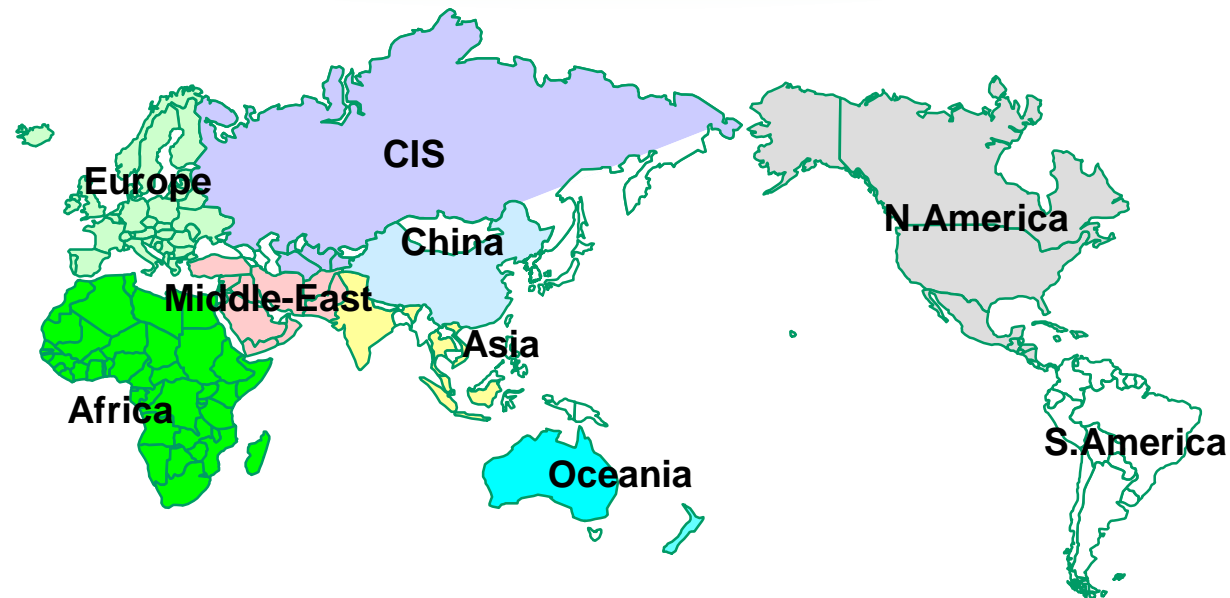


Welcome to

LCD TV

(PAL & NTSC Chassis with LCD screen !)

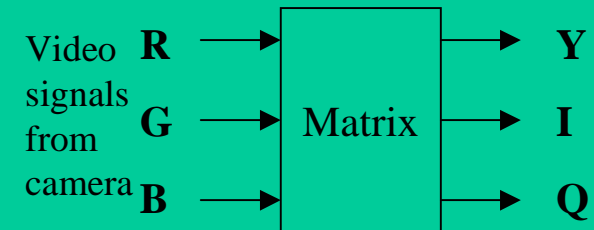


LCD TV CHASSIS APPLICATION NOTE

1. TV COLOR SYSTEM
2. TV SOUND SYSTEM
3. Special feature
 - SCART
 - V-CHIP
 - CAPTION
 - TELETEXT
 - Etc..
4. ADJUSTMENT & OPTION TABLE
5. MODEL NAME DONATION
6. GENERAL SPEC.
7. Chassis SPEC.
8. BLOCK DIAGRAM

NTSC(National Television System Committee)

- ▶ Developed in USA, on 1953
- ▶ Video signal(R,G,B) from Camera is converted to Y,I,Q signal.
- ▶ Y Signal : Luminance signal
 $Y=0.30R+0.59G+0.11B$
- ▶ I Signal: Chrominance Signal($I=0.60R-0.28G-0.32B$)
- ▶ Q Signal: 90° (Phase difference) compare with I Signal.
 $(Q=0.21R-0.52G+0.31B)$
- ▶ Color sub-carrier 3.58MHz
- ▶ Frame rate : 30/sec (60 Field)
- ▶ Horizontal line : 525 Line
- ▶ Nation : USA.Canada,Mexico,Korea,Japan etc..



PAL(phase alternation by line)

- ▶ Developed in Germany ,on 1967
- ▶ In every other line the R-Y signal is transmitted by inverting phase(180 degree).
- ▶ By combining two horizontal lines, using a delay line in the TV set, two lines can be combined and any phase error can be cancelled.
→ Phase(Chroma) distortion is reduced. (Automatic hue control)
- ▶ Color sub-carrier 4.43MHz
- ▶ Frame rate : 25/sec (50 Field)
- ▶ Horizontal line : 625 Line
- ▶ Nation : West Europe (except France),China,Brazil etc..

SECAM(sequential chrominance and memory)

- ▶ Developed in France, on 1967
- ▶ One color signal at a time, transmitting chrominance signal (the R-Y signal and the B-Y signal) alternately by delay one line.
- ▶ FM modulation for color which is not effected by phase shift removes the problem during transmission that will effect the color hue nor saturation.
- ▶ Color sub-carrier 4.4MHz and 4.25MHz is used for R-Y and B-Y
- ▶ Frame rate : 25/sec (50 Field)
- ▶ Horizontal line : 625 Line
- ▶ Nation : France,CIS,East Europe etc..

👉 **Comparison of Feature**

SYSTEM	NTSC	PAL	SECAM
FLICKER	○	△	△
RESOLUTION	△	○	○
COLOR ERROR	△	○	○
NOISE SENSITIVITY (Picture Image)	⊙	○	○

TV Color System



SYSTEM	UNIT	NTSC M	PAL B,G,H	PAL I	PAL D	PAL N	PAL M	SECAM B,G,H	SECAM D,K,K1,L
Line/fiel	Line	525/60	625/50	625/50	625/50	625/50	525/50	625/50	625/50
Horizontal Frequency	kHz	15.734	15.625	15.625	15.625	15.625	15.75	15.625	15.625
Vertical Frequency	Hz	60 Hz	50Hz	50Hz	50Hz	50Hz	50Hz	50Hz	50Hz
Colour Subcarrier Frequency	MHz	3.579545	4.433618	4.433618	4.433618	3.582056	3.575611	4.25 4.4	4.25 4.4
Video Bandwidth	MHz	4.2 MHz	5.0MHz	5.5MHz	6.0MHz	4.2MHz	4.2MHz	5.0MHz	6.0MHz
Sound Car	MHz	4.5MHz	5.5MHz	6.0MHz	6.5MHz	4.5MHz	4.5MHz	5.5MHz	6.5MHz

TV Broadcasting System Specifications

Code	Popular Name of Broadcasting System	Frames	Scan Lines	Freq Band	Sound Offset	Vision Modulation	Channel Band Width	In Use
Terrestrial Transmission Standards								
A	UK ch	25	405	VHF	-3.5MHz	Pos	5.0MHz	No
B	CCIR ch(1)	25	625	VHF	+5.5MHz	Neg	7.0MHz	Yes
C	Luxembourg	25	625	VHF	+5.5MHz	Pos	5.5MHz	Yes
D	OIRT ch(1)	25	625	VHF	+6.5MHz	Neg	8.0MHz	Yes
E	Old France ch	25	819	VHF	+11MHz	Neg	14.0MHz	No
F	Old Luxembourg ch	25	819	VHF	+5.5MHz	Pos	7.0MHz	No
G	CCIR ch(2)	25	625	UHF	+5.5MHz	Neg	8.0MHz	Yes
H	CCIR ch(2)	25	625	UHF	+5.5MHz	Neg	8.0MHz	Yes
I	Ireland ch	25	625	UHF	+6.0MHz	Neg	8.0MHz	Yes
K	OIRT ch(2)	25	625	UHF	+6.5MHz	Neg	8.0MHz	Yes
KI	OIRT ch(2)	25	625	UHF	+6.5MHz	Neg	8.0MHz	Yes
L	France ch	25	625	UHF	+6.5MHz	Pos	8.0MHz	Yes
M	US or JAP ch	30 (29.97)	525	VHF/UHF	+4.5MHz	Neg	6.0MHz	Yes
N	Argentina ch	25	625	VHF/UHF	+4.5MHz	Neg	6.0MHz	Yes
Satellite Transmission Standards								
Ku-Band		Any	Any	~11GHz	+6.50MHz	Neg		Yes
C-Band		Any	Any	~4GHz	+6.50MHz	Pos		Yes

Summary

- 1) Image is transmitted by AM modulation, Sound is FM modulation.
- 2) Separation & detection of Vision, Sound signal in TV system.

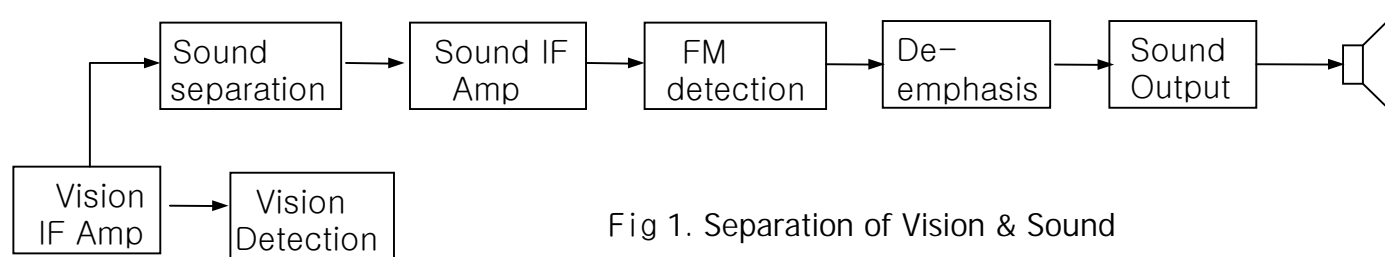


Fig 1. Separation of Vision & Sound

- 3) De-emphasis Circuit (For improving S/N ratio)

; Noise sensitivity of high frequency is poor

To compensate this problem, transmitter amplifies high frequency part with high-pass AMP (Pre-emphasis)

► Receiver needs De-emphasis circuit (low pass filter) for decreasing high frequency.

- 4) To avoid interference with color signal, use FM modulation & transmit by decreasing amplitude.
- 5) Mono : same sound pressure in two speaker.

Stereo : different sound pressure in two speaker. sound form is moved.

Surround : different sound pressure & Phase. user can feel the sound form in the outside of speaker .

