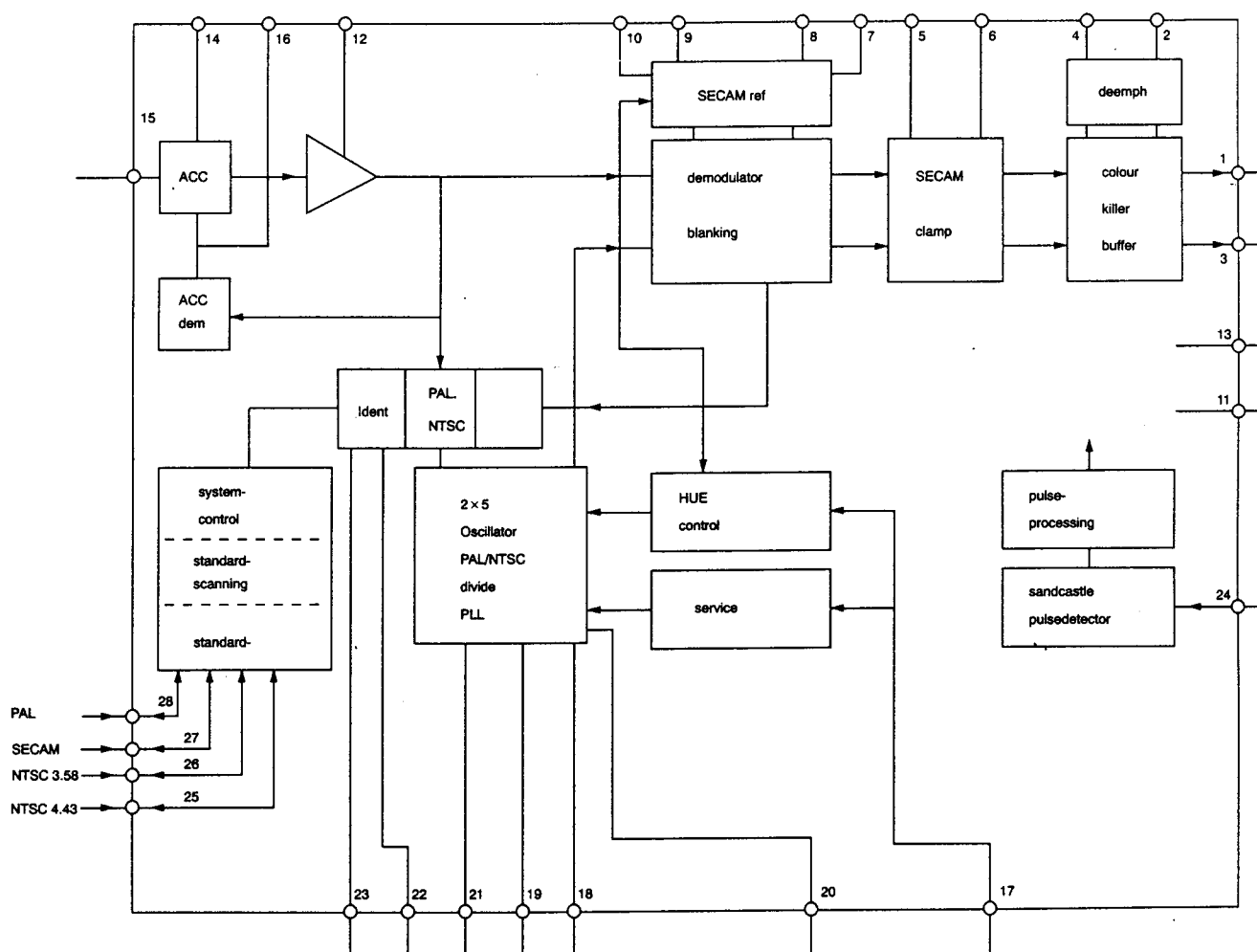
- Force switch-on of every standard
- H-identification for SECAM
- One pin for each crystal oscillator(internal switching)
- Chromatic correction for NTSC(HUE control)
- Service switching for oscillator free run and colour on.

**MEMO**

### c) Quick reference Data

parameter	symbol	min	typ	max	unit
supply voltage	Vcc	10.8	12	13.2	V
supply current	I <sub>p</sub>	-	65	-	mA
chrominance input voltage (peak-to-peak value)	V <sub>15-11</sub>	20	100	400	mV
colour diff, output voltage PAL/NTSC(peak-to-peak value)	V <sub>1-11</sub>	0.42	0.535	0.66	V
	V <sub>3-11</sub>	0.53	0.675	0.84	V
colour diff, output voltage SECAM(peak-to-peak value)	V <sub>1-11</sub>	0.83	1.05	1.32	V
	V <sub>3-11</sub>	1.06	1.33	1.67	V

### d) BLOCK Diagram



## e) PIN DESCRIPTION

Pin	Description	Pin	Description
1	R-Y output	15	chroma input
2	B-Y deemphasis	16	AGC
3	B-Y output	17	HUE- Control
4	R-y deemphasis	18	PLL
5	B-Y clamping	19	7.15MHz oscillator
6	R-Yclamping	20	PLL DC
7	SECAM reference circuit	21	8.86MHz oscillator
8	"	22	NTSC identification
9	"	23	PAL/SECAM identification
10	"	24	Sandcastle
11	Ground	25	NTSC 4.43MHz recognize output
12	DC for demodulators	26	NTSC 3.58MHz recognize output
13	supply voltage	27	SECAM recognize output
14	DC feed back	28	PAL recognize output

## 2) 1H DELAY(TDA 4660)

### a) GENERAL Description

The TDA4660 is a monolithic integrated baseband delay line circuit of  $64\mu\text{s}$  for colour difference signals.

The IC consists of two main blocks

- 2 comb filters with a delay time of  $64\mu\text{s}$  in switched capacitor technique.
- Internal clock generation of 3MHz which is line locked via the sandcastle pulse.

- The colour difference-signals(R-Y), (B-Y) are capacitively coupled to the pins 16/14 and clamped in the input stages.

The signals then are fed via a buffer to the delay lines which are driven by an internal clock of 3MHz to get a delay time of  $64\mu\text{s}$

- Samples and hold low-pass filters behind the delay lines suppress the clock signal. The undelayed and delayed signals now are added and fed to the output pins 11/12 via a buffer.

**MEMO**

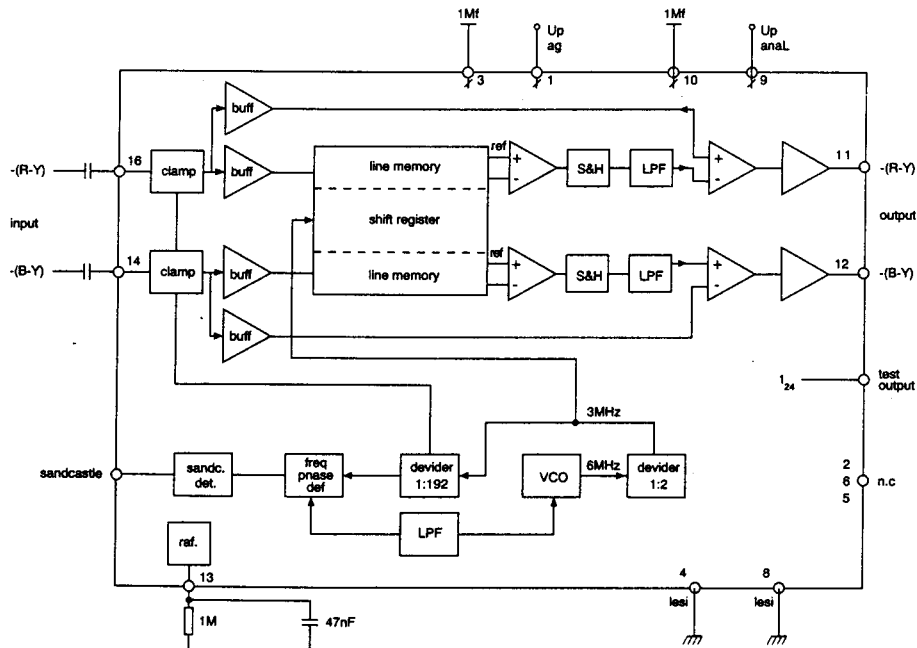
## b) QUICK REFERENCE DATA

parameter		symbol	min	typ	max	unit
Supply voltage	digital	$V_{1-3}$	5.0	-	6.0	V
	analog	$V_{9-10}$	5.0	-	6.0	V
Supply current	digital	$I_1$	-	1.0	2.0	mA
	analog	$I_9$	-	4.5	8.0	mA
Colour difference input signal	PAL, NTSC (Peak-to-peak value)	$U_{16-10}$	-	0.525	-	
		$U_{14-10}$	-	0.675	-	V
	SECAM <sup>(1)</sup> (Peak-to-peak value)	$U_{16-10}$	-	1.05	-	V
		$U_{14-10}$	-	1.35	-	V
Colour difference output signals, Amplitude ratio	PAL, NTSC	$V_{16}/V_{11}$	4.5	5.5	6.5	dB
		$V_{14}/V_{12}$	4.5	5.5	6.5	dB
	SECAM <sup>(1)</sup>	$V_{16}/V_{11}$	-1.5	-0.5	0.5	dB
		$V_{14}/V_{12}$	-1.5	-0.5	0.5	dB

The signals have to be blanked line sequentially.

The blanking levels have to be equal to the uncoloured signal.

## c) BLOCK DIAGRAM



#### d) PIN DESCRIPTION

Pin	Description	Pin	Description
1	digital supply voltage	9	analog supply voltage
2	not connected	10	ground analog
3	ground digital	11	- (R-Y) output
4	test pin input	12	- (B-Y) output
5	sandcastle input	13	reference current
6	not connected	14	- (B-Y) input
7	test pin output	15	not connected
8	test pin input	16	- (R-Y) input

### 3) COLOUR TRANSIENT IMPROVEMENT CIRCUIT (TDA 4565)

#### a) GENERAL DESCRIPTION

The TDA 4565 is a monolithic integrated circuit for Colour Transient Improvement(CTI) and luminance delay line in gyrator technique in colour television receivers.

#### b) FEATURES

- Colour Transient Improvement for colour difference signals(R-Y) and (B-Y) with transient detecting, storage and switching stages resulting in high transients of colour difference output signals
- A luminance signal path(Y) which substitutes the conventional Y-delay coil with an integrated Y-delay line

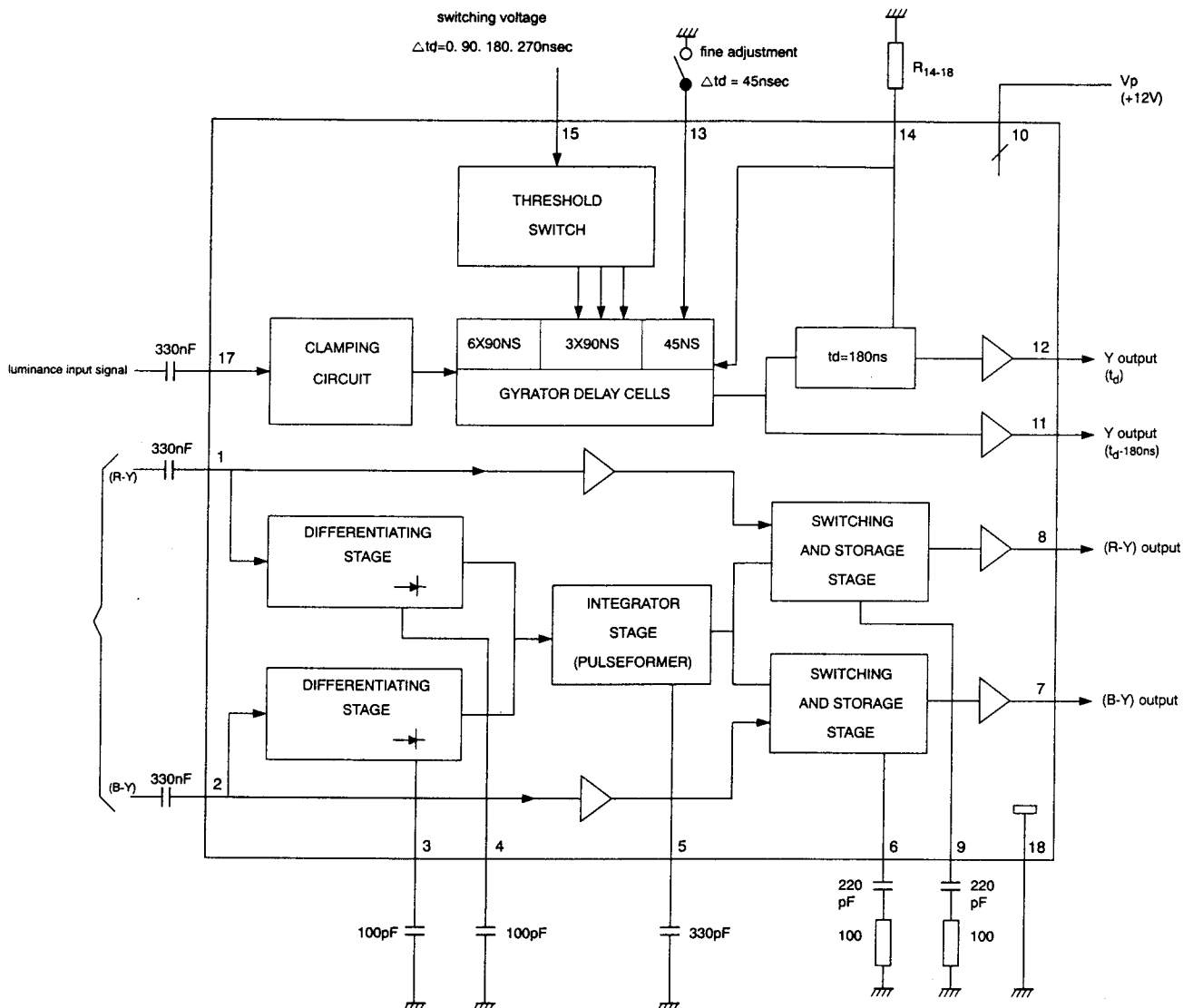
- Switchable delay time from 690ns to 1005ns in step of 45ns
- Two Y output signals ; one of 180ns less delay

#### c) QUICK REFERENCE DATA

parameter	symbol	min	typ	max	unit
supply voltage	Vp	-	12	13.2	V
supply current	Ip	-	35	50	mA
(R-Y) and (B-Y) attenuation	$\alpha$ cd ttr	-	0 150	-	dB ns
(R-Y) and (B-Y) output transient time	td $\alpha$ y	690 -	- 6.5	1005 -	ns dB
Adjustable Y-delay time					
Y-attenuation					

**MEMO**

#### d) BLOCK DIAGRAM



#### 4) VIDEO CONTROL COMBINATION CIRCUIT(TDA 3505)

##### a) GENERAL DESCRIPTION

The TDA 3505 is a monolithic integrated circuits which perform video control functions in a PAL/SECAM decoder. The TDA 3505 is for negative colour difference signals - (R-Y), - (B-Y). The required input signals are : luminance and colour difference and a 3-level sandcastle pulse for control purposes. Linear RGB signals can be inserted from an external source. RGB output signals are available for driving the video output stages. The circuits provide automatic cut-off control of the picture tube.

##### b) FEATURES

- Capacitive coupling of the colour difference and luminance input signals with black level clamping in the

##### input stages

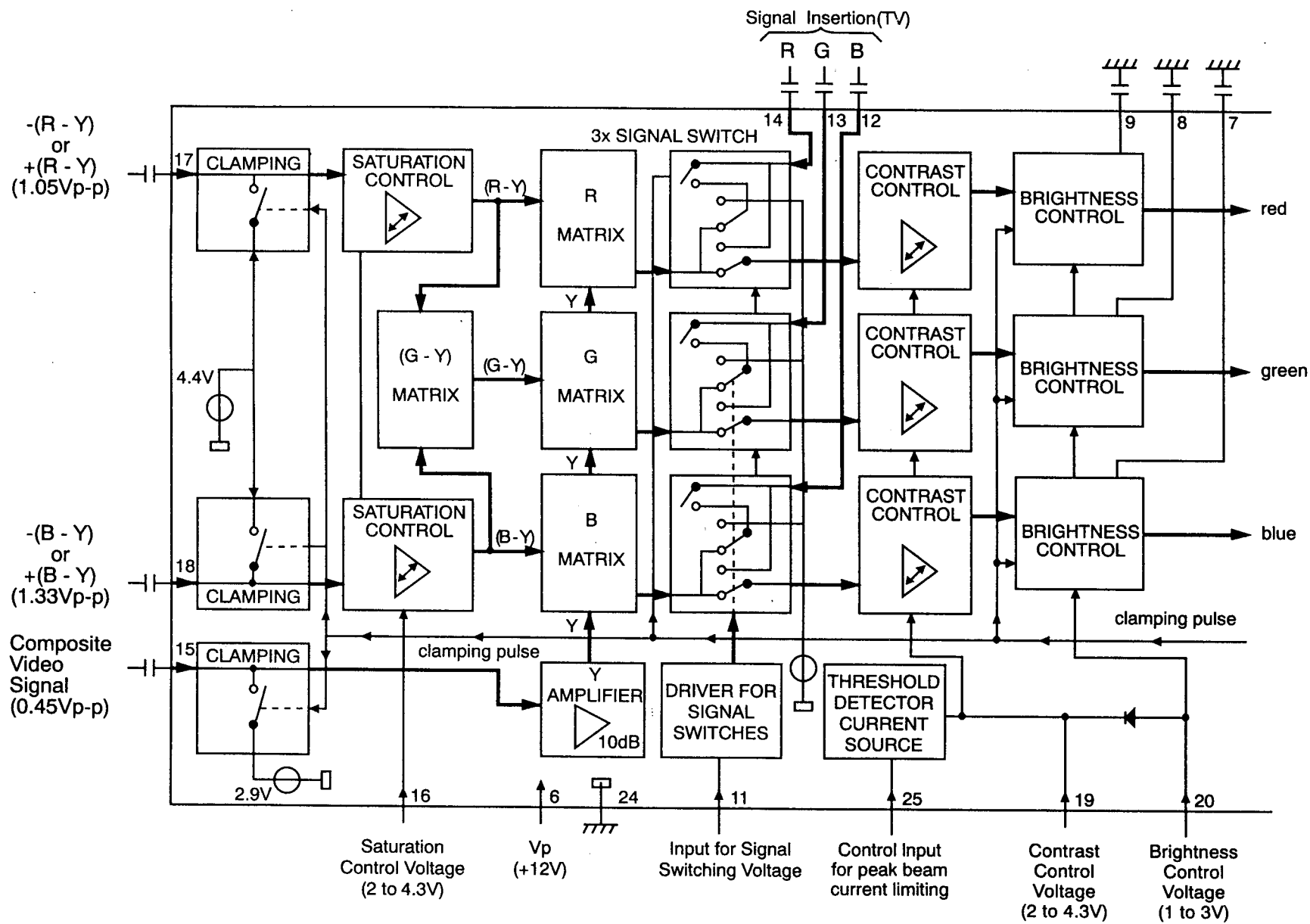
- Linear saturation control acting on the colour difference signals
- (G-Y) and RGB matrix
- Linear transmission of inserted signals
- Equal black levels for inserted and matrixed signals
- 3 identical channels for the RGB signals
- Linear contrast and brightness controls, operating on both the inserted and matrixed RGB signals
- Peak beam current limiting input
- Clamping, horizontal and vertical blanking of the three input signals controlled by a 3-level sandcastle pulse
- 3 DC gain controls for the RGB output signals (white point adjustment)
- Emitter-follower outputs for driving the RGB output stages
- Input for automatic cut-off control with compensation for leakage current of the picture tube

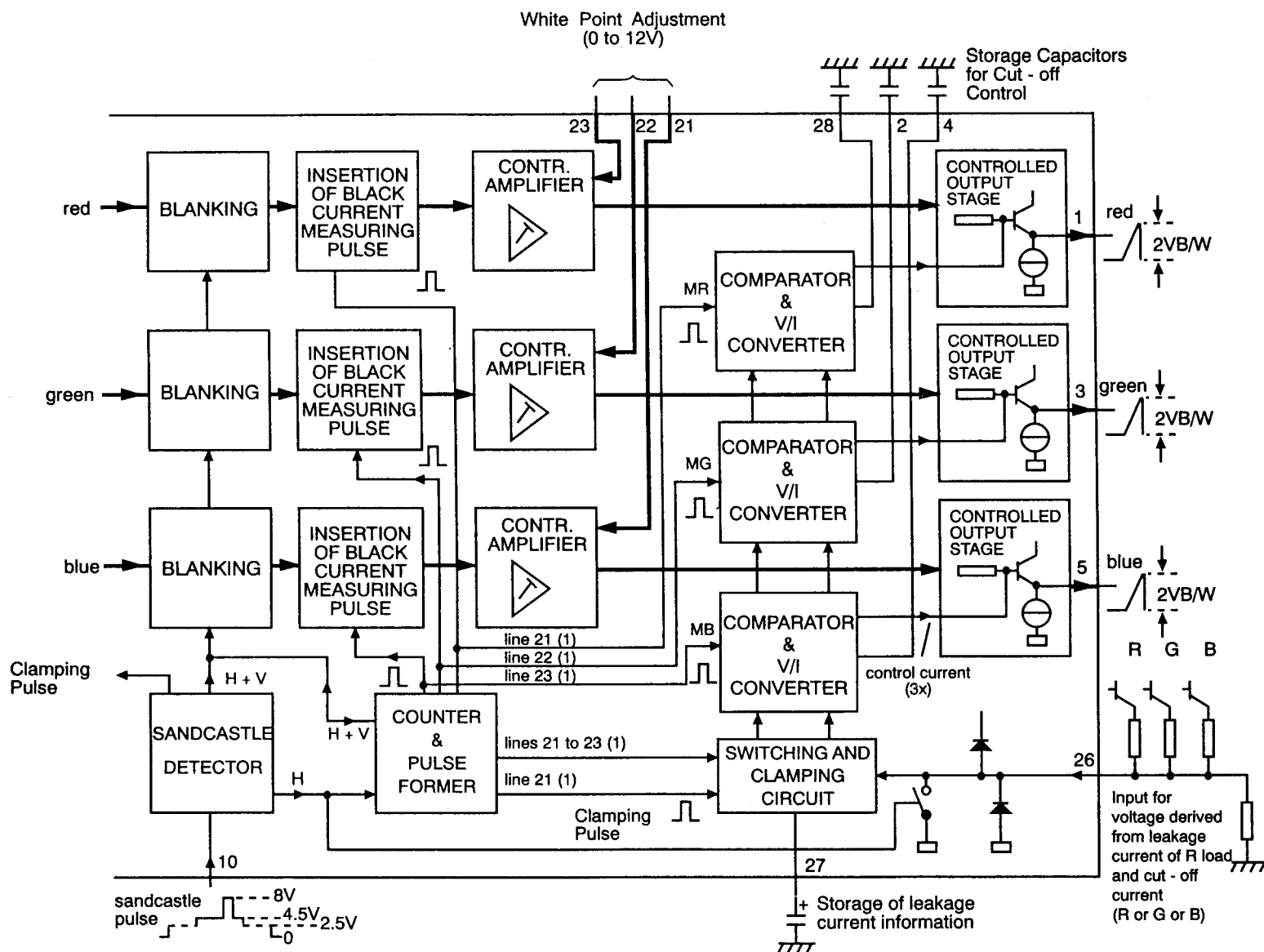
# c) QUICK REFERENCE DATA

parameter	conditions	symbol	min	typ	max	unit
Supply voltage(pin 6)		$V_P = V_{6-24}$	-	12	-	V
Supply current		$I_P = 16$	-	95	-	mA
Composite video input						
signal (peak-to-peak value)		$V_{15-24((p.p)}$	-	0.45	-	V
Colour difference input						
signals(peak-to-peak value)						
- (B.Y) or + (B.Y) respectively		$V_{18-24(p.p)}$	-	1.33	-	V
- (R.Y) or + (R.Y) respectively		$V_{17-24(p.p)}$	-	1.05	-	V
inserted RGB signals						
(black-to-white value)		$V_{12, 13,14-24}$	-	1.0	-	V
Three-level sandcastle pulse		$V_{10-24}$	-	2.5	-	V
			-	4.5	-	V
			-	8.0	-	V
Control voltage ranges						
brightness		$V_{20-24}$	1.0	-	3.0	V
contrast		$V_{19-24}$	2.0	-	4.3	V
saturation		$V_{16-24}$	2.0	-	4.3	V

**MEMO**

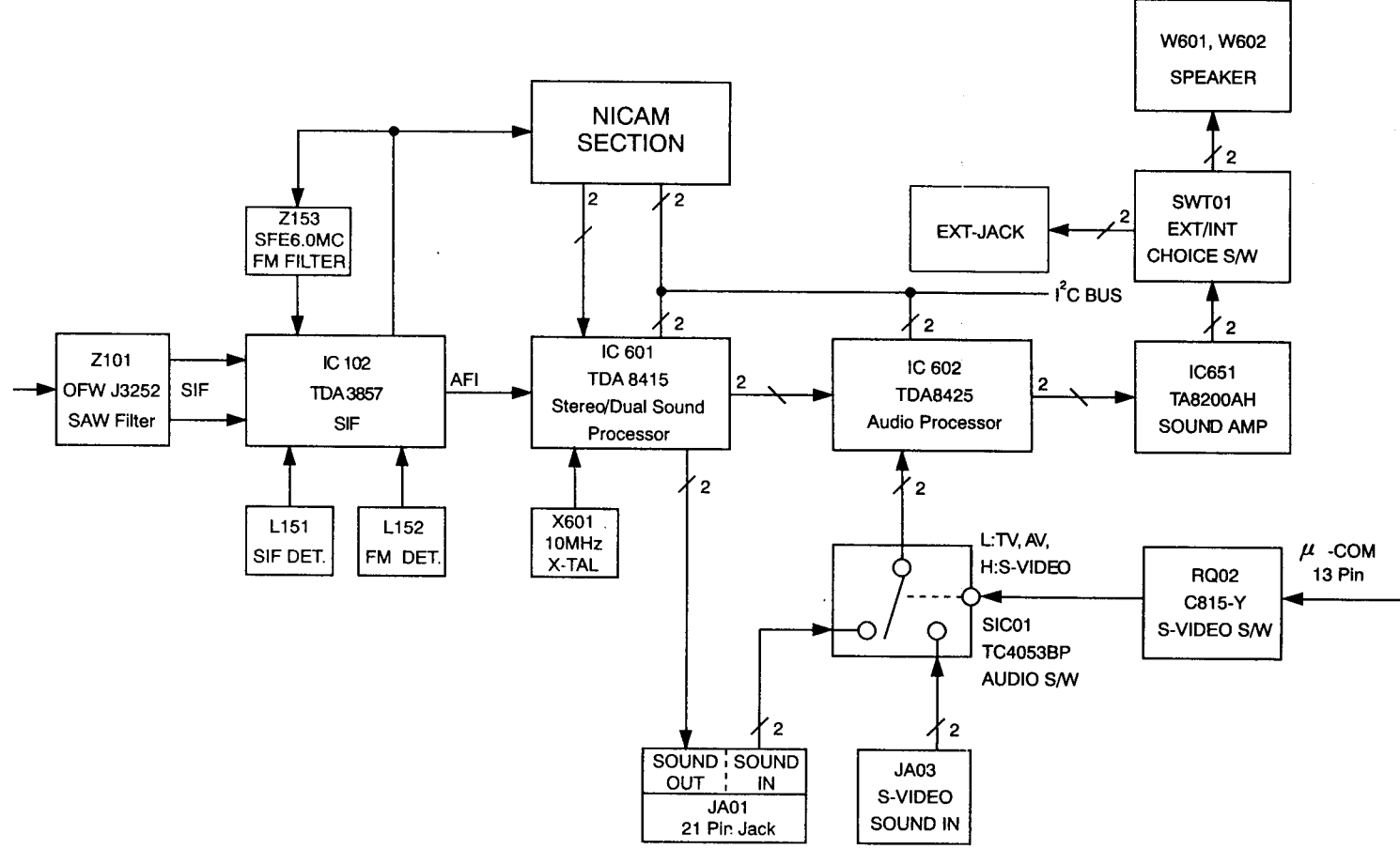
(d) BLOCK DIAGRAM





# 6. SOUND SECTION

## 1. BLOCK DIAGRAM



2. SEMICONDUCTOR SPECIFICATION

1) Quasi-split sound processor with two FM demodulators (TDA 3857)

a) GENERAL DESCRIPTION

Symmetrical IF inputs.  
Gain controlled wideband IF amplifier.  
AGC generation due to peak sync  
Reference amplifier for the regeneration of the vision carrier.  
Optimized limiting amplifier for AM suppression in the regenerated vision carrier signal and 90° phase shifter.  
Intercarrier mixer for FM sound, output with low-pass filter.

b) FEATURES

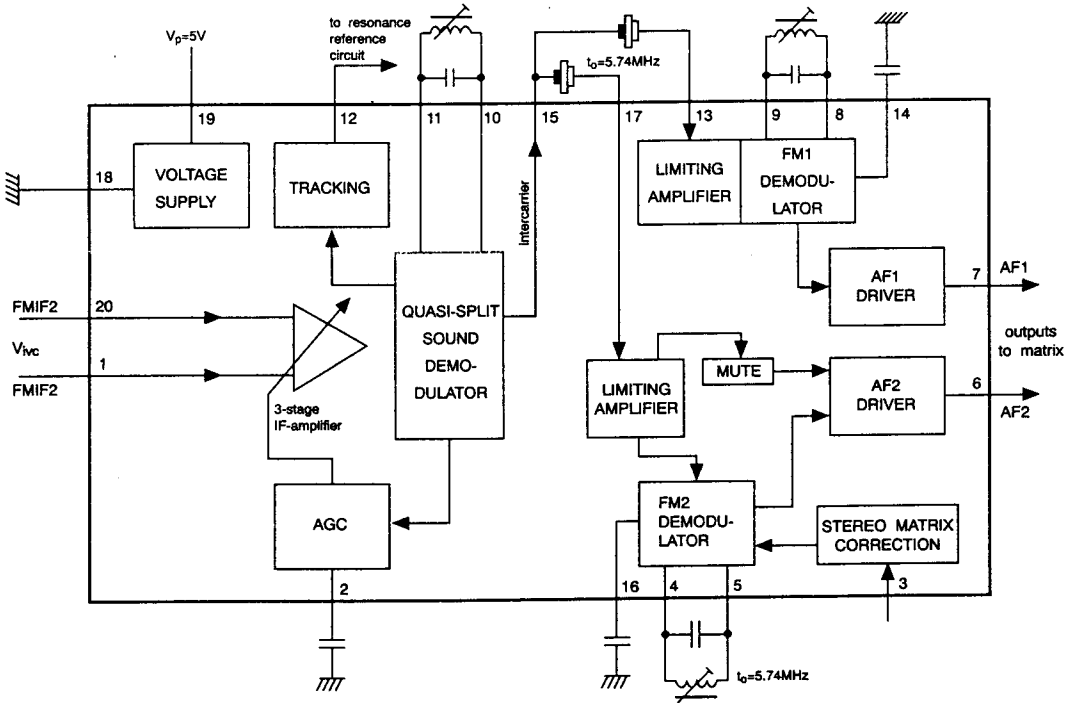
- Quasi-split sound processor for all FM standards
- Reducing of superious video signals by tracking

function and AFC for the vision carrier reference circuit ; (indispensable for NICAM)  
• Automatic muting of the AF2 signal(at B/G) by the input level.

c) QUICK REFERENCE DATA

symbol	parameter	min	typ	max	unit
Vp	supply voltage	4.5	5	8.8	V
Ip	supply current	-	60	72	mA
Vi IF	IF input sensitivity(-3dB)	-	70	100	μ V
Vo AF	Audio output signal(RMS value)	-	1	-	V
THD	Total harmonic distortion	-	0.5	-	%
S/N(w)	Weighted signal to-noise ratio	-	68	-	dB

d) BLOCK - DIAGRAM



### e) PIN FUNCTION

Pin No	Symbol	Description	Pin No	Symbol	Description
1	FMIF1	IF difference input 1	11	VC-R2	reference circuit for the vision carrier
2	CAGC	charge capacitor for AM AGC	12	TRACK	DC output level for tracking
3	MATR	input for stereo matrix correction	13	FM1 I	intercarrier input for FM 1
4	FM2 R1	reference circuit for FM2	14	CAF 1	de-emphasis capacitor for FM1 demodulator
5	FM2 R2	reference circuit for FM2	15	ICO	intercarrier output signal
6	AF2	AF2 OUTPUT	16	CAF 2	de-emphasis capacitor for FM2 demodulator
7	AF1	AF1 OUTPUT	17	FM 2 I	intercarrier input for FM 2
8	FM1 R1	reference circuit for FM 1	18	GND	ground
9	FM1 R2	reference circuit for FM 1	19	VP	supply voltage
10	VC - R1	reference circuit for the vision carrier	20	FMIF 2	IF difference input 2

### f) PIN PARAMETER

Pin No	symbol	parameter	min	typ	max	unit
19	Vp	supply voltage range	4.5	5	8.8	V
	Ip	supply current	48	60	72	mA
1	V <sub>I</sub>	DC input voltage	-	1.75	-	V
20	V <sub>I</sub> IF(rms)	max input signal(RMS Value)	70	100	-	mV
		input signal sensivity (RMS Value)		70	100	μ V
2	V <sub>2</sub>	Voltage range for gain control	1.7	-	2.6	V
10	V <sub>o</sub> (p.p)	Vision carrier amplitude		270		mV
11		(peak-to-peak value)				
15	V <sub>o</sub> (rms)	output signal for FM 1	7.1	95	125	mV
		output signal for FM 2	32	43	56	mV
	V <sub>15</sub>	DC voltage	-	1.75	-	V

Pin No	symbol	parameter	min	typ	max	unit
13	$V_{I(rms)}$	minimum input signal (RMS value)	-	300	450	$\mu V$
		maximum input signal (RMS value)	200	-	-	mV
17	$V_{13}, V_{17}$	DC voltage	-	0	-	V
	$V_{i(rms)}$	level detector threshold for no muting (RMS value, pin 17 only)	-	1	-	mV
4.5	$V_{ic(rms)}$	intercarrier signals	-	100	-	mV
8.9	V	DC voltage	-	1.8	-	V
6  7	$V_{O(rms)}$	AF output	0.84	0.95	1.07	V
	$V_6, V_7$	DC voltage	-	2.1	-	V
	$I_6, I_7$	maximum allowed DC output current	-	-	-2	mA
3	$V_3$	adjusting voltage for AF2 signal	0	-	5	V
14	$V_{14}$	DC voltage	-	1.7	-	V
16	$V_{16}$					
12	$V_{O 12}$	tracking output voltage range	$V_p-3.3$		$V_p-1$	V
18	$V_{ss}$	ground		0		V

## 2) STEREO/DUAL SOUND PROCESSOR WITH INTEGRATED FILTERS : I<sup>2</sup>C Bus(TDA 8415)

(stereo or dual sound). The device is controlled by a microcomputer via the two lines, bidirectional I<sup>2</sup>C bus.

