

FCC/DOJ

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**DESCRIPTION OF CIRCUIT OF RF-MODULATOR
SECTION OF 3IN1 RF-UNIT ASSAY "TMDH2-006A"**

**This RF-Modulator Section of 3in1 RF Unit-Assay "TMDH2-006A"
can convert base band signal to RF output channel of 3 or 4 of
USA.**

ALPS

ALPS ELECTRIC CO., LTD.
RF DEVICES DIVISION

RF-Modulator Section 3in1 RF Unit-Assay

Technical Specifications Detail.

SCOPE-

The device, type TMDH2-006A consists of RF-modulator (RF-converter) and Antenna switch (RF switch).
when power source is not supplied to the unit, the output signal of RF-modulator is not generated and TV signals to be supplied to the ANT input terminal is let to the TV output terminal through the RF switch.

In this case, RF switch (TR2, TR3) shall work as a high pass filter (C1,C4,C5,C6 and L1,L3,L4,L5, $f_c=54\text{MHz}$).

when power source is not supplied, the output signal of the RF modulator is let to the TV output terminal through the RF switch (TR1), but TR2 to TR3 of the switch cut off the signal and do not lead it to the ANT input terminal.

1) Type of Emission

Video Modulation Type : A5c
Polarity of Video Modulation : Negative
TV System : N.T.S.C
Audio Modulation Type : F2, $\pm 25\text{kHz}$, $75\mu\text{s}$ pre-emphasis.

2) Output Frequency Range

Low ch : VHF Channel 3, (60MHz to 66MHz)
High ch : VHF Channel 4, (67MHz to 72MHz)
CH SW terminal is for switching RF Output channel.
If switch to Low ch with open(Hi level) and High ch with GND(Low level).

3) Range of Operating Power

Fixed Power Range : 63dB(μV) to 69dB(μV), 66.0dB(μV) typ.
Means Provided for Changing of Operating Power : Not-Applicable.

4) Maximum Power Rating (INTO 75 Ω)

Low ch : 69.5dB(μV)
High ch : 69.5dB(μV)

5) Voltage and Current to Modulator

Voltage : 5V DC.
Current : 35mA typ.

6) Function of Active Circuit Devices

IC 1: Video Clamper, White Clip.
Video Amplitude Modulator, Video Carrier Oscillator.
Audio Buffer Amplifier, Audio Frequency Modulator, Audio Carrier Oscillator.
TR 1 : RF Switching (Converter output)
TR 2 and TR3 : ANT Switching (IN/OUT)

Type of Devices

IC 1 : LA7160M(SANYO) or Equivalent.
TR1 to TR3 : 2SC4713K(RHOM) or 2SC4680(HITACHI) or 2SC4212(RHOM) or Equivalent.

The video carrier is made by the video carrier from Hi stability Phase Locked Loop oscillation system of IFT (T1) and chip C (C18). Then the video carrier is supplied to the video modulator (IC).

The video to signal to supplied to R12 to R15 having input impedance. Then the video signal is supplied to Clamp (IC) and DC clamped. Then the DC clamped video signal supplied to white clip (IC) and supplied to the video modulator (IC) and the video carrier is amplitude modulated by the video signal.

The video & Audio modulator signal is picked up with ATTENUATOR (R6 & R7) and supplied to ANT output terminal through the band pass filter (C10,C11 and C15 and L7) and RF switch (TR1).

The Audio signal is supplied to C26 and R16,R17 having $75\mu\text{S}$ pre-emphasis time constant.

Then the audio signal is supplied to the amplifier (IC) and the 4.5MHz oscillator is adjusted by Internal PLL oscillation system, both are supplied to audio FM modulator and the 4.5MHz oscillator is frequency modulated by this signal. The frequency modulated signal is supplied to modulator and converted to the sound RF signal. Then this signal is picked up and added to video modulated signal (Picture RF signal). RF switch (TR2 to TR3) can attenuate the RF output signal enough to the ANT input terminal both from the ANT output terminal and RF modulator. output.