Sound system of broadcasting

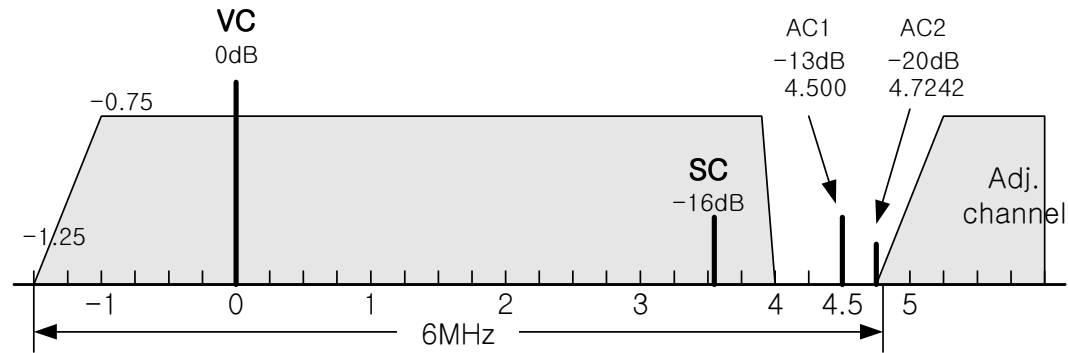


Fig 2. M(NTSC) System

- Sound Frequency & Stereo carrier frequency of Broadcasting System

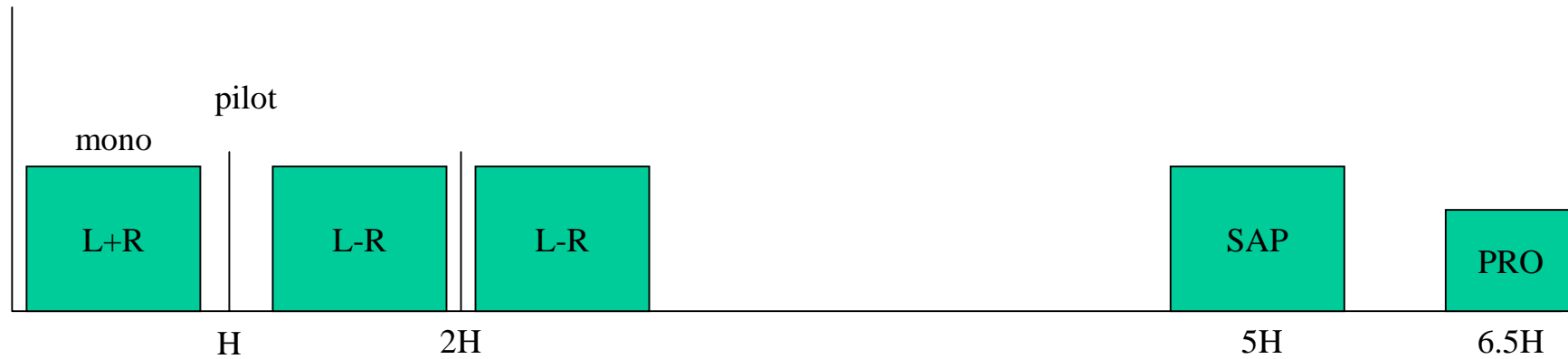
TV system	Position of Sound Carrier /MHz	Sound Modulation	Color System	Country
B/G	5.5/5.7421875	FM-Stereo	PAL	Germany
B/G	5.5/5.85	FM-Mono /NICAM	PAL	Scandinavia,Spain
L	6.5/5.85	FM-Mono /NICAM	SECAM-L	France
I	6.0/6.552	FM-Mono /NICAM	PAL	UK
D/K	6.5/6.2578125 D/K1 6.5/6.7421875 D/K2 6.5/5.85 D/K-NICAM	FM-Mono /NICAM	SECAM-East	USSR Hungary
M M-Korea	4.5 4.5/4.724212		NTSC	USA Korea

Sound system of broadcasting

- Major parameter of broadcasting system when transmit sound signal

Sound Carriers	Carrier FM1			Carrier FM2		
	B/G	D/K	M	B/G	D/K	M
TV-Sound Standard	B/G	D/K	M	B/G	D/K	M
Carrier frequency in MHz	5.5	6.5	4.5	5.74218 75	6.257812 6.742187 5.742187	4.724212
Vision/sound power ratio	13dB					
Sound bandwidth	40Hz to 15kHz					
Preemphasis	50us		75us ±17/	50us		75us
Frequency deviation(nom/max)	± 27 / ± 50kHz		± 25kH	± 25 / ± 50kHz		± 25kHz
Sound Signal Components						
Mono transmission	mono			Mono		
Stereo transmission	(L+R)/2		(L+R)/2	R		(L - R)/2
Dual-sound transmission	Language A			Language B		

MTS(Multi-channel Television Sound, proposed by Zenith)



- ▶ SAP(Second Audio Program) - for second-language
- ▶ PRO(Professional Channel) - used primarily by television stations for program coordination purposes

Multi Carrier sound broadcasting

- 1) KOREA : transmit L+R, L-R signal only (2 carrier method)
 - 2 Language broadcasting: L+R(A Language),L-R(B Language)
- 2) USA ; transmit L+R,L-R, Pilot, SAP carrier individually .

	Aural Carrier	BTSC – MPX - Components			
		(L + R)	Pilot	(L – R)	SAP
Carrier frequency ($f_{hNTSC} = 15.734\text{kHz}$) ($f_{hPAL} = 15.625\text{kHz}$)	4.5MHz	Base-band	f_h	$2f_h$	$5f_h$
Sound bandwidth in kHz		0.05 ~15kHz		0.05 ~15	0.05 ~12kHz
Max. deviation to Aural Carrier	73kHz	25kHz	5kHz	50kHz	15kHz
Max. Freq. Deviation of Sub-carrier Modulation Type				AM	10kHz FM

- 3) JAPAN : transmit L+R, L-R, pilot carrier (3 carrier method)
 - Main sound : R+L, Sub sound : R-L, control carrier($3.5f_h$).
 - 2 Language broadcasting: main sound(A Language),Sub sound(B Language)

NICAM 728

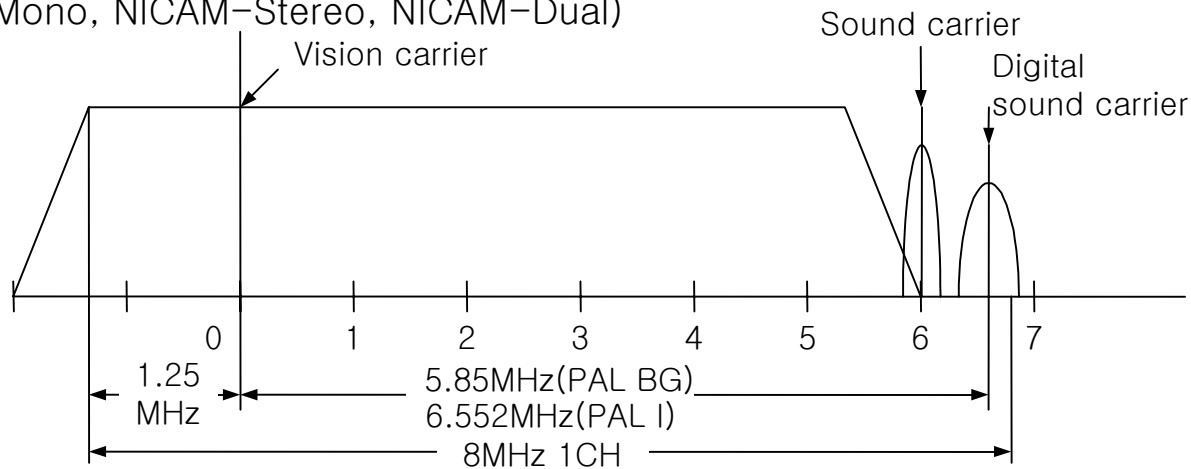
1) NICAM (Near-Instantaneous Companding Audio Multiplex)

; Transmit Digital Sound .

A high frequency sub-carrier (5.85MHz or 6.552MHz) is digitally modulated with a 728Kbits/sec data-stream.

The data-stream consists of 728bit NICAM packets transmitted continuously, one packet every millisecond.

(NICAM-Mono, NICAM-Stereo, NICAM-Dual)


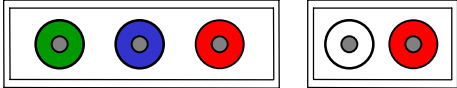






* QPSK(Qudrature Phase Shift Keying) Modulation

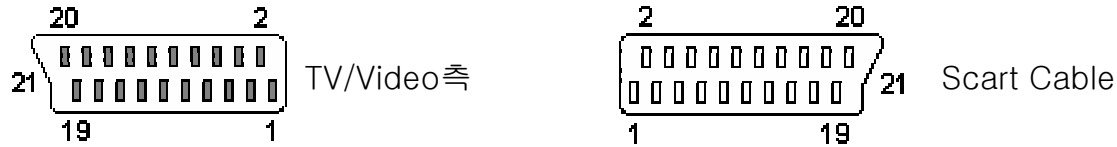
; Phase of carrier is shifted 90 degree every 2-bit period from original point.

0°	90°	180°	270°
00	10	11	01

Standard of External (Rear) Connections

PAL (RZ-) MODEL	NTSC MODEL/ PAL (RT-) MODEL
<p>1) Full-SCART</p>  <p>AV1</p>	<p>1) COMPONENT in</p>  <p>Y PB PR Audio(L) (R)</p> <p>Component</p>
<p>2) Full-SCART & PHONE-IN/OUT</p>  <p>Y Audio(L) (R) S-Video Headphone</p> <p>AV2 S-Video Headphone</p>	<p>2) AV IN / S-Video / Headphone</p>  <p>Y Audio(L) (R) S-Video Headphone</p> <p>AV2 S-Video Headphone</p>
<p>3) PC IN</p>  <p>D-SUB(21P) PC Audio(L,R)</p> <p>PC INPUT</p>	<p>3) PC IN</p>  <p>D-SUB(21P) PC Audio(L,R)</p> <p>PC INPUT</p>

1. Scart Jack (Peri TV Connector)



Pin	NAME	DISCRIPTION	VALUE
1	AOR	Audio output(R)	0.5Vrms ,54% Modulation
2	AIR	Audio input(L)	0.5Vrms
3	AOL	Audio output(L)	0.5Vrms ,54% RF Modulation
6	AIL	Audio input(L)	0.5Vrms
7	B-in	Blue color signal in	0.7Vp-p,75Ω Impedance
8	SWITCH.	Function Switching(AV-ID.)	Level 0:0~2V, Level1A:4.5~7V, Level1B:9.5~12V
10	Bi-directional	Control signal line	*Optional
11	G-in	Green color signal in	0.7Vp-p,75Ω Impedance
12		No connection	*future use under consideration
15	R-in	Red color signal in	0.7Vp-p,75Ω Impedance
16	BLANKING	RGB FB (for switching)	Composite(0~0.4V) ,RGB(1~3V)
19	V-outt	Composite video(or Y) output	1Vp-p,75Ω Impedance
20	V-in	Composite video(or Y) Input	1Vp-p,75Ω Impedance
4,5,9,13,14, 17,18,21	GND	GND for return	

1. Scart Jack (Peri TV Connector)

- Full Scart : RGB input + TV(Video) input/output available
Half Scart : TV(Video) input/output available
- **Control Pin** : 8, 16 Pin using
8 Pin : Auto AV operation(L:0~2V, H:10~12V)
16 Pin: RGB input(L:0~0.4V, H:1~3V)
- **Auto AV Operation** : When Input mode is RF ,and if AV signal is input , screen is automatically changed to AV Mode controlled by 8 Pin
(when 8 Pin is High, changed to AV mode)
 - Channel OSD displayed RF channel OSD.
 - Video & Sound is AV signal.
 - Input mode (RF→AV→Component→RF) keeps AV mode.
 - ▶ Auto AV cancellation :When 8 Pin is Low/Tunning the channel.
 - Return to previous RF channel.
 - When change RF channel .
(PR +/-, Manual programme, Programme edit, Favourite programme operation)
- **TV Out** : RF signal is always output whenever Input mode is changed. (For Scramble release)
*Scramble(Original video & sound is modified for preventing from decoding contents)
- **Monitor Out** : Same output signal of Main input mode.
- *Golden Scart : Auto ARC + Auto AV

1. V-CHIP

To protect from Sexual,violent screen or words of AIR and CABLE broadcast,
All TV in USA must provide V-CHIP(protecting equipment according to rating)

All broadcaster(AIR,Cable) and Video manufacture must include Rating grade in signal.
V-Chip built-in TV is operating as follow method .If improper signal is inserted by rating.
1)Screen BLOCKING, 2) AUDIO MUTING 3) CAPTION OFF

1.8) H/W SPEC

No.	Contents	SPEC
1	H/W configuration	Without H/W configuration , implementation is available with the MICOM which has CAPTION technology
2	Input signal	CVBS (2 Vpp) , V-chip related data is sent with caption data through vertical blanking line 21 of broadcasting signal , sending 2byte in 05h (in the EDS information in Field 2)

1.9) S/W SPEC

No.	Contents	SPEC
1	V-CHIP DECORING	V-CHIP DECORING with CAPTION DECORING ROUTINE
2	PROGRAM SIZE	3.4Kbyte (EXCEPT CAPTION DECORING Part)
3	English CAPTION	Available (MODE : Needs to satisfy English CAPTION standard)

1.4) V-CHIP RATING SYSTEM

- Rating system is mixed with (CONTENT-BASED)” and (AGE-BASED).