### a) GENERAL DESCRIPTION

The TDA8415 is a processor of stereo/dual language signals (B/G-standard) for stereo sound television receivers and VTRs, using the switched capacitor technique. The AF signals at the TDA8415 inputs must be "(L+R)/2" or "language A" on one channel and "R" or "language B" on the second channel (where L = left and R = right). The carrier frequency of the second channel is also modulated by an identification signal

### b) Features

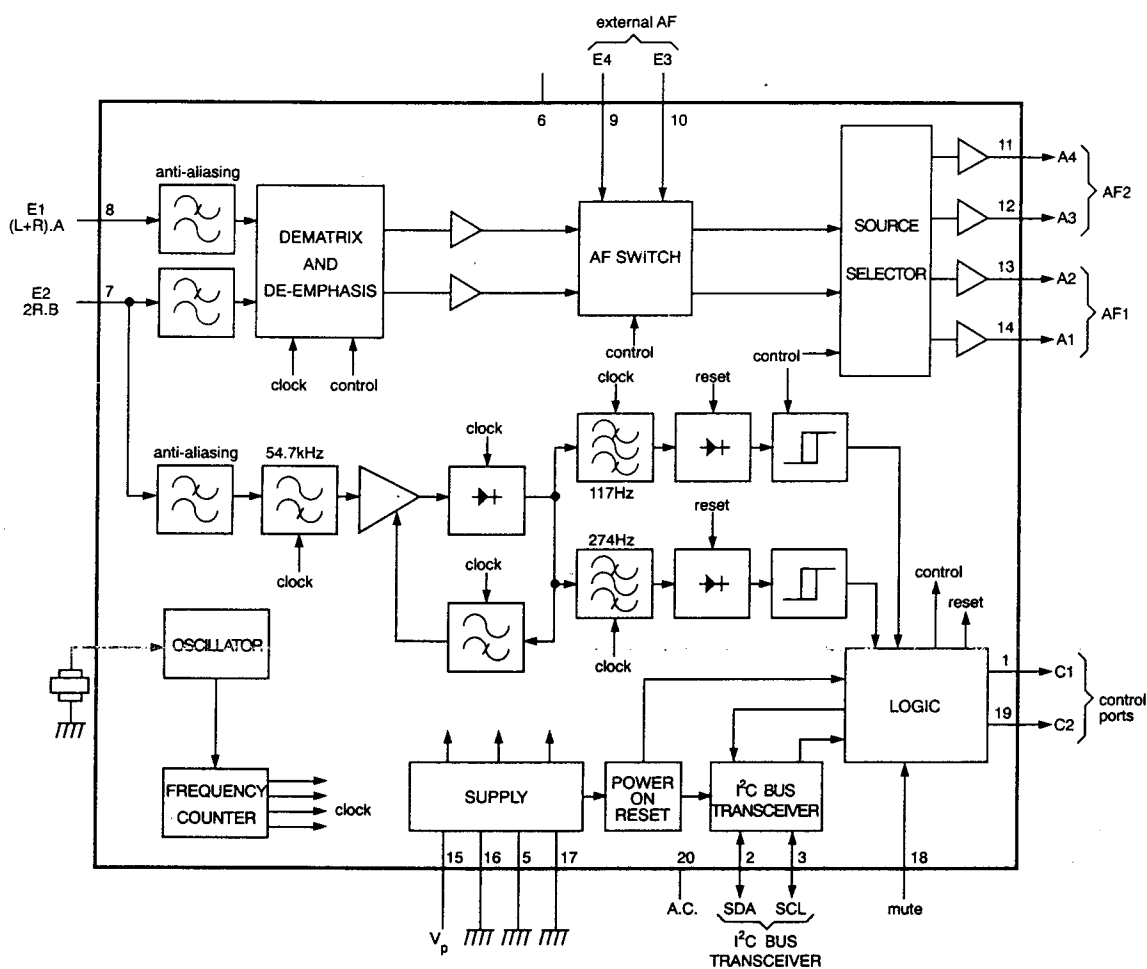
- Use of the switched capacitor technique for signal processing
- Small amount of peripheral components
- Integrated anti - aliasing filters
- Low distortion AF signal handling
- Integrated de - emphasis with a time constant of 50  $\mu s$
- Two general purpose output ports
- Full ESD protection

**MEMO**

# c) QUICK REFERENCE DATA

parameter	symbol	min	typ	max	unit
supply voltage	V <sub>p</sub>	-	12	-	V
supply current	I <sub>p</sub>	-	10	-	mA
AF output signal(RMS value)	V <sub>o</sub>	-	2	-	V
Pilot signal input sensitivity	V <sub>i</sub>	-	2.5	-	mV

# d) BLOCK DIAGRAM



### e) DESCRIPTION AND RATINGS

Pin No	Description		min	Typ	max	unit	Pin No	Description		min	Typ	max	unit
1	Control port C1	Low	-	-	0.5	V	11	Output A4	DC	-	3.25	-	V
		High	4.5	-	5	V	12	Output A3					
2	SDA Serial Data Line (I <sup>2</sup> C bus)	Low	-0.3	-	1.5	V	13	Output A2	AC	-	-	2	V
		High	3	-	5	V	14	Output A1					
3	SCL Serial Clock Line (I <sup>2</sup> C bus)	Low	-0.3	-	1.5	v	15	Supply Voltage		10.8	12	13.2	V
		High	3	-	5	v	16	Analogue ground			0		V
4	Oscillator input		1.7	-	-	V	17	Ripple rejection improvement		-	3.25	-	V
5	Digital ground						18	Mute input	Low	-0.3	-	1.5	V
6	NOT connected								High	3	-	5	V
7	Sound channel input AF2(E2)	DC	-	3.25	-	V	19	control Port C2	Low	-	-	0.5	V
		AC	-	-	1	V			High	4.5	-	5	V
8	Sound channel input AF1(E1)	DC	-	3.25V	-	V	20	Not connected					
		AC	-		0.7	V							
9	External AF input(E4)		-	3.25	-	V							
10	External AF input(E3)		-										

### 3) HI-FI STEREO AUDIO PROCESSOR : I<sup>2</sup>C BUS(TDA 8425)

### c) QUICK REFERENCE DATA

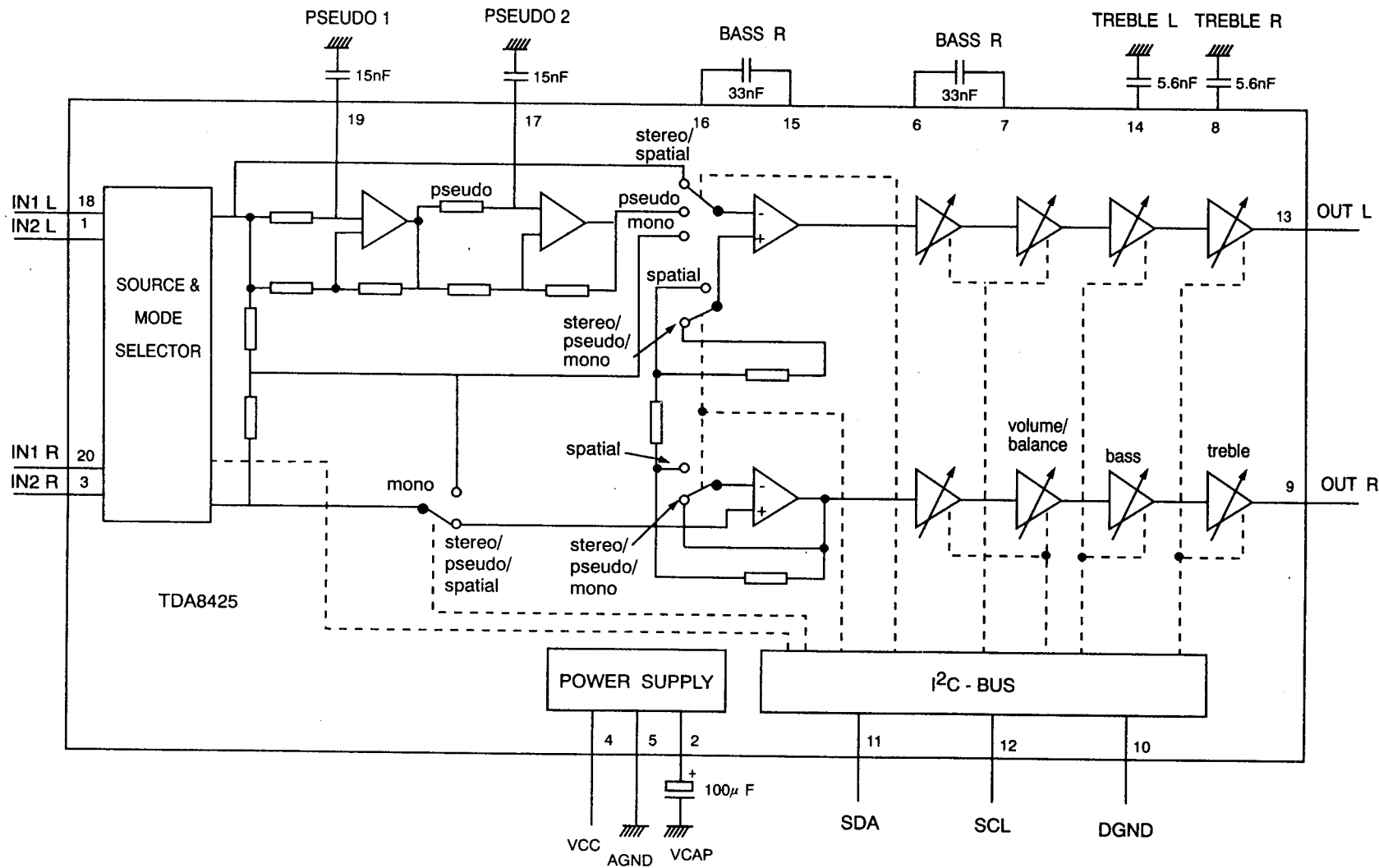
#### a) GENERAL DESCRIPTION

The TDA8425 is a monolithic bipolar integrated stereo sound circuit with a loudspeaker channel facility, digitally controlled via the I<sup>2</sup>C bus for in hi-fi audio and television sound.

#### b) FEATURES

- Source and mode selector for two stereo channels
- Pseudo stereo, spatial stereo, linear stereo and forced mono switch
- Volume and balance control
- Bass, treble and mute control
- Power supply with power-on reset

parameter	symbol	min	typ	max	unit
Supply voltage (pin4)	V <sub>CC</sub>	10.8	13.2	12.0	V
Input signal handling	V <sub>i</sub>	2	-	-	V
Input sensitivity					
full power at the output stage	V <sub>i</sub>	-	-	300	mV
Signal plus noise-to-noise ratio	(S+N)/N	-	-	86	dB
Total harmonic distortion	THD	-	-	0.05	%
Channel separation	$\alpha$	-	-	80	dB
Volume control range	G	-64	6	-	dB
Treble control range	G	-12	12	-	dB
Bass control range	G	-12	15	-	dB



## e) FUNCTIONAL DESCRIPTION

### Source selector

The input to channel 1(CH1) and channel 2 (CH2) are determined by the source selector. The selection is made from the following AF input signals :

- IN 1 L(pin 18) ; IN 1 R(pin 20)
- or
- IN 2 L(pin 1) ; IN 2 R(pin 3)

### Mode selector

The mode selector selects among stereo, sound A and sound B(in the event of bilingual transmission) for OUT R and OUT L

### Volume control and balance

The volume control consists of two stages(left and right). In each part the gain can be adjusted between +6 dB and - 64 dB in steps of 2 dB. An additional step allows an attenuation of  $\geq 80$  dB. Both parts can be controlled independently over the whole range, which allows the balance to be varied by controlling the volume of left and right output channels.

Linear stereo, pseudo stereo, spatial stereo and forced mono mode\*

It is possible to select four modes : linear stereo, pseudo stereo, spatial stereo or forced mono. The pseudo stereo mode handles mono transmissions, the spatial stereo mode handles stereo transmissions and the forced mono can be used in the event of stereo signals.

### Bass control

The bass control stage can be switched from an emphasis of 15 dB to an attenuation of 12 dB for low frequencies in steps of 3dB.

### Treble control

The treble control stage can be switched from + 12 dB

to -12 dB in steps of 3 dB

### Bias and power supply

The TDA8425 includes a bias and power supply stage, which generates a voltage of  $0.5 \times V_{CC}$  with a low output impedance and injector currents for the logic part.

### Power-on reset

The on-chip power-on reset circuit sets the mute bit to active, which mutes both parts of the treble amplifier. The muting can be switched by transmission of the mute bit.

### I<sup>2</sup>C-bus receiver and data handling

#### Bus specification

The TDA8425 is controlled via the 2-wire I<sup>2</sup>C-bus by a microcomputer.

The two wire (SDA - serial data, SCL - serial clock) carry information between the devices connected to the bus. Both SDA and SCL are bidirectional lines, connected to a positive supply voltage via a pull up resistor.

When the bus is free both, lines are HIGH.

The data on the SDA line must be stable during the HIGH period of the clock. The HIGH or LOW state of the data line can only change when the clock signal on the SCL line is LOW. The set up and hold times are specified in AC CHARACTERISTICS.

A HIGH-to-LOW transition of the SDA line while SCL is HIGH is defined as a start condition.

A HIGH-to-LOW transition of the SDA line while SCL is HIGH is defined as a start condition.

The bus receiver will be reset by the reception of a start condition. The bus is considered to be busy after the start condition.

The bus is considered to be free again after a stop condition.

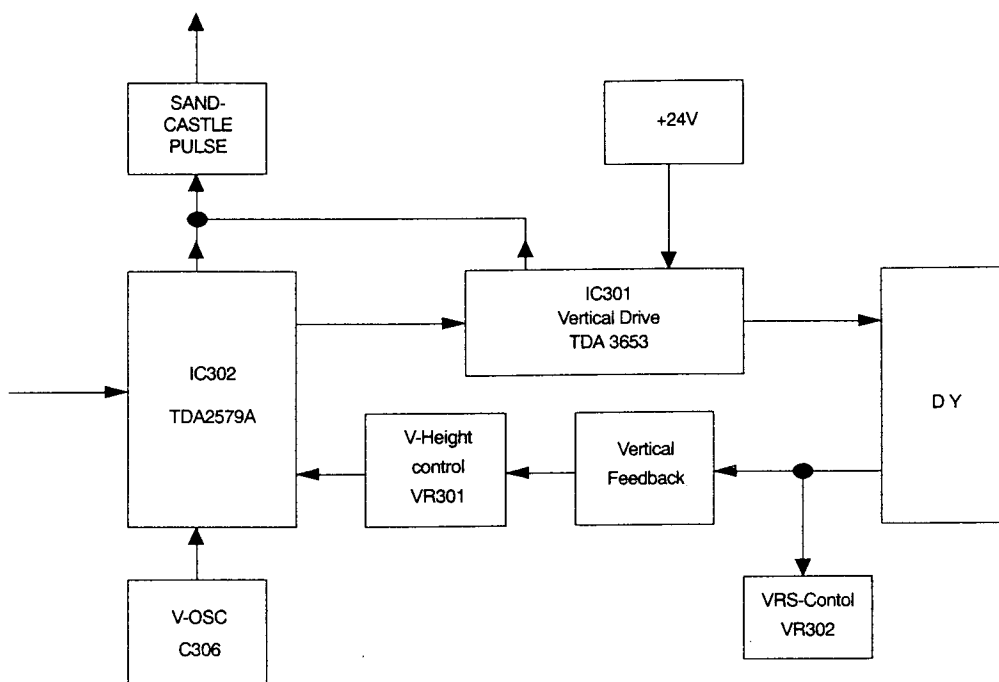
†) PIN PARAMETER

Pin NO	parameter	symbol	min	typ	max	unit
1	Input 2(Left)	$V_I$	-	$V_{ref}$	-	V
2	Voltage range for pins with external capacitors	$V_{cap}$	-	$V_{cc-0.3}$	-	V
3	Input 2(Right)	$V_I$	-	$V_{ref}$	-	V
4	Supply voltage	$V_{CC}$	10.8	12	13.2	V
5	Analog ground	AGND		0		V
6	Bass Right	$V_{cap}$	-	$V_{ref}$	-	V
7	Bass Right					
8	Treble Right	$V_{cap}$	-	$V_{ref}$	-	V
9	Output Right	$V_O$	-	$V_{ref}$	-	V
10	Digital ground	DGND	-	0		V
11	Serial Data	Low	-0.3	-	1.5	V
		High	3.0	-	$V_{cc}$	V
12	Serial clock	Low	-10	-	-	$\mu A$
		High		-	10	$\mu A$
13	Output Left	$V_O$		$V_{ref}$	-	V
14	Treble Left	$V_{cap}$	-	$V_{ref}$	-	V
15	Bass Left					
16	Bass Left					
17	PSEUDO 2					
18	Input 1 (Left)					
19	Pseudo 1					
20	Input 1 (Right)					

**MEMO**

# 7. DEFLECTION SECTION

## 1. VERTICAL SECTION BLOCK DIAGRAM



### 1) GENERAL DESCRIPTION

The TDA3653 is a vertical deflection output circuit for drive of various deflection systems with current up to 1.5 A peak-to-peak.

### 2) FEATURES

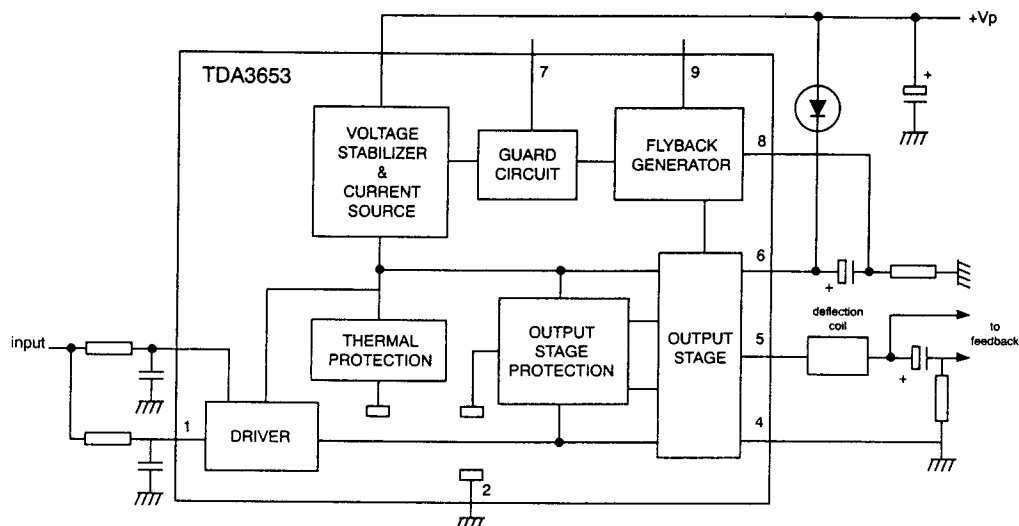
- Driver
- Output stage
- Thermal protection and output stage protection
- Flyback generator
- Voltage stabilizer
- Guard circuit

### 3) QUICK REFERENCE DATA

Supply voltage range (pin 9)	$V_9 = V_{9.4}$	0 to 40 V
Peak output voltage during flyback (pin 5)	$V_{5-4M}$	max. 60V
Output current (peak-to-peak value)	$I_{5(p-p)}$	max. 1.5 A
Operating junction temperature	$T_j$	max. 150 °C
Thermal resistance from junction to mounting base		
(SOT-110B)	$R_{th j-mb}$	typ. 10 K/W
(SOT-131B)	$R_{th j-mb}$	typ. 3.5 K/W

MEMO

#### 4) BLOCK - DIAGRAM



#### 5) FUNCTIONAL DESCRIPTION

##### Output stage and protection circuit

Pin 5 is the output pin. The supply for the output stage is fed to pin 6 and the output stage ground is connected to pin 4. The output transistors of the class B output stage can each deliver 0.75 A maximum.

The maximum voltage for pin 5 and 6 is 60V.

The output power transistors are protected such that their operation remains within the SOAR area.

This is achieved by the co-operation of the thermal protection circuit, the current-voltage detector, the short-circuit protection and the special measures in the internal circuit layout.

During scan the capacitor at pin 6 is charged to a maximum voltage, which is dependent on the value of the resistor at pin 8. During normal operation the voltage at pin 8 may not be lower than 2.2V.

When the flyback starts and the voltage at the output pin (pin 5) exceeds the supply voltage (pin 9), the flyback generator is activated. Then  $V_p = 2V$  is connected in series (via pin 8) with the voltage across the capacitor. The voltage at the supply pin (pin 6) of the output stage will then be the maximum  $2V_p - 2V$ . Lower voltages can be obtained and determined by the value of the resistor at pin 8.

#### 6) DRIVER AND SWITCHING CIRCUIT

Pin 1 is the input for the driver of the output stage. The signal at pin 1 is also applied via external resistors to pin 3 which is the input of a switching circuit. When the flyback starts, this switching circuit rapidly turns off the lower output stage and so limits the turn off dissipation. It also allows a quick start of the flyback generator.

External connection of pin 1 to pin 3 allows for applications in which the pins are driven separately.

#### 8) GUARD CIRCUIT

When there is no deflection current and the flyback generator is not activated, the voltage at pin 8 reduces to less than 2V. The guard circuit will then produce a D.C. voltage at pin 7, which can be used to blank the picture tube and thus prevent screen damage.

#### 9) VOLTAGE STABILIZER

The internal voltage stabilizer provides a stabilized supply of 6V to drive the output stage, which prevents the drive current of the output stage being affected by supply voltage variations.

#### 7) Flyback generator

## 10) RATINGS

Limiting values in accordance with the absolute maximum system(IEC 134) ; pins 4 and 2 externally connected to ground

Supply voltage(pin 9)	$V_p = V_{9.4}$	max.	40V
Supply voltage output stage(pin 6)	$V_{6.4}$	max.	60 V
Output voltage(pin 5)	$V_{5.4}$	max.	60 V
Input voltage (pins 1 and 3)	$V_{1;3-2}$	max.	$V_p$ V
External voltage at pin 7	$V_{7-2}$	max.	5,6 V
Peak output current (pin 5)			
Repetitive	$\pm 15RM$	max.	0.75 A
Non-repetitive	$\pm 15SM$	max.	1,5 A*
Peak output current(pin 8)			
Repetitive	$18RM$	-0.85 to	+0.75A
Non-repetitive	$\pm 18SM$	max.	1,5 A*
Total power dissipation	$P_{tot}$	see Fig. 2	
Storage temperature range	$T_{stg}$	-65 to	+150°C
Operating ambient temperature range	$T_{amb}$	see Fig. 2	
Operating junction temperature range	$T_j$	-25 to	+ 150°C

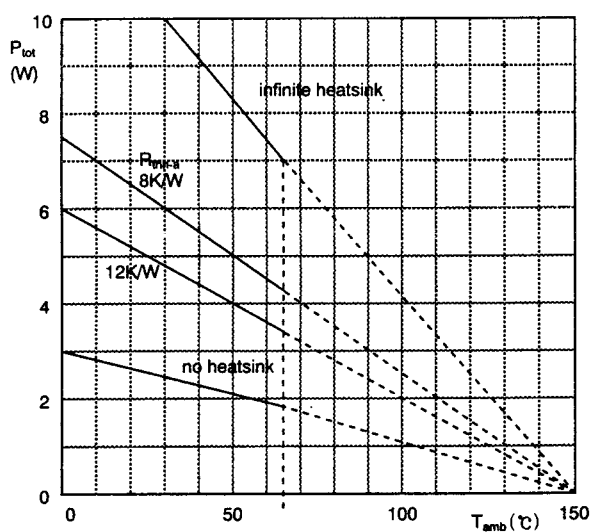


Fig. 2 Power derating curves(for SOT-110B)

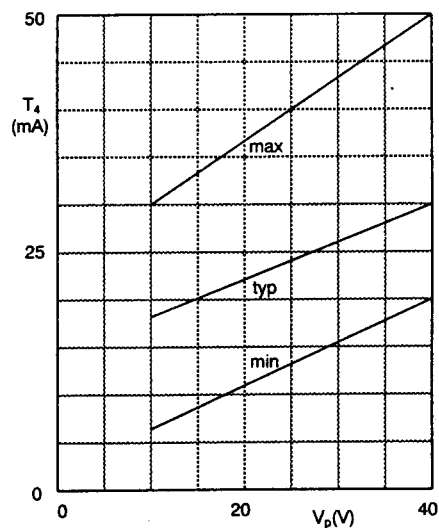


Fig. 3 Quiescent current  $I_4$  as a function of supply voltage  $V_p$

# 11) CHARACTERISTICS

$V_p = V_{9.4} = 26 \text{ V}$  ;  $T_{amb} = 25^\circ\text{C}$  ; pins 2 and 4 externally connected to ground ; unless otherwise specified

parameter	symbol	min	typ	max	unit
Supply					
Supply voltage ; pin 9(note 1)	$V_p = V_{9.4}$	10	-	40	V
Supply voltage ; pin 6(note 1)	$V_{6-4}$	-	-	60	V
Supply current ; pin 9(note 2)	$I_p = I_9$	-	10	20	mA
Quiescent current ; pin 4(see Fig. 3)	$I_4$	6	25	40	mA
Variation of quiescent current with temperature	$\Delta I_4$	-	-0.04	-	mA/K
Output current					
Output current (pin5)					
(peak-to-peak value)	$I_{5(p.p)}$	-	1,2	1,5	A
Output current flyback generator (pin 8)	$-I_8$	-	0,7	0,85	A
Output current flyback generator (pin 8)	$I_8$	-	0,6	0,75	A
Output voltage					
Peak voltage during flyback	$V_{5-4M}$	-	-	60	V
Saturation voltage to supply					
at $I_5 = 0.75\text{A}$	$V_{6-5sat}$	-	2,5	3,0	V
at $I_5 = 0.75\text{A}(\text{note } 3)$	$V_{5-6sat}$	-	2,5	3,0	V
at $-I_5 = 0.6\text{A}$	$V_{6-5sat}$	-	2,2	2,7	V
at $I_5 = 0.6\text{A}(\text{note } 3)$	$V_{5-6sat}$	-	2,3	2,8	V
Saturation voltage to ground					
at $I_5 = 0.75\text{A}$	$V_{5-4sat}$	-	2,0	2,5	V
at $I_5 = 0.6\text{A}$	$V_{5-4sat}$	-	1,7	2,2	V
Flyback generator					
Saturation voltage					
at $-I_8 = 0.85\text{A}$	$V_{9-8sat}$	-	1,6	2,1	V
at $I_8 = 0.75\text{A}(\text{note } 3)$	$V_{8-9sat}$	-	2,3	2,8	V
at $-I_8 = 0.7\text{A}$	$V_{9-8sat}$	-	1,4	1,9	V
at $I_8 = 0.6\text{A}(\text{note } 3)$	$V_{8-9sat}$	-	2,2	2,7	V
Flyback generator active if :	$V_{5-9}$	4	-	-	V
Leakage current at pin 8	$-I_8$	-	5	100	$\mu\text{A}$
Input current(pin 1)					
at $I_{5(p.p)} = 1.5\text{A}$	$I_1$	-	-	1,3	mA
Input voltage during scan (pin1)	$V_{1-2}$	-	-	3,2	V
Input voltage during scan (pin 3)					
pins 1 and 3 not connected	$V_{3-2}$	0.9	-	$V_p$	V

parameter	symbol	min	typ	max	unit
Input current during scan (pin 3) Pins 1 and 3 not connected	I3	0.01	-	-	mA
Input current during scan (pin 3) Pins 1 and 3 connected	I3	-	-	0.52	mA
Input resistance(pin 3)	R3	3.75	5.0	6.25	k $\Omega$
Input voltage during flyback(pin 1)	V1-2	-	-	250	mV
Input voltage during flyback (pin 3)	V3-2	-	-	250	mV
Guard circuit Output voltage ; pin 7(note 4) Loaded with 100 K $\Omega$	V7-2	4.4	5.0	5.8	V
Loaded with 0,5 mA	V7-2	3.5	4.4	5.3	V
Internal series resistance of pin 7	Ri7	0.9	1.2	1.7	k $\Omega$
Guard circuit active if V8-2 is lower than (note 6)	V8-2	-	-	2.0	V
General data Thermal protection becomes active if junction temperature exceeds	Tj	158	175	192	$^{\circ}$ C
Thermal resistance junction to mounting base	Rth j-mb	-	10	12	K/W
Open loop gain at 1 KHz(note 5)	Go	-	42	-	dB
Frequency response(-3dB) (note 7)	f	-	40	-	kHz

#### Notes to the characteristics

1. The maximum supply voltage should be chosen so that during flyback the voltage at pin 5 does not exceed 60V.
2. These values are obtained (pin 9) at no load and no quiescent current.

3. Duty factor maximum 3,3%

4. Guard circuit is active.

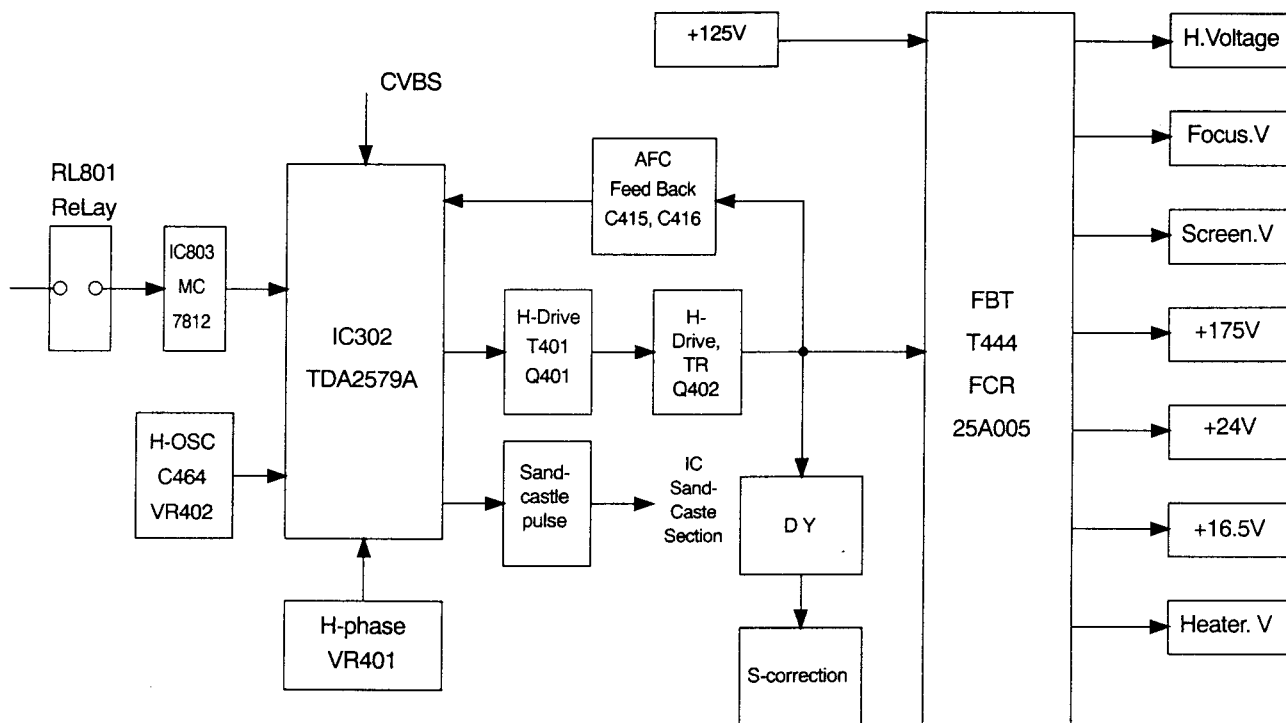
5.  $R_{load} = 8 \Omega$  ;  $I_{load(rms)} = 125 \text{ mA}$ .

6. During normal operation the voltage V8-2 may not be lower than 2,5V.

7. With 220pF between pins 1 and 5.

**MEMO**

## 2. HORIZONTAL SECTION BLOCK DIAGRAM



## 3. HORIZONTAL/VERTICAL SYNCHRONIZATION CIRCUIT

### a) GENERAL DESCRIPTION

The TDA2579A generates and synchronizes horizontal and vertical signals. The device has a 3 level sandcastle output ; a transmitter identification signal and also 50/60 Hz identification.