(PLL : Phase Locked Loop)

7) Tune up procedure over the Power range or at specifications Operating power level Not Adjustable (*)

- * The consumer can not adjust it.
- * Tune up procedure

R12,R14,R15 : Video Modulation (Degree) Adjust.

R17 : Audio Modulation (Degree) Adjust.

T1 : Oscillator Coil.

C13 : Picture & Sound Carrier Ratio Adjust.

8) All Circuitry and Devices provided for Determining and Stabilizing Frequency

The Video & Audio carrier of Hi Stability PLL oscillator is used. Composition for the Capacitor of C18 (Temperature compensation for type UJ) and IFT of T1 with schematic.

9) Any Circuitry and Devices Employed for Suppression of Spurious Radiation, for limiting the Operating Power

a) Suppression of Spurious Radiation

On the RF OUTPUT, there is low pass filter to suppress spurious.

b) Limiting the Operating Power

The modulation degree is set with R6 & R7. (Picture & Sound Mixtures Carrier Level)

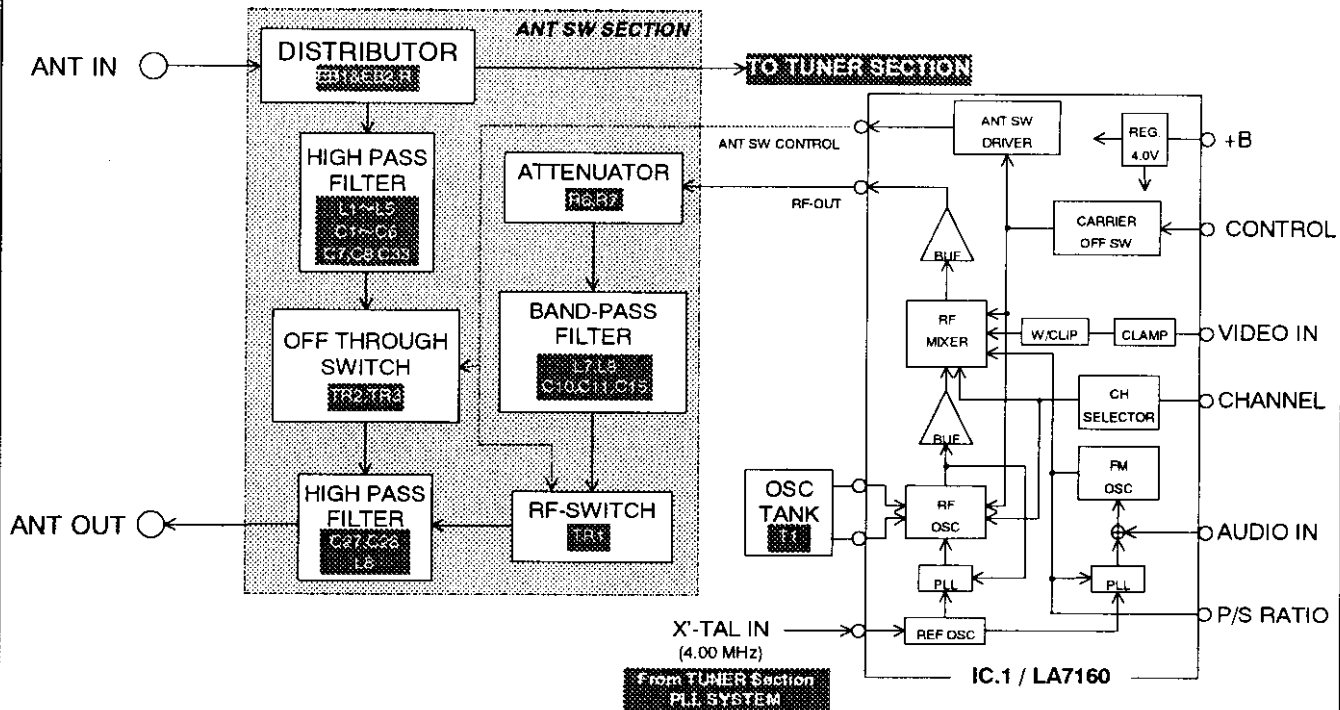
10) Block Diagram and Circuit Diagram

Attached.

