

Contents	Page
Safety Instructions	1
Technical Specifications	2
Operation Instructions	4
Block Diagram	13
TDA2116 2x12 W hi-fi audio power amplifier	14
PCF8598C-2 1024 x 8-bit CMOS EEPROMs with I ² C-bus interface	15
SAA 5297 Teletext and TV microcontroller	16
SAA7710T Dolby* Pro Logic Surround	18
TDA9875A Digital TV sound processor (DVTSP)	21
11.2 Service Menu Description	23
Convergence Adjustments	24
Electronic Part List	25

SAFETY INSTRUCTIONS

SAFETY - PRECAUTIONS

WARNING: The following precautions should be observed.

1. Although the chassis is isolated from the mains supply, some areas of the main PCB are at mains potential. An isolation transformer (250-500 VA) should therefore be connected between the mains and the receiver before service is attempted.
2. Do not install, remove, or handle the picture tube in any manner unless safety goggles are worn. People not equipped should be kept away while picture tubes are handled. Keep the picture tube away from the body while handling.
3. When replacing the chassis in the cabinet, ensure all the protective devices are put back in place, such as: barriers, non-metallic knobs, cable ties, adjustments and compartment cover or shields, isolation resistor-capacitor, etc.
4. When service is required note the original lead locations and anchor points. Ensure all leads, especially in areas of high voltage, are routed/anchored in their correct locations when reassembling the receiver.
5. Always use the manufacturer's replacement safety component. Always replace original spacers and maintain lead lengths. Critical safety components should not be replaced by other makes. Furthermore where a short circuit has occurred, replace those components that indicate evidence of overheating.
6. Before returning a serviced receiver to the customer, the service technician must thoroughly test the unit to be certain that it is completely safe to operate without danger of electric shock, and be sure that no protective device built into the instrument by the manufacturer has become defective, or inadvertently damaged during servicing. Therefore, the following checks are recommended for

the continued protection of customers and service technicians.

INSULATION

Insulation resistance should not be less than 10M at 500V DC between the mains poles and any accessible metal parts.

Also, no flashover or breakdown should occur during the dielectric strength test applying 3kV AC or 4.25kV DC for two seconds between the mains poles and accessible metal parts.

HIGH VOLTAGE

High voltage should always be kept at rated value of the chassis and not higher. Operating at higher voltage may cause a failure of the picture tube or high voltage supply and also, under certain circumstances could produce x-ray radiation moderately in excess of design levels. The high voltage must not, under any circumstances exceed 28.5kV on the chassis.

X-RAY RADIATION

TUBES: The primary source of x-ray radiation in this receiver is the picture tube. The tube utilised for the above mentioned function in this chassis is specially constructed to limit x-ray radiation. For continued x-ray radiation protection, replace tube with the same type as the original BEKO approved type.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in BEKO television receivers have special safety related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified by marking with a **⚠** on the schematics and replacement parts list in this Service Manual.

The use of substitute replacement components which do not have the same safety characteristics as BEKO recommended parts, may create electric shock, fire, X-ray radiation, or other hazards.

TUBE DISCHARGE

The line output stage can develop voltages in excess of 25kV; if removal of the EHT cap is required then, discharge the anode cap to chassis via a high value resistor, prior to its removal from the tube.

TECHNICAL SPECIFICATIONS 11.2 CHASSIS

1. OPERATING CONDITIONS

POWER SUPPLY	140 TO 270 VAC
NOMINAL OPERATING VOLTAGE	230 VAC
FREQUENCY	50 Hz
TEMPERATURE RANGE	0 TO 45 DEGREES C
HUMIDITY RANGE	YEAR'S MEAN = 75% MAX= 95%

2. RF SECTION

2.1 RECEIVING CHANNELS FOR VHF/UHF BAND

	CCIR B/G	UK I
VHF BAND		
BAND I		CHANNEL 2-5
BAND III	CHANNEL 5-12	CHANNEL 6-12
CABLE	S1-S19,S20-S41	S1-S19,S20-S41
UHF BAND		
BAND IV-V	CHANNEL 21-69	CHANNEL 21-69

	MIN	UNIT
GAIN LIMITED SENSITIVITY		
INPUT SIGNAL LEVEL FOR		
STANDARD VIDEO OUTPUT VOLTAGE		
BAND 1/3	-	dB μ V
BAND 4/5	-	dB μ V
NOISE LIMITED SENSITIVITY		
INPUT SIGNAL LEVEL FOR 30 dB		
(S+N)/N-RATIO, WEIGHTED, CCIR		
REC 567		
BAND 1/3/4/5	-	dB (μ V)
SELECTIVITY HF+IF		
IF FREQUENCIES		
	I	
Picture Carrier	38.9	38.9
Sound Carrier	33.4	32.9
Colour Carrier	34.47	34.47
VOLTAGE STANDING WAVE RATIO	MIN	UNIT
BAND 1/3	-	-
BAND 4/ 5	-	-
MAXIMUM INPUT SIGNAL LEVEL :		
BAND 1/3	100 dB μ V (MAX)	
BAND 4/	100 dB μ V (MAX)	

3. VIDEO OUTPUT SECTION

	MIN	NOM	MAX	UNIT
VIDEO OUTPUT VOLTAGE				
(measured on cathode with				
lowest output level, contrast				
control and drive control at max :	90	100	-	V
FREQUENCY RESPONSE				
INPUT AERIAL STANDARD, HF SIGNAL :				
STANDARD B/G - D/K-I-L	-10	-7	-	dB
INPUT: SCART PIN 20				

4. CHROMA SECTION

	MIN	NOM	MAX	UNIT
PAL/SECAM				
COLOUR CAPTURE RANGE	: +300/-500	±700	–	HZ
PHASE ERROR OF REFERENCE CARRIER	: –	+–5	10	DEGRESS
COLOUR KILLER	: 30			dB µV (NOMINAL)

5. SOUND SECTION

	MIN	NOM	MAX	UNIT
SCART OUTPUT S/N RATIO	: 40	45	–	dB

POWER OUTPUT (at 10% distortion) fm= 1KHz	: 28"	$\frac{R}{10}$	$\frac{L}{10}$	$\frac{C}{10}$	$\frac{S}{5}$	(Rms) Watts
	: 33"	12	12	12	6	

6. SYNCHRONISATION

LINE FREQUENCY LOCKING RANGE	: ±300 HZ
VERTICAL FREQUENCY LOCKING RANGE	: ±5 HZ

7. PICTURE TUBE DRIVE SECTION

	28"	33"
EHT	: 25.0±0.5KV	: 28.5±0.5KV
FOCUS VOLTAGE	: MIN 25.6%	: MIN 25.6%
	: MAX 38%	: MAX 38%
GRID 2 VOLTAGE RANGE	: MIN 300V, MAX 1350 V	: MIN 300V, MAX 1350 V
HEATER VOLTAGE	: 6.2±0.2 Vms	: 6.2±0.2 Vms