### b) FEATURES

- Horizontal phase detector, (sync to oscillator), sync separator and noise inverter
- Triple current source in the phase detector with automatic selection
- Second phase detector for storage compensation of the horizontal output

- Stabilized direct starting of the horizontal oscillator and output stage form mains supply
- Horizontal output pulse with constant duty cycle value of 29 $\mu$ s
- Internal vertical sync separator, and two integration selection times
- Divider system with three different reset enable windows
- Synchronization is set to 628 divider ratio when no vertical sync pulses and no video transmitter is identified
- Vertical comparator with a low DC feedback signal
- 50/60Hz identification output combined with mute function
- Automatic amplitude adjustment for 50 and 60Hz and blanking pulse duration
- Automatic adaption of the burst-key pulsewidth

**MEMO**

# c) QUICK REFERENCE DATA

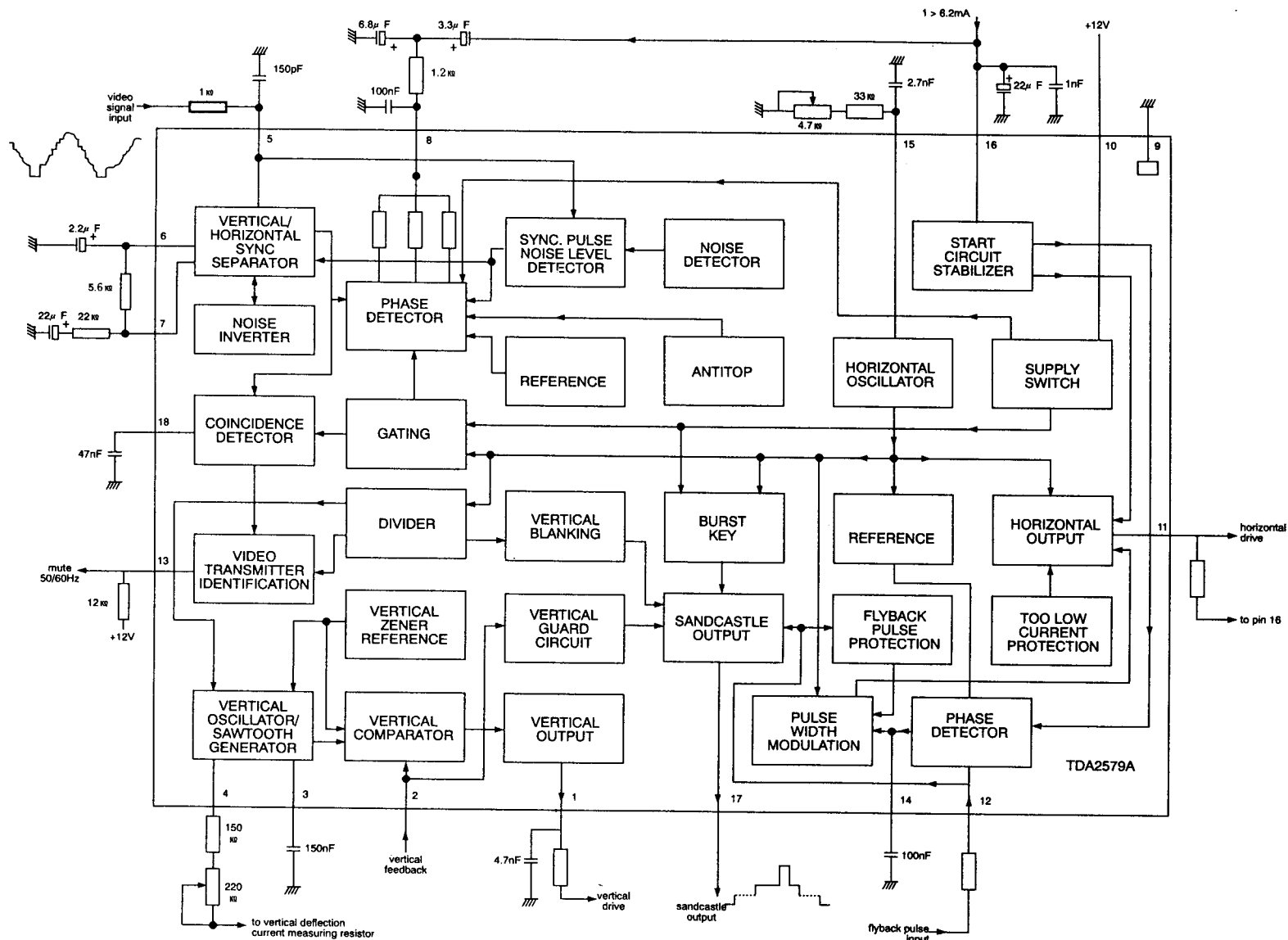
parameter	condition	symbol	min	typ	max	unit
Supply						
Minimum required current for starting horizontal oscillator and output stage		$I_{16}$	6.2	-	-	mA
Main supply voltage		$V_{10}$	-	12	-	V
Supply current		$I_{10}$	-	70	-	mA
Input signals						
Sync pulse input amplitude		$V_{5(p.p)}$	0.05	-	1.0	V
Horizontal flyback pulse input current		$I_{12}$	-	1	-	mA
Vertical comparator input signal						
Voltage AC		$V_2$	-	0.8	-	V
Voltage DC		$V_2$	-	1	-	V
Output signals						
Horizontal output(open collector) $I_{11} = 25\text{mA}$		$V_{11}$	-	-	0.5	V
Vertical output stage driver (emitter follower) $I_1 = 1.5\text{mA}$		$V_1$	5	-	-	V
Sandcastle output levels						
$V_{17}$ burst-key		$V_{17}$	9.8	-	-	V
horizontal blanking		$V_{17}$	-	4.5	-	V
vertical blanking		$V_{17}$	-	2.5	-	V
Video transmitter identification output stage (open collector loaded with external resistor to positive supply) No sync. pulse present		$V_{13}$ $I_{13}$	- -	- -	0.5 5	V mA
Sync pulse present						
divider ratio >576		$V_{13}$	-	$V_{10}$	-	V
divider ratio <576		$V_{13}$	-	7.65	-	V

**MEMO**

# PACKAGE OUTLINE

18 lead dual in line ; plastic(SOT 102H).

## d) BLOCK-DIAGRAM



e) PIN DESCRIPTION

Pin	Description	Pin	Description
1	Vertical output stage	10	Supply
2	Vertical comparator	11	HORIZONTAL output
3	Vertical ramp generator	12	Flyback input pulse
4	Current source	13	Video transmitter identification output
5	Video input	14	Second control loop
6	Vert/HORI sync SEPARATOR	15	Horizontal oscillator
7		16	Supply
8	First control loop	17	Sandcastle output
9	ground	18	Coincidence detector

**MEMO**

# 8. INSTALLATION AND SERVICE ADJUSTMENTS

## 1. GENERAL INFORMATIONS

All the adjustments are thoroughly checked and corrected when the receiver leaves the factory. Therefore the receiver should operate normally and produce proper colour and B/W picture upon installation. However the minor service adjustments may be required depending on the particular location in which the receiver is operated. This receiver is shipped completely in cardboard carton. Carefully draw out the carton and remove all the packing materials.

Plug the power cord into a convenient two pin power outlet. Turn the receiver on and adjust the fine tuning for the best picture detail.

Check and adjust all the customer controls such as BRIGHTNESS, CONTRAST and COLOUR controls to obtain natural colour or B/W picture.

## 2. AUTOMATIC DEGAUSSING

A degaussing coil is mounted around the picture tube so that the external degaussing after moving the receiver is normally unnecessary, providing the receiver is properly degaussed upon installation. The degaussing coil operates for about 1 second after the power to the receiver is switched on. If the set is moved or faced in a different direction, the power switch must switch off at least 10 minutes in order that the automatic degaussing circuit operates properly.

If the chassis or parts of the cabinet becomes magnetized and cause poor colour purity, use an external degaussing coil. Slowly move the degaussing coil around the face-plate of the picture tube, the sides and the rear of the receiver and slowly withdraw the coil to the distance of about 2m before disconnecting it from the AC source. If the colour shading still persists, perform the COLOUR PURITY ADJUSTMENT and CONVERGENCE ADJUSTMENTS procedures as mentioned later.

## 3. HIGH VOLTAGE CHECK

**CAUTION :** There is no HIGH VOLTAGE ADJUSTMENT on this chassis. But B+ power must be adjusted in +125V under the full colour bar pattern and

normal picture control level.

- 1) Connect an accurate high voltage meter to the second anode of the picture tube.
- 2) Turn on the receiver. Set the BRIGHTNESS and CONTRAST control to minimum (Zero beam).
- 3) The high voltage should be measured less than 27KV.
- 4) Rotate the BRIGHTNESS and CONTRAST control to the both extremes to be sure. The high voltage does not exceed the limit of 27KV under any conditions.

## 4. HORIZONTAL OSCILLATOR ADJUSTMENT

If there is an indication of unstable horizontal sync, adjust the HORIZONTAL HOLD control (VR 401) to remove the condition. When you adjust the horizontal hold control, you should connect TP-H and TP-G for the H-oscillator adjustment.

## 5. HORIZONTAL PHASE ADJUSTMENT

If you want to move the center of picture, adjust HORIZONTAL phase control (VR 402)

## 6. VERTICAL HEIGHT ADJUSTMENT

The SIZE control (VR 301) on the main board changes the size of the picture, having an equal effect on the top and the bottom.

## 7. SCREEN ADJUSTMENT

- 1) Tune in an active channel.
- 2) Make the picture normal condition (no blooming or no-flyback line) with the VR screen.

## 8. FOCUS ADJUSTMENT

Adjust the FOCUS control on FBT for well defined scanning lines in the centre area of the screen.

## 9. R-F AGC ADJUSTMENT

- 1) Turn the set in the strongest station in your area.

- 2) Turn the AGC control (VRI21) on the IF board to fully clockwise position.
- 3) Adjust the AGC control until noises (snow) disappear from the screen.

#### 10. HORIZONTAL WIDTH ADJUSTMENT

The width coil (L 404) on the power board changes the width of the picture, having an equal effect on the left and the right.

#### 11. VERTICAL RASTER SHIFT ADJUSTMENT

If you want to move the center of picture, adjust VERTICAL RASTER SHIFT control (VR 302)

#### 12. COLOUR PURITY ADJUSTMENT

NOTE : Before attempting any purity adjustments, the receiver should be operated for at least fifteen minutes. Purity adjustment requires Rubber Wedge kit.

- 1) Demagnetize the picture tube and cabinet using a degaussing coil.
- 2) Turn the CONTRAST and BRIGHTNESS controls to the maximum.
- 3) Receive the green colour pattern.
- 4) Loose the clamp screw holding the yoke, and slide the yoke backward or forward to provide vertical green belt (zone) in the picture screen.
- 5) Remove the Rubber Wedges.
- 6) Rotate and spread the tabs of the purity magnet (See Fig. 3) around the neck of the picture tube until a green belt is obtained in the centre of the screen.  
And at the same time, centre the raster vertically by adjusting the magnet.
- 7) Move the yoke slowly forward or backward until a uniform red screen is obtained. Tighten the clamp screw.
- 8) Check the purity of the red and blue raster.
- 9) Tighten the clamp screw of the yoke temporarily.
- 10) Obtain a white raster ; referring to the "CRT WHITE BLANCE ADJUSTMENT ".
- 11) Proceed with convergence adjustment.

#### 13. CRT WHITE BALANCE ADJUSTMENT

- 1) Turn in an active channel.
- 2) Set the colour control to the minimum.
- 3) By rotations the red and blue drive controls (VR201, VR 202) clockwise from minimum, Set them to the midposition.
- 4) Adjust the blue and the red drive controls (VR 201, VR 202) to obtain proper white-blanced picture a high area.

#### 14. CONVERGENCE ADJUSTMENTS

NOTE : Before attempting any convergence adjustments, the receiver should be operated for at least fifteen minutes.

- 1) Centre Convergence Adjustment
  - a) Receive the crosshatch pattern with a colour bar signal generator.
  - b) Adjust the BRIGHTNESS and CONTRAST controls for a well defined pattern.
  - c) Adjust the two tabs of the 4-pole Magnets to change the angle among them(See Fig. 2) and superimpose the red and the blue vertical lines in the centre area of the picture screen. (See Fig. 2).
  - d) Turn the both taps while at the same time keeping angle constant and superimpose the red and the blue horizontal lines at the centre of the screen. (See Fig. 3).
  - e) Adjust the two tabs of 6-pole Magnets to superimpose the red/blue line and the green one. Adjusting the angle affects the vertical lines and rotating both magnets affect the horizontal lines.
  - f) Due to the interaction between these adjustments the steps 3,4 and 5 should be repeated until the satisfactory results are obtained.
- 2) Circumference Convergence Adjustment
  - a) Loose the clamping screw of deflection yoke to allow the yoke to tilt.
  - b) Put a wedge as shown in Fig. 1 temporarily. (Do not remove the cover paper on adhesive part of the wedge).
  - c) Tilt front of the deflection yoke up or down to obtain better convergence in circumference. (See Fig. 3) Push the mounted wedge into the space between th picture

- tube and the yoke to fix the yoke temporarily.
- d) Put the other wedge into bottom space and remove the cover paper to stick.
  - e) Tilt the front of the yoke right of left to obtain the convergence in circumference. (See Fig. 4).
  - f) Keep the yoke position and put another wedge in either upper space. Remove the cover paper and stick the wedge on picture tube to fix the yoke.
  - g) Detach the temporarily mounted wedge and put it in another upper space. Stick it on picture tube to fix the yoke
  - h) After fixing three wedges recheck overall convergence. Tighten the screw firmly to fix the yoke and check the yoke is firm.
  - i) Stick 3 adhesive tabs on wedges as shown in Fig. 1.

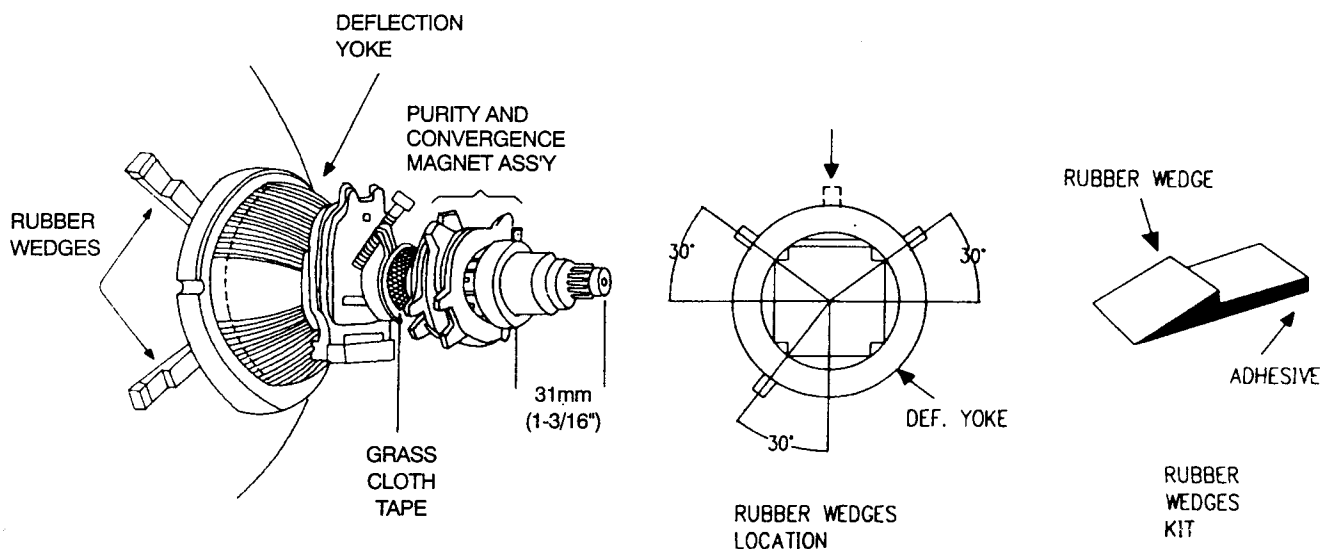


Figure 1 TUBE ASSMEBLY

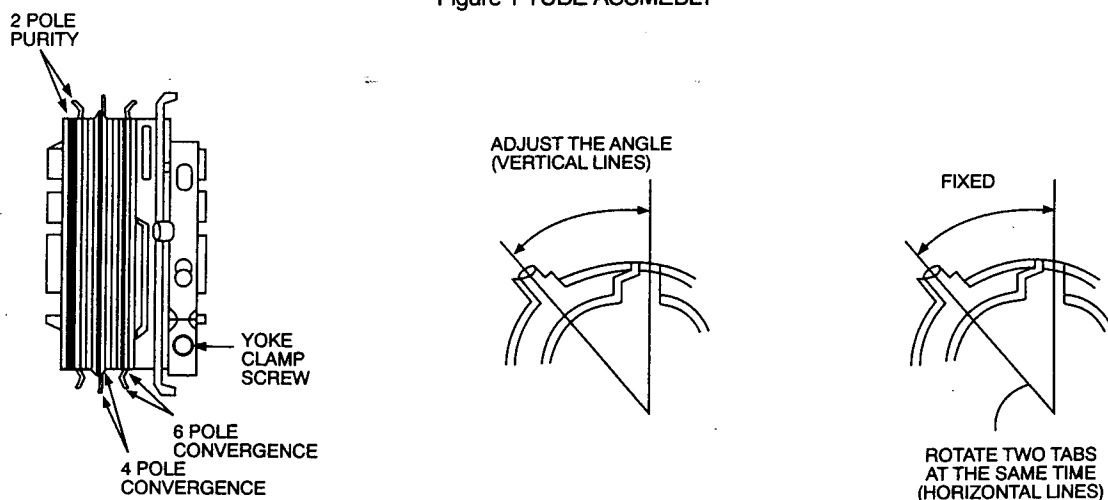


Figure PURITY AND CONVERGENCE MAGNETS

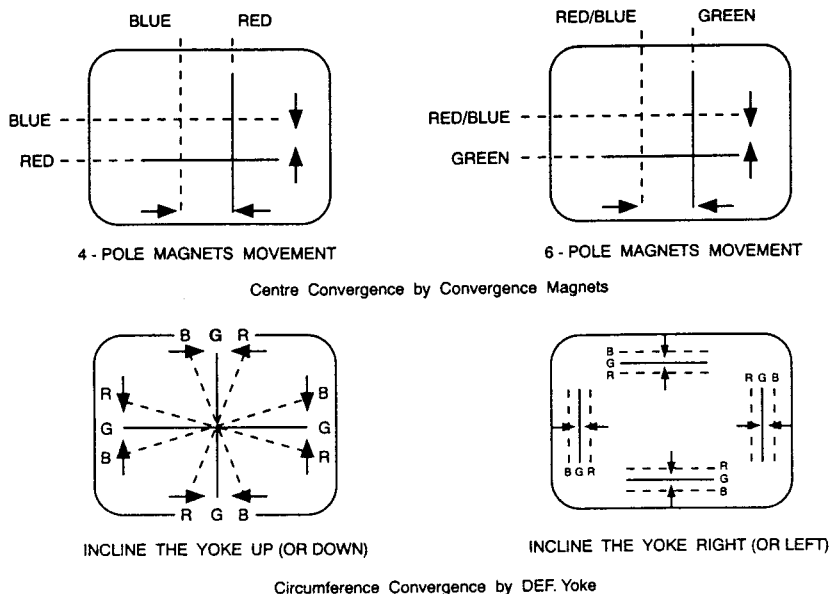


Figure3. Dot Movement Pattern

## 9. GENERAL ALIGNMENT INSTRUCTIONS

### A. GENERAL

The alignment is an exacting procedure and should be undertaken only when necessary.

The test equipments specified or its equivalent is required to properly perform the alignment procedures which are outlined on the following pages. The use of equipment which does not meet these requirements may result which does not meet these requirements may result in the inability of properly aligning in the receiver.

It is essential that the bias values as specified are maintained, while the alignment insures the proper results.

### B. EQUIPMENT TERMINATIONS

The alignment pads are designed for correct matching of the equipment to the circuits involved, The failure to the proper matching will result in the responses which cannot be depended upon as representing the ture operation of the receiver.

The pads should be constructed as compactly as possible with all the unshielded leads not being in excess of 2.5cm long.

### C. SIGNAL OVERLOAD

Since the large excessive of the sweep generator causes the overloading of receiver circuits, first, the output of the sweep

generator set to zero and then gradually increase the output until a response is obtained, Further the increase of the sweep output should not change the configuration of the response except in amplitude. If the response changes in configuration, for example, flattening at the top or dropping below the base line at the bottom, decrease the sweep output to restore the proper configuration. The oscilloscope gain should be as high as possible to maintain a useable pattern with the peak-to-peak values specified, thus requiring a lower output from the sweep generator and less chance of overload.

The insertion of makers from the marker generator should not cause the distortion of the response.

### D. TEST EQUIPMENTS

- 1) PAL-I PATTERN GENERATOR (PM5518)
- 2) OSCILLOSCOPE.
- 3) DC power supply (DC range : 0-10V,0-20V)
- 4) Matching pad.
- 5) Probe (which impedance is 75 ohm)
- 6) TV DIGITAL SOUND GENERATOR (NICAM)
- 7) BNC TO DIN JACK
- 8) BNC TO BNC CABLE
- 9) DIGITAL VOLTMETER
- 10) FREQ COUNTER METER

## 1. VIDEO DETECTOR ALIGNMENT

- 1) Set the supply voltage to AC 240V.
- 2) Set the RF output frequency of GEN to 39.5MHZ and then to multi-burst pattern.
- 3) Connect the RF out of PM5518 to TP-IF.
- 4) Connect the probe of oscilloscope to TP-11.  
ONLY - use  $\left\{ \begin{array}{l} 10:1 \text{ probe, horizontal sync,} \\ 50\text{mv/DIV /qwsec/DIV} \end{array} \right.$
- 5) Adjust the waveform minimum without distortion of (a) portion by controlling L123(VIDEO DET COIL).

WAVE FORM AFTER ADJUSTMENT

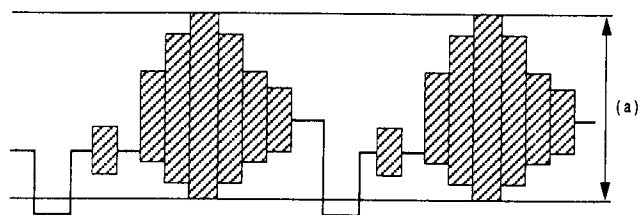


Figure 4

## 2. AFT ADJUSTMENT

- STEPS 1), 2), 3) one the same as video DET adjustment
- 4) Connect the DC volts meter to TP-17
  - 5) Adjust the DC Voltage of TP-17 tube  $6.0 \pm 0.2\text{V}$  by controlling the L120(AFT Control coil)
- \* Set the VR121(AGC VR) at center.

## 3. GROUP DELAY ALIGNMENT

- 1) Receive the multi - burst pattern of 511.25MHz with the PAL - I pattern generator.
- 2) Set the signal gain of the pattern generator to be the maximum (about 75 - 85dBuV.)
- 3) Connect the oscilloscope probe (using 10:1 probe) to TP-11.
- 4) Adjust the upper core of tuner so that the amplitude of multi-burst signal is flat. (See Fig.5)

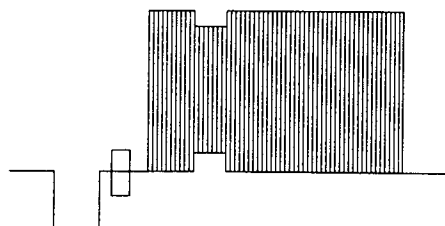


Figure 5

## 4. APC ADJUSTMENT

- 1) Receive the colour bar pattern with PAL colour bar generator.
  - 2) Connect the terminal TPA to the terminal TPG with the short jumper wire.
  - 3) Adjust the APC control (C541) so that the colour bar pattern stands still vertically or drifts slowly across the picture screen (See Fig. 6).
  - 4) Remove the short jumper wire.
  - 5) Check that the colour appears with in 0.5sec when changing the channel to another.
- If the colour appears slowly or the colour sync is not normal, retouch the colour sync Trimmer (C541) for the proper colour display.

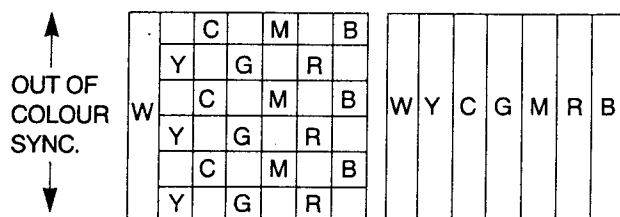


Figure 6

## 5. CHROMA TRAP ADJUSTMENT

- 1) Receive red pattern of the PAL-I pattern generator.
- 2) Connect the oscilloscope to TP-Y
- 3) Adjust L251 until the amplitude A of the red signal is the minimum (See Fig. 7)

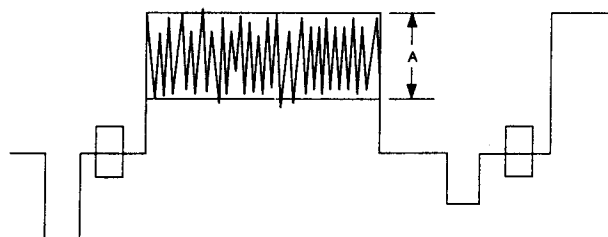


Figure 7

## 6. SOUND ADJUSTMENT

- a) Connect the video output terminal of the PAL pattern generation to the video input terminal of the TV digital Sound generator.

- b) Connect the RF output of TV digital sound generator to the antenna terminal of the TV receiver.
- c) Set the sound mode of the TV digital Sound generator to Stereo, Dual or Mono mode.

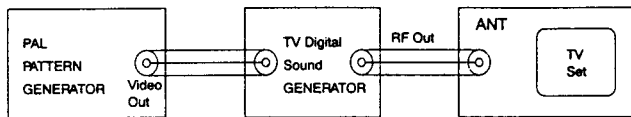


Figure 8

### 1) SIF DETECTOR ADJUSTMENT

- a) Receive the FM SOUND and the color bar signal.
- b) Connect the probe of oscilloscope to TP-38.
- c) Set the color bar signal amplitude Minimum by controlling the L151 (See Fig.9)

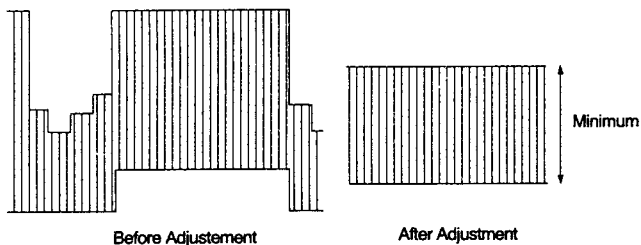


Figure 9

### 2) FM DETECTOR ADJUSTMENT

- a) Receive the FM SOUND and the color bar signal
- b) Connect the probe of oscilloscope to TP-SCI.
- c) Adjust the A amplitude maximum by controlling L152 (see Fig.10)

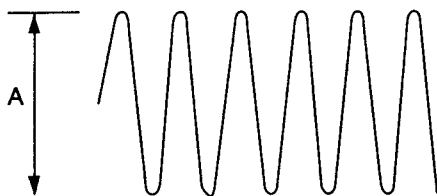


Figure 10

### 3) EYE PATTERN ADJUSTMENT

- a) Receive the stereo sound and the color bar signal
- b) Connect the probe of oscilloscope to TP-N2 (only use the 10:1 probe)  
( AC Sync : 10 : 1 probe  
20 mv/DIV : 1  $\mu$  sec/DIV )
- c) Adjust the EYE pattern to be folded one line by controlling NC13  
(See Fig. 11)

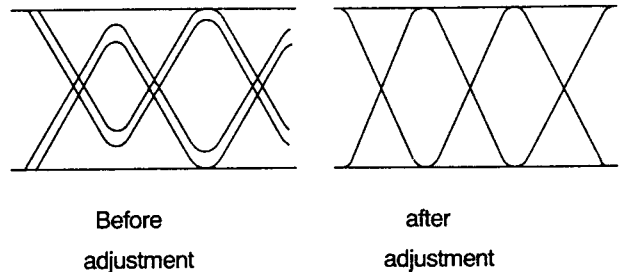


Figure 11

### 4) 5.824 MHz ADJUSTMENT

- a) Receive the stereo sound and the color bar signal
- b) Connect the input of Frequency Counter to the TP-N1 and the TP-G4.
- c) Set the signal to be 5.824MHz by controlling the NC31.

### 5) 17.472 MHz ADJUSTMENT

- a) Receive the stereo sound and the color bar signal
- b) Connect the probe of oscilloscope to the TP-G3 and the TP-N4.
- c) Control the NC36 to stop the wave form movement as shown Fig.12

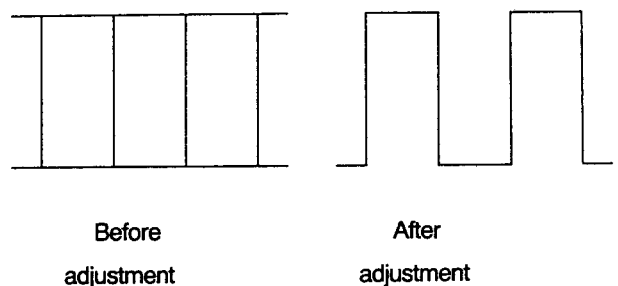


Figure.12

# 10. REMOCON SECTION

## 1. FEATURES

SPM 113 is a television receiver control system, based on the PCA84C 641 microcontroller.

It is a voltage synthesis tuning(VST) system with On-Screen Display (OSD) of the relevant control functions.

"German" stereo and NICAM sound system are supported.

The analogue video controls are controlled by the on chip digital to analogue convertors.

This system is a colour standard independent and can be used all over the world. The SPM113 package supports external teletext processors by means of a CTV 9XX interface.

- VST tuning system

- On - screen display of all control functions

- Off - screen LED indication for stand by mode and for NICAM signal available

- "German" stereo sound control

- NICAM sound control

- video source switching

- VTR time constant control

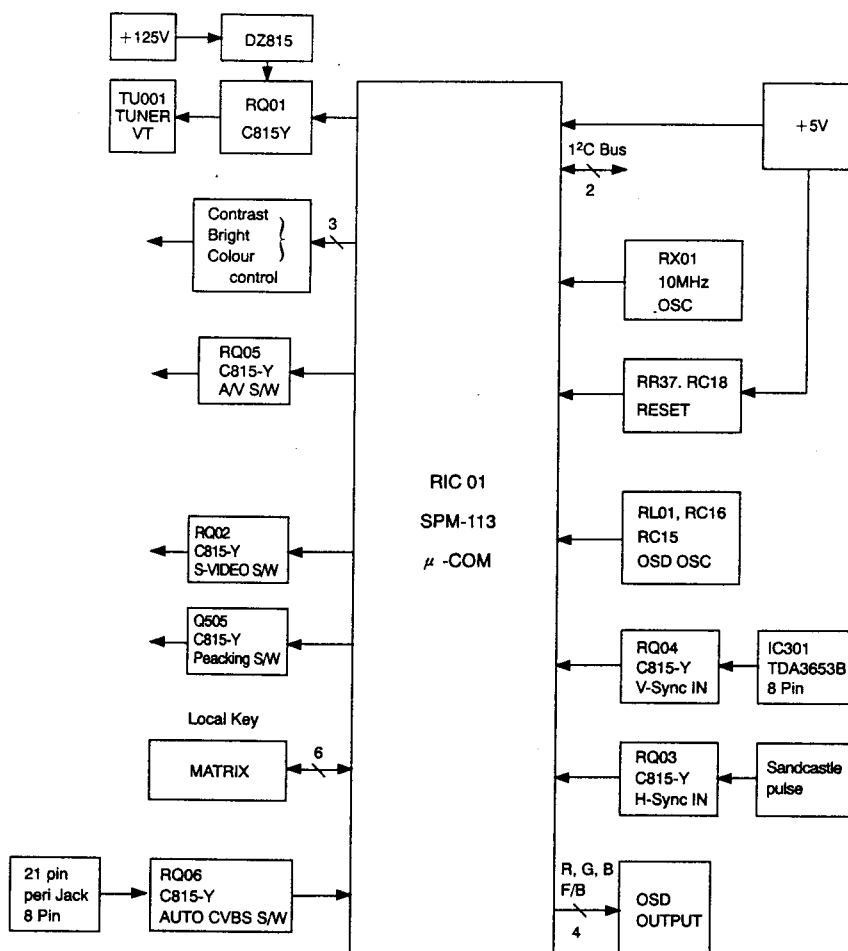
- Non - volatile memory for storage of preferred programs and personal presets

- CTV 9XX teletext interface

- RC - 5 remote control decoding

- Local keyboard decoding

## 2. BLOCK DIAGRAM

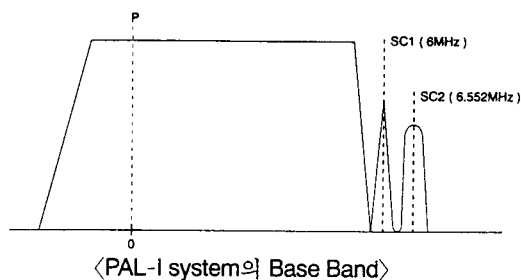


3. PIN DESCRIPTION					
pin No	pin Name	Discription	pin No	pin Name	Discription
1	VTUNN	tuning Voltage control output	22	RED	OSD red output
2	VOL	NOT USED	23	GREEN	OSD green output
3	BRI	brightness control output	24	BLUE	OSD blue output
4	COL	colour control output	25	FBL	OSD fast blanking output
5	CON	contrast control output	26	HSYNC	horizontal synchronization input
6	HUE	hue control output	27	VSYNC	vertical synchronization input
7	BND - 0	band - switch output 0	28	DOSC OUT	LC oscillator output for OSD
8	BND - 1	band - switch output 1	29	DOSC IN	LC oscillator input for OSD
9	AFC	analog AFC sense input	30	TEST	test input ; connected to ground
10	peri 0	AV switching	31	XTAL 1	oscillator input;10M crystal
11	peri 1	RGB switching	32	XTAL 2	oscillator output
12	CVBS in	CVBS status input	33	RESETN	power - ON reset input/output
13	P0	S-Video swithching	34	IDENT	horizontal coincidence input
14	P1	AV-1 switching	35	RMOT	remote control input
15	KEYB 2	Keyboard scan line  input/output	36	PEAK	Peaking on/off switching
16	KEYB 3		37	SYS 1	system output 1
17	KEYB 4		38	SYS 2	system output 0
18	KEYB 5		39	SCL	I <sup>2</sup> C - bus clock signal input/output
19	KEYB 6		40	SDA	I <sup>2</sup> C - bus data signal input/output
20	MDSTR	system mode strobe output	41	STDBY	stand by/on control input/output
21	VSS	ground	42	Vdd	+5V supply voltage input

# 11. NICAM SECTION

## 1. Features

- FM sound(Analog) & Isolated high quality sound function.
- As a result of keeping the compatibility of a receiving apparatus
- It has countermeasure against the variety of Data broadcasting and facsimile broadcasting.
- 3 different transmission function(Mono (analog), Dual I , Dual II ).