■ (AGE-BASED)

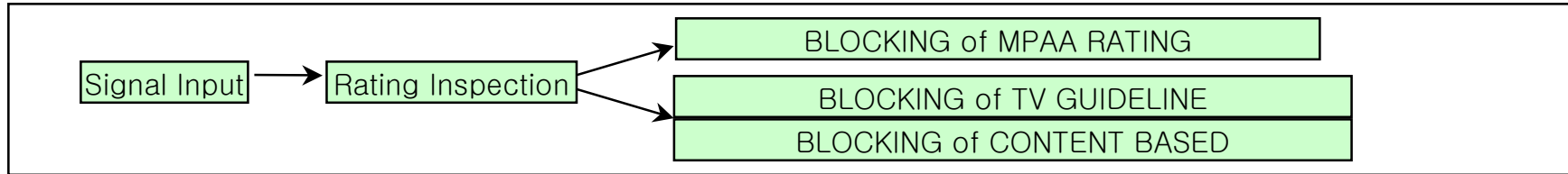
TV PARENTAL GUIDELINES		*MPAA RATING	
TV-Y	Proper to all children	G	Proper to all ages
TV-Y7	Proper to over 7 ages children	PG	Improper contents to children
TV-G	Proper to all ages	PG-13	Improper to under 13 ages children
TV-PG	Improper contents to children	R	Under 17 ages With Parents or guardian
TV-14	Improper contents to under 14 ages chil	NC-17	Improper to under 17 ages
TV-MA	Over 17 ages. For adult	X	For adult

*MPAA : Motion Picture Association of America

■ (CONTENT-BASED)

Content rating is defined by TV PARENTAL GUIDELINES						
	TV-Y	TV-Y7	TV-G	TV-PG	TV-14	TV-MA
SEXUAL SITUATION	-	-	-	SOME	INTENSE	EXPLICIT
ADULT LANGUAGE	-	-	-	INFREQUENT COARSE	STRONG COARSE	-
VIOLENCE	-	FANTASY	-	MODERATE	INTENSE	GRAPHIC
SEXUAL DIALOG	-	-	-	SOME	INTENSE	CRUDE

1.5) System realization



[BLOCKING according to MPAA RATING]

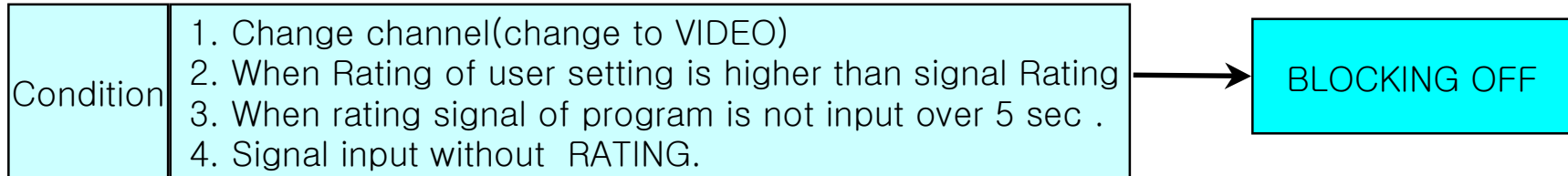
		Rating of user setting					
		G	PG	PG-13	R	NC-17	X
Signal Rating	G						
	PG			BLOCKING OFF			
	PG-13						
	R						
	NC-17	BLOCKING					
	X						

[BLOCKING according to TV GUIDELINES]

		Rating of user setting					
		TV-Y	TV-Y7	TV-G	TV-PG	TV-14	TV-MA
Signal Rating	TV-Y						
	TV-Y7			BLOCKING OFF			
	TV-G						
	TV-PG						
	TV-14	BLOCKING					
	TV-MA						

BLOCKING according to (CONTENT-BASED)

1.6) BLOCKING OFF



1.7) V-CHIP Data STRUCTURE

Data	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Rating	P	1	-	-	A0	R2	R1	R0
Advisory	P	1	V1	V0	S1	S2	I1	I0

A0	1/0	Content advisory character exist(1) or not(0)
R2/R1/R0	0/0/0	N/A
	0/0/1	“G”
	0/1/0	“P”
	0/1/1	“PG13”
	1/0/0	“R”
	1/0/1	“NC-17”
	1/1/0	“X”
	1/1/1	NOT RATED
V1/V0	0/0	No Violent content
	0/1	V1
	1/0	V2
	1/1	V3
S1/S0	0/0	No Sexual content
	0/1	S1
	1/0	S2
	1/1	S3
I1/I0	0/0	No adult content
	0/1	L1
	1/0	L2
	1/1	L3

2. Closed Caption

1. Caption type.

- **Closed Caption** : first ,memory caption code,
when user wants to display ,caption is reproduced in the screen by decoder.
- **Open Caption** : Vision manufacturer or broadcaster edit caption in the screen.
caption is always displayed when user wants or not.

2. Kind of caption

- **Real time Caption** :used in news, talk show ,sports relay
- **Scroll Caption** : caption is scrolled from under line to upper line (Roll-Up)
generally ,used in Real-time Caption.
- **Pop-up Caption** : 2 or 3 line of caption is displayed at the same time
generally ,used in Drama , Movies .

3. Technology of caption

Modulation method

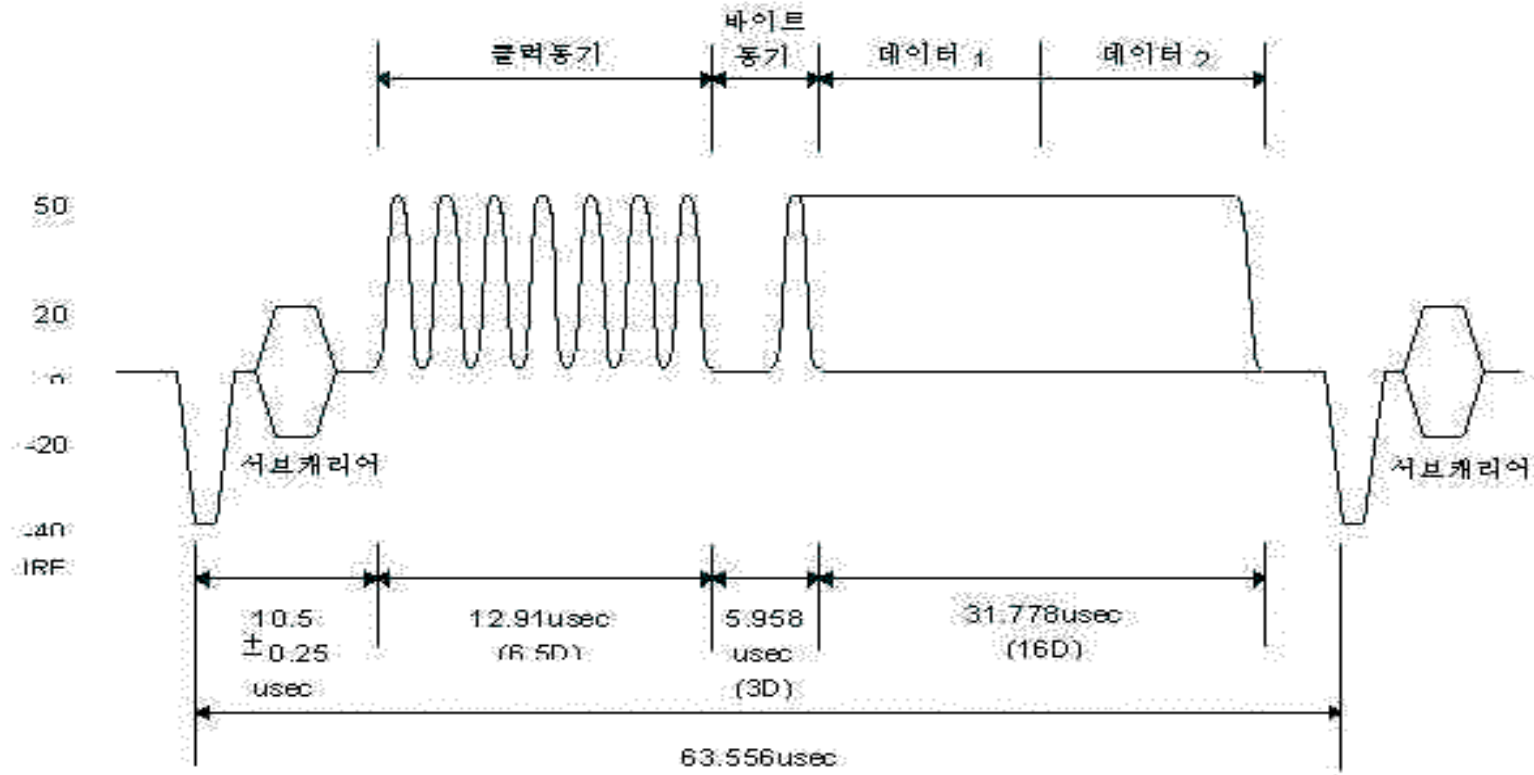
Modulation method is AM(Amplitude modulation),

In the condition of Vertical Blanking(retrace) Interval , Signal level is within 70 IRE .

- Interposition of Data

In the VBI interval, interpose to 10H~21H and 273H~284H.

transmission capacity of one data line is 2 byte.



$D = 1 / (f_H * 32), f_H = 15734.26\text{Hz} \pm 0.05\text{Hz}$
 ※데이터 전송시 상승/하강시간: 0.240μsec

Closed Caption Data Timing

Teletext (Character multiplex broadcasting)

-Summary of Teletext

- transmit latest information(real time)
- consisted with character and figure.
vision information is multiplexed in TV signal with digital data format.
receiver reproduce with TV Vision signal form by using Teletext decoder.