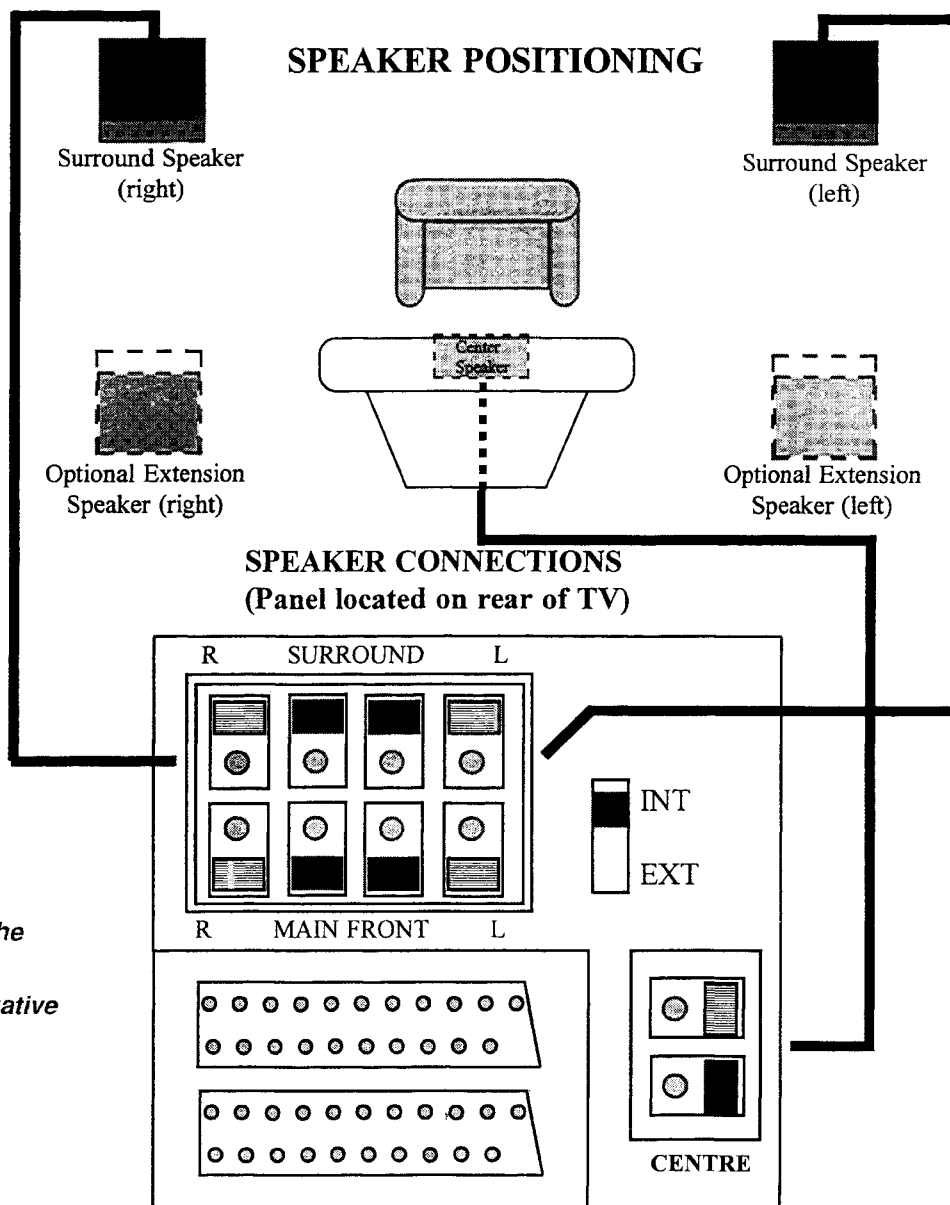
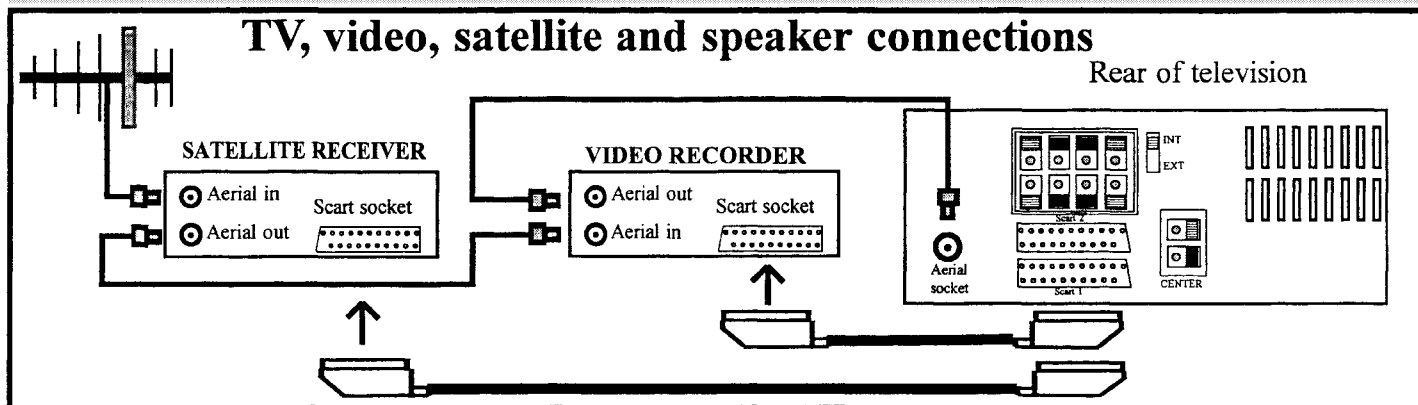
Power Supply Voltages

B+SUPPLY VOLTAGE (AT Ib=0)	28" / 33"	145V±1V
20V OUTPUT Audio Stereo		: 20.0 ±0.5 VDC
12V OUTPUT		: 12 ±0.5 VDC
8V OUTPUT		: 8.0±0.5VDC
5V OUTPUT		: 5.0±0.5VDC