P : Picture Carrier

Sc : Analog FM sound Carrier

Sc : Digital sound Carrier

## 2. RF transmission system

	Analog	Digital
Modulation System	FM	QPSK
Sub-carrier frequency	6.0MHz	6.552MHz
Roll - off rate of transmission filter	-	100%
P/S IF Power	13dB	20dB
Signal options	MONO	MONO
	MONO	STEREO
	MONO	DUAL I , DUAL II
Band width	-	700KHZ

\* QPSK : Quadrature phase Shift Keying  
(4 phase modulation)

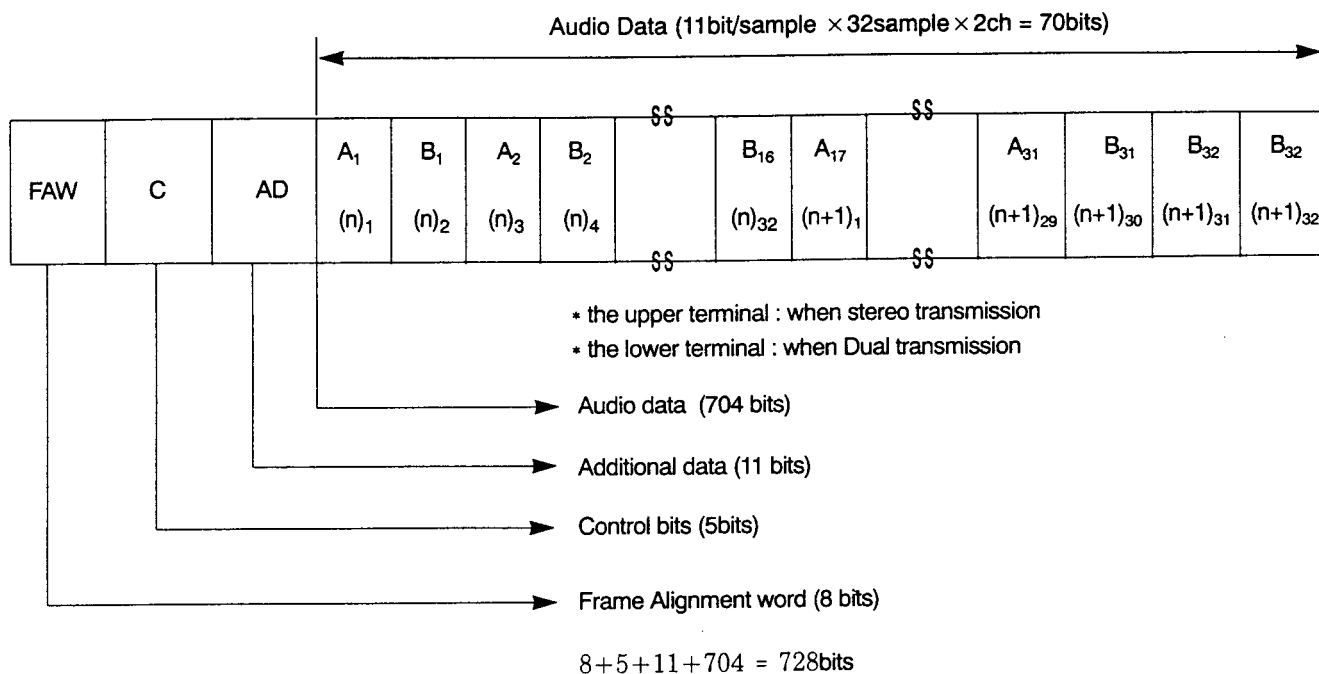
## 3. NICAM 728 Basic Source

### Digital Features

- Transmission bit rate 728kbit/sec
- Frame Construction 728bit/msec
- Sound Signal band width 15KHz
- Sampling frequency 32Khz
- Initial residution 14Bit
- Companding characteristics 14/10bit
- Digital Sound Channel 2CH

**MEMO**

#### 4. Frame Construction



##### 1) Frame Alignment Word (8bits)

· It is fixed to 「01001110」 by Frame sync Data.

0	1	0	0	1	1	1	0
---	---	---	---	---	---	---	---

##### 2) Control bits (5 bits)

C <sub>0</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>
----------------	----------------	----------------	----------------	----------------

It is fixed as shown the above figure.

a) C<sub>0</sub>(Frame flag bit) : It is added for 16 frame sync.

- ( 1 : first half - 8 frame  
0 : second half - 8 frame

b) C<sub>1</sub>~C<sub>3</sub> (Application Control bits) : Transmits the contents of transmission broadcasting mode.

C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	The Contents of Sound/Data Block of 704 bits
0	0	0	Stereo broadcasting
0	1	0	Change 2CH Isolation Mono broadcasting to Dual broadcasting
1	0	0	Transmission of 1CH Mono broadcasting(M <sub>1</sub> ) + 352Kbits/sec Data
1	1	0	Transmission the 704 Kbits/sec Date

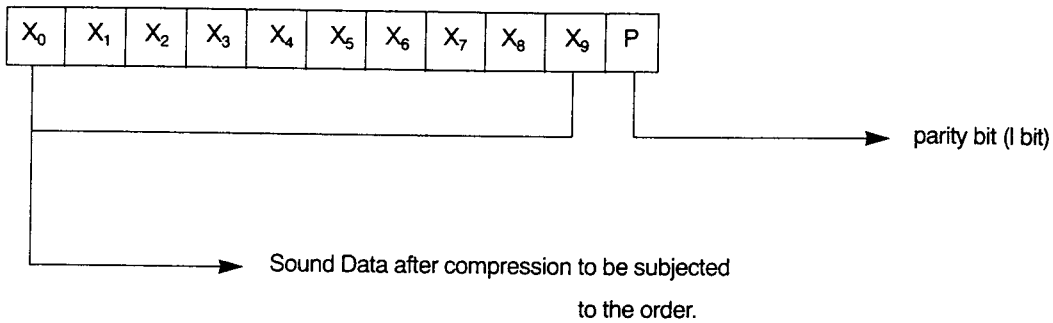
c) C<sub>4</sub> (Reserved Sound switching Flag)

- 1 : In Case that the contents of digital sound is equal to that transmitted at FM  
0 : In Case that the contents of digital sound is different from that transmitted at FM

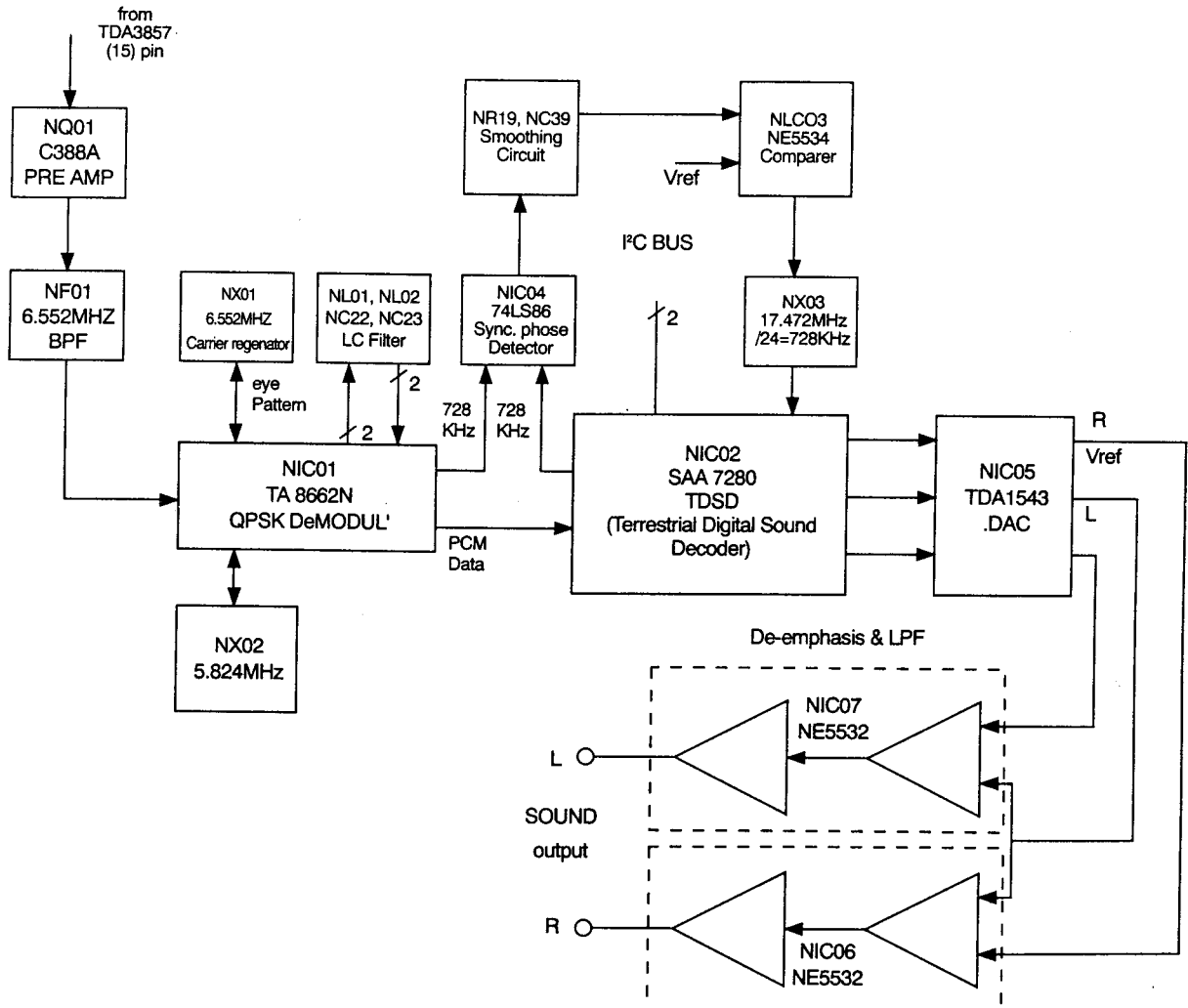
### 3) Additional Data(11bits)

It is not specified at present because It is prepared for the extension service in the future.

### 4) Audio Data(11bits/sample)



### 5. BLOCK DIAGRAM



## 6. SEMICONDUCTOR SPECIFICATION

### 1) Terrestrial Digital Sound Decoder(SAA 7280)

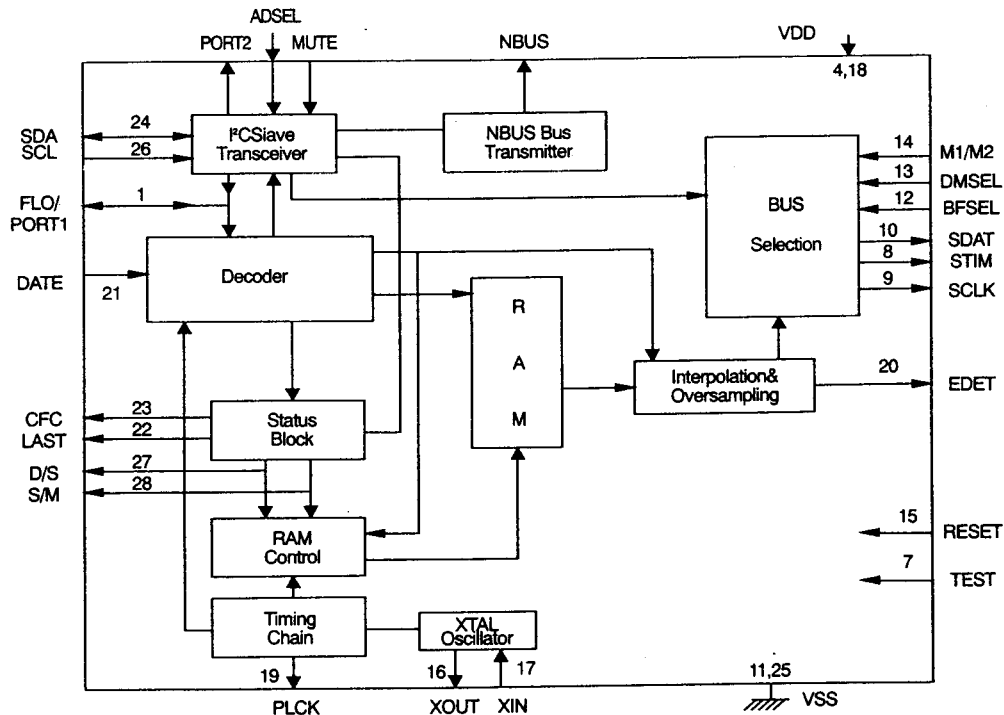
#### a) Features

- Full EBU NICAM 728 specification decoder
- Micro computer controlled by I<sup>2</sup>C
- Automatic decoding and output configuration depending upon transmission : - digital stereo  
digital mono+data  
2 independent mono signals
- Three - state outputs for sound bus.
- 3 times digital oversampling FILTER(select table)
- selectable sound bus output format via BFSEL pin.
- status information and decoder control also available via external pin

#### b) Quick Reference Data

Parameter	symbol	Min	TYP	Max	Unit
Supply Voltage	VDD	4.5	5.0	5.5	V
Input Voltage	VImax	-0.3		VDD+0.5	V
Output Voltage	Vomax	-0.3		VDD+0.5	V
DC Input or output diode current	IIOK			+/-20	mA
Output current	Iomax			+/-10	mA

#### c) Block Diagram:



#### d) Pin Description

Pin Number	Pin Type	Pin Name	Description of Function																																			
1	I/O	FLO/PORT1	This I/O is a reserve sound switching flag over-ride signal when selected as an input, which is used in the logical equation for the 'LAST' output. It defaults to an input, but can be set via I <sup>2</sup> C control. When selected as an output by the PTIEN bit in the I <sup>2</sup> C control register, becomes a port output pin controlled by bit PORT1 via the I <sup>2</sup> C control register.																																			
2	Output	PORT2	Output pin providing a port out controlled by bit PORT2 via the I <sup>2</sup> C control register. See fig 2.																																			
3	Output	NBUS	This intermittent data line contains control information. It is used to transfer specific information sent via the I <sup>2</sup> C bus on sub-address 0. It has a unique start condition followed by a fixed amount of data sent with separator bits to avoid duplicating the start condition.																																			
4.18	Supply	VDD	+5 volt power supplies.																																			
5	Input	ADSEL	The I <sup>2</sup> C slave address select input allows selection of one of two separate slave addresses. <table border="1"><thead><tr><th rowspan="2">ADSEL</th><th colspan="8">TDSD Slave Address</th></tr><tr><th>A6</th><th>A5</th><th>A4</th><th>A3</th><th>A2</th><th>A1</th><th>A0</th><th>R/W</th></tr></thead><tbody><tr><td>High</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td><td>X</td></tr><tr><td>Low</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>X</td></tr></tbody></table>	ADSEL	TDSD Slave Address								A6	A5	A4	A3	A2	A1	A0	R/W	High	1	0	1	1	0	1	1	X	Low	1	0	1	1	0	1	0	X
ADSEL	TDSD Slave Address																																					
	A6	A5	A4	A3	A2	A1	A0	R/W																														
High	1	0	1	1	0	1	1	X																														
Low	1	0	1	1	0	1	0	X																														
6	Input	<u>MUTE</u>	The mute input, when asserted, will mute the SDAT output samples. It sets the sample values to zero. In non-I <sup>2</sup> C applications. This input is active low. With the I <sup>2</sup> C active, the mute polarity can be set to an "exclusive-or" operation with the SC3 bit. See fig 2.																																			
7	Input	TEST	This pin must be connected to VSS for normal operation.																																			
8	Output	STLM	Sound bus output timing signal. Depending on the bus format selected, either I <sup>2</sup> S' s word select (I <sup>2</sup> SWS) or S-bus' s sound identification (S-ident). This output can be set to tri-state via I <sup>2</sup> C.																																			
9	Output	SCLK	Sound bus output clock. Depending on the bus format selected either I <sup>2</sup> S' s I <sup>2</sup> SCK or S-Bus' s S-clock @5.824 Mbits/s. This output can be set to tri-state via I <sup>2</sup> C.																																			
10	Output	SDAT	Sound bus data output pin. Depending on the bus format selected (via BFSEL) this pin carries either I <sup>2</sup> S' s I <sup>2</sup> SD or S-bus' s S-DATA serial data output. This output can be set																																			

Pin Number	Pin Type	Pin Name	Description of Function						
11.25	Supply	SDAT contd	tri-state via I <sup>2</sup> C.						
12	Input	VSS	Ground (0v).						
		BFSEL	Input for the selection of the sound output bus format.						
			<table><tr><td>BFSEL</td><td>BUS Format</td></tr><tr><td>high</td><td>S-bus</td></tr><tr><td>low</td><td>I<sup>2</sup>S bus</td></tr></table>	BFSEL	BUS Format	high	S-bus	low	I <sup>2</sup> S bus
BFSEL	BUS Format								
high	S-bus								
low	I <sup>2</sup> S bus								
13	Input	DMSEL	When S-bus is selected, the oversampling function is automatically turned off. An active high "dual mono select" input. When asserted, this input will select M1 and M2 as the output signals when the incoming transmission consists of two independent mono signals.						
14	Input	M1/M2	An "M1 or M2" select input. This input will select either M1 (M1/M2 = 1) or M2 (M1/M2 = 0) when the input transmission consists of two independent mono signals. See fig 2.						
15	Input	RESET	Active low reset input. Used to set the device in a valid initial condition e.g. at power on.						
16	Output	XOUT	Respectively the output and input of a single stage inverter used to provide a crystal oscillator maintaining circuit (with external biasing) or a simple CMOS input at XIN for the 17.472 MHz master clock.						
17	Input	XIN							
19	Output	PCLK	Output 728 KHz clock derived from the 17.472 MHz crystal.						
20	output	EDET	Active high error detect output. It indicates that an output sample is unreliable (having been obtained by interpolation).						
21	Input	DATA	Serial data at 728 kbits/s from the DQPSK demodulator.						
22	Output	LAST	Logical 'AND' status pin, which gives the status of VDSP(RSSF + FLO). See fig 2. VDSP. "valid digital sound present" signal. When high, this output indicates that the decoder is operating with a valid NICAM digital input which carries at least one sound channel.						
		LAST contd	RSSF "or" FLO FLO is a RSSF over-ride signal which allows a user to turn off the RSSF input to the "LAST" function. The purpose of this is to disable the RSSF input to the logical and status pin(LAST) thus allowing the user to determine whether there is a reserve sound switching capability when the decoder is out of sync or receiving 'transparent data' . RSSF is a signal which indicates the reserve sound switching status. When high this output shows that the conventional analogue FM signal is the same as the digital signal being decoded. Thus a failure of the digital signal can result in the switching to the conventional analogue sound.						

Pin Number	Pin Type	Pin Name	Description of Function			
			VDSP	RSSF	FLO	LAST
			0	X	X	0
			1	0	0	1
			1	1	0	1
			1	X	1	1
23	Output	$\overline{\text{CFC}}$	Active low open drain output. Signals a configuration change at the 16-frame boundary (not 8ms in advance). It is cleared by a status register read in I <sup>2</sup> C applications.			
24	I/O	SDA	I <sup>2</sup> C data input/open drain output.			
26	Input	SCL	I <sup>2</sup> C clock input. (Maximum speed 100KHz)			
27	Output	D/ $\overline{\text{S}}$	Output pin which indicates whether single or dual mono sound signals are being transmitted, D/ $\overline{\text{S}}$ = 1 indicates dual mono, D/ $\overline{\text{S}}$ = 0 indicates not dual mono. This bit is also available within the I <sup>2</sup> C register map.			
28	Output	S/ $\overline{\text{M}}$	Output pin which indicates whether stereo or mono sound is being transmitted. S/ $\overline{\text{M}}$ = 1 indicates stereo, S/ $\overline{\text{M}}$ = 0 indicates mono. This bit is also available within the I <sup>2</sup> C register map.			

## 2) QPSK DEMODULATION(QUADRATURE PSK) (TA 8662N)

### a) Features

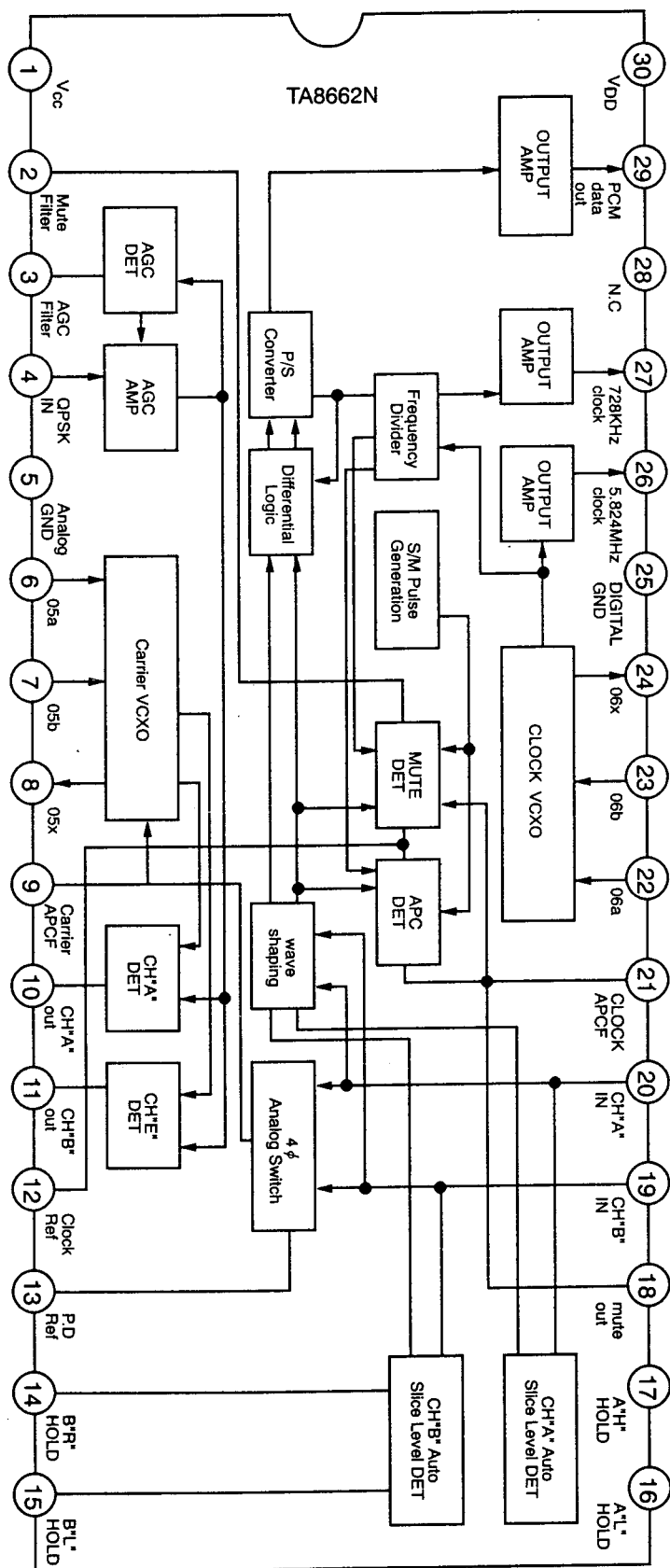
- By the input AGC circuit, it can make the stable demodulation not to be subjected to the input signal level variation.  
\* Input Level : 150 mv p-p (standard)
- The following base band selection PLL, by the phase sync detector circuit, can make the high and stable demodulation.
- By the clock regenerator circuit, It can obtain 5.824MHz and 728KHz output synchronized to the input Data.
- There is no combination of DC offset in the phase detector because It has auto slice level detector circuit.
- It has the output terminal for Mute.

### b) Quick Reference Data

ITEM		Min	Typ	max	unit
Supply Voltage	Vcc	9.0	10.0	11.0	V
	VDD	4.5	5.0	5.5	V
Supply Current	Icc	28	40	52	mA
	IDD	15	24	35	mA
Power Consumption		355	520	695	mW

**MEMO**

# c) BLOCK DIAGRAM



d) Pin Description

Pin No	Pin Name	Description of Function
1	Vcc	Analog Bt(10V)
2	Mute Filter	By making the internal 5K $\Omega$ and the external RC filter and then averaging the output of the Mute detector, It is operated as a phase detector operation
3	AGC Filter	It make the LPF which is used the peak HOLD detector in AGC detector
4	Qpsk IN	It is a input pin of the gain control Amp ; Whose dynamic range is from so to 450mV p-p
5	Analog GND	Analog Section GND
6	$\varphi$ 5a	The input terminal of carrier generation VcXo
7	$\varphi$ 5b	It can input the phase signal delayed to 45° in external RC circuit
8	$\varphi$ 5x	Output terminal of the carrier generation VcXo
9	Carrier APCF (analog s/w output)	It deletes the phase information of QPSK by the 4 phase analog switch output pin and only return the phase error voltage to VcXo. To change output to DC, It, external eraser, makes LPF.
10	CH "A" output	Output terminal of detector. It makes the carrier out LPF
11	CH "B" output	By delaying the demodulation signal.
12	CLOCK Ref.	It adjusts the control DC level of clock generation VC <sub>0</sub> . It is connected with the pin 21 when adjusting the frequency of clock VC <sub>0</sub> .
13	P.D Ref.	Output terminal of standard voltage for phase detection circuit
14	B. "H" Hold	"H" Level detection circuit. It connects the 0.1 $\mu$ F Condenser to VCC
15	B "L" Hold	"L" Level detection circuit. It connects the 0.1 $\mu$ F Condenser to GND
16	A "L" Hold	"L" Level detection circuit. It connects the 0.1 $\mu$ F Condenser to GND
17	A "H" Hold	"H" Level detection circuit. It connects the 0.1 $\mu$ F Condenser to VCC
18	Mute output	It is TTL Level changed "H" in PLL Lock or "L" in PLL Lock
19	CH "B" input	Input pin of 4 phase analog switch
20	CH "A" input	
21	CLOCK APCF (CLOCK Filter)	By averaging the output of the APC detector, it makes LPF which operates as phase detector
22	$\varphi$ 6a	Input terminal of the CLOCK regeneration VcXo
23	$\varphi$ 6b	It inputs the signal delayed to 45° in the external RC circuit
24	$\varphi$ 6x	Output terminal of the clock regeneration VcXo
25	Digital GVD	Digital section GND
26	Buffer output of VcXo	It is PCM data and buffer output terminal former changes the data of two system in to serial form later buffers original oscillation of clock and VcXo synchronized to the above data.
27	Data sync. clock	
28	Data output	
29	N C	
30	VDD	Digital B <sup>+</sup> (5V)

### 3) DUAL 16-BIT DAC(TDA 1543)

#### a) Features

- Low distortion
- 16-bit dynamic range.
- 4 × oversampling possible
- single 5V power supply
- No external components required
- No requirement for external deglitcher circuitry due to fast settling output current
- Adjustable bias current
- Internal timing and control circuits
- I<sup>2</sup>S input format : time multiplexed, two's complement, TTL

#### b) Quick Reference Data

Parameter	symbol	min	Typ	max	unit
Supply Voltage	VDD	3.0	5.0	8.0	V
Supply Current	IDD	-	50	60	mA
Current setting time to $\pm 1$ LSB	tcs	-	0.5	-	$\mu$ s
Input bit rate at data input	BR	-	-	6.4	Mbits/s
clock frequency at clock input	fBCK	-	-	6.4	MHz
Total power dissipation	Ptot	-	250	-	mW
Bias current	Ibias	-0.5	-	1.8	mA

#### c) pin description

Pin No	Pin Name	Description of Function
1	BCK	bit clock input
2	WS	word select input (Left, Right select) High - Right, Low - Left
3	DATA	data input
5	GND	ground
6	AOL	left channel output
7	vref	reference voltage output
8	AOR	right channel output

#### 4) DUAL LOW NOISE OP AMP(NE 5532)

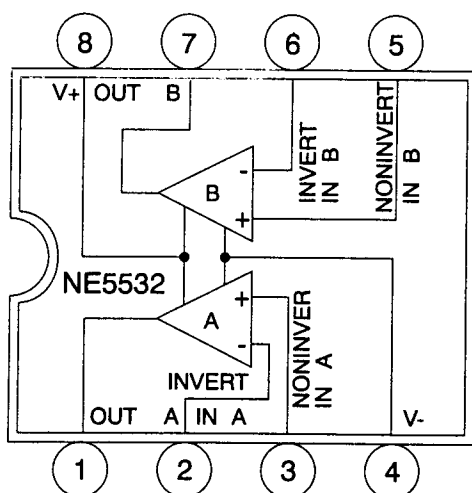
##### a) Features

- Small - Signal bandwidth : 10MHz
- output drive capability : 600 $\Omega$ . 10V Rms
- DC voltage gain :50,000
- AC voltage gain : 2200 at 10KHz
- Power bandwidth : 140KHz
- Compensated for unity gain

##### b) Pin Description

Pin No	
1	Output A
2	Inverting input A
3	Non - inverting input A
4	Ground
5	Non - inverting input B
6	Inverting input B
7	Output B
8	Vdd

##### c) Block Diagram



#### 5) Signal Low Noise OP AMP(NE 5534)

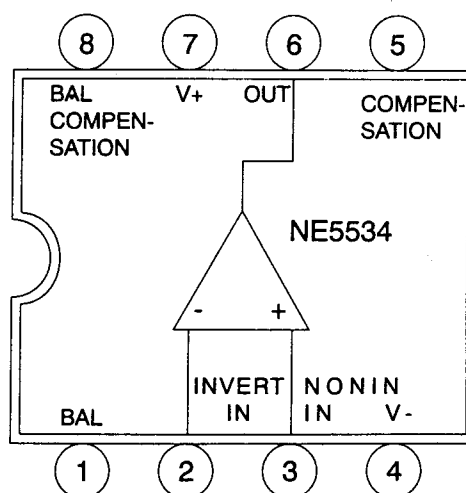
##### a) Features

- Small - Signal band width : 10MHz
- Output drive capability : 600 $\Omega$ . 10V Rms at Vs =  $\pm 18V$
- DC Voltage gain : 100,000
- AC Voltage gain : 6000 at 10KHz
- Power bandwidth : 200KHz
- Large supply voltage range :  $\pm 3$  to  $\pm 20V$

##### b) Pin Description

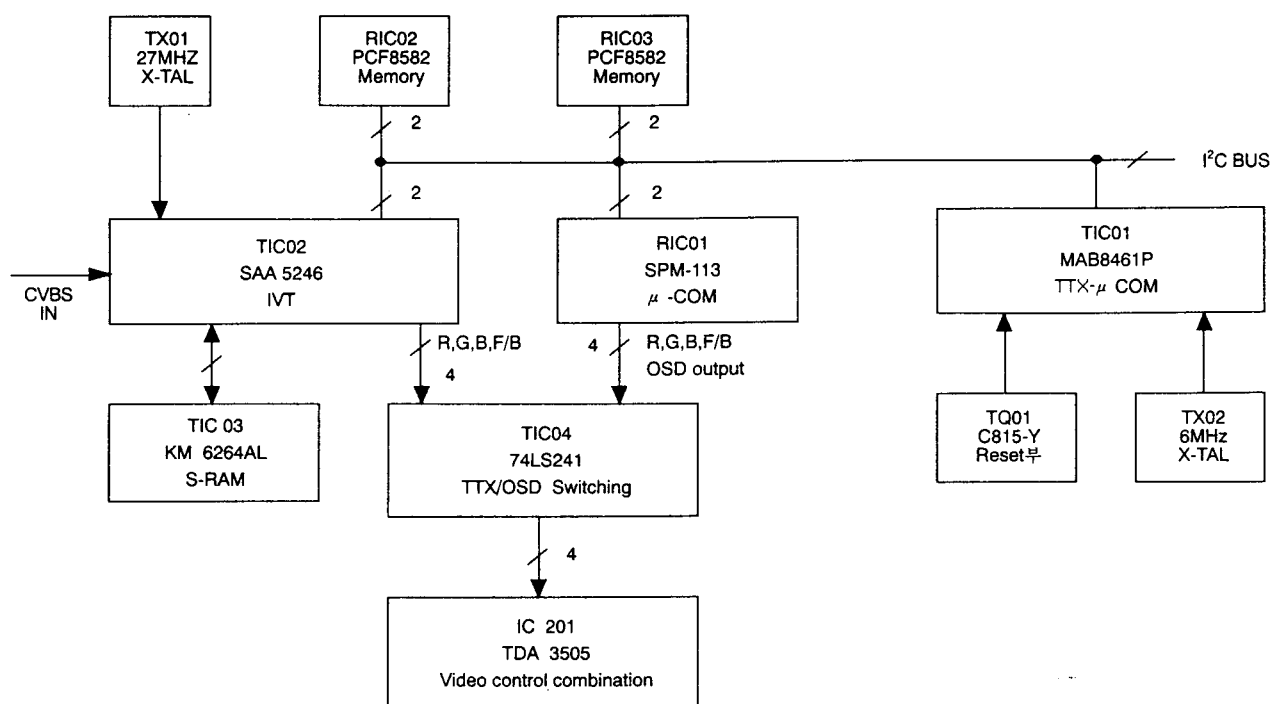
Pin No	
1	Balance
2	Inverting input
3	Non - inverting input
4	Ground
5	Compensation
6	Output
7	VDD
8	Balance/Compensation

##### c) Block Diagram



# 12. TELETEXT SECTION

## 1. BLOCK DIAGRAM



## 2. SEMICONDUCTOR SPECIFICATION

### 1) Integrated Video input processor and Teletext Integrated circuit (SAA 5246)

#### a) GENERAL DESCRIPTION

The Integrated VIP and Teletext decoder (contained within a single chip package) for decoding 625-line based world system Teletext transmissions. The teletext decoder hardware is based on the Enhanced Computer Controlled Teletext (ECCT) device (SAA5243) with some additional features; existing ECCT software remains compatible.

The video input processor (VIP) section of the device uses new mixed analogue and digital designs for the Data Slicer and the Display Clock Phase Locked Loop functions. As a result the number of external component is greatly reduced and no critical or adjustable components are required.