Teletext Signal

- Field fly-back mode :transmit text data in the VBI(vertical blanking interval) of Video signal) interval.
use horizon. Line 6~22, 318~335 . (transmit data of 45byte in every Line)

- Page format

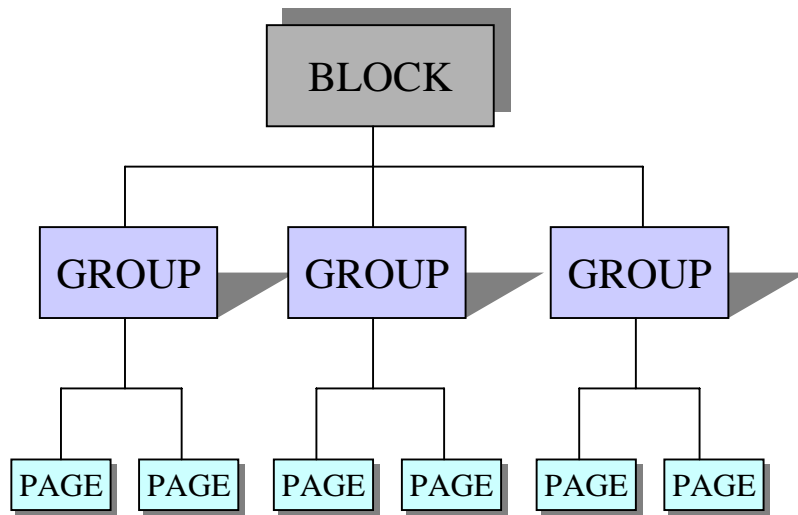
- every Page is consist with Packet. 1 Page have 32 Packet .
- possible total Page : 800Page(100 Page ~ 899 Page)

- Teletext form

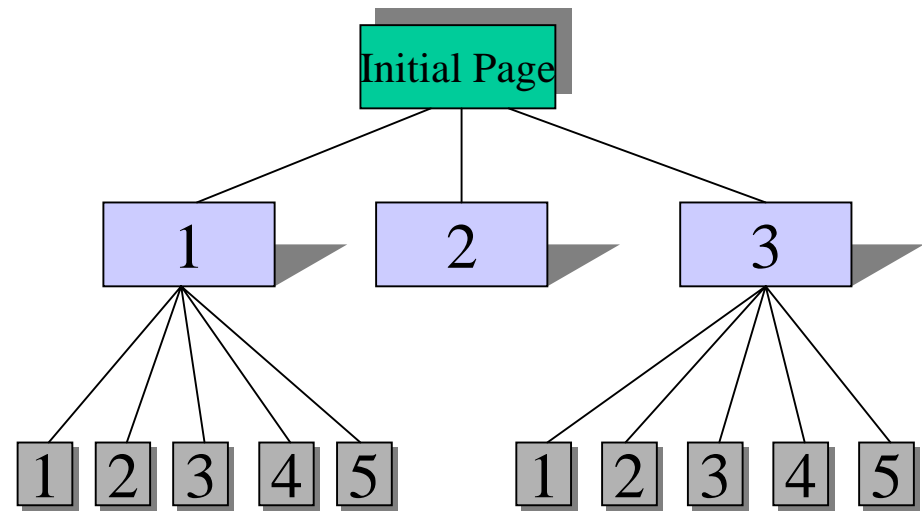
- TOP** : TXT contents is consisted with table form of total page,in designated pages.
(Germany,sweden,swiss etc..)
- FLOF** : use 3 Page no. and 5 additional key of Remocon.(Red, Green, Yellow, Blue, Index)
(UK,france, etc..)

[2] Structure

TOP



FLOF



TV Function for Teletext

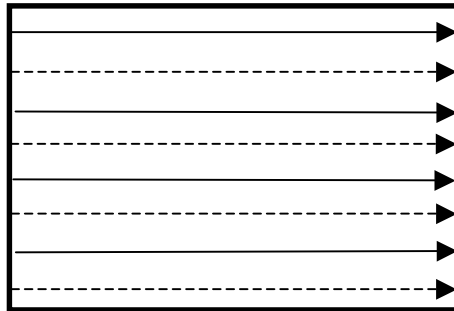
1. Teletext Related Function in TV.

기능	리모콘	설명
TEXT		Teletext On/Off
SIZE		Double Height for Teletext Data
HOLD		Maintaining current Display Page contents even if the Page contents is changed
UPDATE		Inform user when current Display Page contents are Updated
MIX		Mixing current Display Page to show up with Video at the same time
TIME		When TXT OFF, display current time information and when TXT ON, select Sub-page Mode
REVEAL		Let the text which is concealed in Current Display Page to be shown
MODE		Memorize 4 pages that user wants per program at current program
RED		Change to the page linked to TXT RED key
GREEN		Change to the page linked to TXT GREEN key
YELLOW		Change to the page linked to TXT YELLOW key
CYAN		Change to the page linked to TXT CYAN key
INDEX		Change current page to index page
ACMS	---	After Auto search, detect broadcasting name per country and memorize channel automatically as wanted
WSS	ARC	With using WSS signal from teletext signal, change to wide picture ratio

► Progressive Scan for High Picture Quality Without Flicker

Progressive Scan double the number of scan lines for high density, high quality images. Therefore, flicker was eliminated for long time viewing without eye fatigue.

Odd field
Even field



[Interlaced scanning]

- Interlaced Scanning :
First one- half of the image is scanned in odd-numbered line, and then followed by even-numbered line.



[Progressive scanning]

- Progressive Scanning :
From 1st scan line to last scan line, each lines is progressively scanned. So,Reduce line-flicker. And,providing higher resolution image(vertically) .

▶ High Definition Digital Broadcast Reception (HD grade)

In response to digital broadcasting, it is possible to receive digital signals through the separate digital terminal so viewers can enjoy high quality digitalized images. HD grade D-TV(480P,720P,1080I) compatible. (When digital receiver is connected.)

<Digital Broadcast Screen Comparison>



<Conventional TV>

<Digital TV Compatible>

□ DTV Video formats

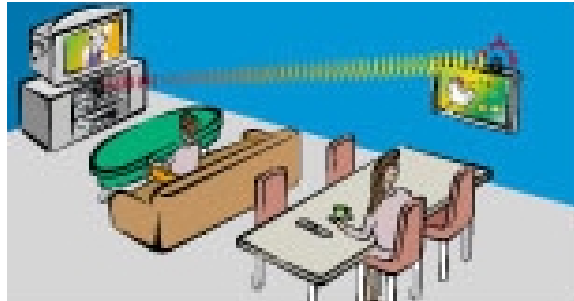
	Signal Format (V. Lines x H. Pixels)	Aspect Ratio	Scan	Application Area
HDTV	1080 x 1920	16 / 9	60I 30P 24P	Interlace camera vision Hi definition movie film
	720 x 1280	16 / 9	60P 30P 24P	Sports, Graphic ,Advertisement , Animation movie(35mm)
SDTV	480 x 704	16/9 or 4/3	60P 60I 30P 24P	Multimedia vision(DVD,LDP) Data interface
	480 x 640	4 / 3	60P 60I 30P 24P	VGA grade vision data Interface

▶ Wireless Transmission and Reception

The TV and other AV devices can be connected without connecting wires for picture and sound signals can be received more freely.



<Wireless Receiver>



<Wireless Reception Demonstration>

▶ Multi-Use

Desktop, wall-hanging, floor standing, and wireless reception and transmission allow a variety of installation possible.



PSM (Picture Status Memory)

PSM for PAL Model has 5mode(**STANDARD, DYNAMIC, MILD, GAME** and **USER**).
STANDARD, DYNAMIC, MILD and GAME are programmed at the factory for good picture reproduction appropriate to each program character and cannot be changed.
USER status controls the picture status.(contrast,brightness,color, sharpness and tint)

PSM for NTSC Model has 5mode (**CLEAR,OPTIMUM,SOFT,USER**).
CLEAR,OPTIMUM,SOFT are programmed at the condition of surroundings in mode.
USER status controls the picture status.(contrast,brightness,color, sharpness and tint)

SSM(Sound Status Memory)

SSM for PAL Model has 5 mode(**FLAT, MUSIC, MOVIE, SPEECH** and **USER**)
You can always obtain the best sound conditions, for movies, music and speech, as you prefer.
Also you can adjust the sound frequency to the levels you prefer in user mode.

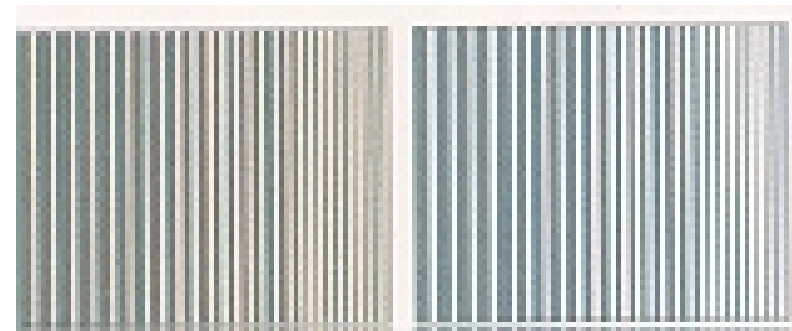
SSM for NTSC Model has 5 mode (**FLAT, MOVE, MUSIC, SPORTS, USER**).
You can always obtain best sound conditions, for movies, music, sports and speech, as you prefer.
Also you can adjust the sound frequency to the levels you prefer in USER mode.

Favorite Program

After you memorize the channels desired,
you can easily watch your favorite programs.
(MAX. 5 program)

DCF(Digital Comb Filter)

The Comb filter separates the color information from luminance signal to avoid cross color on the luminance(Y) signal and to eliminates edge crawls. Adaptive Digital 2-H comb filter is compatible with PAL and NTSC systems.



Existing Comb Filter

Digital Comb Filter (4H)

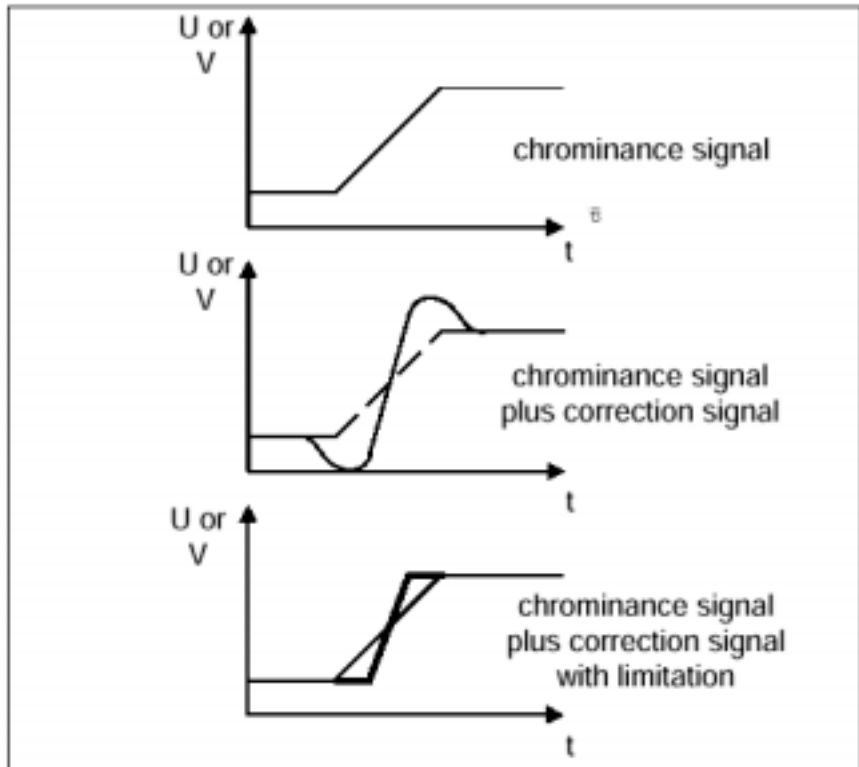
ACMS plus

ACMS plus(Auto Channel Memory System and Station Labeling) function makes a TV set automatically search all the active channels and to store the names of broadcasting stations by VPS and PDC information. This makes it possible to display a station name on the screen and to edit programs.