8. OTHERS

AMBIENT OPERATING TEMPERATURE	: 0-45 DEGREES C
STORAGE TEMPERATURE	: -10 TO + 85 DEGREES C
POWER CONSUMPTION	28" : 135 Watts (max)
	33" : 145 Watts (max)
SAFETY	: IEC 65 /BS P2N
X-RAY RADIATION	: ACC. IEC 65 /BS P2N
Picture Tube Dimensions/Visible Screen Size	: 28" (70 cm/66 cm)
	: 33" (80 cm/84 cm)

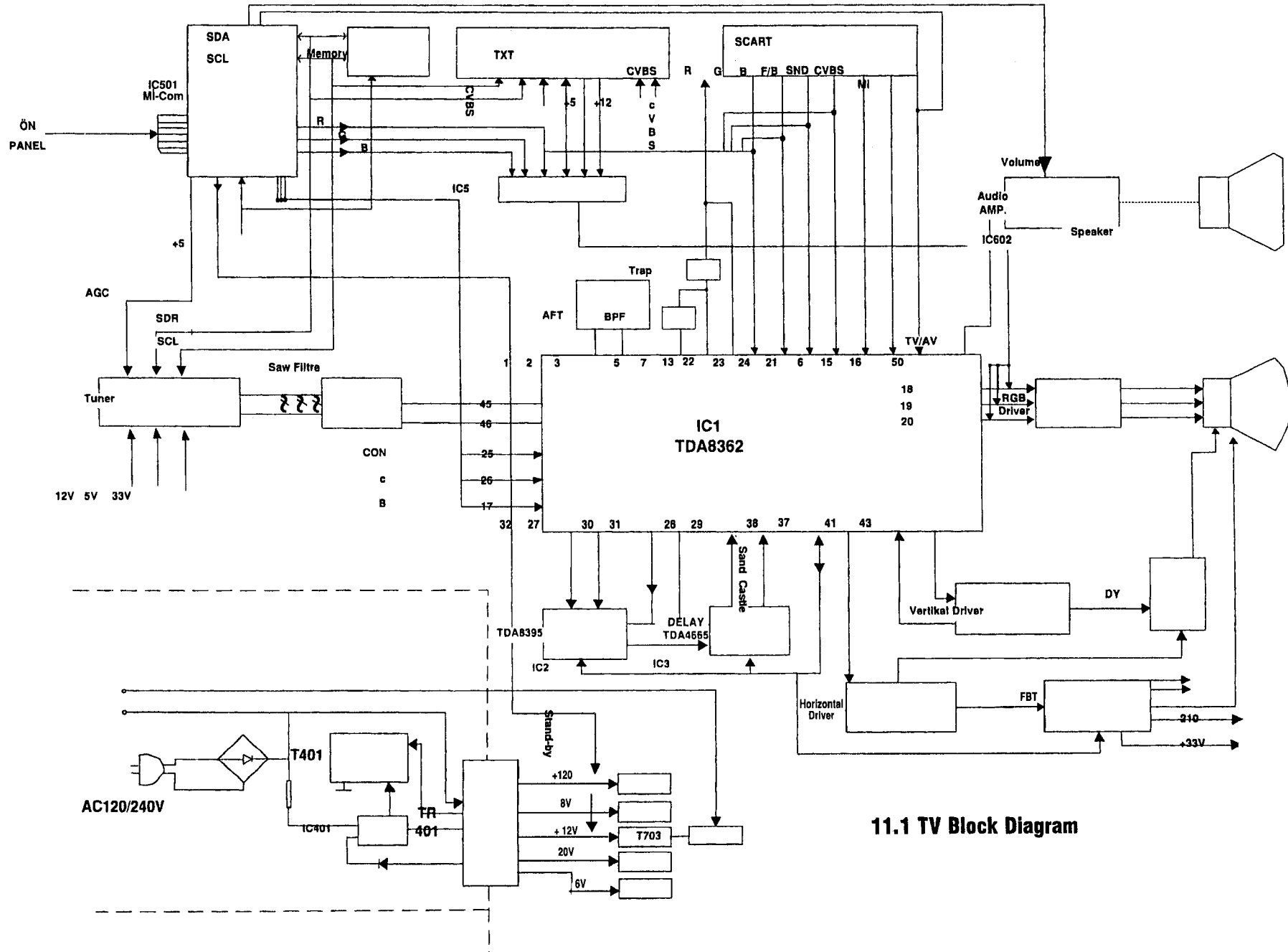
2. TECHNICAL FEATURES / CONNECTIONS



Note: The wire with the black trace must be connected to the negative (black) terminal.

Centre and Surround Speakers

These speakers are essential to get Surround effects from your TV. The centre speaker is detachable from the stand if required, and should be placed below the TV screen. The rear speakers should ideally be placed above and behind the normal seating area as shown. The optimum mounting height being approx. 1metre above seated head height. Alternatively these speakers can stand on the floor.