#### b) FEATURES

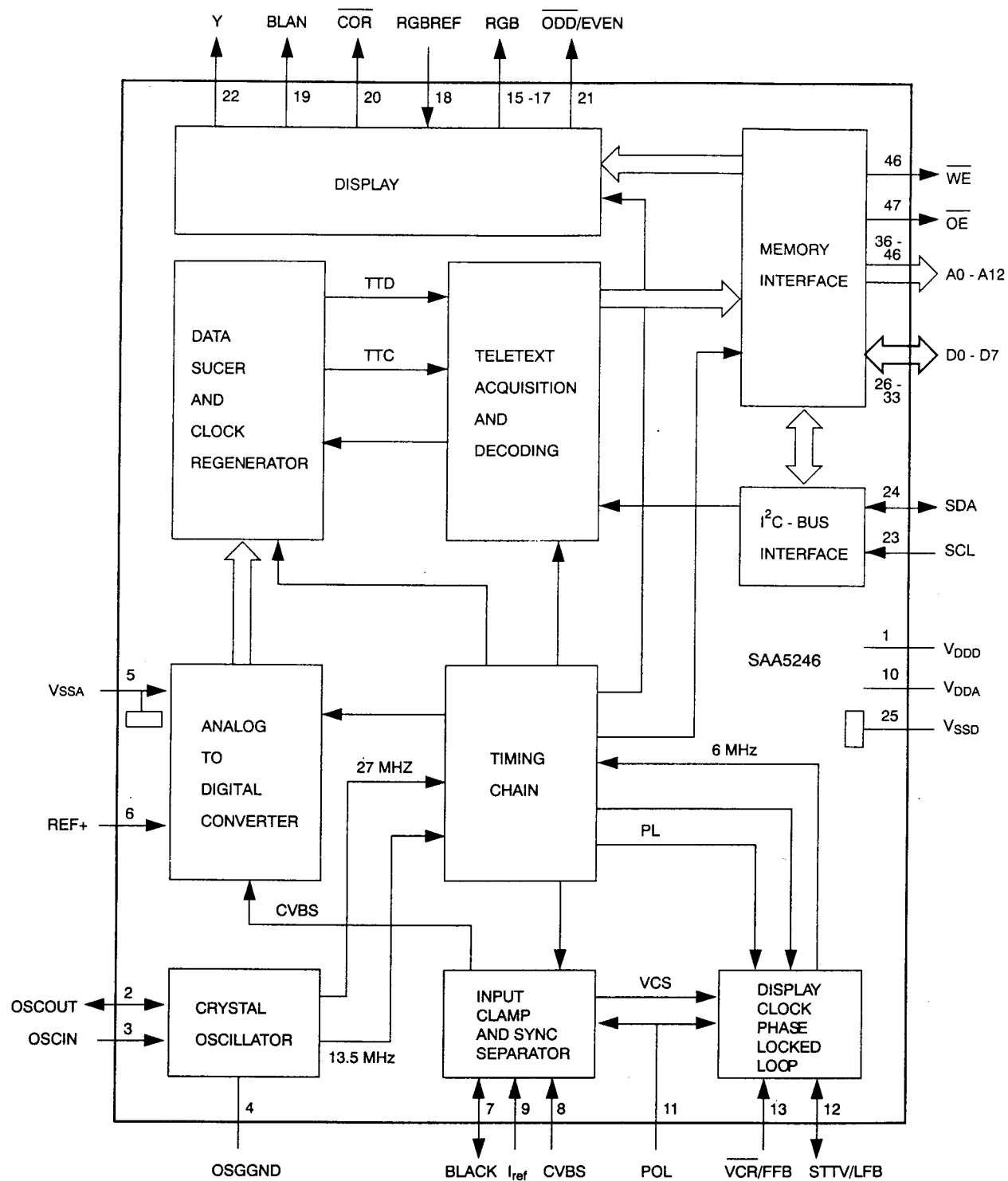
- Complete teletext decoder in single 48-pin DIL package.
- Single +5V power supply.
- Digital Data Slicer and Display Clock Phase Locked Loop reduce Peripheral Components to a minimum.
- Both Video and Scan related synchronization modes are supported.

- A/B page acquisition system is software compatible with ECCT
- RGB interface to standard colour decoder ICS, push-pull output drive; requires only 2 external resistors.
- software compatibility with ECCT maintained.
- Interfaces with 8K × 8-bit static RAM.
- optional storage of packet 24 in the display memory.
- packet 8/30/2 mapped to a different extension chapter, as an aid for VCR programming applications.

#### c) QUICK REFERENCE DATA

Parameter	symbol	min	Typ	max	unit
Supply Voltage	VDD	4.5	5	5.5	V
Supply Current	IDD	-	60	120	mA
Sync amplitude	Vsyn	0.1	0.3	0.6	V
Video amplitude	Vvid	0.7	1	1.4	V
crystal frequency	f <sub>x</sub> TAL	-	27	-	MH
operating ambient temperature range	Tamb	-20	-	+70	°C

d) BLOCK DIAGRAM



# e) PINNING DESCRIPTION

Pin	Pin name	description
1	VDDD	+5V supply to the digital sections of the device.
2	OSCOUT	27 MHz crystal oscillator output.
3	OSCIN	27 MHz crystal oscillator input.
4	OSCGND	Crystal oscillator ground 0 V.
5	VSSA	Analogue ground 0 V.
6	REP+	Positive reference voltage for the ADC. If necessary, the pin should be connected to analogue +5 V via decoupling components.
7	BLACK	Video black level storage pin, connected to analogue ground via a 100 nF capacitor.
8	CVBS	Composite video input pin, a positive-going 1 V peak-to-peak input is required, connected via a 100 nF capacitor.
9	Iref	Reference current input pin, connected to analogue ground via a 27 k $\Omega$ resistor.
10	VDDA	+ 5 V supply to the analogue sections of the device.
11	POL	STTV/LFB/FFB polarity select pin.
12	STTV/LFB	Sync to TV output pin/line flyback input pin. Function controlled by an internal register bit.
13	VCR/FFB	PLL time constant switch/field flyback input pin. Function controlled by an internal register bit.
14	VSSD	Connected to VSSD for normal operation.
15	R	Dot rate character output of the RED colour information.
16	G	Dot rate character output of the GREEN colour information.
17	B	Dot rate character output of the BLUE colour information.
18	RGBREF	DC voltage to define the output high level on the RGB pins.
19	BLAN	Dot rate fast blanking output HIGH for text and LOW for picture.
20	COR	Programmable output to provide contrast reduction of the TV picture for mixed text and picture displays or when viewing newflash/subtitle pages open drain output.
21	ODD/EVEN	25 Hz output synchronized with the CVBS input's field sync pulses to produce a non-interlaced display by adjustment of the vertical deflection currents.
22	Y	Dot rate character output of teletext foreground colour information open drain output.
23	SCL	Serial clock input for I <sup>2</sup> C-bus. It can still be driven HIGH during power-down of the device.
24	SDA	Serial data port for the I <sup>2</sup> C-bus. Open drain output. It can still be driven HIGH during power-down of the device.
25	VSSD	Digital ground 0 V.
26-33	D0-D7	Data lines for the page RAM.
34-46	A0-A12	Address lines for the page RAM.
47	OE	Output enable to the page RAM.
48	WE	Write enable to the page RAM.

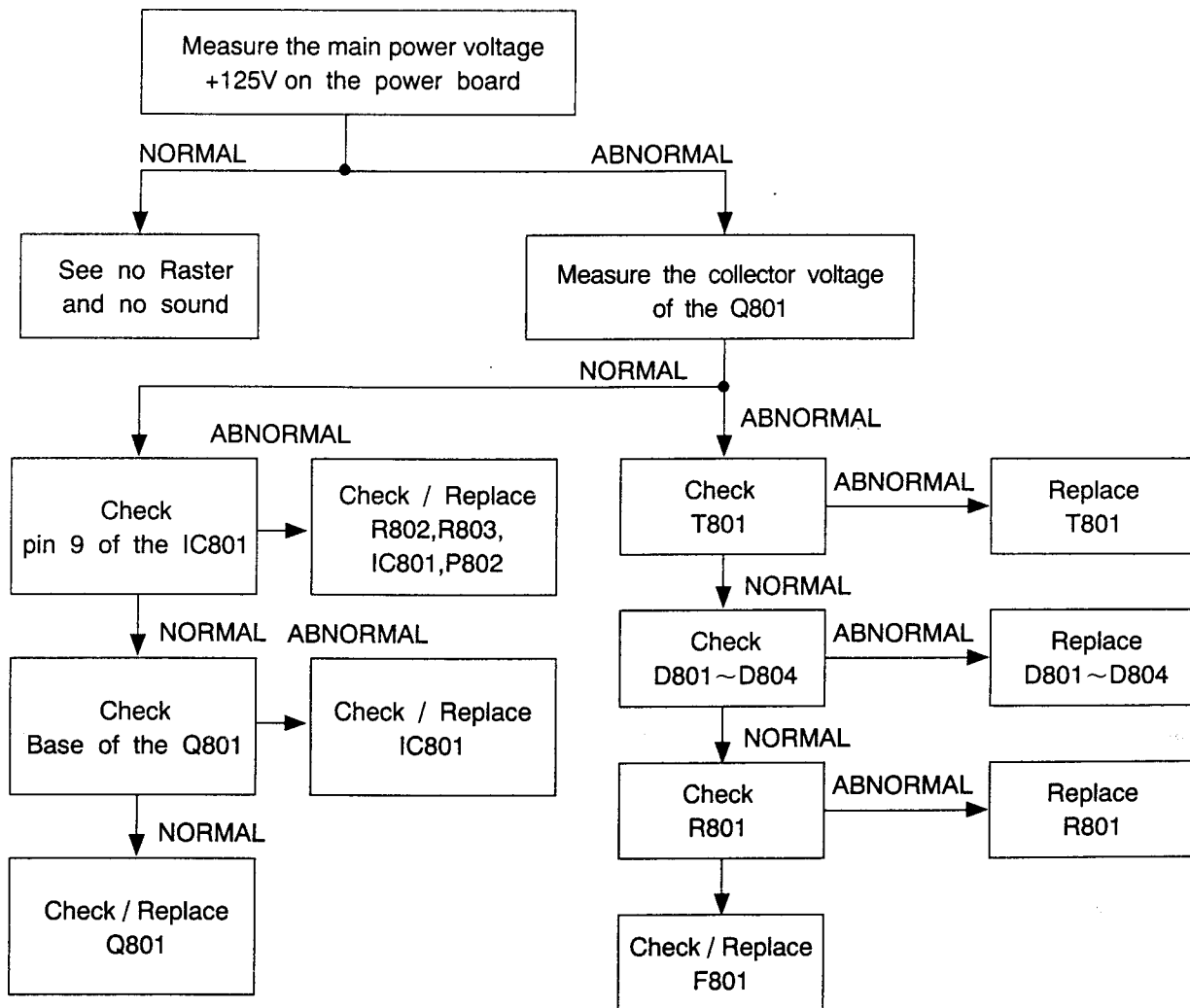
# 13. TROUBLESHOOTING CHARTS

The following charts are devoted to troubleshooting which, if followed carefully, will assist you in tracking down a fault to the correct stage.

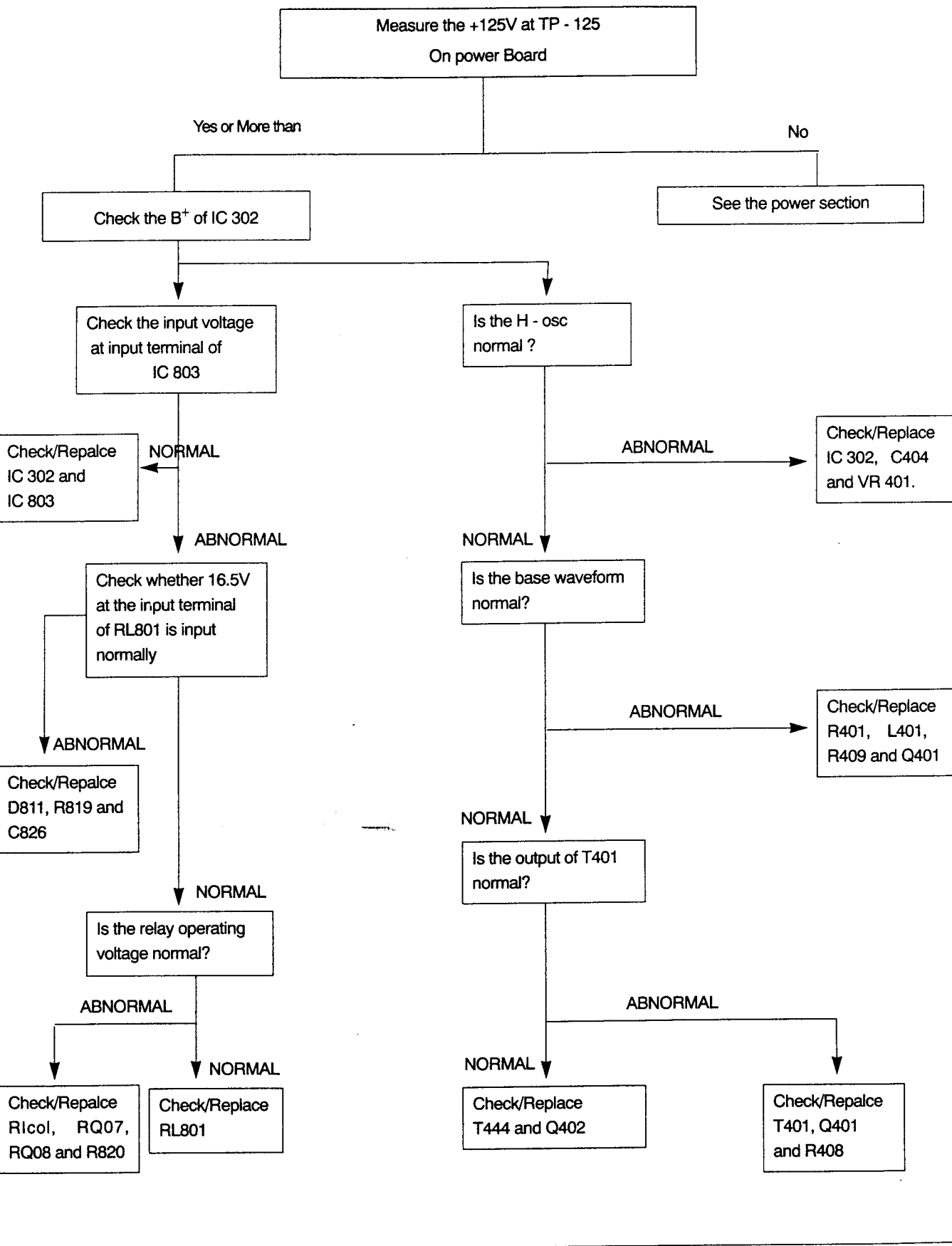
In order to utilize the charts (fault trees), first establish the complaint, e.g.-NO Raster, NO Sound.

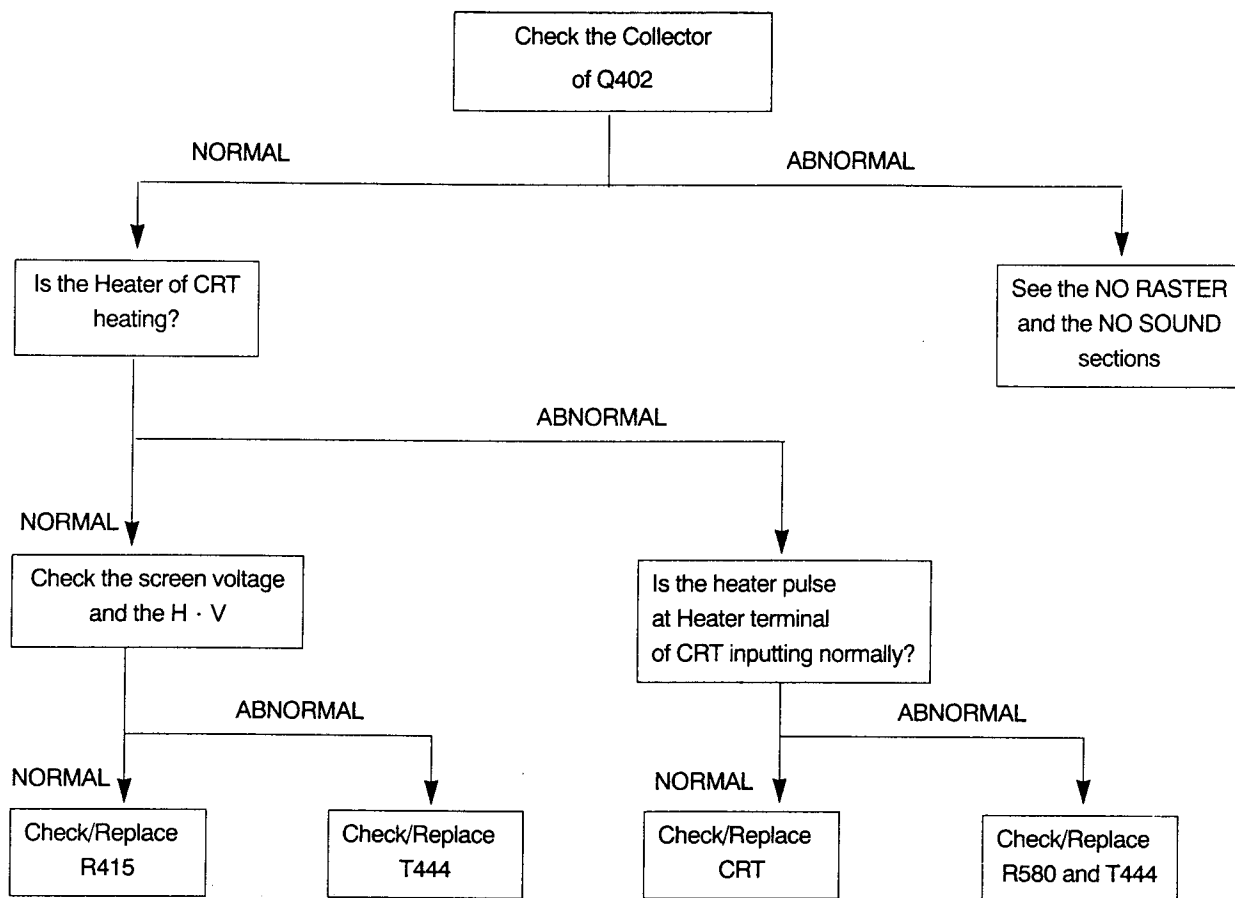
Locate the chart applicable and then progress through the various alternatives until a final block indicates the defective components or stage.

## NO POWER

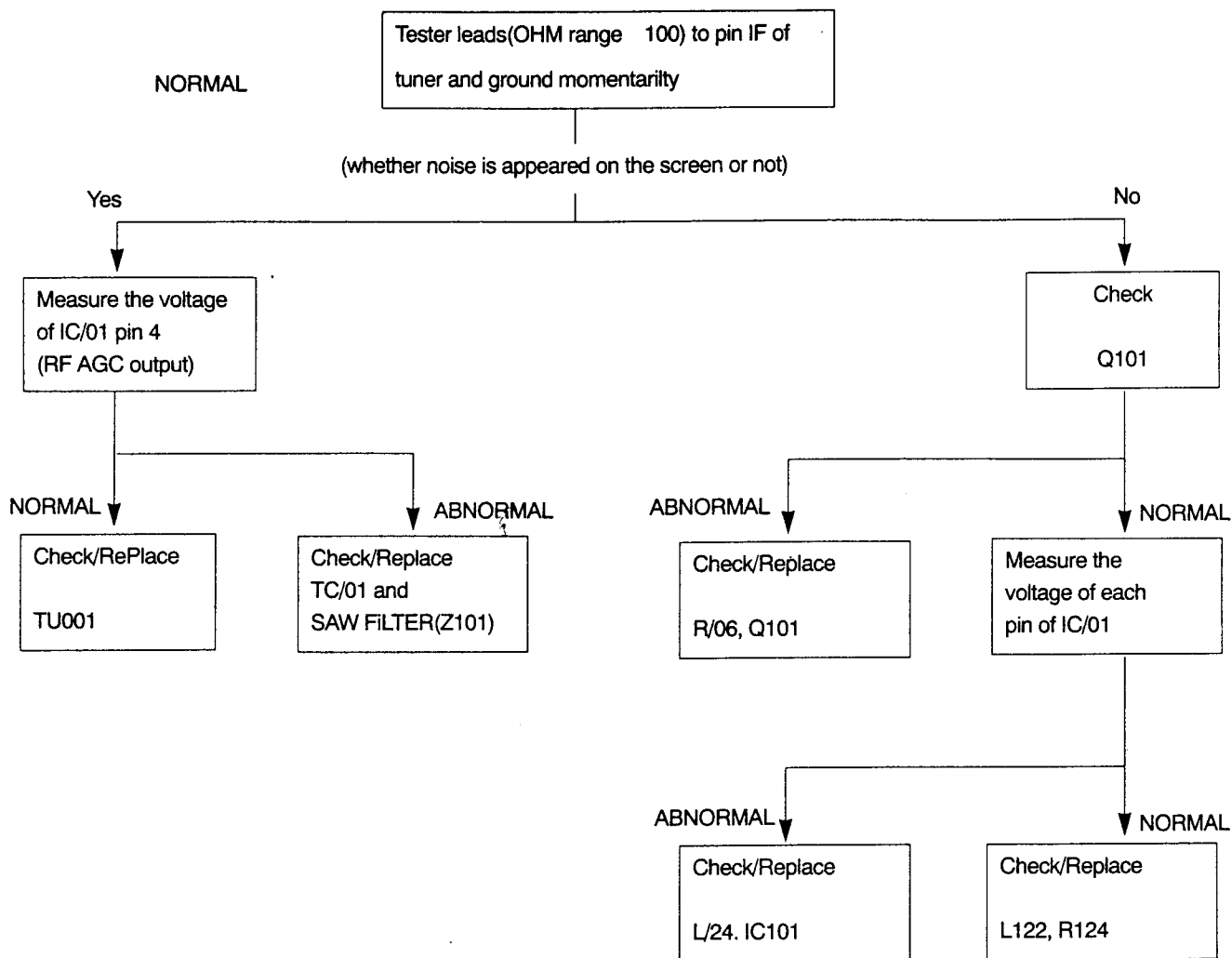


# NO RASTER AND NO SOUND

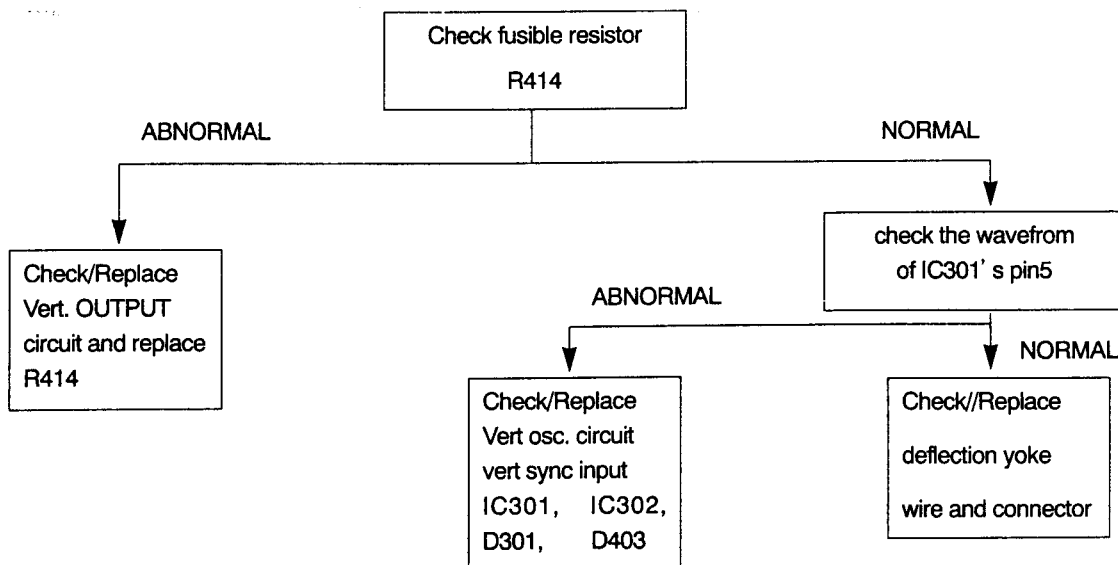




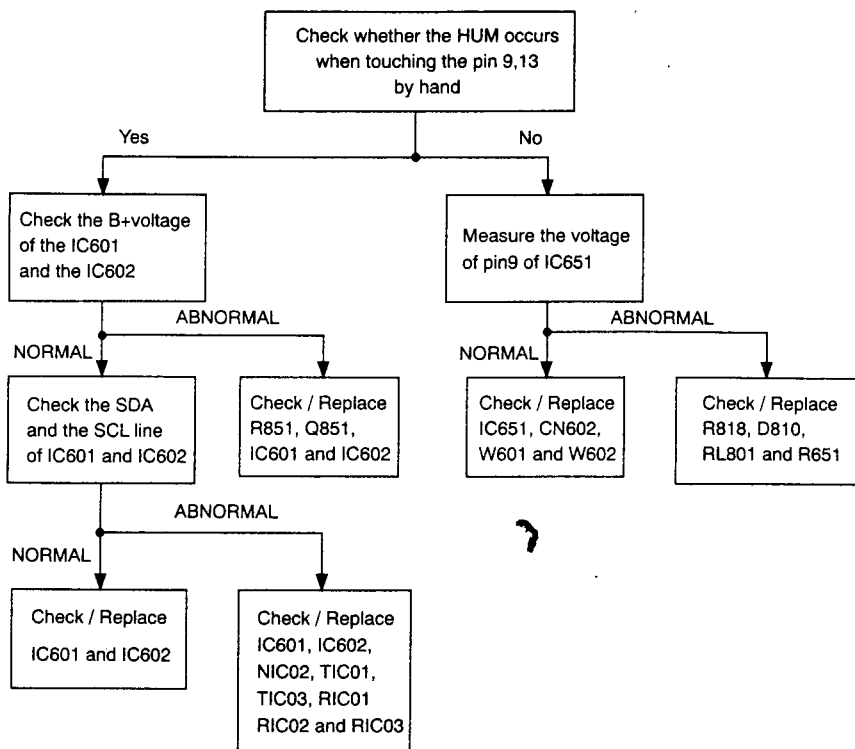
NO PICTURE(RASTER OK)



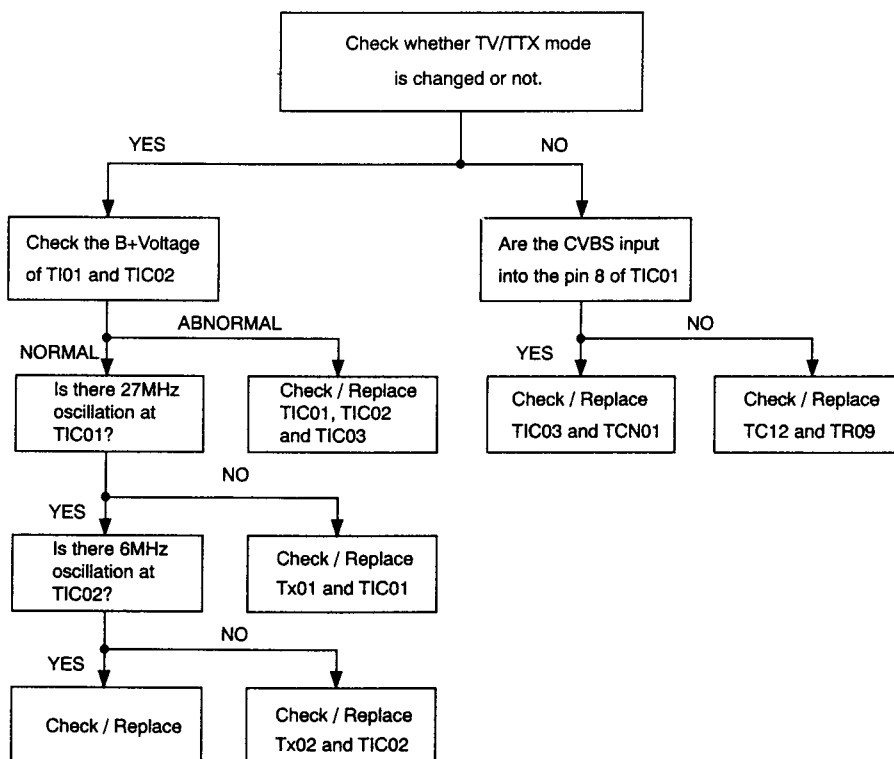
NO VERT, SCAN(ONE HORIZ, LINE RASTER)



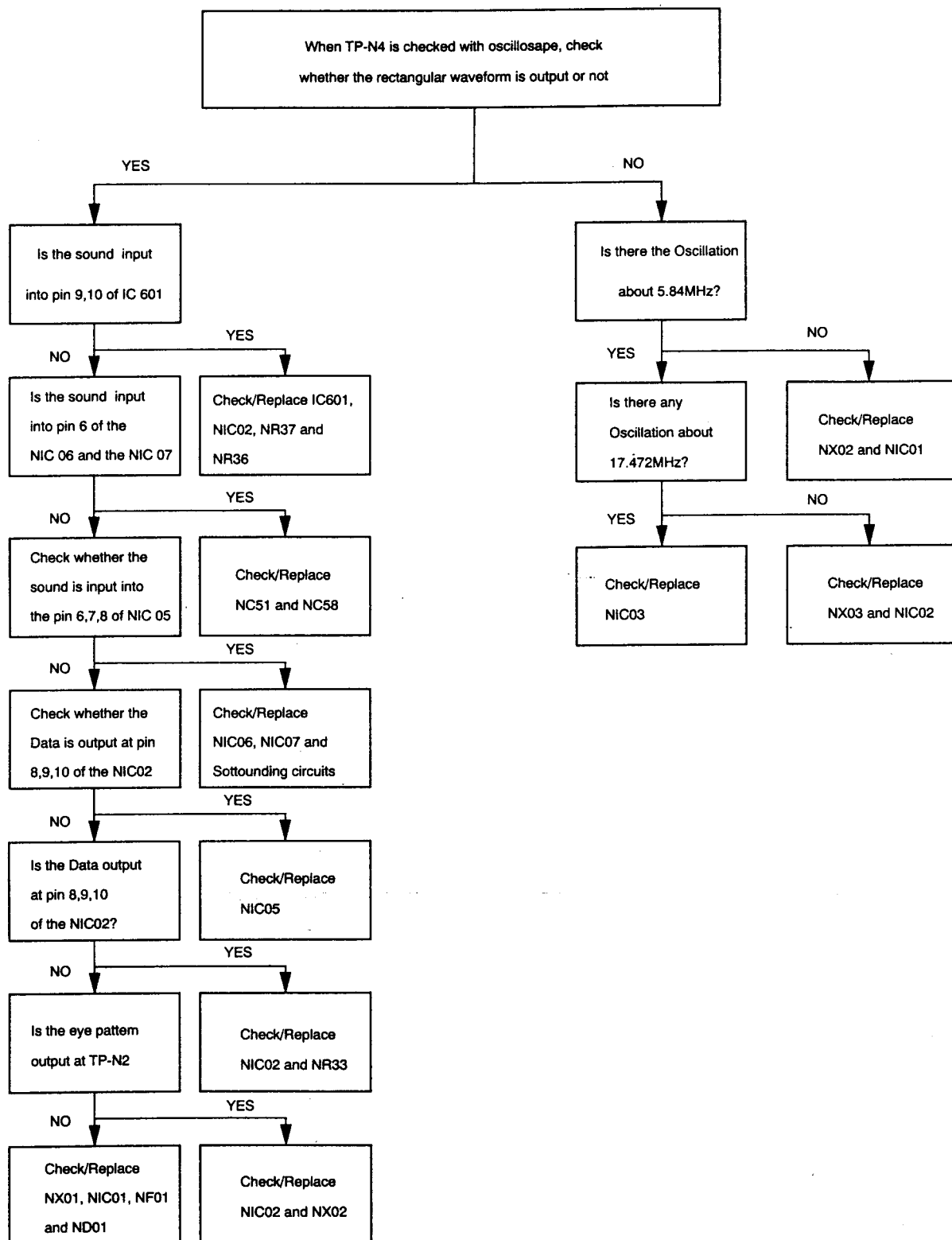
## NO SOUND (PICTURE OK)



## NO TELETEX



# NO NICAM SOUND (FM SOUND OK)



# 14. CHASSIS REPLACEMENT PARTS LIST

ABBREVIATIONS : CC C-CERAMIC  
 CE C-ELECTROLYTIC  
 CFS C-M, POLYESTER  
 CK C-CERAMIC, HK  
 CQ C-POLYPROPYLENE, POLYESTE  
 CS C-TANTALIUM, SOLID  
 RC R-COMPOSITION  
 RD R-CARBON  
 RF R-FUSIBLE  
 RM R-METAL, FILM  
 RP R-CEMENT WIRE  
 RS R-METAL, OXIDE

NOTE : The items with "\*" are usually out of stock since they are seldom required for the routine service. There may be some anticipated delay when you order these items.

S.N.A. = Service Not Available , L/C = Local Purchase

The components identified by mark "\*\*" are critical for safety. Replace only with Supplier part number specified.