Digital Comb Filter

The Comb filter separates the color information from luminance signal to avoid cross color on the luminance(Y) signal and eliminate edge crawls. Adaptive intra-field comb filter is compatible with PAL and NTSC systems.

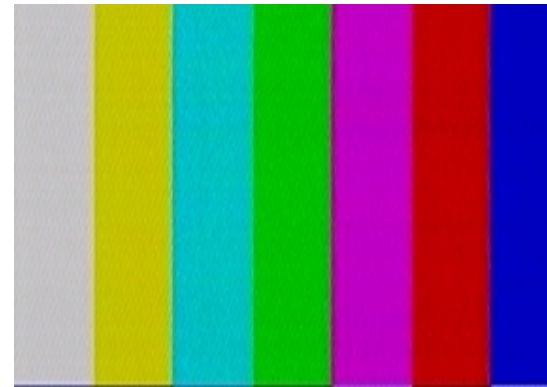
DCTI



Before
DCTI



After
DCTI

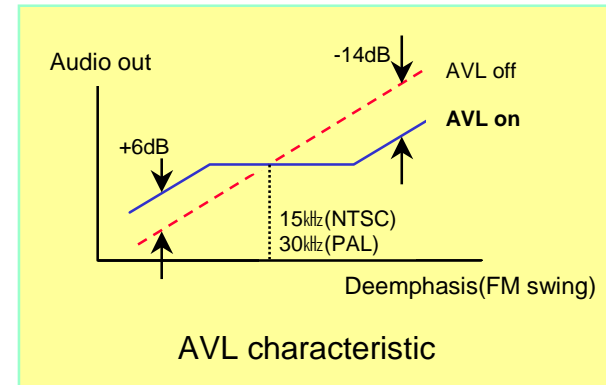


DCTI(Digital Color Transient Improvement) is implemented to improve horizontal transitions of the chrominance signals resulting in a better picture sharpness.
(Refer to page 53.)

AVL (Automatic Volume Leveler)

This function is automatic gain control on the volume which regulates the audio level to constant sound level with non-standard signals

Most of broadcasting station has different modulation ratio. Especially, in case of CATV or BSTV broadcast system, the difference of modulation ratio is more serious than normal system. Whenever customer change the channel, volume level should be also adjusted again. AVL function makes uniform sound-output level, independently of various modulation ratio. AVL function can solve upper inconvenience of customer's needless operation. So, it's very powerful and useful function for customer. AVL function of applied to LCD TV chassis can make uniform sound-output level(60% modulation ratio) from 30% under-modulation to 300% over-modulation ratio. AVL modulation ratio is 60%, it's base on 60% modulation ratio.



Auto Demonstration Mode

Press "OK" in control(local) key(TV Set) for 10 sec .



Automatic demonstration (guide all function of TV)



Press any key to exit (Only front control key in TV set)

In this time ,cannot operate TX(remote control)

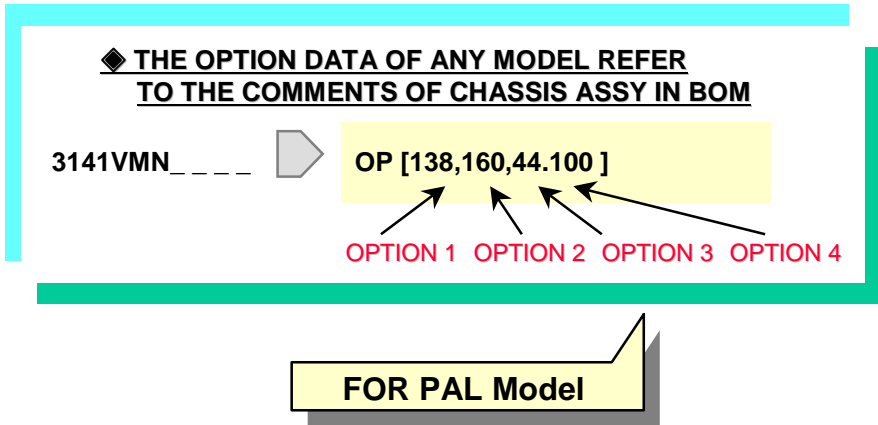
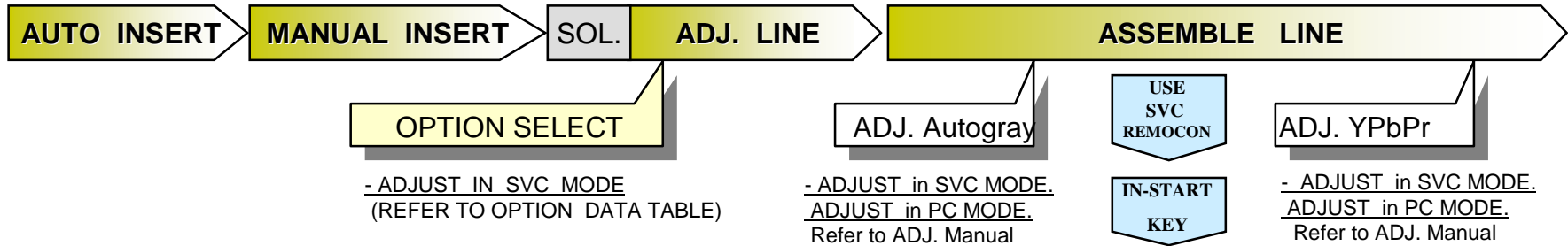
DBS (Dynamic Bass System)

The DBS extends the frequency range of loudspeakers or headphones.

After the adaptation of DBS to the loudspeakers and the cabinet, further customizing of DBS allows individual fine tuning of the sound.

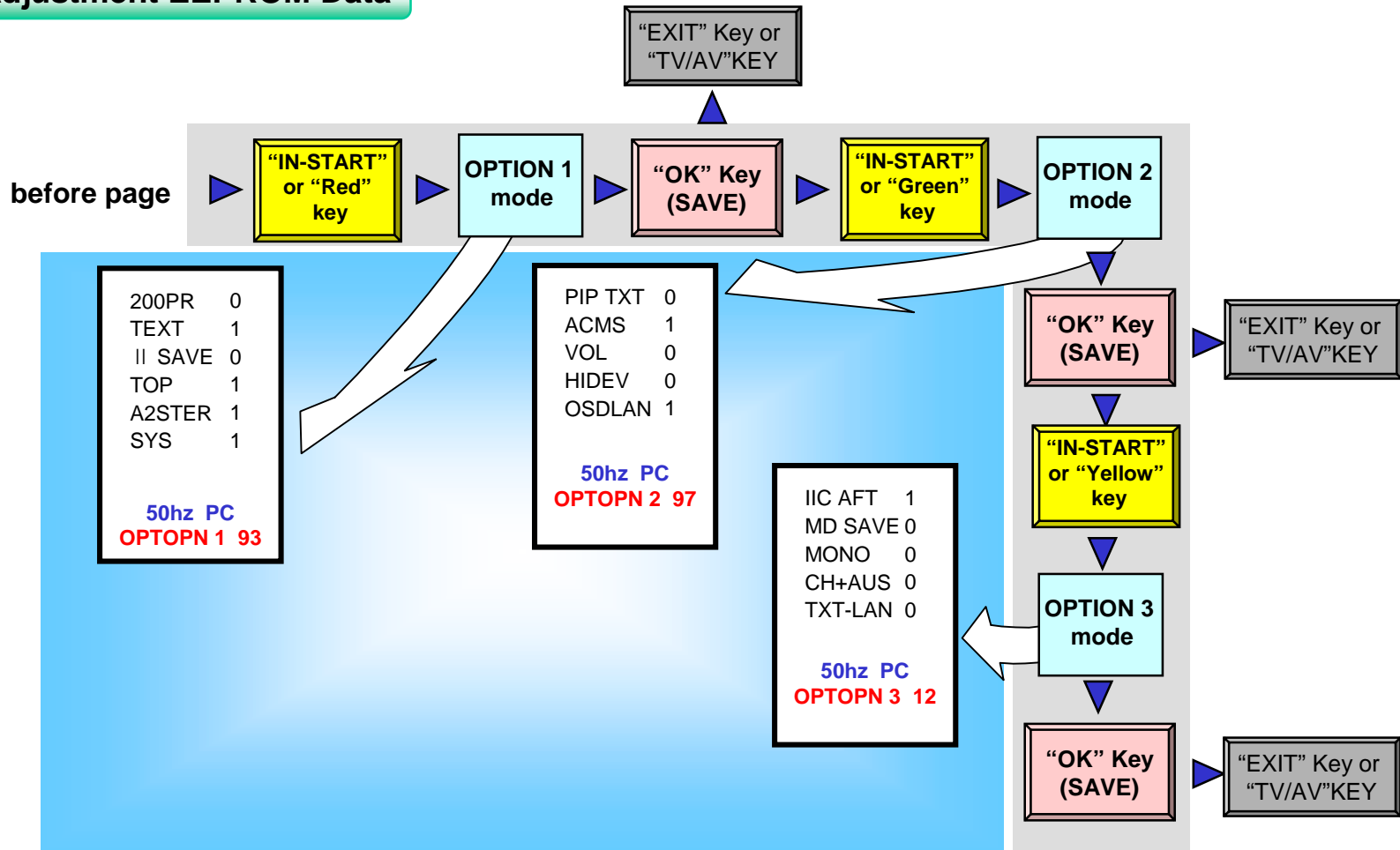
Dynamic Bass System combines two effects: dynamic amplification and adding harmonics.

- Dynamic amplification : If the amplitude comes close to the definable limit, the gain is reduced automatically in dynamic volume mode. Therefore, Clipping effects are avoided.
- Adding Harmonics : Adding harmonics of the frequency components below the cutoff frequency gives the impression of actually hearing the low frequency fundamental.
In other words, the listener has the impression that a loudspeaker system seems to reproduce frequencies although physically not possible.

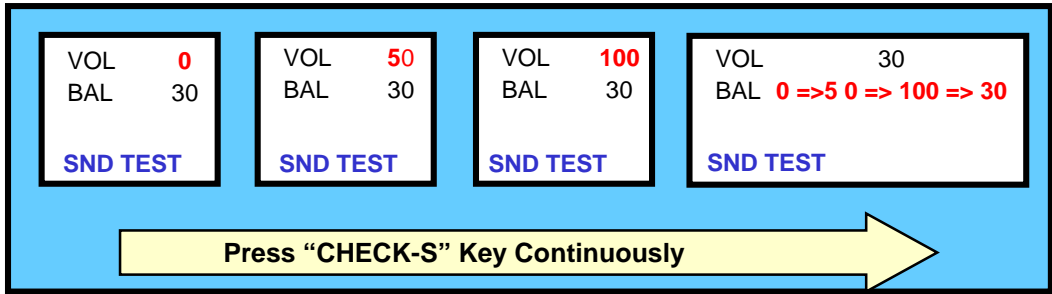
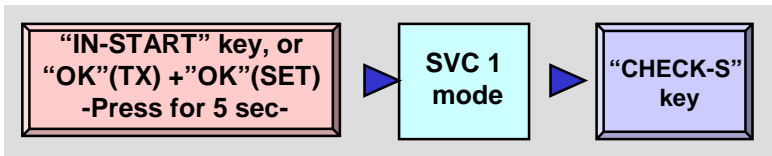


ADJUSTMENT in SVC MODE [OPTION 1,2,3,4]