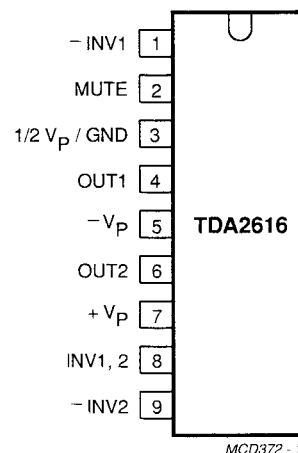


11.1 TV Block Diagram

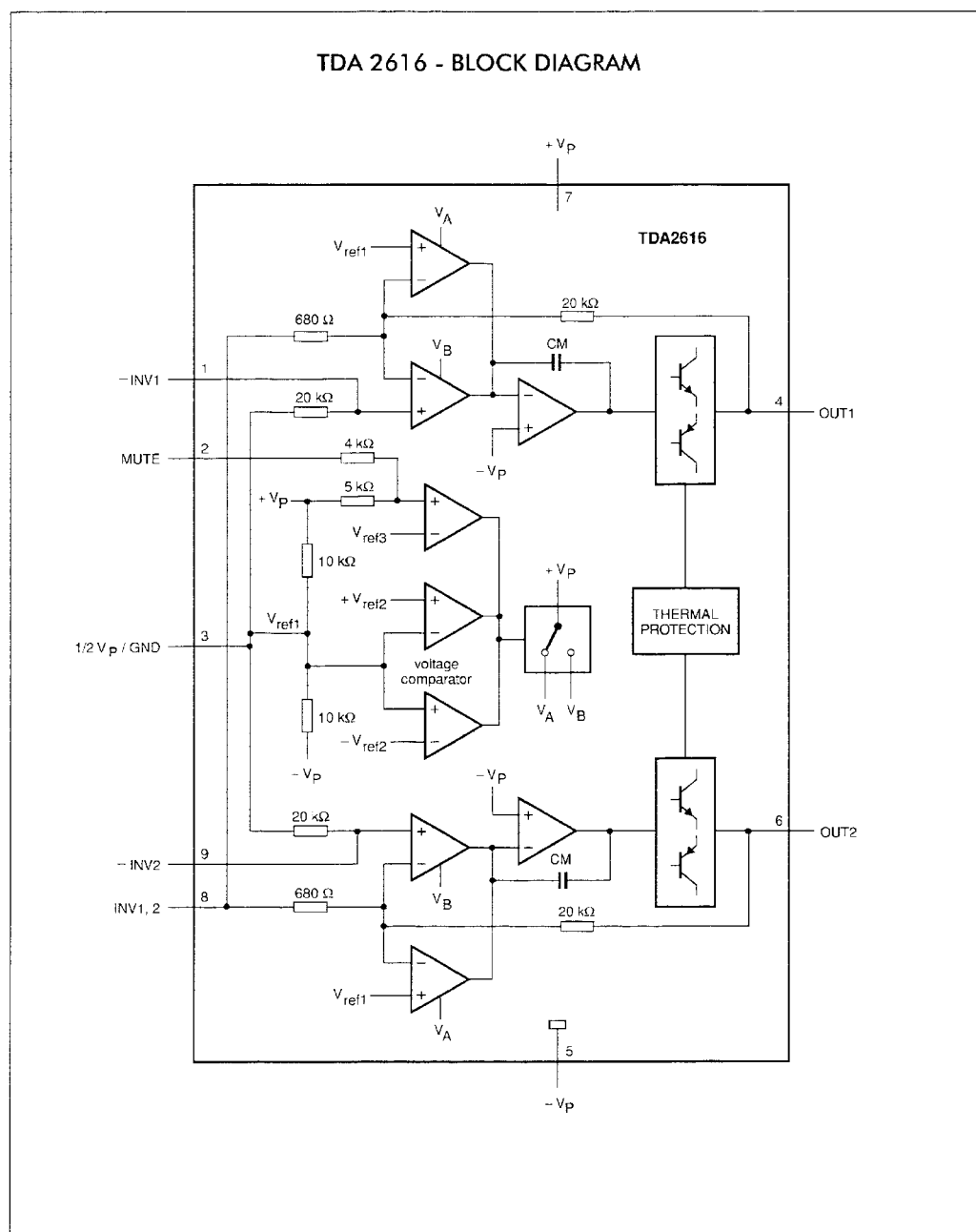
2 x 12 W hi-fi audio power amplifier with mute

GENERAL DESCRIPTION

The TDA2616 is dual power amplifier and is supplied in a 9-lead single-in-line (SIL9) plastic power package. It has been especially designed for mains fed applications, such as stereo radio and stereo TV.

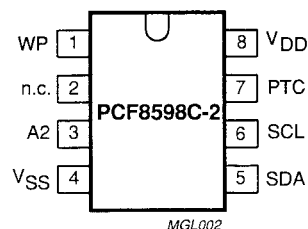


TDA 2616 - BLOCK DIAGRAM



256 to 1024 × 8-bit CMOS EEPROMs with
I²C-bus interface

The PCF8598C-2 is a floating gate Electrically Erasable Programmable Read Only Memory (EEPROMs) with 8 kbits ($1\,024 \times 8$ -bit). By using an internal redundant storage code it is fault tolerant to single bit errors. This feature dramatically increases the reliability compared to conventional EEPROMs. Power consumption is low due to the full CMOS technology used. The programming voltage is generated on-chip, using a voltage multiplier.



MGL002

The block diagram of the PCF8598C-2 IC illustrates its internal architecture and pin connections. The chip is powered by V_{DD} (pin 8) and V_{SS} (pin 4). It features an I²C-BUS CONTROL LOGIC block that interfaces with the SCL (pin 5) and SDA (pin 6) lines. This logic is connected to several internal components: an INPUT FILTER, a SEQUENCER (÷128), a DIVIDER (÷128), an ADDRESS HIGH REGISTER, an ADDRESS POINTER (8 bits), a BYTE COUNTER (3 bits), a BYTE LATCH (8 bits), a SHIFT REGISTER, an EE CONTROL block, an EEPROM (4 Kbits), a TEST MODE DECODER (2 bits), a POWER-ON-RESET block, a TIMER (÷16), and an OSCILLATOR. The chip also includes an ADDRESS SWITCH (pins 1, 2, 3) and a PTC (pin 7). The internal components are interconnected via a central bus system, allowing for data transfer and control signal distribution throughout the device.