When indicating parts by location number, Please include the PWB names  
 ( PWB = Printed Writing Board )

Loc No	Supplier Parts No.	Specifiction	Loc No	Supplier Parts No.	Specifiction
A S S Y - P W B M A I N					
*3T30-01292-010 CI5913W/SEUKX					
PWB	33004-145-351	U88MT <S.N.A>	NR31	31018-177-472	RD 1/8T 4.7K-J
RESISTORS			NR32	31018-177-472	RD 1/8T 4.7K-J
CR05	31018-177-331	RD 1/8T 330-J	NR33	31018-177-102	RD 1/8T 1K-J
NR01	31018-177-103	RD 1/8T 10K-J	NR34	31046-567-331	RS 2T 330-J(AUTO)
NR02	31018-177-102	RD 1/8T 1K-J	NR35	31046-567-121	RS 2T 120-J(AUTO)
NR03	31018-177-332	RD 1/8T 3.3K-J	NR36	31018-177-101	RD 1/8T 100-J
NR04	31018-177-150	RD 1/8T 15-J	NR37	31018-177-101	RD 1/8T 100-J
NR05	31018-177-561	RD 1/8T 560-J	NR38	31018-177-471	RD 1/8T 470-J
NR06	31018-177-471	RD 1/8T 470-J	NR39	31018-177-102	RD 1/8T 1K-J
NR07	31018-177-224	RD 1/8T 220K-J	NR40	31018-177-331	RD 1/8T 330-J
NR08	31018-177-154	RD 1/8T 150K-J	NR41	31018-177-331	RD 1/8T 330-J
NR09	31018-177-511	RD 1/8T 510-J	NR43	31018-177-102	RD 1/8T 1K-J
NR10	31018-177-102	RD 1/8T 1K-J	NR44	31018-177-102	RD 1/8T 1K-J
NR11	31018-177-393	RD 1/8T 39K-J	NR45	31018-177-102	RD 1/8T 1K-J
NR12	31018-177-393	RD 1/8T 39K-J	NR46	31018-177-331	RD 1/8T 330-J
NR13	31018-177-471	RD 1/8T 470-J	R100	31018-177-680	RD 1/8T 68-J
NR14	31018-177-102	RD 1/8T 1K-J	R101	31018-177-562	RD 1/8T 5.6K-J
NR15	31018-177-154	RD 1/8T 150K-J	R102	31018-177-102	RD 1/8T 1K-J
NR16	31018-177-103	RD 1/8T 10K-J	R103	31018-177-102	RD 1/8T 1K-J
NR17	31018-177-106	RD 1/8T 10M-J	R104	31018-177-221	RD 1/8T 220-J
NR18	31018-177-103	RD 1/8T 10K-J	R105	31018-177-270	RD 1/8T 27-J
NR19	31018-177-511	RD 1/8T 510-J	R106	31018-377-101	RD 1/2T 100-J
NR20	31018-177-562	RD 1/8T 5.6K-J	R107	31018-177-824	RD 1/8T 820K-J
NR21	31018-177-564	RD 1/8T 560K-J	R108	31018-177-823	RD 1/8T 82K-J
NR22	31018-177-472	RD 1/8T 4.7K-J	R120	31018-177-331	RD 1/8T 330-J
NR23	31018-177-272	RD 1/8T 2.7K-J	R123	31018-177-151	RD 1/8T 150-J
NR24	31018-177-122	RD 1/8T 1.2K-J	R124	31018-177-331	RD 1/8T 330-J
NR25	31018-177-562	RD 1/8T 5.6K-J	R125	31018-177-271	RD 1/8T 270-J
NR26	31018-177-472	RD 1/8T 4.7K-J	R128	31018-177-333	RD 1/8T 33K-J
NR27	31018-177-472	RD 1/8T 4.7K-J	R129	31018-177-682	RD 1/8T 6.8K-J
NR28	31018-177-472	RD 1/8T 4.7K-J	R130	31018-177-682	RD 1/8T 6.8K-J
NR29	31018-177-122	RD 1/8T 1.2K-J	R131	31018-177-393	RD 1/8T 39K-J
NR30	31018-177-562	RD 1/8T 5.6K-J	R132	31018-177-104	RD 1/8T 100K-J
			R143	31018-177-472	RD 1/8T 4.7K-J
			R152	31018-177-152	RD 1/8T 1.5K-J
			R152	31018-177-182	RD 1/8T 1.8K-J
			R153	31018-177-471	RD 1/8T 470-J
			R201	31018-177-750	RD 1/8T 75-J
			R202	31018-177-750	RD 1/8T 75-J

Loc No	Supplier Parts No.	Specification
R203	31018-177-750	RD 1/8T 75-J
R204	31018-177-750	RD 1/8T 75-J
R205	31018-177-101	RD 1/8T 100-J
R206	31018-177-101	RD 1/8T 100-J
R207	31018-177-101	RD 1/8T 100-J
R211	31018-177-683	RD 1/8T 68K-J
R212	31018-177-103	RD 1/8T 10K-J
R213	31018-177-472	RD 1/8T 4.7K-J
R214	31018-177-152	RD 1/8T 1.5K-J
R215	31018-177-473	RD 1/8T 47K-J
R216	31018-177-682	RD 1/8T 6.8K-J
R217	31018-177-472	RD 1/8T 4.7K-J
R218	31018-177-223	RD 1/8T 22K-J
R219	31018-177-102	RD 1/8T 1K-J
R220	31018-177-102	RD 1/8T 1K-J
R251	31018-177-473	RD 1/8T 47K-J
R252	31018-177-333	RD 1/8T 33K-J
R253	31018-177-102	RD 1/8T 1K-J
R254	31018-177-221	RD 1/8T 220-J
R255	31018-177-272	RD 1/8T 2.7K-J
R259	31018-177-222	RD 1/8T 2.2K-J
R260	31018-177-153	RD 1/8T 15K-J
R261	31018-177-333	RD 1/8T 33K-J
R262	31018-177-272	RD 1/8T 2.7K-J
R263	31018-177-391	RD 1/8T 390-J
R264	31018-177-681	RD 1/8T 680-J
R265	31018-177-223	RD 1/8T 22K-J
R266	31018-177-104	RD 1/8T 100K-J
R500	31018-177-101	RD 1/8T 100-J
R501	31018-177-122	RD 1/8T 1.2K-J
R502	31018-177-151	RD 1/8T 150-J
R504	31018-177-431	RD 1/8T 430-J
R505	31018-177-273	RD 1/8T 27K-J
R506	31018-177-151	RD 1/8T 150-J
R507	31018-177-682	RD 1/8T 6.8K-J
R508	31018-177-221	RD 1/8T 220-J
R509	31018-177-222	RD 1/8T 2.2K-J
R510	31018-177-101	RD 1/8T 100-J
R511	31018-177-272	RD 1/8T 2.7K-J
R512	31018-177-203	RD 1/8T 20K-J
R513	31018-177-821	RD 1/8T 820-J
R514	31018-177-122	RD 1/8T 1.2K-J
R515	31018-177-301	RD 1/8T 300-J
R516	31018-177-472	RD 1/8T 4.7K-J
R517	31018-177-222	RD 1/8T 2.2K-J
R518	31018-177-333	RD 1/8T 33K-J
R519	31018-177-561	RD 1/8T 560-J
R520	31018-177-105	RD 1/8T 1M-J
R521	31018-177-103	RD 1/8T 10K-J
R522	31018-177-123	RD 1/8T 12K-J
R523	31018-177-472	RD 1/8T 4.7K-J
R524	31018-177-332	RD 1/8T 3.3K-J
R528	31018-177-472	RD 1/8T 4.7K-J
R529	31018-177-101	RD 1/8T 100-J
R530	31018-177-101	RD 1/8T 100-J
R540	31018-177-272	RD 1/8T 2.7K-J
R541	31018-177-620	RD 1/8T 62-J

Loc No	Supplier Parts No.	Specification
R602	31018-177-101	RD 1/8T 100-J
R603	31018-177-101	RD 1/8T 100-J
R604	31018-177-101	RD 1/8T 100-J
R605	31018-177-101	RD 1/8T 100-J
R606	31018-177-472	RD 1/8T 4.7K-J
R607	31018-177-472	RD 1/8T 4.7K-J
R608	31018-177-472	RD 1/8T 4.7K-J
R609	31018-177-472	RD 1/8T 4.7K-J
R610	31018-177-221	RD 1/8T 220-J
R611	31018-177-221	RD 1/8T 220-J
R612	31018-177-104	RD 1/8T 100K-J
R613	31018-177-104	RD 1/8T 100K-J
**R851	31059-002-130	RF 1/2P 0.47-K
**R853	31059-002-130	RF 1/2P 0.47-K
**R854	31046-567-330	RS 2T 33-J(AUTO)
RR01	31018-177-332	RD 1/8T 3.3K-J
RR03	31018-377-103	RD 1/2T 10K-J
RR04	31018-177-683	RD 1/8T 68K-J
RR05	31018-177-153	RD 1/8T 15K-J
RR06	31018-177-103	RD 1/8T 10K-J
RR07	31018-177-472	RD 1/8T 4.7K-J
RR08	31018-177-472	RD 1/8T 4.7K-J
RR09	31018-177-912	RD 1/8T 9.1K-J
RR10	31018-177-152	RD 1/8T 1.5K-J
RR11	31018-177-202	RD 1/8T 2K-J
RR12	31018-177-103	RD 1/8T 10K-J
RR13	31018-177-103	RD 1/8T 10K-J
RR15	31018-177-472	RD 1/8T 4.7K-J
RR16	31018-177-202	RD 1/8T 2K-J
RR17	31018-177-103	RD 1/8T 10K-J
RR18	31018-177-332	RD 1/8T 3.3K-J
RR19	31018-177-332	RD 1/8T 3.3K-J
RR20	31018-177-103	RD 1/8T 10K-J
RR22	31018-177-333	RD 1/8T 33K-J
RR23	31018-177-202	RD 1/8T 2K-J
RR24	31018-177-124	RD 1/8T 120K-J
RR25	31018-177-124	RD 1/8T 120K-J
RR28	31018-177-222	RD 1/8T 2.2K-J
RR29	31018-177-223	RD 1/8T 22K-J
RR30	31018-177-222	RD 1/8T 2.2K-J
RR31	31018-177-244	RD 1/8T 240K-J
RR32	31018-177-223	RD 1/8T 22K-J
RR34	31018-177-472	RD 1/8T 4.7K-J
RR35	31018-177-333	RD 1/8T 33K-J
RR36	31018-177-202	RD 1/8T 2K-J
RR37	31018-177-102	RD 1/8T 1K-J
RR41	31018-177-162	RD 1/8T 1.6K-J
RR42	31018-177-202	RD 1/8T 2K-J
RR43	31018-177-202	RD 1/8T 2K-J
RR44	31018-177-202	RD 1/8T 2K-J
RR45	31018-177-101	RD 1/8T 100-J
RR46	31018-177-101	RD 1/8T 100-J
RR47	31018-177-471	RD 1/8T 470-J
RR48	31018-177-471	RD 1/8T 470-J
RR49	31018-177-471	RD 1/8T 470-J
RR50	31018-177-471	RD 1/8T 470-J
RR51	31018-177-102	RD 1/8T 1K-J

Loc No	Supplier Parts No.	Specification
RR52	31018-177-102	RD 1/8T 1K-J
RR53	31018-177-102	RD 1/8T 1K-J
RR54	31018-177-102	RD 1/8T 1K-J
RR55	31018-177-102	RD 1/8T 1K-J
RR56	31018-177-202	RD 1/8T 2K-J
SR01	31018-177-103	RD 1/8T 10K-J
SR02	31018-177-473	RD 1/8T 47K-J
SR03	31018-177-103	RD 1/8T 10K-J
SR04	31018-177-473	RD 1/8T 47K-J
SR05	31018-177-104	RD 1/8T 100K-J
SR06	31018-177-104	RD 1/8T 100K-J
SR07	31018-177-750	RD 1/8T 75-J
SR08	31018-177-220	RD 1/8T 22-J
SR09	31018-177-750	RD 1/8T 75-J
SR10	31018-177-750	RD 1/8T 75-J
SR12	31018-177-563	RD 1/8T 56K-J
SR13	31018-177-563	RD 1/8T 56K-J
SR15	31018-177-222	RD 1/8T 2.2K-J
SR16	31018-177-750	RD 1/8T 75-J
TR02	31018-177-822	RD 1/8T 8.2K-J
TR03	31018-177-152	RD 1/8T 1.5K-J
TR04	31018-177-472	RD 1/8T 4.7K-J
TR05	31018-177-105	RD 1/8T 1M-J
TR06	31018-177-682	RD 1/8T 6.8K-J
TR07	31018-177-101	RD 1/8T 100-J
TR08	31018-277-131	RD 1/4T 130-J
TR09	31018-177-301	RD 1/8T 300-J
TR10	31018-177-273	RD 1/8T 27K-J
TR13	31018-177-512	RD 1/8T 5.1K-J
TR14	31018-177-101	RD 1/8T 100-J
TR15	31018-177-101	RD 1/8T 100-J
TR16	31018-177-682	RD 1/8T 6.8K-J
TR17	31018-177-271	RD 1/8T 270-J
TR18	31018-177-271	RD 1/8T 270-J
TR19	31018-177-271	RD 1/8T 270-J
TR20	31018-177-181	RD 1/8T 180-J
TR21	31018-177-682	RD 1/8T 6.8K-J
TR22	31018-177-563	RD 1/8T 56K-J
TR23	31018-177-682	RD 1/8T 6.8K-J
TR25	31018-177-101	RD 1/8T 100-J
TR30	31018-177-223	RD 1/8T 22K-J
VARIABLE RESISTORS		
VR121	31249-128-008	EVN-DJA A03 B50K
VR201	31249-128-001	EVN-DJA A03 B10K
VR202	31249-128-001	EVN-DJA A03 B10K
VR501	31018-177-151	RD 1/8T 150-J
VR502	31249-128-004	EVN-DJA A03 B1K
CAPACITORS		
C100	31417-344-104	CK45 TAPG F 50V 104-Z
C101	31417-109-140	CK45 TAPG F 50V 103-Z
C103	31417-109-140	CK45 TAPG F 50V 103-Z
C104	31417-109-140	CK45 TAPG F 50V 103-Z
C105	31417-109-140	CK45 TAPG F 50V 103-Z
C106	31407-101-270	CC45(T) SL 50V 470-J
C107	31407-101-270	CC45(T) SL 50V 470-J

Loc No	Supplier Parts No.	Specification
C120	31417-109-140	CK45 TAPG F 50V 103-Z
C121	31417-104-400	CK45 TAPG B 50V 102-K
C122	31417-109-140	CK45 TAPG F 50V 103-Z
C123	31607-402-220	CE04W TAPG 50V 2.2M
C124	31607-401-470	CE04W TAPG 16V 100M VENT
C125	31417-109-140	CK45 TAPG F 50V 103-Z
C126	31417-109-140	CK45 TAPG F 50V 103-Z
C127	31417-109-140	CK45 TAPG F 50V 103-Z
C130	31417-104-400	CK45 TAPG B 50V 102-K
C131	31607-402-220	CE04W TAPG 50V 2.2M
C132	31607-402-220	CE04W TAPG 50V 2.2M
C135	31507-127-024	ECQ-V1H 224JZ3/2E 63V 0.
C136	31607-401-470	CE04W TAPG 16V 100M VENT
C151	31607-401-470	CE04W TAPG 16V 100M VENT
C152	31417-109-140	CK45 TAPG F 50V 103-Z
C154	31607-402-220	CE04W TAPG 50V 2.2M
C155	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
C156	31407-105-280	CC45(T) CH 50V 560-J
C157	31409-106-650	CC45 RH 50V 680-K
C158	31607-402-210	CE04W TAPG 50V 1M
C201	31507-127-008	ECQ B1 H 223J F3
C202	31507-127-008	ECQ B1 H 223J F3
C203	31507-127-008	ECQ B1 H 223J F3
C204	31507-127-008	ECQ B1 H 223J F3
C205	31507-127-008	ECQ B1 H 223J F3
C206	31507-127-008	ECQ B1 H 223J F3
C207	31507-127-025	ECQ-V1H 334JZ3/2E 63V 0.
C208	31507-127-025	ECQ-V1H 334JZ3/2E 63V 0.
C210	31407-057-330	CC45(T) CH 50V 330-J
C211	31507-127-025	ECQ-V1H 334JZ3/2E 63V 0.
C212	31607-402-250	CE04W TAPG 50V 10M
C213	31607-402-240	CE04W TAPG 50V 4.7M
C214	31607-402-240	CE04W TAPG 50V 4.7M
C215	31607-402-240	CE04W TAPG 50V 4.7M
C216	31607-902-250	CE04W TAPG 50V 0.22M
C217	31507-127-006	ECQ B1 H 103J F3
C218	31607-401-480	CE04W TAPG 16V 220M-M-VE
C250	31607-803-730	CE04W TAPG 50V 4.7M-NP
C251	31607-402-240	CE04W TAPG 50V 4.7M
C252	31407-106-380	CC45(T) RH 50V 181-J
C255	31417-104-270	CK45 TAPG B 50V 681-K
C260	31507-127-016	ECQ B1 H 472J F3
C261	31407-105-280	CC45(T) CH 50V 560-J
C501	31607-402-240	CE04W TAPG 50V 4.7M
C502	31607-401-470	CE04W TAPG 16V 100M VENT
C503	31407-106-260	CC45(T) RH 50V 101-J
C504	31407-106-260	CC45(T) RH 50V 101-J
C505	31407-106-250	CC45(T) SL 50V 331-J
C506	31407-047-221	CC45(T) RH 50V 221-J
C507	31507-127-008	ECQ B1 H 223J F3
C508	31507-127-008	ECQ B1 H 223J F3
C509	31407-047-221	CC45(T) RH 50V 221-J
C510	31507-127-008	ECQ B1 H 223J F3
C511	31407-101-160	CC45(T) SL 50V 150-J
C512	31407-101-270	CC45(T) SL 50V 470-J
C513	31407-106-760	CC45(T) RH 50V 151-J
C514	31407-017-390	CC45(T) SL 50V 390-J

Loc No	Supplier Parts No.	Specification
C515	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
C516	31607-402-210	CE04W TAPG 50V 1M
C517	31607-402-210	CE04W TAPG 50V 1M
C518	31507-127-010	ECQ B1 H 473J F3
C519	31607-401-480	CE04W TAPG 16V 220M-M-VE
C520	31417-109-140	CK45 TAPG F 50V 103-Z
C521	31507-127-008	ECQ B1 H 223J F3
C522	31507-127-008	ECQ B1 H 223J F3
C523	31407-047-221	CC45(T) RH 50V 221-J
C524	31407-047-221	CC45(T) RH 50V 221-J
C525	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
C526	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
C527	31407-106-150	CC45(T) RH 50V 150-J
C528	31407-106-760	CC45(T) RH 50V 151-J
C529	31407-106-760	CC45(T) RH 50V 151-J
C530	31407-106-150	CC45(T) RH 50V 150-J
C531	31407-047-221	CC45(T) RH 50V 221-J
C532	31507-127-006	ECQ B1 H 103J F3
C533	31507-127-006	ECQ B1 H 103J F3
C534	31607-401-480	CE04W TAPG 16V 220M-M-VE
C535	31417-109-140	CK45 TAPG F 50V 103-Z
C536	31407-057-330	CC45(T) CH 50V 330-J
C537	31507-127-025	ECQ-V1H 334JZ3/2E 63V 0.
C538	31507-127-025	ECQ-V1H 334JZ3/2E 63V 0.
C539	31507-127-010	ECQ B1 H 473J F3
C540	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
C541	31829-105-610	TZ03P 450E
C542	31507-127-008	ECQ B1 H 223J F3
C543	31417-109-140	CK45 TAPG F 50V 103-Z
C601	31607-402-530	CE04W TAPG 50V 0.47u-NP
C605	31507-127-024	ECQ-V1H 224JZ3/2E 63V 0.
C606	31607-803-730	CE04W TAPG 50V 4.7M-NP
C607	31607-803-730	CE04W TAPG 50V 4.7M-NP
C608	31507-127-025	ECQ-V1H 334JZ3/2E 63V 0.
C609	31507-127-025	ECQ-V1H 334JZ3/2E 63V 0.
C610	31507-127-007	ECQ B1 H 153J F3
C611	31507-127-007	ECQ B1 H 153J F3
C612	31507-127-009	ECQ B1 H 333J F3
C613	31607-803-730	CE04W TAPG 50V 4.7M-NP
C614	31607-803-730	CE04W TAPG 50V 4.7M-NP
C615	31507-127-004	ECQ B1 H 562J F3
C616	31507-127-009	ECQ B1 H 333J F3
C618	31507-127-025	ECQ-V1H 334JZ3/2E 63V 0.
C619	31607-401-470	CE04W TAPG 16V 100M VENT
C620	31507-127-025	ECQ-V1H 334JZ3/2E 63V 0.
C621	31607-803-730	CE04W TAPG 50V 4.7M-NP
C622	31607-803-730	CE04W TAPG 50V 4.7M-NP
C623	31507-127-004	ECQ B1 H 562J F3
C624	31417-109-140	CK45 TAPG F 50V 103-Z
C625	31607-401-460	CE04W TAPG 16V 47M
C626	31607-401-460	CE04W TAPG 16V 47M
**C852	31607-401-510	CE04W TAPG 16V 1000U-M
**C853	31607-401-510	CE04W TAPG 16V 1000U-M
**C856	31607-402-480	CE04W TAPG 50V 47-W(+20-
**C857	31607-402-480	CE04W TAPG 50V 47-W(+20-
NC01	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
NC03	31607-402-250	CE04W TAPG 50V 10M

Loc No	Supplier Parts No.	Specification
NC04	31417-109-140	CK45 TAPG F 50V 103-Z
NC05	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
NC06	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
NC07	31607-401-660	CE04W TAPG 25V 33M
NC08	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
NC09	31417-109-140	CK45 TAPG F 50V 103-Z
NC10	31607-402-200	CE04W TAPG 50V 0.47M
NC11	31607-402-200	CE04W TAPG 50V 0.47M
NC12	31407-105-280	CC45(T) CH 50V 560-J
NC13	31829-001-002	CV05B1001
NC14	31407-105-180	CC45(T) CH 50V 220-J
NC15	31407-057-180	CC45(T) CH 50V 180-J
NC16	31607-402-200	CE04W TAPG 50V 0.47M
NC17	31417-109-140	CK45 TAPG F 50V 103-Z
NC18	31417-109-140	CK45 TAPG F 50V 103-Z
NC19	31417-109-140	CK45 TAPG F 50V 103-Z
NC20	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
NC21	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
NC22	31417-104-040	CK45 TAPG B 50V 181-K
NC23	31417-104-040	CK45 TAPG B 50V 181-K
NC24	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
NC25	31417-109-140	CK45 TAPG F 50V 103-Z
NC26	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
NC27	31417-109-140	CK45 TAPG F 50V 103-Z
NC28	31607-402-200	CE04W TAPG 50V 0.47M
NC29	31407-105-280	CC45(T) CH 50V 560-J
NC30	31407-057-180	CC45(T) CH 50V 180-J
NC31	31829-001-002	CV05B1001
NC32	31407-105-180	CC45(T) CH 50V 220-J
NC33	31507-127-024	ECQ-V1H 224JZ3/2E 63V 0.
NC34	31417-109-140	CK45 TAPG F 50V 103-Z
NC35	31607-401-460	CE04W TAPG 16V 47M
NC36	31829-105-610	TZ03P 450E
NC37	31407-105-300	CC45(T) CH 50V 680-J
NC38	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
NC39	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
NC40	31607-402-250	CE04W TAPG 50V 10M
NC41	31417-109-140	CK45 TAPG F 50V 103-Z
NC42	31417-318-152	CK45 TAPG B 50V 152-K
NC43	31417-109-140	CK45 TAPG F 50V 103-Z
NC44	31607-402-250	CE04W TAPG 50V 10M
NC46	31607-401-670	CE04W TAPG 25V 47M
NC48	31507-127-009	ECQ B1 H 333J F3
NC49	31507-127-008	ECQ B1 H 223J F3
NC50	31507-127-004	ECQ B1 H 562J F3
NC51	31607-402-250	CE04W TAPG 50V 10M
NC52	31417-104-270	CK45 TAPG B 50V 681-K
NC54	31507-127-009	ECQ B1 H 333J F3
NC55	31507-127-008	ECQ B1 H 223J F3
NC56	31507-127-004	ECQ B1 H 562J F3
NC58	31607-402-250	CE04W TAPG 50V 10M
NC59	31417-104-270	CK45 TAPG B 50V 681-K
NC60	31607-401-460	CE04W TAPG 16V 47M
NC61	31607-401-460	CE04W TAPG 16V 47M
NC62	31417-109-140	CK45 TAPG F 50V 103-Z
NC63	31417-109-140	CK45 TAPG F 50V 103-Z
NC64	31607-401-510	CE04W TAPG 16V 1000U-M

Loc No	Supplier Parts No.	Specifiction	Loc No	Supplier Parts No.	Specifiction
NC70	31407-105-180	CC45(T) CH 50V 220-J	TC20	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
NC71	31407-105-180	CC45(T) CH 50V 220-J	TC21	31607-402-250	CE04W TAPG 50V 10M
NC72	31417-109-140	CK45 TAPG F 50V 103-Z	TCN01	31497-009-360	EXF-FP8 331MDV(9P 331)
RC01	31407-106-250	CC45(T) SL 50V 331-J	I C		
RC02	31507-127-000	ECQ B1 H 102J F3	IC101	32119-101-380	TDA8341/N6
RC03	31607-402-250	CE04W TAPG 50V 10M	IC102	32119-110-025	TDA3857/V3
RC04	31507-127-025	ECQ-V1H 334JZ3/2E 63V 0.	IC201	32119-501-020	TDA3505 V9/V1
RC05	31507-127-025	ECQ-V1H 334JZ3/2E 63V 0.	IC501	32119-110-007	TDA4650/V2
RC06	31407-106-250	CC45(T) SL 50V 331-J	IC502	32119-110-006	TDA4660/V1
RC07	31407-106-250	CC45(T) SL 50V 331-J	IC503	32119-101-650	TDA4565/V6
RC08	31407-106-250	CC45(T) SL 50V 331-J	IC601	32119-710-012	TDA8415/V2
RC09	31607-402-250	CE04W TAPG 50V 10M	IC602	32119-710-011	TDA8425/V7
RC10	31607-402-250	CE04W TAPG 50V 10M	NIC01	32119-710-013	TA8662N
RC11	31607-402-250	CE04W TAPG 50V 10M	NIC02	32119-710-008	SAA7280
RC13	31507-127-012	EVQB1 H 104J-F3/2E 63V 1	NIC03	32109-310-027	NE5534
RC14	31417-109-140	CK45 TAPG F 50V 103-Z	NIC04	32109-301-050	SN74LS86
RC15	31407-105-180	CC45(T) CH 50V 220-J	NIC05	32119-710-009	TDA1543
RC16	31407-105-180	CC45(T) CH 50V 220-J	NIC06	32109-310-026	NE5532
RC18	31607-401-450	CE04W TAPG 16V 33M	NIC07	32109-310-026	NE5532
RC19	31607-401-470	CE04W TAPG 16V 100M VENT	NQ02	32119-401-110	MC7805C ( AUTO )
RC20	31417-109-140	CK45 TAPG F 50V 103-Z	Q853	32119-401-110	MC7805C ( AUTO )
RC21	31507-127-000	ECQ B1 H 102J F3	**RIC01	32109-110-022	SPM-113
RC23	31507-127-000	ECQ B1 H 102J F3	RIC02	32109-201-430	PCF8582 AP
RC24	31607-402-250	CE04W TAPG 50V 10M	RIC03	32109-201-430	PCF8582 AP
RCN01	31499-009-390	B6RC0910-33N(6P 330P)	SIC01	32109-301-890	CD4053BCN
SC01	31607-803-730	CE04W TAPG 50V 4.7M-NP	SIC02	32109-301-890	CD4053BCN
SC02	31607-803-730	CE04W TAPG 50V 4.7M-NP	SIC03	32119-101-010	TEA2014
SC03	31607-803-730	CE04W TAPG 50V 4.7M-NP	TIC01	32109-101-380	MAB8461P/W115
SC04	31607-803-730	CE04W TAPG 50V 4.7M-NP	TIC02	32109-110-017	SAA5246P/E
SC05	31607-803-730	CE04W TAPG 50V 4.7M-NP	TIC03	32109-201-410	KM6264AP-10
SC06	31607-803-730	CE04W TAPG 50V 4.7M-NP	TIC04	32109-310-025	KS74HCTLS241
SC07	31417-109-140	CK45 TAPG F 50V 103-Z	TRANSISTORS		
SC08	31607-401-470	CE04W TAPG 16V 100M VENT	NQ01	32137-301-090	2SC388ATM(TAPG)
SC09	31607-401-470	CE04W TAPG 16V 100M VENT	Q101	32137-301-090	2SC388ATM(TAPG)
SC11	31607-803-730	CE04W TAPG 50V 4.7M-NP	Q251	32137-301-720	KSC 815-Y (TAPG)
SC12	31417-109-140	CK45 TAPG F 50V 103-Z	Q253	32137-301-510	KSC 2310-0(TAPG)
SC13	31607-401-470	CE04W TAPG 16V 100M VENT	Q501	32157-210-000	BC548-C(TAPG)
SC15	31607-803-280	CE04W TAPG 50V 1U-M(NP)	Q502	32157-210-001	BC558-C(TAPG)
SC16	31607-803-280	CE04W TAPG 50V 1U-M(NP)	Q503	32157-210-000	BC548-C(TAPG)
SC18	31417-109-140	CK45 TAPG F 50V 103-Z	Q504	32137-301-090	2SC388ATM(TAPG)
SC19	31417-109-140	CK45 TAPG F 50V 103-Z	Q505	32137-301-720	KSC 815-Y (TAPG)
TC01	31607-401-480	CE04W TAPG 16V 220M-M-VE	RQ01	32137-301-720	KSC 815-Y (TAPG)
TC02	31417-109-140	CK45 TAPG F 50V 103-Z	RQ02	32137-301-720	KSC 815-Y (TAPG)
TC03	31607-402-220	CE04W TAPG 50V 2.2M	RQ03	32137-301-720	KSC 815-Y (TAPG)
TC04	31407-105-180	CC45(T) CH 50V 220-J	RQ04	32137-301-720	KSC 815-Y (TAPG)
TC05	31407-105-180	CC45(T) CH 50V 220-J	RQ05	32137-301-720	KSC 815-Y (TAPG)
TC06	31417-109-140	CK45 TAPG F 50V 103-Z	RQ06	32137-301-720	KSC 815-Y (TAPG)
TC07	31607-401-290	CE04W TAPG 10V 220U	RQ07	32137-301-720	KSC 815-Y (TAPG)
TC08	31507-127-000	ECQ B1 H 102J F3	RQ08	32137-301-550	KSC 2331-0(TAPG)
TC09	31407-106-640	CC45(T) RH 50V 560-K	SQ01	32137-301-720	KSC 815-Y (TAPG)
TC10	31407-106-640	CC45(T) RH 50V 560-K	TQ01	32137-301-720	KSC 815-Y (TAPG)
TC11	31507-127-012	EVQB1 H 104J-F3/2E 63V 1	DIODES		
TC12	31507-127-012	EVQB1 H 104J-F3/2E 63V 1	CD02	32167-406-480	1N4148 TAPG
TC13	31507-127-012	EVQB1 H 104J-F3/2E 63V 1	CD03	32167-406-480	1N4148 TAPG
TC14	31417-109-140	CK45 TAPG F 50V 103-Z			
TC16	31607-401-480	CE04W TAPG 16V 220M-M-VE			
TC17	31607-401-480	CE04W TAPG 16V 220M-M-VE			

Loc No	Supplier Parts No.	Specification
D201	32167-406-150	MTZ 13A
D202	32167-406-150	MTZ 13A
D203	32167-406-150	MTZ 13A
D204	32167-406-480	1N4148 TAPG
D205	32167-406-480	1N4148 TAPG
D212	32167-406-150	MTZ 13A
D501	32167-406-480	1N4148 TAPG
D502	32167-406-480	1N4148 TAPG
D503	32167-401-800	EQA02-06A/MTZ5.6B(TAPG)
ND01	32167-406-480	1N4148 TAPG
ND02	32167-406-070	MTZ 5.1A
ND04	32167-406-070	MTZ 5.1A
NV01	32167-661-012	1SV97
RD03	32167-406-480	1N4148 TAPG
SD02	32167-406-480	1N4148 TAPG
SD03	32167-406-480	1N4148 TAPG
SD04	32167-101-130	1K34A (TAPG)
TD01	32167-406-040	MTZ 3.6A
TD02	32167-406-480	1N4148 TAPG
TD03	32167-406-480	1N4148 TAPG
TD04	32167-406-480	1N4148 TAPG
TD05	32167-406-480	1N4148 TAPG
TD08	32167-406-480	1N4148 TAPG
VD151	32167-661-012	1SV97
VD152	32167-661-012	1SV97
COILS		
D-COIL	32479-029-301	29RT85L1500/L1500(D)
L101	32429-014-020	1.3UH-K
L121	32427-803-410	8.2UH-M
L122	32427-805-450	12UH-K TAPG
L124	32427-803-130	10UH-K TAPG
L125	32427-803-410	8.2UH-M
L254	32427-805-500	33UH-K TAPG
L501	32427-803-410	8.2UH-M
L502	32427-805-330	5.6UH-M
NL01	32427-904-940	EL0606RA 102-J
NL02	32427-904-940	EL0606RA 102-J
NL03	32427-904-941	EL0606RA 681-J
NL04	32427-904-941	EL0606RA 681-J
NL06	32427-805-110	1UH-M
RL01	32427-803-130	10UH-K TAPG
TL01	32427-805-110	1UH-M
TRANS		
L120	32709-024-310	38.9MHZ/0.17UH
L123	32709-024-320	38.9MHZ/0.36UH
L151	32729-601-008	38.9MHZ
L152	32729-601-009	5.5MHZ(7M/M)
L251	32709-024-260	4MHZ
L252	32709-024-350	72UH
L504	32709-024-300	4.33 MHZ(7CAN)
NF01	32729-601-006	6.552MHZ
TUNER		
**TU01	34519-970-060	ECC-5883CE(D)

Loc No	Supplier Parts No.	Specification
FILTERS		
Z101	34529-700-014	OFW J3252
Z104	34527-460-008	TPS6.0MBTF21
Z153	34527-460-007	SFE6.0MBTF21
CRYSTALS		
NX01	34539-001-012	6.552 MHZ
NX02	34539-001-014	5.824 MHZ
NX03	34539-001-011	17.472 MHZ
RX01	34539-001-000	10MHZ
TX01	34539-001-018	27MHZ
TX02	34539-071-040	HC-18/U,6MHZ
X502	34537-001-020	8.867238MHZ(TAPG)
X601	34539-001-000	10MHZ
MISCELLANEOUS		
CN601	33347-114-810	YW025-04(AUTO)
CN801	33345-110-310	67094-012(SEP)
CNC01	33347-114-810	YW025-04(AUTO)
CNC02	33347-108-140	67094-006 (AUTO)
CNC03	33347-108-310	67094-003(AUTO)
CNM01	33347-114-810	YW025-04(AUTO)
CNM02	33050-101-893	Y4XY4/1185/400
CNM02	33347-114-810	YW025-04(AUTO)
CNT08	33347-108-140	67094-006 (AUTO)
JA01	33136-103-030	HXC-1510-01-300A(R)
JA02	33329-100-150	TCS7549-01-201
NL05	34047-019-060	3.5X6X1.0
RCA-J	33339-030-302	2P AW,R
CASE/S	34543-113-310	SPTE TO.25
S-C-T	34543-113-410	SPTE TO.25
S-C-B	34543-113-510	SPTE TO.25
CASE/S	34544-128-010	SPTE TO.25
SPEAKER		
LEAD-T	33050-005-028	Y4/F/700
SPK	34209-169-460	06Q01BRA 10W 8
ASSY-H/SINK TR		
*3H84-00050-000 35684-118-340,MC7812C		
**TR	32119-901-110	MC7812C ( AUTO )
H/SINK	35684-118-340	A6063 EXTR BLK H4<S.N.A>
SCREW	37158-230-061	2S-3X6 FE FZY <S.N.A>
A S S Y - A C C E S S O R Y		
CARD/W	38124-121-290	WHT PAPER 220 SEUK
SVC/N	38134-379-010	ART PAPER 100
I/B	38134-398-610	ART PAPER 120 CI5913W
PE-BAG	38653-108-161	HDPE TO.015 400X230 NO
A S S Y - P W B C R T		
*3D32-00010-050 CX5913ZN,NICAM		
PWB	33004-145-581	8Y,P88MS(T), <S.N.A>
R506	31018-277-152	RD 1/4T 1.5K-J