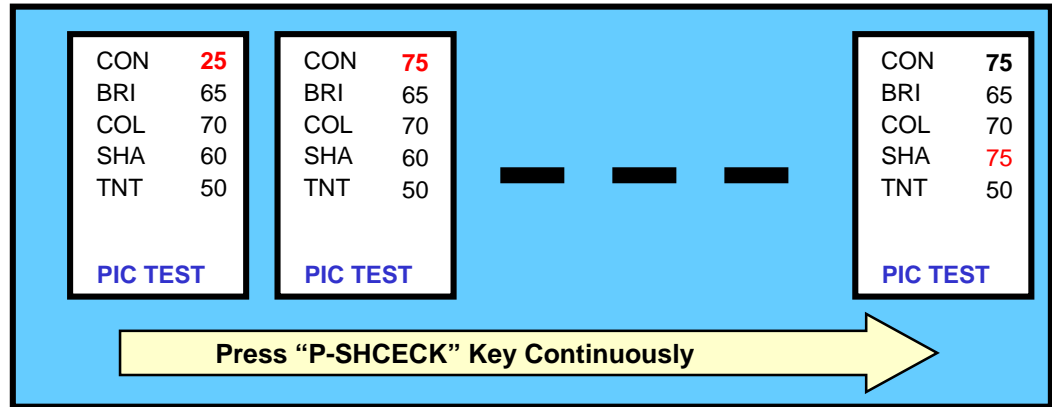
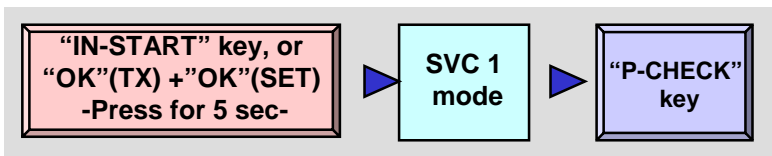
Adjustment EEPROM Data



Test The Sound Condition



Test The Picture Condition



SERVICE - 4

FIX	FP	19
FIX	NP	73
FIX	SP	19
FIX	S1VOL	112
FIX	S2VOL	105
50HZ PC		

List of Pre-scaler DATA for MSP34xy

Service-4	Function	DATA	REMARKS
FIX	FP	19	Don't adjust data (Fixed data)
FIX	NP	73	
FIX	SP	19	
FIX	S1 VOL	112	
FIX	S2 VOL	105	

- This data can be used to adjust picture alignment by memorized EEPROM of the default value.
- SVC-4 data is no need of adjustment.

OPTION TABLE in OPTION 1,2,3

World wide
LCD TV
◆ : Recommended Item

OPTION-1

200PR	0
TEXT	1
II SAVE	0
TOP	1
A2STER	1
SYS	1
50HZ	PC
OPTION 1	93

After Key in New Data (According to BOM) Press "OK" Key

OPTION-1	Code	Function	Remarks
200PR	0		
	1		
TOP	0	Disable TOP (FLOF BASIC)	Only applied "some EU nation" with TOP TEXT Option.
	1	Enable TOP TEXT	
ACMS	0	Disable ACMS plus (Australia Only)	Auto Channel Memory with Broadcasting Station Labeling
	1	Enable ACMS plus	
TOP	0	Disable TOP (FLOF BASIC)	Only applied "some EU nation" with TOP TEXT Option.
	1	Enable TOP TEXT	
A2-ST	0	NICAM check only	All model is applied "1"
	1	NICAM Check & FM Stereo available	
SYS ◆	0	BG / I / DK / M	RT – Model
	1	BG / I / DK / L	RZ – Model
	2	Reserved	
	3	Reserved	

◆ THE OPTION 1 & 2 DATA OF ANY MODEL REFER TO THE COMMENTS OF CHASSIS ASSY IN BOM

OPTION-2

PIP TXT	0
ACMS	1
VOL	0
HIDEV	0
OSDLAN	1
50HZ	PC
OPTION 2	97

OPTION-2	Code	Function	Remarks
PIP TXT	0	Disable TXT in PIP	
	1	Enable TXT in PIP	
ACMS	0	Disable ACMS plus (Australia Only)	Auto Channel Memory with Broadcasting Station Labeling
	1	Enable ACMS plus	
VOL ◆	0	Standard Sound Volume Curve	Low Step = Slow, High Step = Rush
	1	Rushed Sound Volume Curve at Low	Low Step = Rush, High Step = Slow
HIDEV	0		
	1		RT-(China) model Only
OSD LAN ◆	0	ENGLISH Only	
	1	EU-5 EA	
	2	6 COUNTRY	
	3	5 COUNTRY	
	4	4 COUNTRY	
	5	3 COUNTRY	
	6	2 COUNTRY	
7	Reserved		

OPTION-3

IIC AFT	1
MD SAVE	0
MONO	0
CH+AUS	0
TXT-LAN	0
50HZ	PC
OPTION 3	12

◆ THE OPTION 3 DATA OF ANY MODEL REFER TO THE COMMENTS OF CHASSIS ASSY IN BOM



OPTION-3	Code	Function	Remarks
IIC AFT	0	Enable IIC Tunning	RZ – Model
	1	Enable AFT Tunning	RT – Model
MD SAVE	0	Not Save DUAL I/II Sound Condition	EU model
	1	Save DUAL I/II Sound Condition	Non EU model
MONO	0	Normal (RF-ST Model must be fixed "0")	
	1	Forced Mono (AV-ST Model must be fixed "1")	
CH+AU	0	Exception China & Australia Model	Frequency (RF) Table Setting
	1	China & Australia Model Only	
TXT-LAN	0	West EU (E, France, Sweden, Czech, German, Spain, Italy)	"Western EU"
	1	East EU (Poland, France, Sweden, Czech, German, Slovenia, Italy, Romania)	
	2	Turkey (E, France, Sweden, Turkey, German, Spain, Italy)	"TURKEY"
	6	Cyrillic3 (E, Russia, Estonia, Czech, German, Ukraine, Lettish)	
	7	Greek (E/France/Sweden/Turkey/German/Spain/Italy/Greece)	"GREECE"

◆ : Recommended Data

VIDEO

- High Luminance (430cd/m²)
- PSM(Picture Status Memory)
- DCF (Digital Comb Filter ; IC)
- CTI (Color Transient Improvement)

AUDIO

- A2 / Nicam Stereo
- DBS (Dynamic Bass System)
- AVL (Auto Volume Leveler)
- SSM (Sound Status Memory) : DASP
- Graphic Equalizer

MONITOR

- XGA 1024X768 75Hz (Except 13" 14" 20")

ML-024

Tuning

- Full Multi System
- FVS/FS
- ACMS Plus with VPS & TXT
- Program List & Edit

- Auto Sleep & Sleep Timer
- Real Timer (On Off Time)
- Favorite CH Memory : 5
- Closed Caption (RU/RN/RJ-MODEL only)
- Stand-By Power Consumption 3W

ETC

- Front or Side
AV-IN
S-Vide / Head Phone
- Rear Side
AV-IN, DVD-IN (Option)

User Interface

COMPARE SPEC. LIST (1)

World wide
LCD TV

※ ● : Basic Function, ◎ : Option Function

Items	Sub Items	ML-012C (15LA60)		ML-024A (15LA54)		ML-027B (17LZ20)		Remarks
		RT-	RU-	RT-	RU-	RT-	RU-	
Receiving System	PAL-B/G,D/K,I/I	●		●		●		
	SECAM-B/G, D/K,	●		●		●		
	NTSC AV 3.58 / 4.43	●		●		●		
	NTSC RF 3.58	●	●	●	●	●	●	
Aspect Ratio		4:3		4:3		16:9		
Tuning	System	FVS	FS	FVS	FS	FVS	FS	
	Memory type	ACMS +		ACMS +		ACMS +		
	No. of Program	100 (200)	125	100 (200)	125	100 (200)	125	W/O TXT : 200Pr.(China)
	Pr. Edit ,Station Labeling (AMS+)	●		●		●		
	Quick View		●		●		●	
	CATV / Hyper Band		● / ●		● / ●		● / ●	
	Favorite CH Memory		●		●		●	
Picture	DCDI	●		-		●		
	DCF	●		●		●		
	CTI		-	●		-		

COMPARE SPEC. LIST (2)

※ ● : Basic Function, ◎ : Option Function

Items	Sub Items	ML-012C (15LA60)		ML-024A (15LA54)		ML-027B (17LZ20)		Remarks
		RT-	RU-	RT-	RU-	RT-	RU-	
Picture	Luminance	450nit		430nit		450nit		
	Blue Back	-		●		-		
Sound	Stereo (A2 /Nicom)	● / ●	● /-	● / ●	● /-	● / ●	● /-	
	AVL	●		●		●		
	Surround	●		●		●		
	Graphic Equalizer	●		●		●		
	DBS	-		●		●		♣
	SSM	●(5 mode)		●(5 mode)		●(5 mode)		
	Sound Output (Max)	3W × 2		1W × 2		3W × 2		
PIP	PIP (PC Mode)	●		-		●		
	Double Window	-		-		●		
	Multi Window	-		-		4/9/13 windows		
TXT/ Caption	TXT / CAPTION	● / -	- / ●	● / -	- / ●	● / -	- / ●	
	No. of pages (TXT)	10	-	10	-	10	-	
OSD	Type	WINDOW		MENU		WINDOW		
	Character	Graphic		RGB font		Graphic		
	Language	Multi Lang.		Multi Lang.		Multi Lang.		

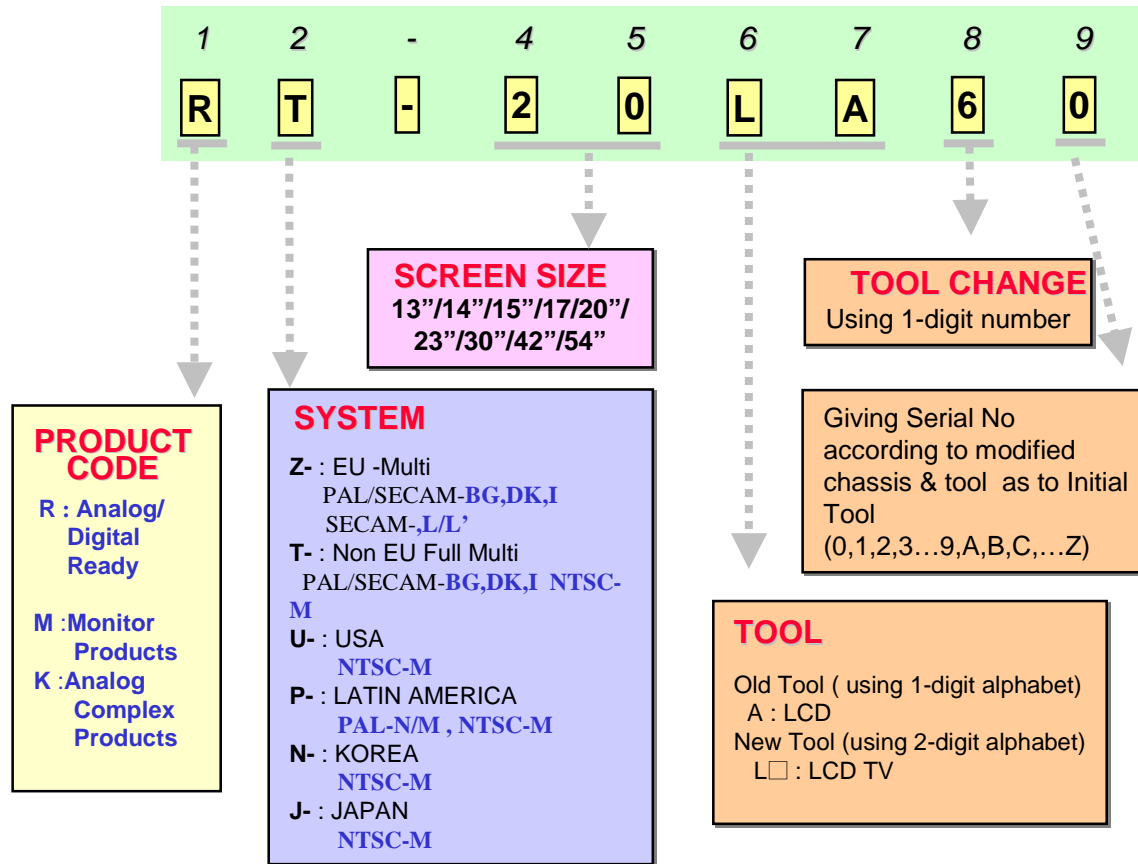
COMPARE SPEC. LIST (3)