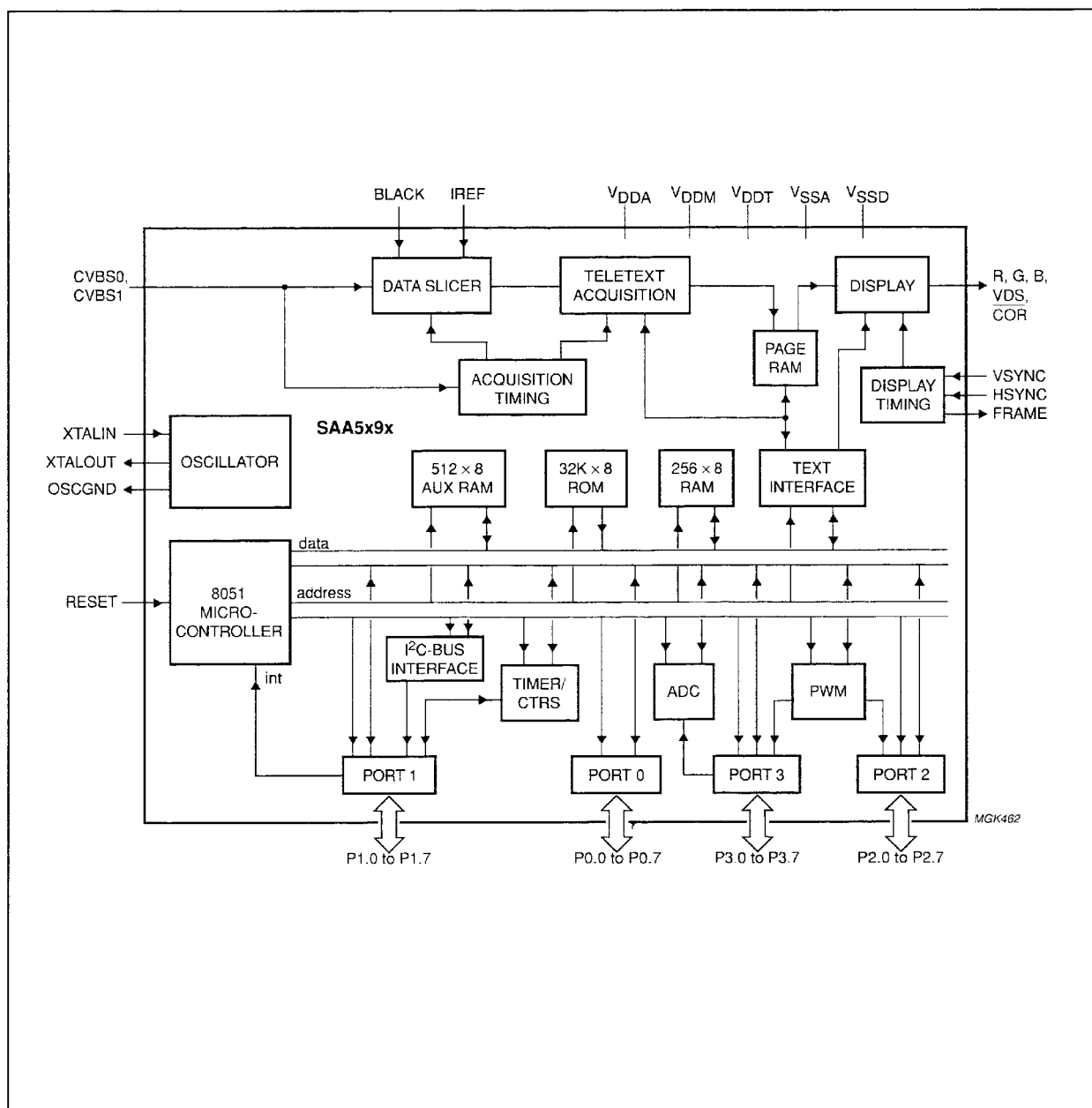
1 FEATURES

1.1 General

- Single chip microcontroller with integrated teletext decoder
- Single +5 V power supply
- Single crystal oscillator for teletext decoder, display and microcontroller.

SAA 5297

BLOCK DIAGRAM



Pin configuration:

P2.0/TPWM	1	52	P1.5
P2.1/PWM0	2	51	P1.4
P2.2/PWM1	3	50	P1.7/SDA
P2.3/PWM2	4	49	P1.6/SCL
P2.4/PWM3	5	48	P1.3/T1
P2.5/PWM4	6	47	P1.2/INT0
P2.6/PWM5	7	46	P1.1/T0
P2.7/PWM6	8	45	P1.0/INT1
P3.0/ADC0	9	44	V _{DDM}
P3.1/ADC1	10	43	RESET
P3.2/ADC2	11	42	XTALOUT
P3.3/ADC3	12	41	XTALIN
V _{SSD}	13	40	OSCGND
P0.0	14	39	V _{DDT}
P0.1	15	38	V _{DDA}
P0.2	16	37	VSYNC
P0.3	17	36	HSYNC
P0.4	18	35	VDS
P0.5	19	34	R
P0.6	20	33	G
P0.7	21	32	B
V _{SSA}	22	31	RGBREF
CVBS0	23	30	P3.4/PWM7
CVBS1	24	29	COR
BLACK	25	28	V _{SSD}
IREF	26	27	FRAME

SAA5297

MGK461

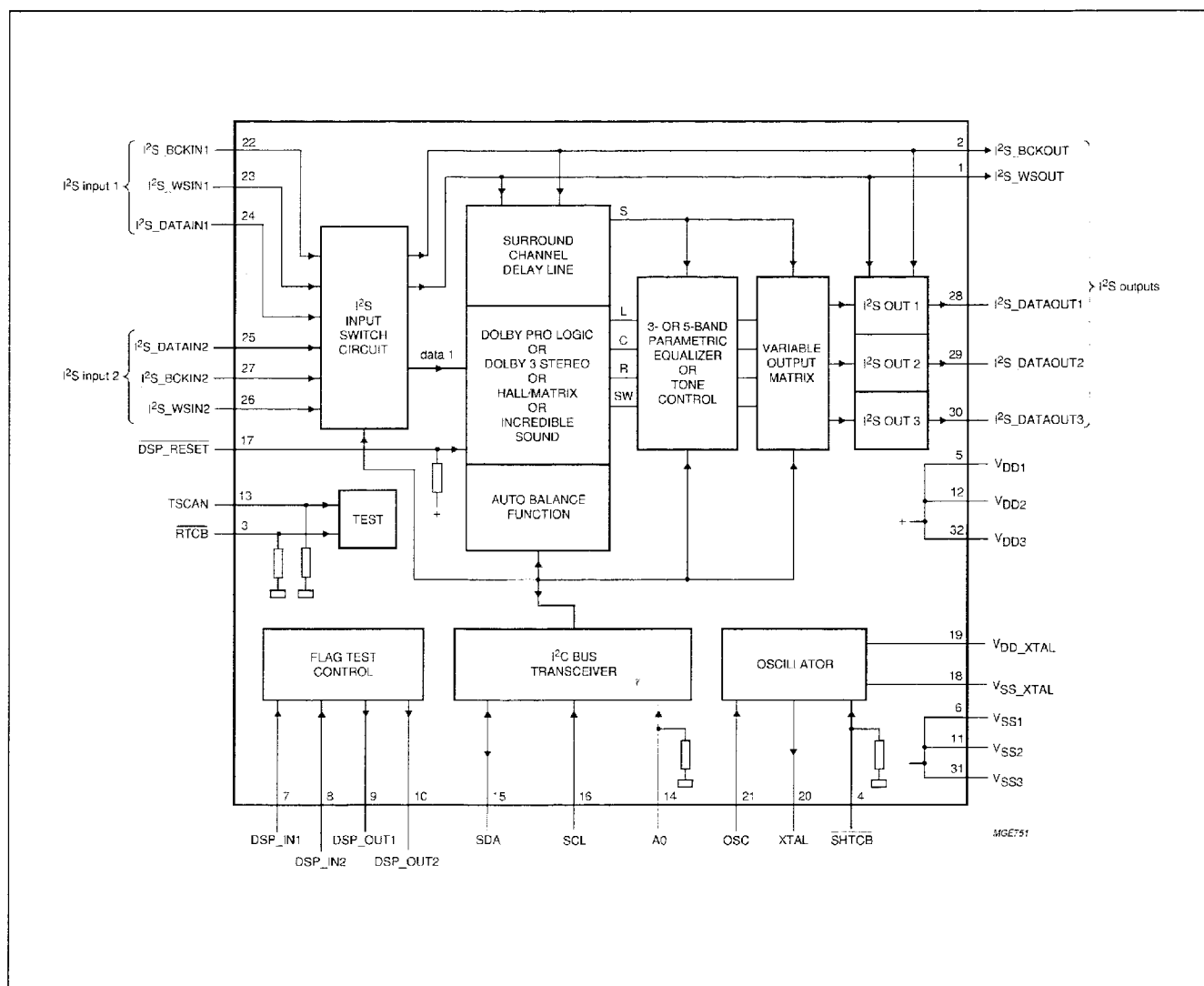
Dolby* Pro Logic Surround; Dolby 3 stereo; Incredible Sound

GENERAL DESCRIPTION

The SAA7710T chip is a high quality audio-performance digital add-on processor for digital sound systems. It provides all the necessary features for complete Dolby Pro Logic surround sound on chip. In addition to the Dolby Pro Logic surround function, this device also incorporates, a 5-band parametric equalizer, a tone control section and a volume control. Instead of Dolby Pro Logic surround, the Hall/matrix surround and Incredible sound functions can be used together with the equalizer.