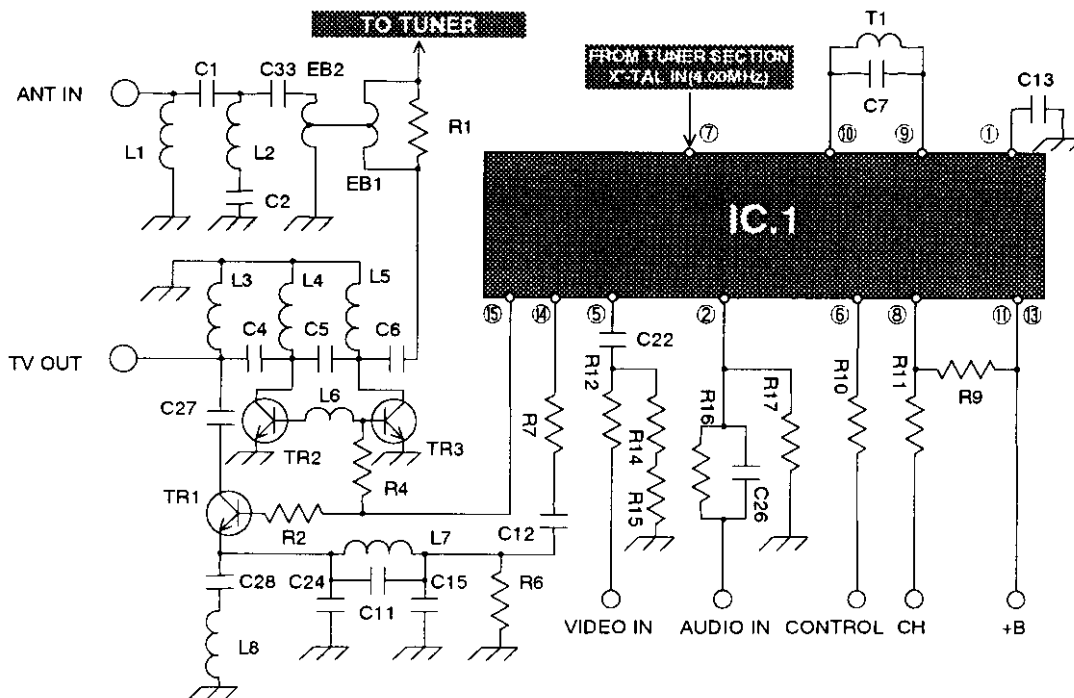
11) Limiting Spurious

- a) The oscillator circuit is to get as small as possible the oscillator power.
- b) Low pass filter in output circuit to suppress out band spurious.
- c) Entire circuit board is covered and shielded by metal case.

**NTSC 3IN1 TUNER RF-CONVERTERPLL SYSTEM SECTION
BLOCK DIAGRAM FOR IC1(LA7160)**



**NTSC 3IN1 TUNER RF-CONVERTERPLL SYSTEM SECTION
SCHEMATIC FOR TMDH2-006A**



DEC 09 1998

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HOME VIDEO CASSETTE RECORDER - HIFI TYPE

—HS-U595—

Features(Tentative)