※ ● : Basic Function, ◎ : Option Function

Items	Sub Items	ML-012C	ML-024A	ML-027B	Remarks
		RU/T-15LA60	RU/T-15LA54	RU/RT-17LZ20	
Other Function	Picture Status Memory	5 mode	5 mode	5 mode	
	clock	●	●	●	♣
	ARC(Zoom, 16:9, 4:3)	-	-	●	
	Auto Demo	●	●	●	
	DPM	●	●	●	
	Digital TV(W/ STB)	●(HD)	●(HD)	●(HD)	
	Child Lock	●	●	●	
	On/Off Timer	-	●	●	♣
	Sleep Timer	●	●	●	
	Recall / Mute	● / ●	● / ●	● / ●	
AV(PC) Terminals	AV-in (RCA)	●	●	●	
	S-Video in	●	●	●	
	Component-In	● -	●	●	♣
	Head Phone	●	●	●	
	PC-in (D-SUB)	●	●	●	
	PC Audio-in	●	●	●	

Model Name Definition



5. Main Functions/Spec.

ML-024 SPEC. (PAL)

	SPECIFICATIONS	REMARKS		SPECIFICATIONS	REMARKS
SYSTEM	PAL/SECAM-B/G,D/K, I, SECAM-L/L' PAL/SECAM- B/G,D/K,I, NTSC-M	RZ-Model RT-Model	OSD	Halftone OSD Ez Menu Multi-language * Program List & Edit Mode	
POWER	100-240V , 50/60Hz Adapter Free Power Consumption : 13"(35W) , 14"15"(55W) 17"(60W) , 20"(65W) Stand by : 3W Below		EXTERNAL CONNECTIONS	Rear .Scart In .Video In .S-VHS In .DVD In /DTV In (480i,480p,720P,1080i Compatible Input) .Headphone Out .XGA-IN (D-SUB Jack) .PC-Audio In	RZ-Model RZ-Model
TUNING	FVS, 100Program(200 Optional) Auto/Manual programming ACMS+ With VPS & TXT Quick View			TELETEXT	FLOF/LIST/TOP*
VIDEO	PSM (Dynamic, Standard, Mild, Game) Digital comb filter CTI Progressive Scan		USER CONVENIENT FEATURES	Auto A/V DPM (Display Power Management) Child Lock Easy Picture Control (PSM) Auto Sleep Any Key Power On	RZ-Model
SOUND	RF Stereo (A2, NICAM) DASP(4mode) AVL, Balance (Stereo) Graphic Equalizer Sound output: 3W + 3W (rms)				

5. Main Functions/Spec.

ML-024 SPEC. (NTSC)

	SPECIFICATIONS	REMARKS		SPECIFICATIONS	REMARKS
SYSTEM	NTSC M, PAL- M, PAL-N		OSD	Halftone OSD Ez Menu Multilanguage (English, French, Spanish)	
POWER	100-240V , 50/60Hz Adapter Free Power consumption : 13"(35W) , 14"15"(55W) 17"(60W) , 20"(65W) Stand by : 3W Below				
TUNING	FS 181Ch Auto/Manual Programming		EXTERNAL CONNECTIONS	<u>Rear part</u> .Video in .S-VHS in .Component(DVD/DTV) Input (480i,480p,720P,1080i Compatible Input) .Headphone Out .XGA-IN (D-SUB Jack) .PC-Audio In	
VIDEO	APC (PSM) (Clear,Soft, Optimum, User) Digital comb filter CTI Progressive Scan				
SOUND	RF Stereo (Zenith Stereo/SAP) Bass, Treble, Balance Sound output : 3W + 3W		Caption/V-Chip	Standard	
			USER CONVENIENT FEATURES	DPM (Display Power Management) Auto Picture Control(APC) Auto Sleep Any Key Power On	

5. Main Functions/Spec.

Description (15.1")

ML-024 15" SPEC. (LCD Module)

		SPECIFICATIONS	REMARKS
MONITOR	XGA 1024 X 768 85Hz		
LCD Panel	Type Size Pixel Format Display Type Pixel Pitch Color Depth Active Video Area Surface Back Light Lamp Life cycle	Color Active Matrix TFT 15" (38cm) 1024 X 768 Pixel R / G / B Stripe 0.297 X 0.297mm 8 bits 304 X 228mm Anti Glare, Hard Coating 6CCFL 50,000 Hours(min)	
Optical	Viewing Angle Luminance Contrast Ratio	Left / Right: 176° Upward /Downward: 176 ° 450Cd/m ² 400 : 1	Contrast ratio≥10
PC Input Sync	Input Signal Volt. Input Sync. type Signal Polarity	Low = 0 ~ 0.8V,High= 2.1 ~ 5.5V Separator Sync Positive & Negative	
PC Input Color Signal	Signal Type Input Signal Volt. Input Impedance	R, G, B Analog 0 ~ 0.741V p-p 75Ω	

5. Main Functions/Spec.

Description (17.1")

ML-024(17.1") LCD TV Features

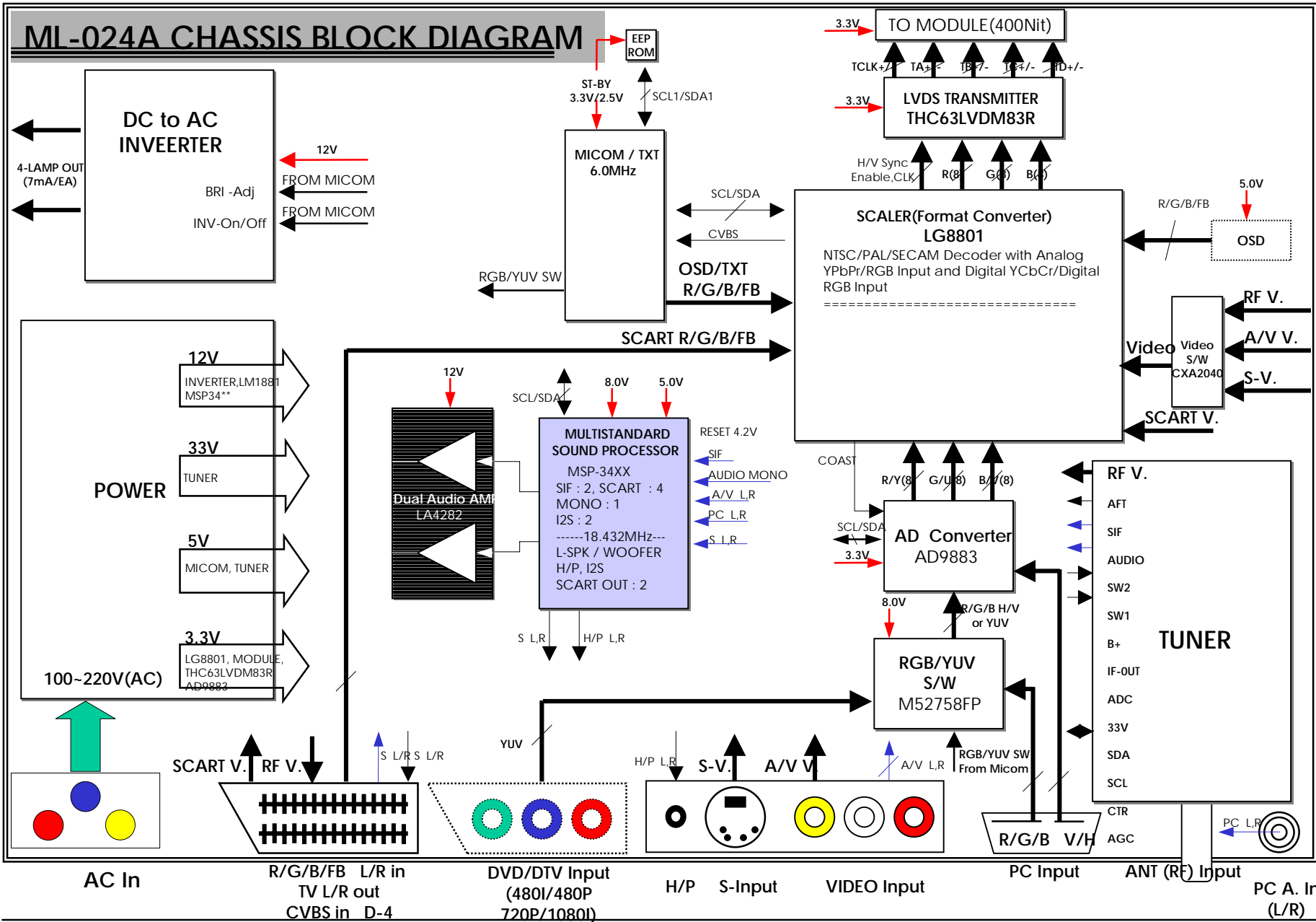
		SPECIFICATIONS	REMARKS
MONITOR	XGA 1280 X 768 75Hz		
LCD Panel	Type Size Pixel Format Display Type Pixel Pitch Color Depth Active Video Area Surface Back Light Lamp Life cycle	Color Active Matrix TFT 17.1" (43.438cm) 1280 X 768 Pixel R / G / B Stripe 0.291 X 0.291mm 16,194,277 color 372.48 X 223.488mm Anti Glare, Hard Coating 6CCFL 50,000 Hours(min)	
Optical	Viewing Angle Luminance Contrast Ratio	Left / Right: 176° Upward /Downward: 176 ° 450Cd/m ² 400 : 1	Contrast ratio≥5
PC Input Sync	Input Signal Volt. Input Sync. type Signal Polarity	Low = 0 ~ 0.8V,High= 2.1 ~ 5.5V Separator Sync Positive & Negative	
PC Input Color Signal	Signal Type Input Signal Volt. Input impedance	R. G. B Analog 0 ~ 0.741V p-p 75Ω	