SAA 7710T

BLOCK DIAGRAM



Functional modes

The device supports three main modes, Dolby Pro Logic/Dolby 3 stereo or hall/matrix surround or Incredible sound mode. All modes can be combined with equalizing (5-band)

THE DOLBY PRO LOGIC MODE

In Dolby Pro Logic mode, several blocks must be initialized and controlled during operation:

- Noise generator and noise sequencer
- Centre channel mode (normal, phantom, wide, off)
- Surround channel delay time

Possible post-processing modes for Dolby Pro Logic are:

- Volume control only
- Equalizer (5-band on L, C and R); variable output matrix ; volume control

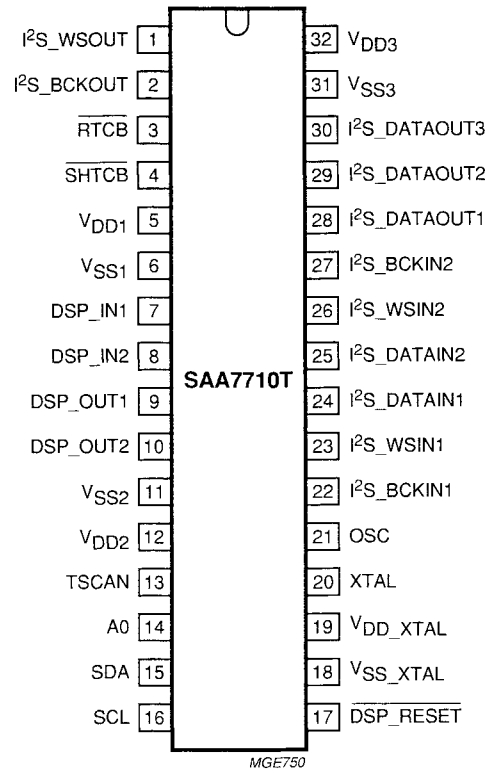
THE DOLBY 3 STEREO MODE

In Dolby 3 stereo mode, several blocks must be initialized and controlled during operation:

- Noise generator and noise sequencer
- Centre channel mode (normal, phantom, wide and off)

THE HALL/MATRIX SURROUND MODE

- Hall or matrix surround Mode setting
- Surround channel delay .



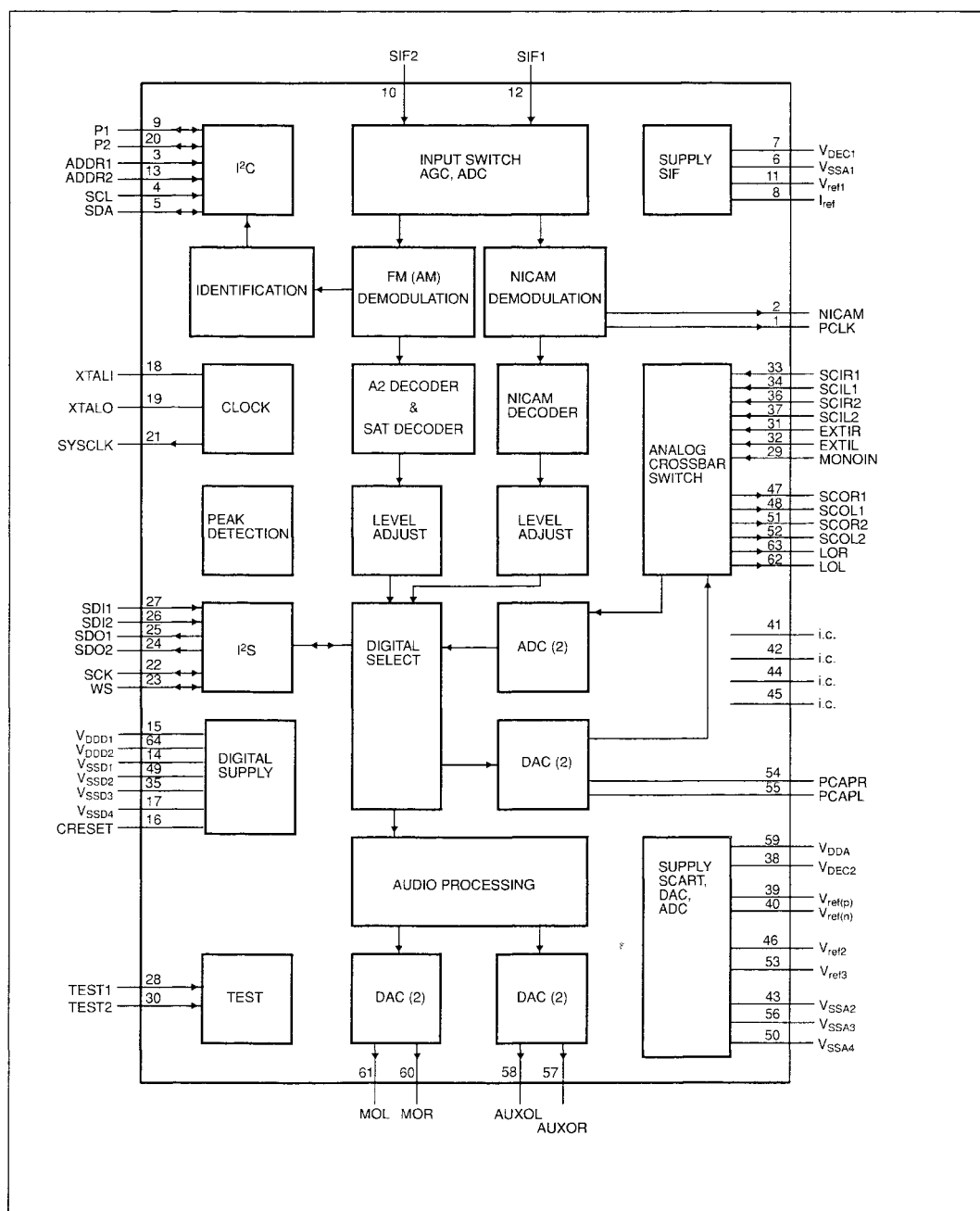
Digital TV sound processor (DTVSP)