Loc No	Supplier Parts No.	Specifiction
R550	31018-277-102	RD 1/4T 1K-J
R551	31018-277-122	RD 1/4T 1.2K-J
R553	31017-347-681	RD 1/2N 680-J (F.P)
R555	31018-277-684	RD 1/4T 680K-J
R556	31018-277-102	RD 1/4T 1K-J
R557	31028-328-472	RC 1/2T 4.7K-K
R558	31018-277-680	RD 1/4T 68-J
R559	31018-277-102	RD 1/4T 1K-J
R560	31018-277-122	RD 1/4T 1.2K-J
R561	31049-101-473	RS 1P 47K-J
R562	31017-347-681	RD 1/2N 680-J (F.P)
R563	31018-277-122	RD 1/4T 1.2K-J
R564	31018-277-684	RD 1/4T 680K-J
R565	31049-315-030	RS 2P 18K-J
R566	31028-328-472	RC 1/2T 4.7K-K
R568	31018-277-122	RD 1/4T 1.2K-J
R569	31049-101-473	RS 1P 47K-J
R570	31017-347-681	RD 1/2N 680-J (F.P)
R571	31018-277-122	RD 1/4T 1.2K-J
R572	31018-277-684	RD 1/4T 680K-J
**R573	31049-315-030	RS 2P 18K-J
R574	31028-328-472	RC 1/2T 4.7K-K
R575	31018-277-561	RD 1/4T 560-J
R578	31018-277-122	RD 1/4T 1.2K-J
**R580	31059-003-010	RF 1P 4.3-J
R581	31049-315-030	RS 2P 18K-J
R582	31049-101-473	RS 1P 47K-J
R590	31018-277-105	RD 1/4T 1M-J
VR550	31018-277-680	RD 1/4T 68-J
VR551	31018-277-680	RD 1/4T 68-J
C551	31417-104-250	CK45 TAPG B 50V 471-K
C552	31417-104-050	CK45 TAPG B 50V 101-K
C553	31407-105-700	CC45(T) CH 50V 151-J
C554	31407-105-300	CC45(T) CH 50V 680-J
C555	31417-104-250	CK45 TAPG B 50V 471-K
C556	31407-101-360	CC45(T) SL 50V 101-J
C557	31407-105-700	CC45(T) CH 50V 151-J
C558	31417-104-250	CK45 TAPG B 50V 471-K
C559	31607-402-480	CE04W TAPG 50V 47-W(+20-
C560	31609-403-460	CE04W 250V 2.2-VENT
C561	31417-767-331	CK45(T) B2KV 331-K
C566	31407-105-700	CC45(T) CH 50V 151-J
C567	31607-401-460	CE04W TAPG 16V 47M
C590	31609-403-460	CE04W 250V 2.2-VENT
Q550	32159-101-270	BF 871
Q551	32137-301-510	KSC 2310-0(TAPG)
Q552	32159-101-260	BF 423
Q553	32159-101-270	BF 871
Q554	32137-301-510	KSC 2310-0(TAPG)
Q555	32159-101-260	BF 423
Q556	32159-101-270	BF 871
Q557	32137-301-510	KSC 2310-0(TAPG)
Q558	32159-101-260	BF 423
Q559	32137-401-530	KSA 539-Y(TAPG)
D550	32167-406-480	1N4148 TAPG
D551	32167-406-480	1N4148 TAPG
D552	32167-201-070	1N4003 TAPG

Loc No	Supplier Parts No.	Specifiction
D553	32167-406-480	1N4148 TAPG
D554	32167-406-480	1N4148 TAPG
D555	32167-201-070	1N4003 TAPG
D556	32167-406-480	1N4148 TAPG
D557	32167-406-480	1N4148 TAPG
D558	32167-201-070	1N4003 TAPG
D590	32167-201-180	M100J(TAPG)
CNT08	33345-108-140	67094-006(SEP)
CNT08	33058-017-020	S6XS6/F/500
CNT09	33050-101-851	Y4XY4/1185X2/500
CNT09	33347-114-820	YW025-04(AUTO,NO TUBE)
LEAD-T	33054-833-009	P1/1015/500
V999A	33359-063-620	HF-29.1A
A S S Y - P W B C O N T R O L		
*3D33-00593-330 CX5913ZN,RM113,U88MT		
PWB	33004-145-151	CF-5913Z <S.N.A>
CR01	31018-277-223	RD 1/4T 22K-J
CR02	31018-277-220	RD 1/4T 22-J
CR03	31018-277-681	RD 1/4T 680-J
CC01	31607-401-460	CE04W TAPG 16V 47M
CD04	32167-406-480	1N4148 TAPG
PA01	32199-411-008	MM-007
CD01	32309-110-430	DS2 (DL-25R)/SL-425R
CD02	32309-110-430	DS2 (DL-25R)/SL-425R
CD03	32309-110-430	DS2 (DL-25R)/SL-425R
CNC01	33058-005-020	Y4/F/500
CNC02	33058-010-024	S6/F/600
CNC03	33055-216-214	S3/2405/600
S/W01	33598-001-000	KPT-1106A
S/W02	33598-001-000	KPT-1106A
S/W03	33598-001-000	KPT-1106A
S/W04	33598-001-000	KPT-1106A
S/W05	33598-001-000	KPT-1106A
S/W06	33598-001-000	KPT-1106A
S/W07	33598-001-000	KPT-1106A
S/W08	33598-001-000	KPT-1106A
S/W09	33598-001-000	KPT-1106A
S/W10	33598-001-000	KPT-1106A
S/W11	33598-001-000	KPT-1106A
S/W12	33598-001-000	KPT-1106A
S/W13	33609-101-004	JTM-1105C/KPT-1105B
S/W15	33598-001-000	KPT-1106A
HOLDER	36023-117-810	HIPS HB BLK
A S S Y - P W B P O W E R		
*3D50-00002-040 CF-5913Z,25S-60MT		
PCB	33004-145-161	25S-60MTC <S.N.A>
RESISTORS		
R302	31018-377-561	RD 1/2T 560-J
R303	31018-177-432	RD 1/8T 4.3K-J
R304	31018-377-471	RD 1/2T 470-J
R305	31018-177-433	RD 1/8T 43K-J
R306	31018-177-473	RD 1/8T 47K-J

Loc No	Supplier Parts No.	Specification
R307	31018-177-102	RD 1/8T 1K-J
R308	31018-177-362	RD 1/8T 3.6K-J
R309	31018-377-109	RD 1/2T 1-J
R310	31018-177-820	RD 1/8T 82-J
R311	31018-177-154	RD 1/8T 150K-J
R312	31018-177-221	RD 1/8T 220-J
R313	31018-177-562	RD 1/8T 5.6K-J
R314	31018-177-220	RD 1/8T 22-J
R315	31018-177-152	RD 1/8T 1.5K-J
R317	31018-177-432	RD 1/8T 4.3K-J
R318	31018-277-432	RD 1/4T 4.3K-J
R319	31018-277-432	RD 1/4T 4.3K-J
R320	31018-377-109	RD 1/2T 1-J
R321	31018-277-102	RD 1/4T 1K-J
R322	31018-277-472	RD 1/4T 4.7K-J
R324	31018-177-103	RD 1/8T 10K-J
R325	31018-377-681	RD 1/2T 680-J
R326	31018-177-682	RD 1/8T 6.8K-J
R400	31059-427-121	RF 1P 120-J
R401	31018-177-221	RD 1/8T 220-J
R402	31018-377-220	RD 1/2T 22-J
R403	31046-467-122	RS 1T 1.2K-J (AUTO)
R404	31018-177-222	RD 1/8T 2.2K-J
R405	31018-277-184	RD 1/4T 180K-J
R406	31059-002-130	RF 1/2P 0.47-K
R407	31018-177-333	RD 1/8T 33K-J
R411	31018-376-124	RD 1/2T 120K-G
R412	31018-377-102	RD 1/2T 1K-J
R413	31039-687-569	RW 7H 5.6-J
R414	31059-002-130	RF 1/2P 0.47-K
R415	31059-002-130	RF 1/2P 0.47-K
R416	31018-377-220	RD 1/2T 22-J
**R417	31018-377-159	RD 1/2T 1.5R-J
**R420	31018-177-333	RD 1/8T 33K-J
R421	31018-177-393	RD 1/8T 39K-J
R423	31046-467-102	RS 1T 1K-J (AUTO)
R424	31018-177-472	RD 1/8T 4.7K-J
R425	31018-177-222	RD 1/8T 2.2K-J
R426	31018-277-181	RD 1/4T 180-J
R657	31039-687-109	RW 7H 1-J
R658	31018-177-221	RD 1/8T 220-J
R659	31018-177-221	RD 1/8T 220-J
R661	31018-377-399	RD 1/2T 3.9-J
R662	31018-377-399	RD 1/2T 3.9-J
**R801	31039-687-569	RW 7H 5.6-J
R802	31046-468-688	RS 1T 0.68-K (AUTO)
R804	31039-586-390	RW 5J 39-J
R805	31046-567-101	RS 2T 100-J(AUTO)
R806	31018-177-104	RD 1/8T 100K-J
R807	31018-377-154	RD 1/2T 150K-J
R808	31018-377-124	RD 1/2T 120K-J
R809	31018-177-122	RD 1/8T 1.2K-J
R810	31018-277-103	RD 1/4T 10K-J
R811	31018-177-221	RD 1/8T 220-J
R812	31018-377-154	RD 1/2T 150K-J
R813	31046-567-132	RS 2T 1.3K-J(AUTO)
R814	31046-567-132	RS 2T 1.3K-J(AUTO)

Loc No	Supplier Parts No.	Specification
**R815	31028-328-475	RC 1/2P 4.7M-K
R816	31059-002-130	RF 1/2P 0.47-K
R817	31059-004-010	RF 2P 0.47-K
**R818	31046-567-243	RS 2T 24K-J(AUTO)
R820	31018-377-124	RD 1/2T 120K-J
R821	31049-547-104	RS 2N 100K-J
R822	31018-377-270	RD 1/2T 27-J
R823	31059-002-130	RF 1/2P 0.47-K
R825	31046-467-680	RS 1T 68-J (AUTO)
R827	31046-467-470	RS 1T 47-J (AUTO)
R828	31018-377-102	RD 1/2T 1K-J
R829	31046-567-913	RS 2T 91K-J(AUTO)
R830	31046-567-913	RS 2T 91K-J(AUTO)
R908	31018-177-153	RD 1/8T 15K-J
SR01	31018-177-913	RD 1/8T 91K-J
SR02	31018-177-682	RD 1/8T 6.8K-J
SR03	31018-177-303	RD 1/8T 30K-J
SR04	31018-177-224	RD 1/8T 220K-J
SR05	31018-277-103	RD 1/4T 10K-J
SR06	31018-277-681	RD 1/4T 680-J
SR08	31018-277-152	RD 1/4T 1.5K-J
SR09	31018-277-273	RD 1/4T 27K-J
SR10	31018-277-302	RD 1/4T 3K-J
SR11	31018-277-152	RD 1/4T 1.5K-J
SR12	31018-277-392	RD 1/4T 3.9K-J
SR14	31046-477-271	RS 1T 270-J
VARIABLE RESISTORS		
SVR01	31249-128-005	EVN-DJA A03 B5K
SVR02	31249-130-006	EVN DCA A03 B20K
VR301	31249-128-010	EVN-DJA A03 B100K
VR401	31249-128-005	EVN-DJA A03 B5K
VR402	31249-128-008	EVN-DJA A03 B50K
VR801	31249-128-005	EVN-DJA A03 B5K
CAPACITORS		
C301	31607-402-100	CE04W TAPG 35V 100M-M-VE
C302	31507-127-006	ECQ B1 H 103J F3
C303	31507-127-006	ECQ B1 H 103J F3
C305	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
C306	31507-127-001	ECQ B1 H 152J F3
C307	31607-402-240	CE04W TAPG 50V 4.7M
C308	31609-402-130	CE04W 35V 470M VENT SNAP
C309	31417-109-140	CK45 TAPG F 50V 103-Z
C310	31507-127-004	ECQ B1 H 562J F3
C311	31519-101-110	DSR 50V 0.22U-J
C312	31407-106-760	CC45(T) RH 50V 151-J
**C313	31607-402-220	CE04W TAPG 50V 2.2M
**C314	31607-402-070	CE04W TAPG 35V 22M
**C315	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
**C316	31607-402-250	CE04W TAPG 50V 10M
C317	31609-401-740	CE04W 25V 2200M.VENT
C402	31419-901-410	CK45 B 2KV 681-K
C403	31507-127-007	ECQ B1 H 153J F3
C406	31519-338-112	CFS922M 1600V 0.0082M-J
C407	31509-337-090	CQ922M 400V 0.022-J
C409	31609-401-740	CE04W 25V 2200M.VENT

Loc No	Supplier Parts No.	Specifiction
C410	31609-403-120	CE04W 100V 220M-VENT
C411	31519-391-000	CFS 922M 400V 364-J
C412	31609-402-130	CE04W 35V 470M VENT SNAP
C413	31519-003-020	CFS922M 400V 0.1-K
C414	31609-803-930	CE04W 250V 2.2M
C415	31519-002-020	CFS 922M 400V 824-J
C416	31609-403-460	CE04W 250V 2.2-VENT
C417	31417-901-660	CK45(T) B1KV 222-K
C421	31607-401-500	CE04W TAPG 16V 470M-M(SG
C423	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
C424	31519-101-100	DSR 50V 0.0027 U-J
C425	31607-401-460	CE04W TAPG 16V 47M
C426	31507-127-010	ECQ B1 H 473J F3
C434	31417-109-140	CK45 TAPG F 50V 103-Z
C435	31417-767-102	CK45(T) B2KV 102-K
C608	31609-402-490	CE04W 35V 2200M
C651	31507-127-009	ECQ B1 H 333J F3
C652	31607-401-460	CE04W TAPG 16V 47M
C653	31607-401-460	CE04W TAPG 16V 47M
C654	31607-401-670	CE04W TAPG 25V 47M
C655	31607-401-460	CE04W TAPG 16V 47M
C656	31507-127-009	ECQ B1 H 333J F3
C657	31609-402-710	CE04W 35V 1000M
C660	31609-401-740	CE04W 25V 2200M.VENT
C661	31609-401-740	CE04W 25V 2200M.VENT
C801	31469-502-220	CK 45P E250V 222-Z(T1.5K
C802	31469-502-220	CK 45P E250V 222-Z(T1.5K
C803	31469-502-220	CK 45P E250V 222-Z(T1.5K
C804	31469-502-220	CK 45P E250V 222-Z(T1.5K
C805	31417-109-140	CK45 TAPG F 50V 103-Z
C806	31607-401-680	CE04W TAPG 25V 100U
C807	31609-403-840	CE04W 400V 220M(30X40)
C808	31607-401-680	CE04W TAPG 25V 100U
C810	31509-337-770	CQ922M 400V 0.0082-J
C811	31607-402-210	CE04W TAPG 50V 1M
C812	31607-401-470	CE04W TAPG 16V 100M VENT
C813	31609-401-740	CE04W 25V 2200M.VENT
C814	31509-391-090	CQ922M 1600V 0.0022-J
**C816	31407-105-700	CC45(T) CH 50V 151-J
C817	31469-504-060	ECK-DNS472MEX/E400V 472(
C818	31469-504-060	ECK-DNS472MEX/E400V 472(
C819	31609-401-180	CE04W 16V 1000u
**C821	31607-401-500	CE04W TAPG 16V 470M-M(SG
C822	31419-901-180	CK45 B 2KV 271-K
**C823	31417-109-140	CK45 TAPG F 50V 103-Z
C824	31417-618-851	CK45(T) B1KV 851-K
**C825	31419-901-180	CK45 B 2KV 271-K
C827	31417-109-140	CK45 TAPG F 50V 103-Z
C828	31607-402-250	CE04W TAPG 50V 10M
C829	31419-901-180	CK45 B 2KV 271-K
C830	31607-401-500	CE04W TAPG 16V 470M-M(SG
C831	31609-403-910	CE04W 200V 220M(30X25)
C841	31569-204-190	250V 0.47M/KNB 1530
C842	31569-204-190	250V 0.47M/KNB 1530
C843	31569-204-190	250V 0.47M/KNB 1530
C844	31507-127-004	ECQ B1 H 562J F3
C845	31509-391-050	CQ922M 1600V 0.01M-J

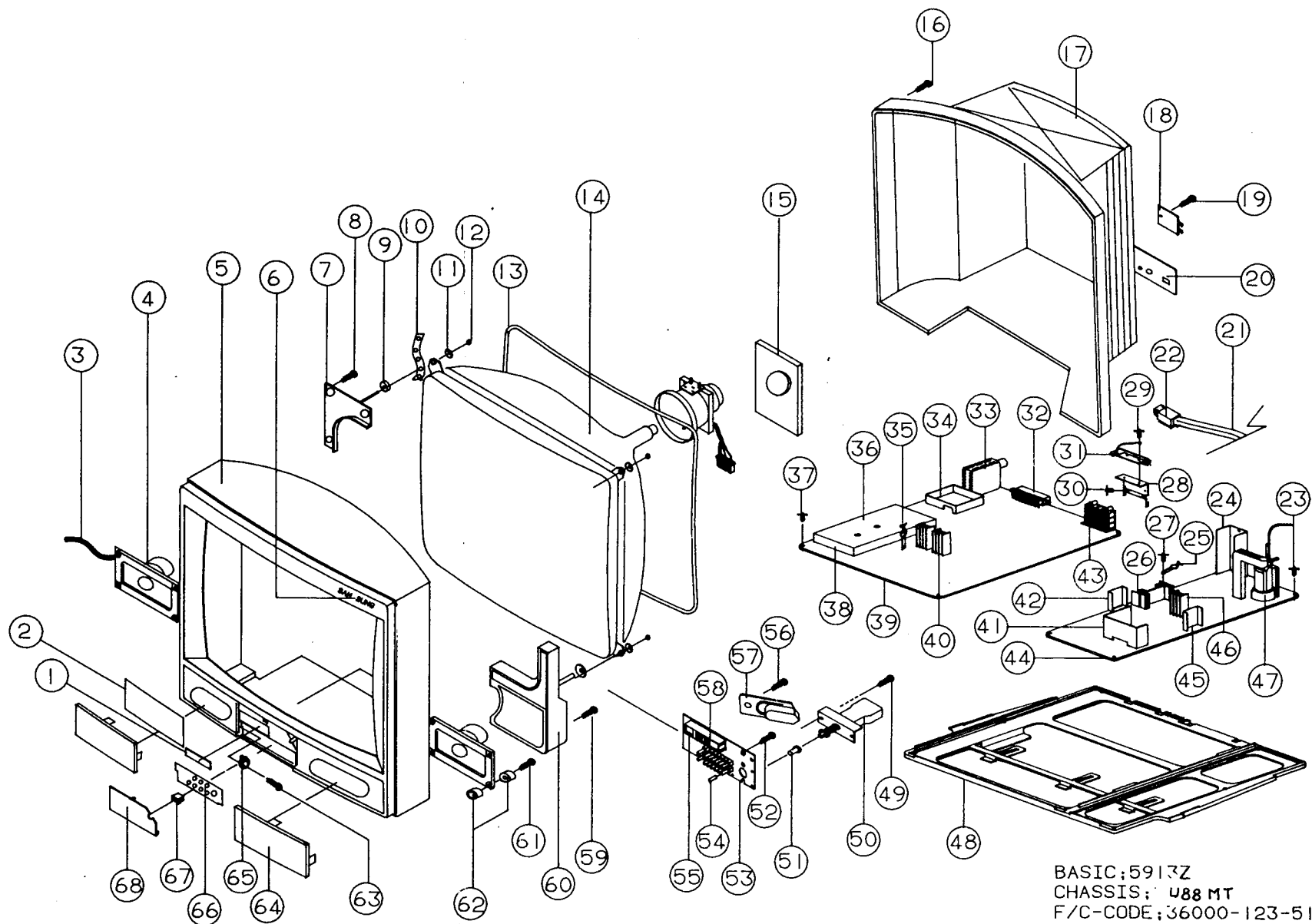
Loc No	Supplier Parts No.	Specifiction
C847	31407-106-180	CC45(T) RH 50V 180-J
SC01	31507-127-025	ECQ-VIH 334JZ3/2E 63V 0.
SC02	31507-127-012	EVQB1 H 104J-F3/2E 63V 1
SC03	31607-403-200	CE04W TAPG 160V 4.7M-M(G
SC04	31607-402-480	CE04W TAPG 50V 47-W(+20-
SC05	31607-401-460	CE04W TAPG 16V 47M
SC06	31607-402-100	CE04W TAPG 35V 100M-M-VE
	I C	
D810	32119-103-060	UPC574J
IC401	32119-101-460	TDA2579A/N8
IC803	32119-901-110	MC7812C ( AUTO )
	TRANSISTORS	
Q301	32137-301-720	KSC 815-Y (TAPG)
Q302	32137-301-720	KSC 815-Y (TAPG)
Q402	32149-301-020	KSC 2073 ( AUTO )
SQ01	32137-301-720	KSC 815-Y (TAPG)
SQ02	32137-103-430	KSA 642-0(TAPG)
	DIODES	
D301	32167-218-150	RU-2V(TAPG)
D401	32167-201-190	RGP15G(TAPG)
D402	32167-201-190	RGP15G(TAPG)
D403	32167-201-190	RGP15G(TAPG)
D404	32167-501-030	BYW96D/BYT77
D405	32169-101-210	BY228/(TFK)
D406	32167-201-070	1N4003 TAPG
D601	32167-406-480	1N4148 TAPG
D801	32167-208-550	ERC24-06
D802	32167-208-550	ERC24-06
D802	32167-401-810	MTZ6.2C
D803	32167-208-550	ERC24-06
D804	32167-208-550	ERC24-06
D805	32167-208-550	ERC24-06
D806	32167-401-810	MTZ6.2C
D807	32167-208-550	ERC24-06
D809	32167-208-550	ERC24-06
D811	32167-208-550	ERC24-06
D812	32167-501-040	GI824
D814	32169-201-230	RU4AM
D825	32167-208-550	ERC24-06
D826	32167-201-070	1N4003 TAPG
D830	32167-208-550	ERC24-06
D831	32167-201-070	1N4003 TAPG
D832	32169-301-670	RH-2F
DZ601	32167-406-130	MTZ 9.1B
SD201	32167-408-070	EQA02-23AC TAPG
	THERMISTOR	
**P802	32189-102-030	P2462-J29/J29-P190-A20
	POSISTOR	
**P801	32189-609-330	PTH451C202BG360N270
	COILS	

Loc No	Supplier Parts No.	Specifiction
L401	32427-805-110	1UH-M
L402	32449-412-602	1MH
**L404	32429-039-190	2.2MH
**L405	32449-730-001	22UH/2PIN
L408	32429-040-001	5.6MH
L661	32429-040-002	20UH/2.0A-K
L662	32429-040-002	20UH/2.0A-K
L801	32429-633-090	39MHX2(U)
L802	32429-903-610	6MH
L803	32429-226-160	4.7UH-K
SL01	32429-040-000	8.4MH
TRANS		
**T401	32849-020-010	50MH,K-16
**T801	32899-002-422	P:160-260 S:155/21/16/5V
TRANS FLY-BACK		
**T444	32859-200-013	FCR-25A005
FUSE		
**F801	34709-084-730	FST 250V 3.15A 20MM SEMK
CORE FERRITE		
L403	34047-019-060	3.5X6X1.0
L804	34047-019-060	3.5X6X1.0
L805	34047-019-060	3.5X6X1.0
RELAY		
**RL801	34729-002-010	JC 2A DC 12V
MISCELLANEOUS		
CN601	33050-101-895	Y4XY4/1185X2/100
CNP01	33345-110-310	67094-012(SEP)
CNP01	33058-023-008	S12XS12/F/200
CNP04	33347-114-820	YW025-04(AUTO,NO TUBE)
CNP09	33347-114-820	YW025-04(AUTO,NO TUBE)
CNP601	33347-114-820	YW025-04(AUTO,NO TUBE)
EXT01	33304-114-320	PUSH-4P(PCB)
F801	33167-001-001	PFC 5000-0202
SW601	33519-106-008	KSA-2273
ASSY-H/SINK MAIN		
*3H80-00270-000 35684-118-810,BU508AF1		
**Q401	32159-210-009	BU508AF1
H/SINK	35684-118-810	A1063 EXTR WHT <S.N.A>
SCREW	37158-230-101	2S-3X10 FE FZY <S.N.A>
ASSY-H/SINK MAIN		
*3H80-00270-001 35684-118-810,TDA3654		
**IC301	32119-110-016	TDA3654
H/SINK	35684-118-810	A1063 EXTR WHT <S.N.A>
BRKT	36614-241-510	SBHG-1 100 T1.0 <S.N.A>
SCREW	37158-230-101	2S-3X10 FE FZY <S.N.A>
ASSY-H/SINK SOUND		

Loc No	Supplier Parts No.	Specifiction
*3H81-00050-001 35682-105-010,TA8200AH		
**IC651	32119-201-190	TA8200AH
H/SINK	35682-105-010	A6063 EXTR WHT <S.N.A>
SCREW	37158-230-101	2S-3X10 FE FZY <S.N.A>
ASSY-H/SINK VERT(POWER)		
*3H82-00080-000 35684-113-710,TDA4601		
**IC801	32119-401-010	TDA4601
H/SINK	35684-113-710	CUSI 1/2H TO.5 <S.N.A>
SCREW	37048-130-061	+M3X6 FE FZY <S.N.A>
N/HEX	37208-113-001	1-M3 FE FZY <S.N.A>
ASSY-H/SINK POWER		
*3H83-00200-000 35684-118-410,2SC3552		
**Q801	32159-210-004	2SC3552YG-L
H/SINK	35684-118-411	A1050S-H14 T2.0 <S.N.A>
SCREW	37158-230-101	2S-3X10 FE FZY <S.N.A>
ASSY-H/SINK TR		
*3H84-00010-007 35684-118-320,MC7805C		
**IC902	32119-401-110	MC7805C ( AUTO )
H/SINK	35684-118-320	A6063 EXTR BLK H2<S.N.A>
SCREW	37158-230-061	2S-3X6 FE FZY <S.N.A>
ASSY-H/SINK TR		
*3H84-00050-002 35684-118-340,KSC2073		
**IC	32149-301-020	KSC 2073 ( AUTO )
H/SINK	35684-118-340	A6063 EXTR BLK H4<S.N.A>
SCREW	37158-230-061	2S-3X6 FE FZY <S.N.A>
A S S Y - T R A N S M I T T E R		
*3F14-00022-112 TM22,RM113,51,BLK,NOAAA		
PWB	33004-540-021	CF5913W <S.N.A>
XR01	31018-277-159	RD 1/4T 1.5-J
XR02	31018-177-103	RD 1/8T 10K-J
XR03	31018-177-473	RD 1/8T 47K-J
XR04	31018-177-101	RD 1/8T 100-J
XR05	31018-177-102	RD 1/8T 1K-J
XR06	31018-177-680	RD 1/8T 68-J
XR07	31018-177-682	RD 1/8T 6.8K-J
XC01	31607-401-460	CE04W TAPG 16V 47M
XIC01	32109-110-030	SAA3010T
XD03	32309-101-100	CL-2/SSIR-5C
XQ01	32137-401-530	KSA 539-Y(TAPG)
XQ02	32137-301-720	KSC 815-Y (TAPG)
SOCKET	33104-103-920	RA 317(2095)
RUBBER	33142-106-080	SILICON RUBBER HB 51KEY
RERM/A	33144-110-310	NSPX TO.3
RERM/C	33144-110-510	NSPX TO.3
XZ01	34539-050-010	CSB455EBL/KBR455BKTLR
CASE-T	36031-110-510	ABS HB BLK #677
CASE-B	36031-110-610	ABS HB BLK #677
BATT/C	36033-104-210	ABS HB BLK,AAA

Loc No	Supplier Parts No.	Specifiction	Loc No	Supplier Parts No.	Specifiction
SPRG-C	36674-137-210	STS-304 PI0.5			
SPRG-B	36674-145-610	NICO SUS 0.4PI			
SCREW	37118-530-103	2S-3X10 FE FZB			
LID	37643-149-010	ABS HB BLK #677			
WINDOW	37653-119-010	P.C 141-21051 CT-2592			
PVC	37802-117-110	PVC SHEET TO.5 BLK TM22			
PE-BAG	38653-108-081	LDPE TO.08 250X90			
A S S Y - S T A N D					
PH/S	37008-260-503	+M6X50 FE FZB			
TAP/S	37128-540-153	2S-4X15 FE FZB			
HEX/S	37154-102-010	M6X20 FE FZW			
NUT/S	37224-106-910	M6 MBS BE BLK			
LEG	38301-100-710	AL DIECASTING			
SHELT	38352-100-010	CHIPBOARD T15.0 CB-127 P			
SHELT/T	38353-100-210	CHIP BOARD T15.0 GI5913T			
PE-BAG	38654-116-110	LDPE TO.08X80X120			
E/VIEW	39834-001-110	A/P 120 GI5312			

# 15. EXPLODED-VIEW



BASIC: 5913Z  
 CHASSIS: U88 MT  
 F/C-CODE: 36000-123-510  
 B/C-CODE: 36000-124-010

# CI5913W/SEUK

The items with \*\*\* are usually out of stock since they are seldom required for the routine service. There may be some anticipated delay when you order these items.

\*\*\* S.N.A = SERVICE NOT AVAILABLE. \*\*\*

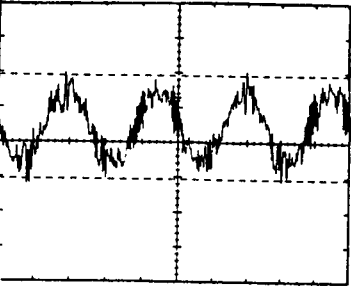
NO	CODE NO	DESCRIPTION	SPECIFICATION	Q'TY
1	37653-120-030	WINDOW-REMOCON	PC SHEET T0.5 CLR	1
2	36843-101-020	NET-COVER,SPEAKER	JERSEY-CLOTH	2
3	33050-005-028	LEAD-CONNECTOR,ASSY	Y4/F/700	1
4	34209-169-460	SPEAKER-GENERAL	06Q01BRA 10W 8R	2
5	36000-123-510	CABINET-FRONT	HIPS HB BLK #055 ALL	1
6	38024-176-010	BADGE-BRAND	AL-FORGING	1
7	36023-117-710	HOLDER-CRT,TOP.R	ABS V0 GRY	1
	36023-117-720	HOLDER-CRT,TOP.L	ABS V0 GRY	1
8	37148-540-201	SCREW-TAP,RH	2S-4X20 FE FZY	8
9	37333-101-020	WASHER-GUM,CRT	NATURAL RUBBER BLK	4
10	36635-002-010	CLAMPER-D,COIL	NYLON 6.6 DADH-300	6
11	37334-105-530	WASHER-SPRING	SBHG-1 100 T1.6	4
12	37208-115-001	NUT-HEX	1-M5 FE FZY	4
13	32479-029-301	COIL-DEGAUSSING	29RT 85L 1500/L1500(D)	1
14	32019-300-102	CRT-COLOR	A59EAK01X01	1
15	*3D32-00010-050	ASSY-PWB,CRT	CX5913ZN,NICAM	1
16	37128-540-153	SCREW-TAP,TH	2S-4X15 FE FZB	7
17	36000-195-010	CABINET-BACK	HIPS V0 BLK 5913	1
18	36604-135-910	COVER-AC,CORD	HIPS HB BLK 348	1
19	37128-540-153	SCREW-TAP,TH	2S-4X15 FE FZB	1
20	38092-103-620	PVC-COVER,BACK	PVC SHEET T0.8	1
21	33054-801-114	POWER-CORD	GTBS-2F/7.5F+BLK-HOU	1
22	36603-111-310	HOLDER-CORD	P.P V0 BLK(NEW)	1
23	37154-101-210	SCREW-WASHER,SPEC	2S-3X10 FE FZY	7
24	DELETE ITEM			
25	36604-134-510	HOLDER-WIRE	NYLON 66 V0 NTR	1
26	*3H81-00050-001	ASSY-H/S,SOUND	TA8200AH	1
27	37148-530-081	SCREW-TAP,RH	2S-3X8 FE FZY	1
28	DELETE ITEM			
29	37148-530-081	SCREW-TAP,RH	2S-3X8 FE FZY	2
30	DELETE ITEM			
31	33304-114-320	TERMINAL-SPEAKER	PUSH-4P(PCB)	1
32	33136-103-030	RECEPTACLE-PERI	HXC-1510-01-300A(R)	1
33	34519-970-060	TUNER	ECC-5883CE(D)	1
34	34544-128-010	SHIELD-CASE	SPTT T0.25	1
35	36634-111-020	CLAMPER-WIRE	NYLON 06 V0 NTR	1

NO	CODE NO	DESCRIPTION	SPECIFICATION	Q'TY
36	34543-113-410	SHIELD-CASE,TOP	SPTT T0.25	1
	34543-113-510	SHIELD-CASE,BOT	SPT4E T0.25	1
37	37154-101-210	SCREW-WASHER,SPEC	2S-3X10 FE FZY	8
38	34543-113-310	SHIELD-CASE	SPTT T0.25	1
39	33054-145-351	PWB-MAIN <S.N.A>	U88MT	1
40	*3H84-00050-000	ASSY-H/S,TR	MC7812C	2
41	*3H83-00200-000	ASSY-H/S,POWER	2SC 3552	1
42	*3H82-00080-000	ASSY-H/S,VERT(POWER)	TDA 4601	1
43	33339-030-302	JACK-RCA,BLOCK	2P,AW,R	1
44	33004-145-161	PWB-POWER <S.N.A>	25S-60MTC	1
45	*3H80-00270-001	ASSY-H/S,MAIN	TDA 3654	1
46	*3H84-00010-007	ASSY-H/S,TR	MC7805C	1
47	32859-200-013	TRANS-FLYBACK	FCR-25A005	1
48	36021-104-810	HOLDER-CHASSIS	ABS V0 GRY	1
49	37148-530-121	SCREW-TAP,RH	2S-3X12 FE FZY	2
50	33529-138-090	SWITCH-PUSH(COVER)	ME5 70060-026	1
51	37624-168-910	KNOB-POWER	ABS HB BLK	1
52	37148-530-123	SCREW-TAP,RH	2S-3X12 FE FZB	3
53	*3D33-00593-330	ASSY-PWB,CONTROL	CX5913W	1
54	33609-101-004	SWITCH-TACT	JTM-1105C/KPT-1105B	1
55	36023-117-810	HOLDER-DISPLAY	HIPS HB BLK	1
56	37148-540-101	SCREW-TAP,RH	2S-4X10 FE FZY	1
57	37624-619-810	KNOB-POWER	HIPS HB BLK	1
58	33598-001-000	SWITCH-RUBBER	KPT-1106A	13
59	37148-540-201	SCREW-TAP,RH	2S-4X20 FE FZY	8
60	36022-108-010	HOLDER-CRT,BOT.L	ABS V0 GRY	1
	36022-108-020	HOLDER-CRT,BOT.R	ABS V0 GRY	1
61	37148-540-151	SCREW-TAP,RH	2S-4X15 FE FZY	8
62	36834-115-410	WASHER-GUM,SPEAKER	NEOPRENE BLK 50%	8
63	37148-530-101	SCREW-TAP,RH	2S-3X10 FE FZY	1
64	37713-224-210	GRILLE-WOOFER	SPC-1 100 T0.5 4R	2
65	35208-100-030	DAMPER-GEAR	BIG TYPE #120 BLK	1
66	37802-115-050	PVC-CONTROL	PVC SHEET T0.5 BLK	1
67	36698-100-110	CATCH-PUSH,DOOR	KIFUCO, LA701	1
68	37642-131-010	DOOR	PC SMOG(5913W)	1