5. Main Functions/Spec.

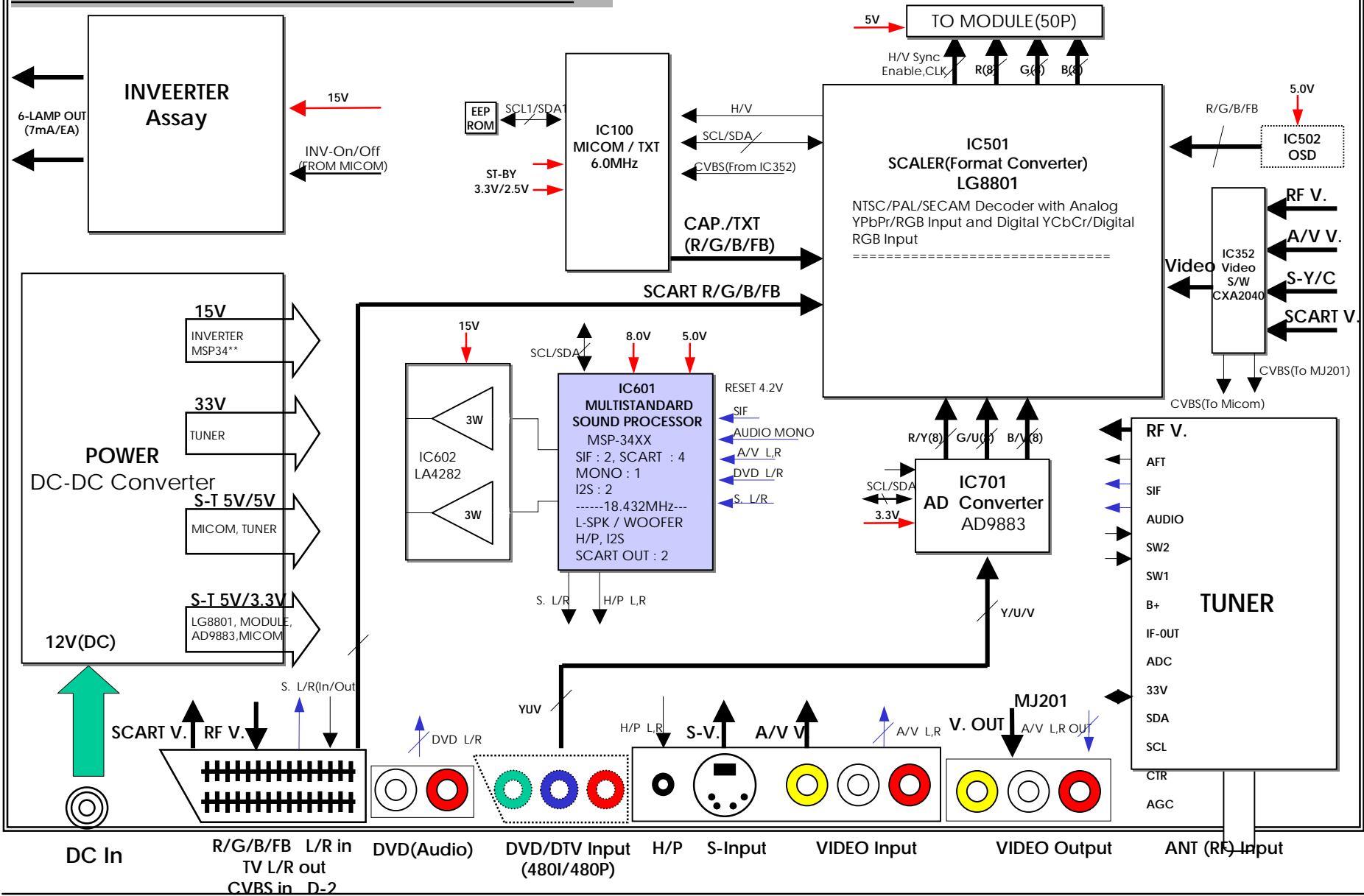
Spec.(20.1")

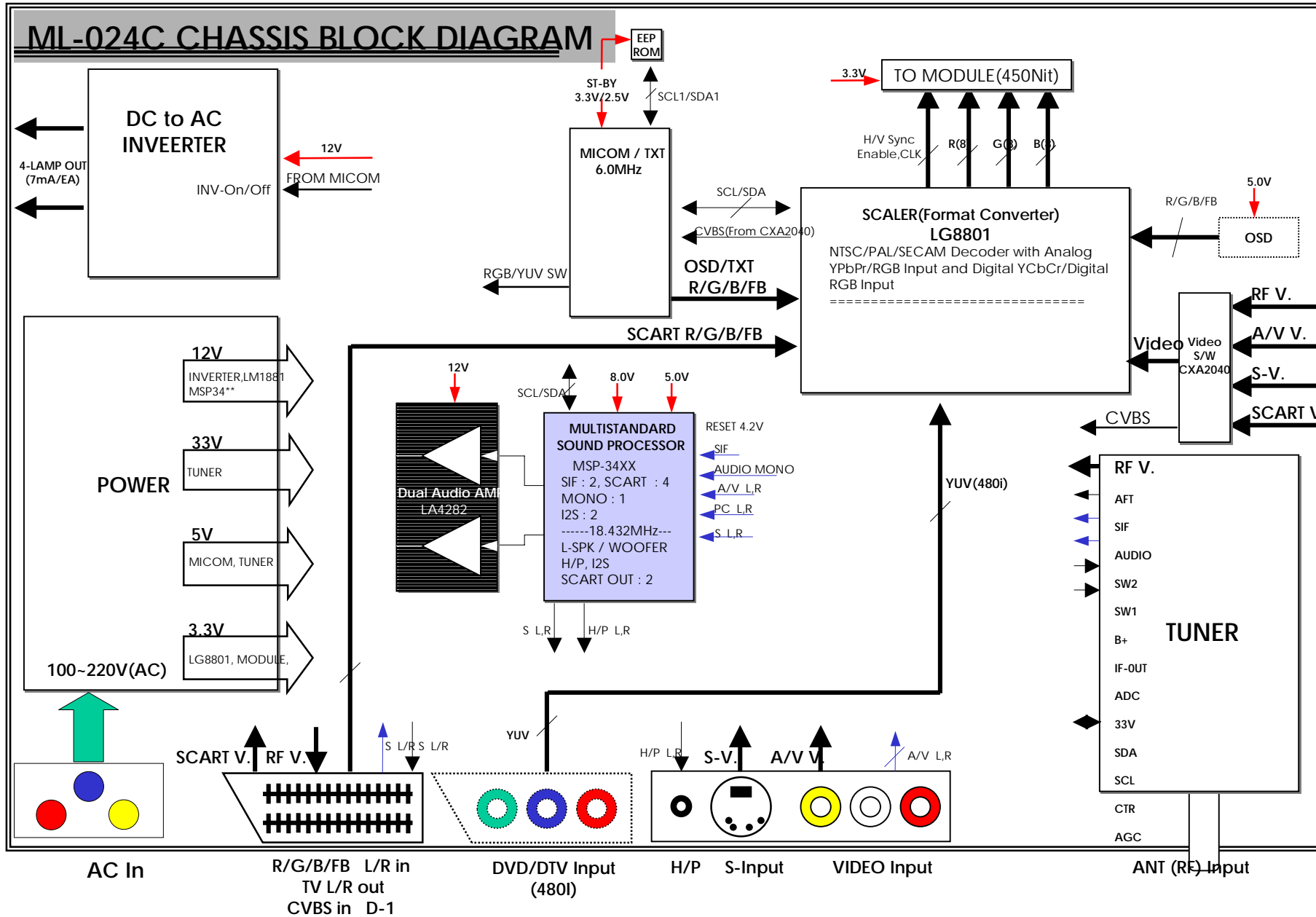
ML-024 20.1" SPEC. (LCD Module)

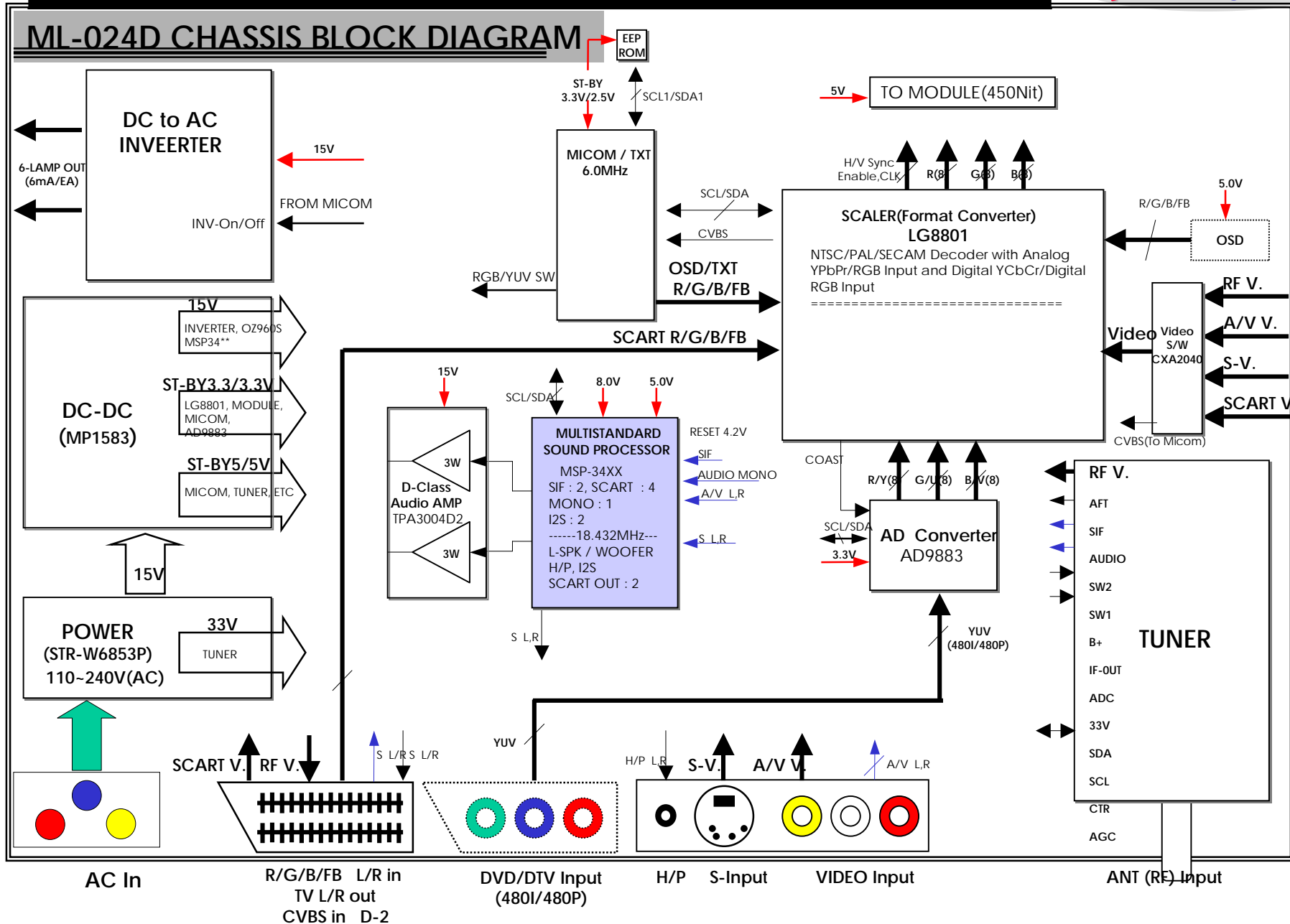
		SPECIFICATIONS	REMARKS
MONITOR	VGA 640 X 480 60Hz		
LCD Panel	Type Size Pixel Format Display Type Pixel Pitch Color Depth Active Video Area Surface Back Light Lamp Life Cycle	Color Active Matrix TFT 20.1" (510.54cm) 640 X 480 Pixel R / G / B Stripe 0.6375 X 0.6375mm 16Mil. Color, 8 bits 408 X 306mm Anti Glare, Hard Coating 6CCFL 50,000 Hours (Minimum)	
Optical	Viewing Angle Luminance Contrast Ratio	Left / Right: 176° Upward /Downward: 176 ° 450Cd/m ² 400 : 1	Contrast ratio≥10



ML-024B CHASSIS BLOCK DIAGRAM







ML-024E CHASSIS BLOCK DIAGRAM