GENERAL DESCRIPTION

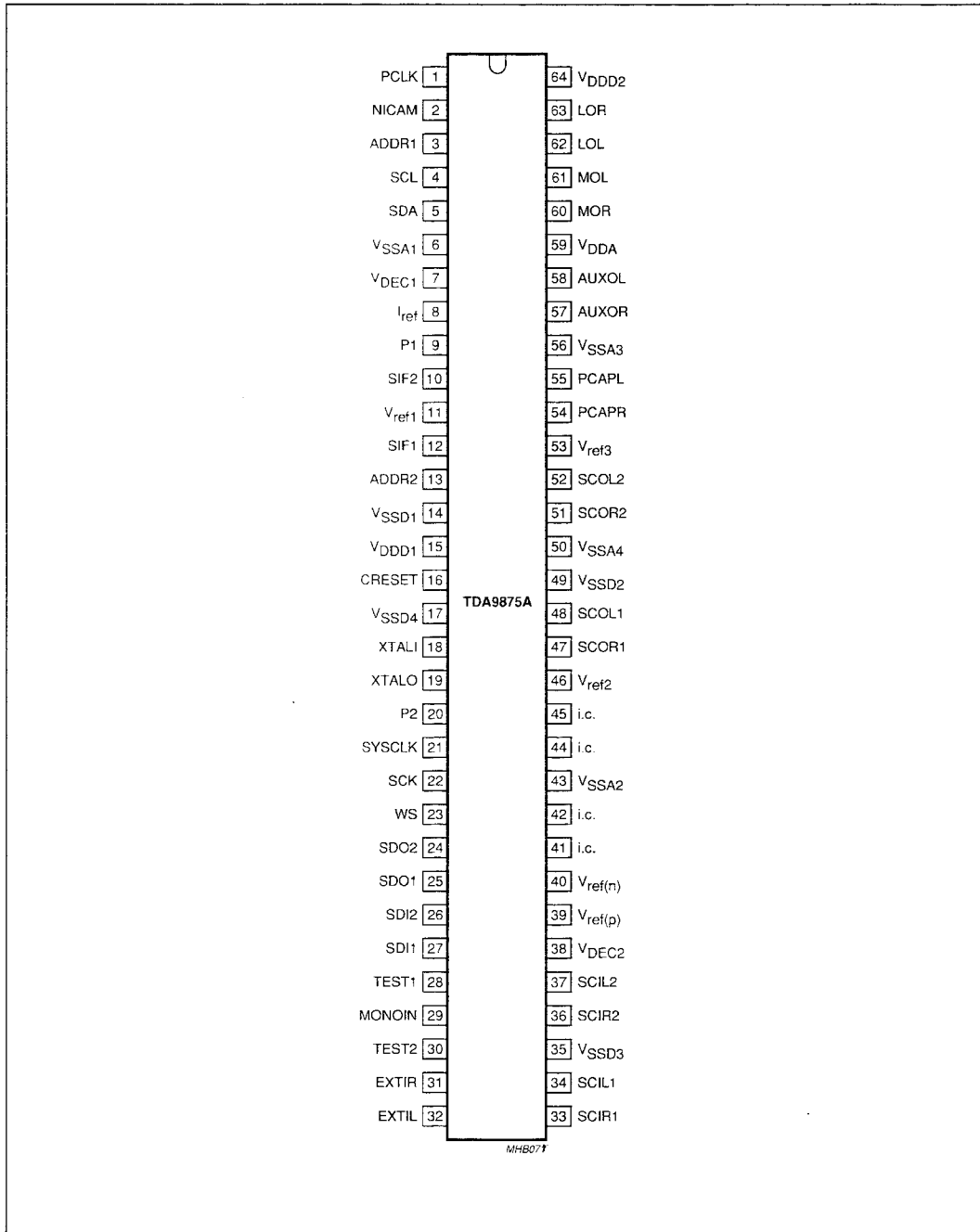
The TDA9875A is a single-chip Digital TV Sound Processor (DTVSP) for analog and digital multi-channel sound systems in TV sets.

TDA9875A

BLOCK DIAGRAM



Pin configuration:



11.2 SERVICE MENU DESCRIPTION

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

OP 0

<u>Bit Nr.</u>	<u>Meaning</u>
7 -----	Menu type 0: Solid OSD, 1: Meshing OSD
6, 5 -----	Tuner type 00: Siel 01: TFK 3402 10: 11:
4 -----	Headphone 0: No 1: Yes
3 -----	Txt 0: No 1: Yes
2 -----	Nr. Of scarts 0: 1 scart 1: 2 scarts
1, 0 -----	Channel table: 00: BG only 01: I only 10: BG-DK 11: BG-LL'

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

OP 1

<u>Bit Nr.</u>	<u>Meaning</u>
7 -----	Subwoofer 0: No 1: Yes
6 -----	IF selection 0: 38.9 Mhz., 1: 38.0 Mhz.
5 -----	Prog. Storage Time 0: 3 sec. 1: 30 sec.
4 -----	Text Language 0: East 1: West
3 -----	Ext. Spkr 0: No 1: Yes
1, 2 -----	OSD Language 00: English 01: Turkish 10: German 11: French
0 -----	Channel type 0: No 1: Yes

CONVERGENCE ADJUSTMENTS

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

• Centre Convergence Adjustment

1. Receive crosshatch pattern with a colour bar signal generator.
2. Adjust the BRIGHTNESS and CONTRAST Controls for well defined pattern.
3. Adjust two tabs of the 4-Pole Magnets to change the angle between them (See figure 16) and superimpose red and blue vertical lines in the central area of the picture screen. (See figure).
4. Turn the both tabs at the same time keeping the constant angle to superimpose red and blue horizontal lines at the centre of the screen. (See figure)
5. Adjust two tabs of 6-Pole Magnets to superimpose red/blue line and green one. Adjusting the angle affects the vertical lines and rotating both magnets affects the horizontal lines.
6. Repeat adjustments 3,4,5 to ensure best convergence, the adjustment must be undertaken with great care because of the interaction between 4 and 6 pole magnets.