MAIN-PWB  
TEST TOINT WAVE FORM

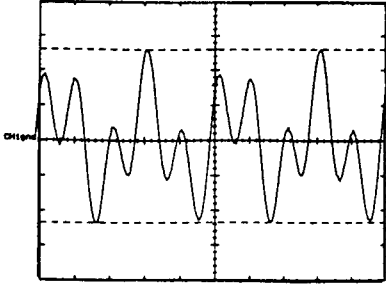
TP-SC1

CH1 50mV A 100 117.4V7 VERT  
13.3mV7 VERT  
70.00mV



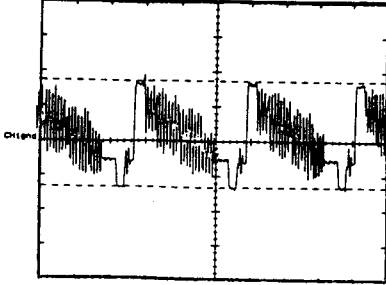
TP-SP

CH1 50mV A 100 380mV7 VERT  
88.00mV



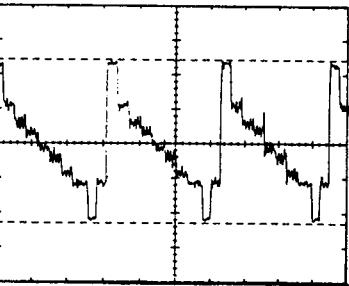
TP-C

CH1 50mV A 20ns 422mV7 VERT  
153.0mV



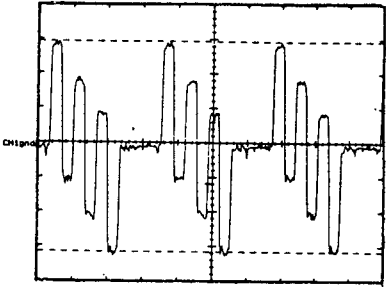
TP-Y

CH1 50mV A 20ns 0.0 V7 VERT  
94.80mV



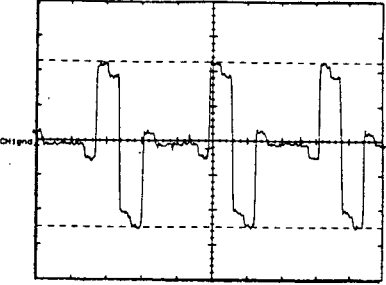
TP-51, B

CH1 20mV A 20ns 2.58mV7 VERT  
122.0mV



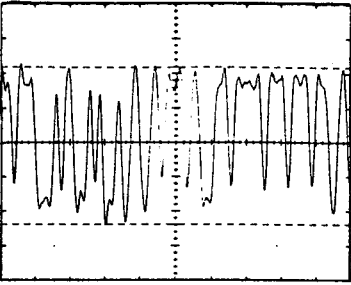
TP-61, R

CH1 20mV A 20ns 2.58mV7 VERT  
95.20mV



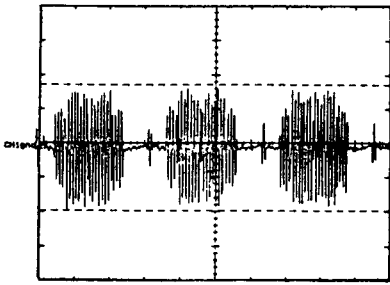
TP-N2, N3

CH1 20mV A 20ns 380mV7 VERT  
81.20mV



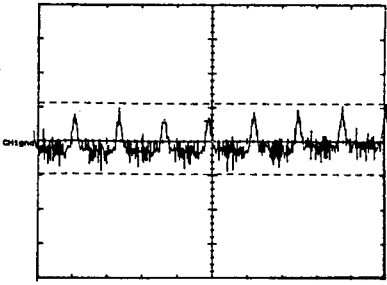
TP-15

CH1 20mV A 20ns 2.58mV7 VERT  
73.80mV



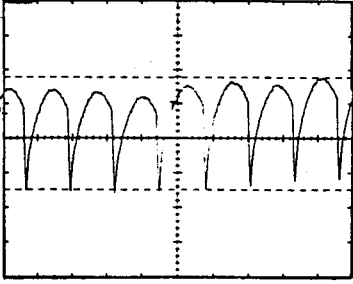
TP-A

CH1 5mV A 50ns 2.63mV7 VERT  
4.180mV



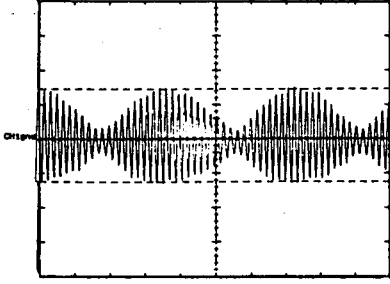
TP-17

CH1 20mV A 50ns 2.58mV7 VERT  
88.40mV



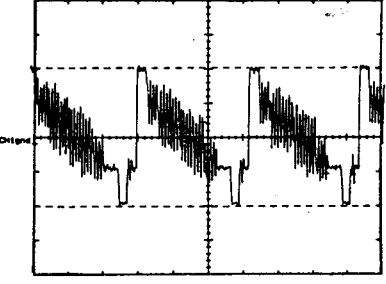
TP-38

CH1 20mV A 100 2.58mV7 VERT  
94.20mV



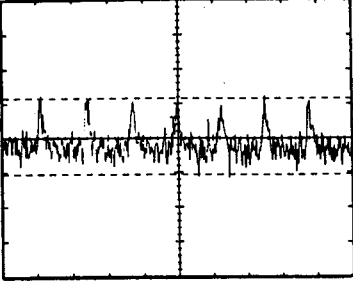
TP-11

CH1 50mV A 20ns 2.58mV7 VERT  
208.5mV



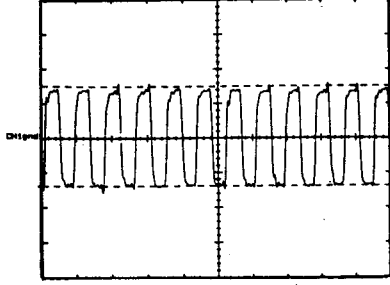
TP-IF

CH1 5mV A 50ns 2.58mV7 VERT  
4.440mV



TP-N1

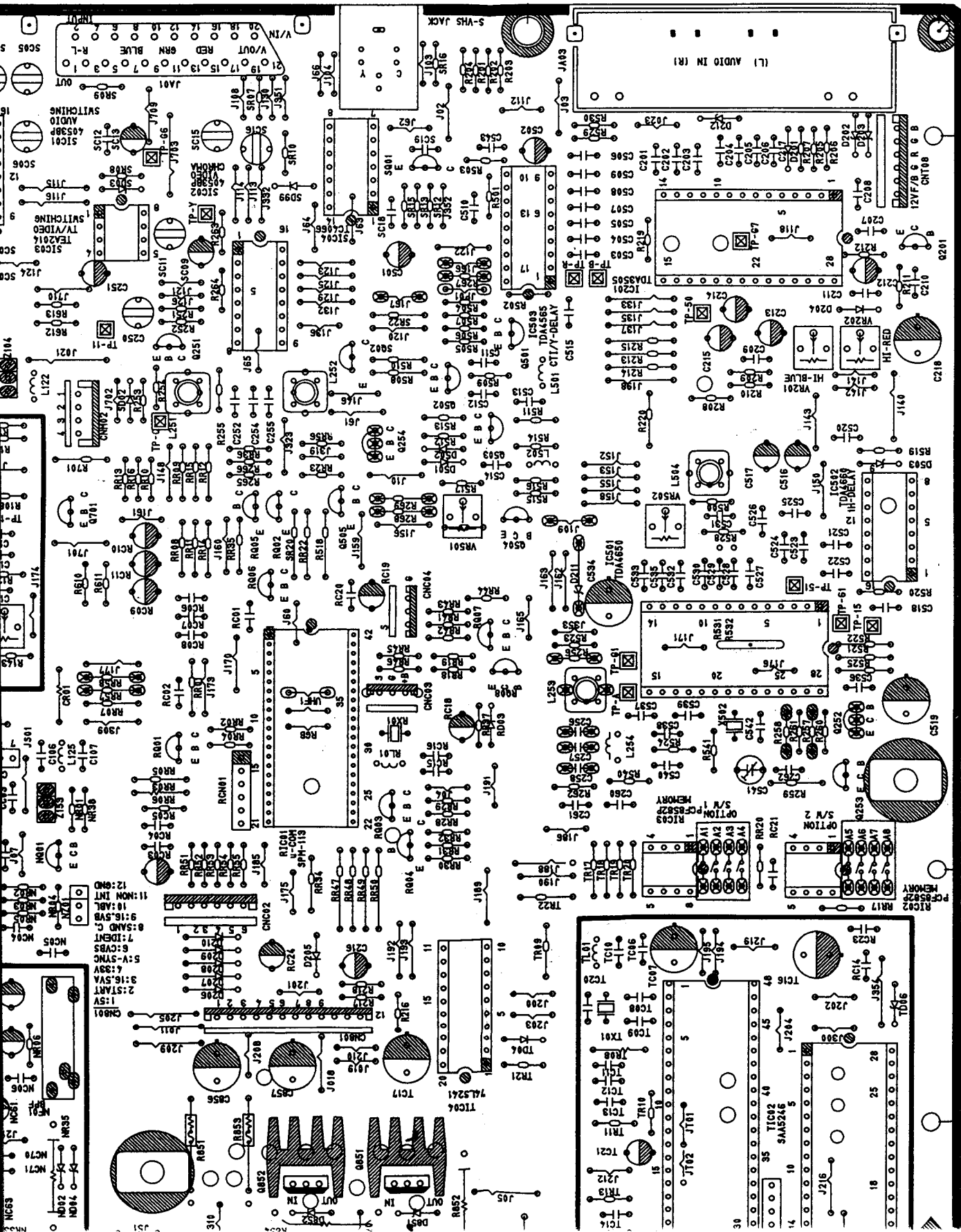
CH1 100mV A 200ns 422mV7 VERT  
250.0mV



The diagram is a detailed schematic of a television set, showing the internal layout of components. It includes various electronic components such as resistors (R1, R2, etc.), capacitors (C1, C2, etc.), integrated circuits (IC1, IC2, etc.), and transformers (T1, T2, etc.). It also shows the placement of the tuner, video processor, and other major sections. The diagram is labeled with component values and part numbers, and includes a list of components at the bottom.

**COMPONENT LIST:**

- RESISTORS: R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100, R101, R102, R103, R104, R105, R106, R107, R108, R109, R110, R111, R112, R113, R114, R115, R116, R117, R118, R119, R120, R121, R122, R123, R124, R125, R126, R127, R128, R129, R130, R131, R132, R133, R134, R135, R136, R137, R138, R139, R140, R141, R142, R143, R144, R145, R146, R147, R148, R149, R150, R151, R152, R153, R154, R155, R156, R157, R158, R159, R160, R161, R162, R163, R164, R165, R166, R167, R168, R169, R170, R171, R172, R173, R174, R175, R176, R177, R178, R179, R180, R181, R182, R183, R184, R185, R186, R187, R188, R189, R190, R191, R192, R193, R194, R195, R196, R197, R198, R199, R200, R201, R202, R203, R204, R205, R206, R207, R208, R209, R210, R211, R212, R213, R214, R215, R216, R217, R218, R219, R220, R221, R222, R223, R224, R225, R226, R227, R228, R229, R230, R231, R232, R233, R234, R235, R236, R237, R238, R239, R240, R241, R242, R243, R244, R245, R246, R247, R248, R249, R250, R251, R252, R253, R254, R255, R256, R257, R258, R259, R260, R261, R262, R263, R264, R265, R266, R267, R268, R269, R270, R271, R272, R273, R274, R275, R276, R277, R278, R279, R280, R281, R282, R283, R284, R285, R286, R287, R288, R289, R290, R291, R292, R293, R294, R295, R296, R297, R298, R299, R300, R301, R302, R303, R304, R305, R306, R307, R308, R309, R310, R311, R312, R313, R314, R315, R316, R317, R318, R319, R320, R321, R322, R323, R324, R325, R326, R327, R328, R329, R330, R331, R332, R333, R334, R335, R336, R337, R338, R339, R340, R341, R342, R343, R344, R345, R346, R347, R348, R349, R350, R351, R352, R353, R354, R355, R356, R357, R358, R359, R360, R361, R362, R363, R364, R365, R366, R367, R368, R369, R370, R371, R372, R373, R374, R375, R376, R377, R378, R379, R380, R381, R382, R383, R384, R385, R386, R387, R388, R389, R390, R391, R392, R393, R394, R395, R396, R397, R398, R399, R400, R401, R402, R403, R404, R405, R406, R407, R408, R409, R410, R411, R412, R413, R414, R415, R416, R417, R418, R419, R420, R421, R422, R423, R424, R425, R426, R427, R428, R429, R430, R431, R432, R433, R434, R435, R436, R437, R438, R439, R440, R441, R442, R443, R444, R445, R446, R447, R448, R449, R450, R451, R452, R453, R454, R455, R456, R457, R458, R459, R460, R461, R462, R463, R464, R465, R466, R467, R468, R469, R470, R471, R472, R473, R474, R475, R476, R477, R478, R479, R480, R481, R482, R483, R484, R485, R486, R487, R488, R489, R490, R491, R492, R493, R494, R495, R496, R497, R498, R499, R500, R501, R502, R503, R504, R505, R506, R507, R508, R509, R510, R511, R512, R513, R514, R515, R516, R517, R518, R519, R520, R521, R522, R523, R524, R525, R526, R527, R528, R529, R530, R531, R532, R533, R534, R535, R536, R537, R538, R539, R540, R541, R542, R543, R544, R545, R546, R547, R548, R549, R550, R551, R552, R553, R554, R555, R556, R557, R558, R559, R560, R561, R562, R563, R564, R565, R566, R567, R568, R569, R570, R571, R572, R573, R574, R575, R576, R577, R578, R579, R580, R581, R582, R583, R584, R585, R586, R587, R588, R589, R590, R591, R592, R593, R594, R595, R596, R597, R598, R599, R600, R601, R602, R603, R604, R605, R606, R607, R608, R609, R610, R611, R612, R613, R614, R615, R616, R617, R618, R619, R620, R621, R622, R623, R624, R625, R626, R627, R628, R629, R630, R631, R632, R633, R634, R635, R636, R637, R638, R639, R640, R641, R642, R643, R644, R645, R646, R647, R648, R649, R650, R651, R652, R653, R654, R655, R656, R657, R658, R659, R660, R661, R662, R663, R664, R665, R666, R667, R668, R669, R670, R671, R672, R673, R674, R675, R676, R677, R678, R679, R680, R681, R682, R683, R684, R685, R686, R687, R688, R689, R690, R691, R692, R693, R694, R695, R696, R697, R698, R699, R700, R701, R702, R703, R704, R705, R706, R707, R708, R709, R710, R711, R712, R713, R714, R715, R716, R717, R718, R719, R720, R721, R722, R723, R724, R725, R726, R727, R728, R729, R730, R731, R732, R733, R734, R735, R736, R737, R738, R739, R740, R741, R742, R743, R744, R745, R746, R747, R748, R749, R750, R751, R752, R753, R754, R755, R756, R757, R758, R759, R760, R761, R762, R763, R764, R765, R766, R767, R768, R769, R770, R771, R772, R773, R774, R775, R776, R777, R778, R779, R780, R781, R782, R783, R784, R785, R786, R787, R788, R789, R790, R791, R7





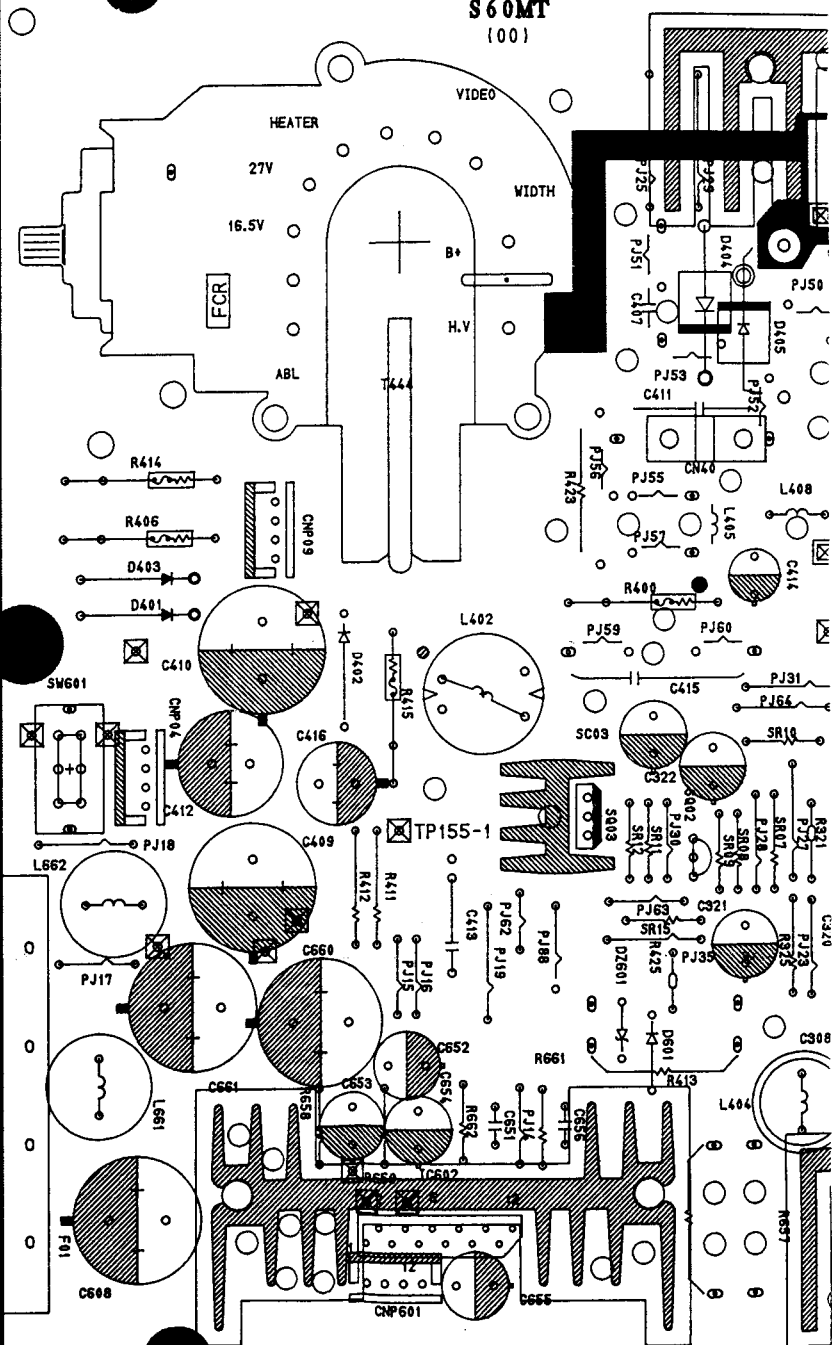


33004-145-351(01)  
U88MT

**PWB-MAIN**

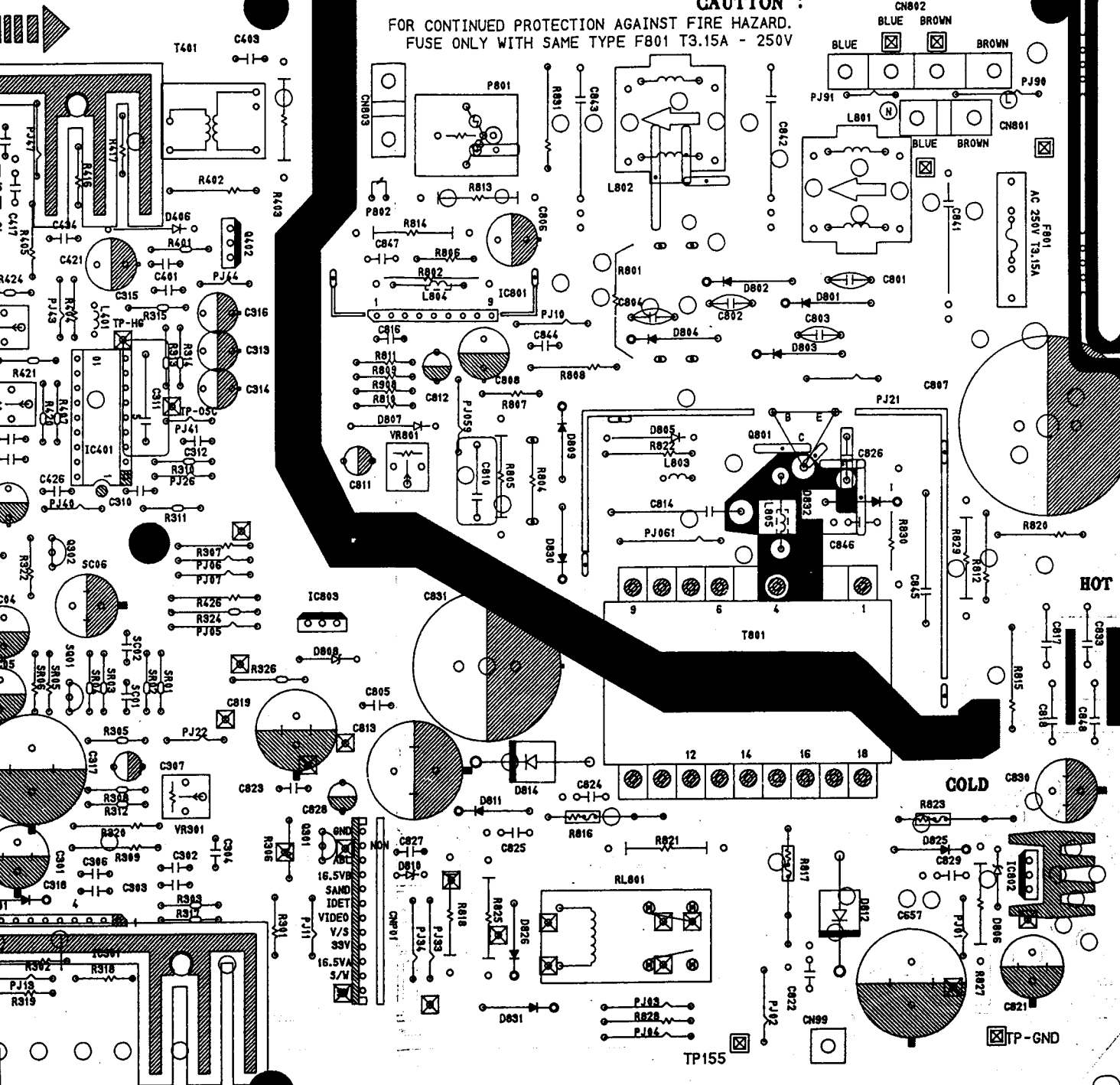
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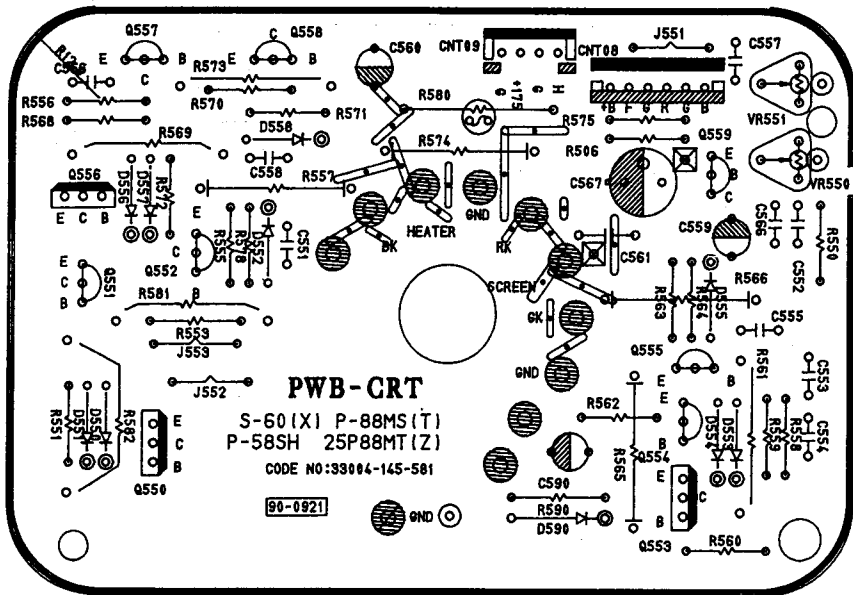


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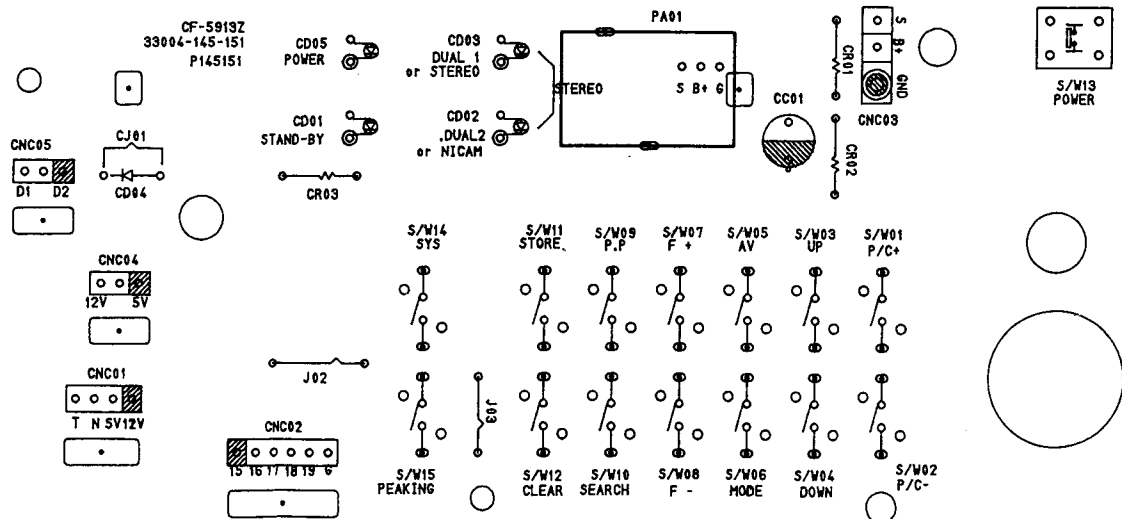
**CAUTION :**



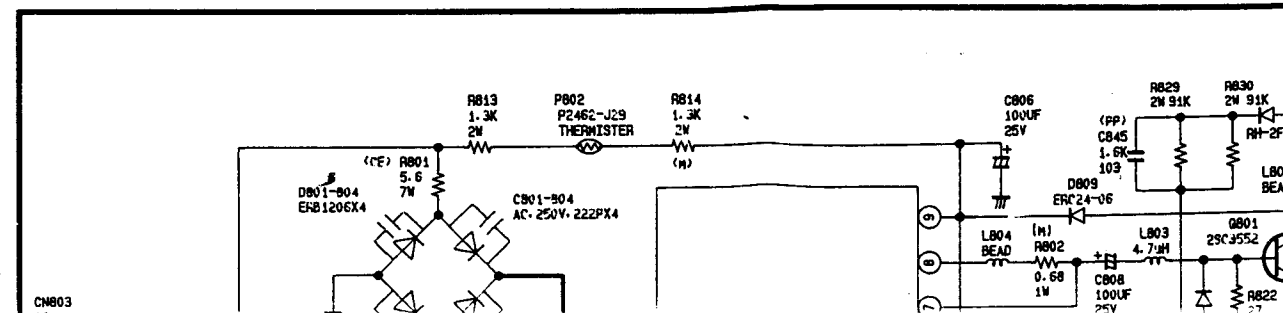
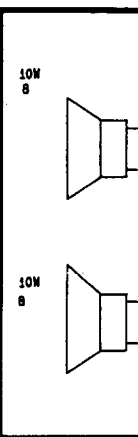
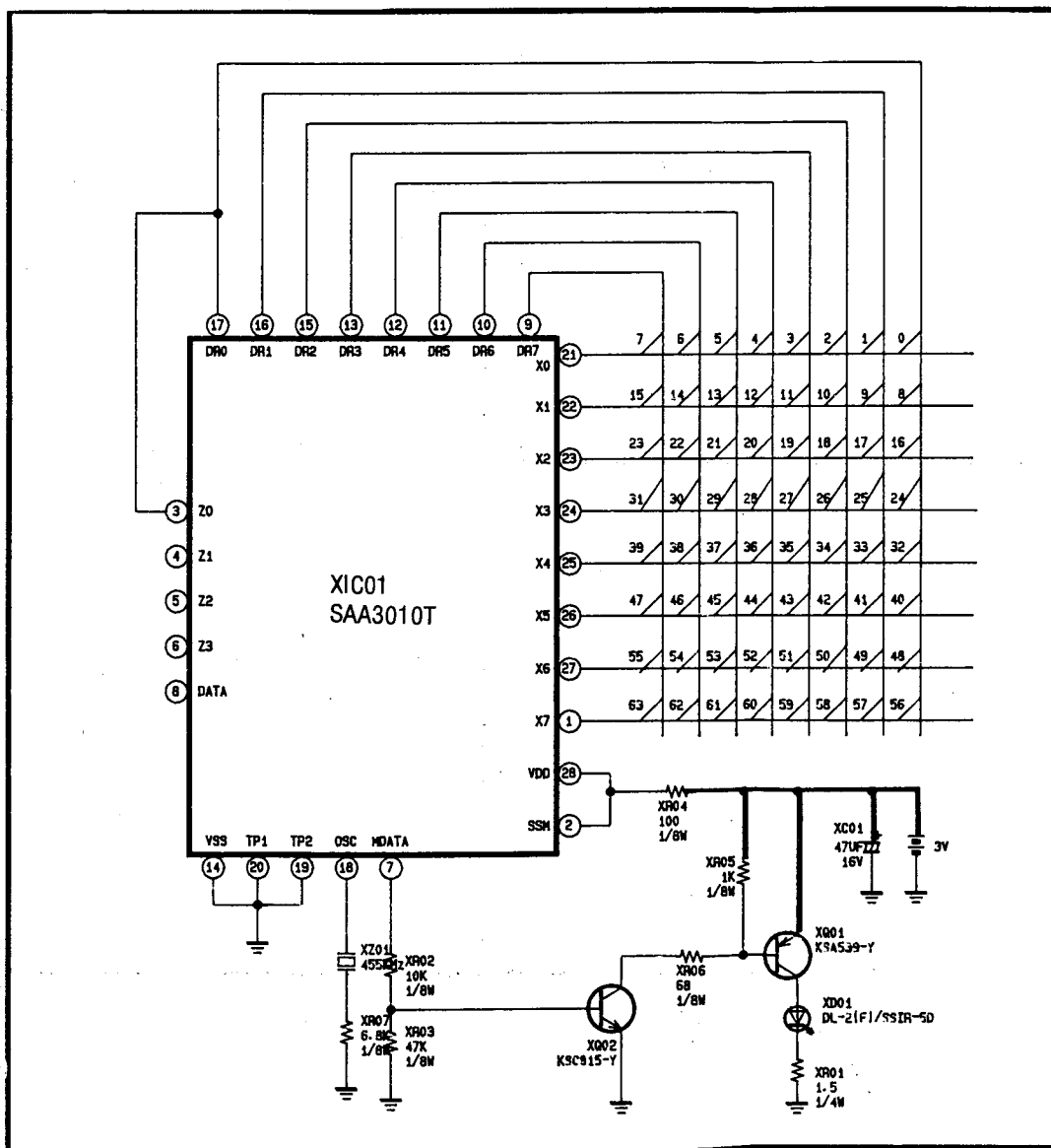
# PWB-CRT



# PWB-CONTROL

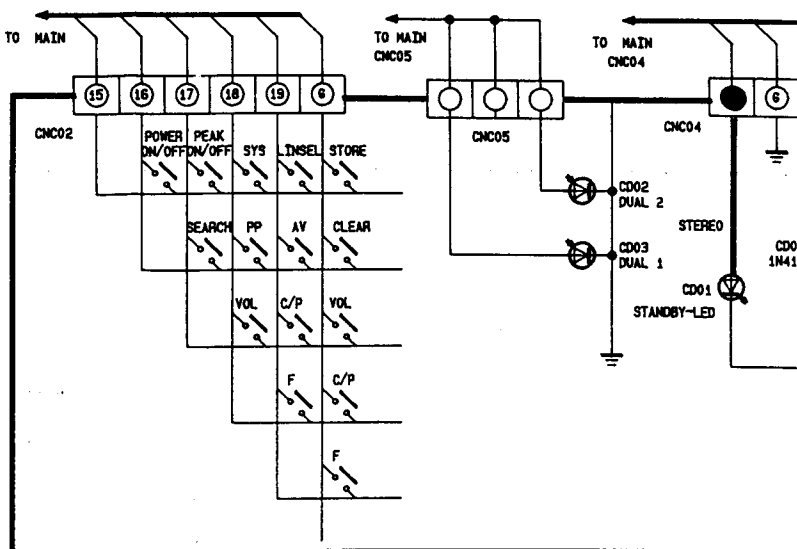


# PWB-TRANSMITTER



\* MARK OPTION

LOCATION	TOSHIBA CRT	PHILIPS CRT
R302	1/2W 330	1/2W 560
R305	1/8W 47K	1/8W 43K
R308	1/8W 3K	1/8W 3.6K
R312	JUMPER	1/8W 220
R309	1/2W 2	1/2W 1
R320	1/2W 0.68	1/2W 1
R321	1/4W 510	1/4W 1K
R411	1/2W 110K-F	1/2W 120K-G
L405	62mH	22mH
R311	130K	150K



PWB-DEFLECTION