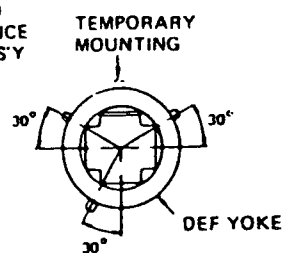
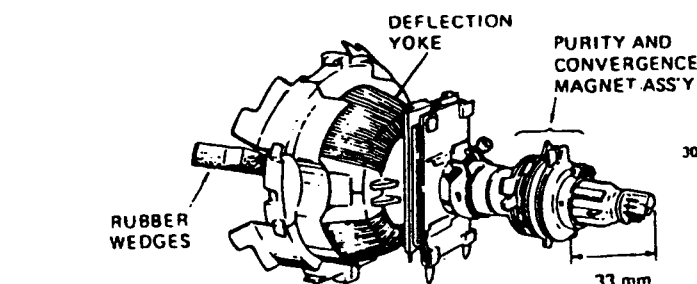
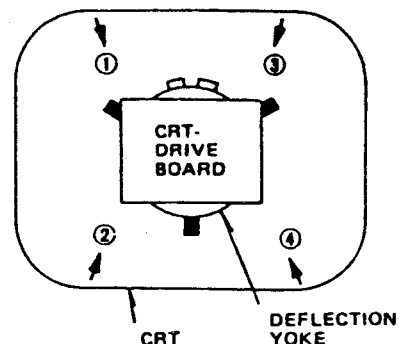
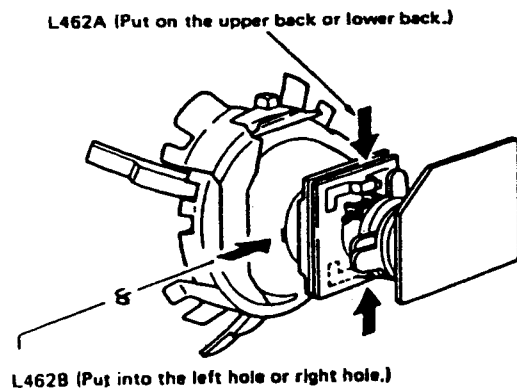
• Circumference Convergence Adjustment

1. Loosen the clamping screw of deflection yoke to allow the yoke to tilt.
2. Put a wedge as shown in figure 15 temporarily. (Do not remove cover paper on adhesive part of the wedge.)
3. Tilt front of the deflection yoke up or down to obtain better convergence in circumference. (See figure) Push the mounted wedge into the space between picture tube and the yoke to fix the yoke temporarily.
4. Put other wedge into bottom space and remove the cover paper to stick.
5. Tilt front of the yoke right or left to obtain better convergence in circumference. (See figure)
6. Keep the yoke position and put another wedge in either upper space. Remove cover paper and stick the wedge on picture tube to fix the yoke.
7. Detach the temporarily mounted wedge and put it in another upper space. Stick it on picture tube to fix the yoke.
8. After fixing three wedges, recheck overall convergence. Tighten the screw firmly to fix the yoke and check the yoke is firm.
9. Stick 3 adhesive tapes on wedges.

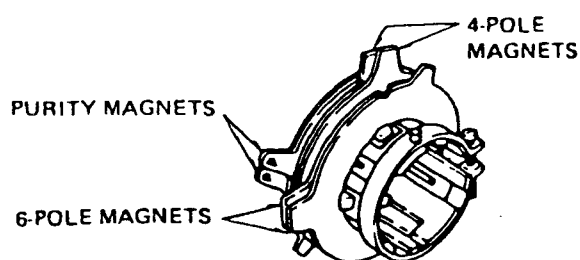
CONVERGENCE COMPENSATOR

Compensators L462A and L462B are used to correct misconvergence (Red-Green) at the top center or bottom center on screen, when the misconvergence is still evident even though the yoke adjustment is tried. Compensator L462C is also used to correct misconvergence (Vertical shift of Red or Blue) at four corners on screen.

1. To correct horizontal misconvergence (Red-Green), put compensator L462A on the yoke back (see figure right) to find a position for minimizing misconvergence. Mark the position and remove protective paper on the rear of L462A to stick it in place. Apply adhesives on both yoke and L462A.
2. To correct vertical misconvergence (Red-Green), put the tips of compensator L462B into either of the holes on the yoke core and apply adhesives.
3. To correct up or down shift of Red at top right or bottom right corner, put compensator L462C at point 1 ve 2 or the picture tube (see figure right.) to find a position for minimizing misconvergence. Mark the position and remove protective paper on the rear of L462C to stick it in place.

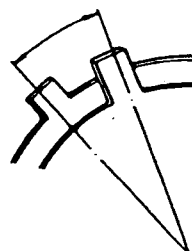


RUBBER WEDGES LOCATION

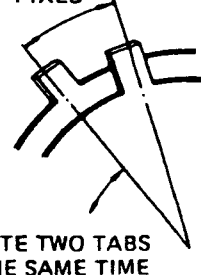


CONVERGENCE MAGNET ASSEMBLY

ADJUST THE ANGLE (VERTICAL LINES)

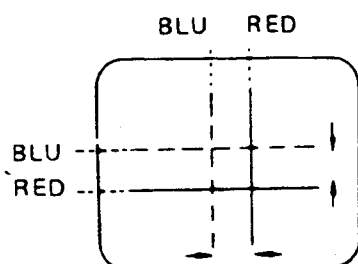


FIXED

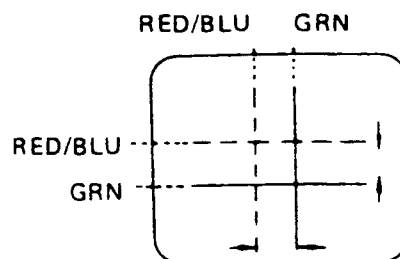


ROTATE TWO TABS AT THE SAME TIME (HORIZONTAL LINES)

ADJUSTMENT OF MAGNETS

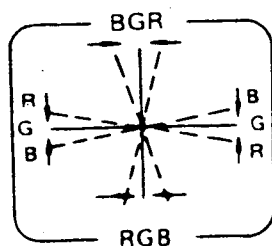


4-POLE MAGNETS MOVEMENT

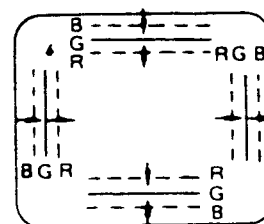


6-POLE MAGNETS MOVEMENT

Centre Convergence by Convergence Magnets



INCLINE THE YOKE UP (OR DOWN)



INCLINE THE YOKE RIGHT (OR LEFT)

Circumference Convergence by DEF Yoke

Dot Movement Pattern