1. Front loading system
2. Superb picture quality with advanced 4 video heads -DJ4-
3. High Quality picture (HQ)
 - *White clip level up
 - *Detail enhancer
 - *Y-Noise Reduction
4. High Fidelity stereo sound quality with rotating 2 audio heads
 - *Dynamic range 90 dB with noise reduction system
 - *Frequency response 20 Hz - 20k Hz
 - *Total harmonic distortion less than 0.3%
 - *Wow and flutter less than 0.005%
 - *CH-separation better than 60 dB
5. Multi channel sound decoder integrated
6. SAP(Separate Audio Program system)
7. Twin digital tracking
8. Multi mode display
 - *REC, PLAY
 - *Cassette-In
 - *Running Indicator
 - *Interactive Clock/Tape Counter Display
 - *Channels
9. Channel program list on screen (8 program)
10. Cable TV compatible (181 channels)
11. Auto Head Cleaning Mechanism

[HS-U595]

#Tape position index search system

- *UP to +/- 19 programs**

- *By CTL signal**

- *400/250 times normal speed (Non ctl signal 75 times normal speed)**

#Linear time counter

By counting CTL signals, it indicates elapsed time (hours, minutes, seconds)

#TV/VIDEO/AUDIO Unified remote

#JOG/SHUTTLE Key on remote control for various kind of operations

#High reliability

- Minimum number of parts used in deck and circuit**

- Good resetability**

#Auto functions

- *Auto Power On**

- *Power off Eject**

- *Auto Clock Set**

- *Auto Rewind**

- *Auto Canceler**

- *Short Pause**

- *Power Off Program Record**

#Double Speed Playback

- *With Sound**

#Reverse Play

#Speed Search

- *10 times normal speed in the EP mode**

- *5 times normal speed in the SP mode**

- *Noise bar reduced system**

#Hi-speed speed search

- *27 times normal speed in the EP mode**

#Perfect still

- *Without noise nor vibration in the EP/SP mode**

#Variable speed slow motion without noise in the EP/SP mode(1/5 - 1/30)

*Without noise nor vibration in the EP/SP mode

#8 Independent Program Recording Function

#One-touch Timer Recording

*Rec time is available for multiple 30 min up to 4 hours

#Single Time Counter

#Time back up

*30 minutes

#SQPB

#Child Lock

#Cable box control

#VCR Plus+

#Remain

#One key program

#System 2

#One Key Play

#Quick View

#3 Color On-Screen

#Perfec Tape

#3 Color Display

#Star Sight Ready

#1 key D.T.

✱

Specifications(tentative)

Tape format	VHS 1/2" width high-density video cassette tape
Power Source	120V : 60Hz
Television System	EIA standard NTSC type color signal (M/NTSC) 525 lines, 60 fields
Video Recording System	4 rotary heads, azimuth helical scanning system
Luminance	Frequency modulation recording
Color Signal	Low frequency conversion, sub-carrier phase shift recording
Audio Recording System	
Hifi Stereo	2 rotary heads, azimuth helical scanning system Frequency modulation, deep layer recording
Linear Audio	1 stationary head, 1 track
Tape Speed	33.35mm/s (standard play) 11.12mm/s (extended play)
Relative Head to Tape Speed	19.03ft./s
Record/Playback Time	160 min. with T-160 cassette 60 min. with T-60 cassette Time is tripled in the EP mode
Fast Forward/Rewind Time	Approx. 2.0 min. with T-120 cassette
Heads: Video	4 rotary single crystal heads
Hifi Audio	2 rotary single crystal heads
Audio/Control	1 stationary head
Erase	1 full track
Video Input	0.5 to 2.0 Vp-p, 75 ohm unbalanced, RCA socket
Audio Input Line	-7 dBs, 50K ohm unbalanced, RCA socket

Video Output	1.0 Vp-p, 75 ohm unbalanced, RCA socket
Audio Output	-7dBs, 1K ohm unbalanced, RCA socket
Aerial Input	UHF input CH 2-13, CH 14-83 VHS CH A-5 — W+10 75 ohm unbalanced, F connector
Aerial Output	Channel 3 or 4, switchable F connector
Horizontal Resolution (monoscope test pattern)	SP: More than 240 lines EP: More than 220 lines
Video Signal to Noise Ratio	better than 45 dB
Audio Frequency Response	50Hz - 10KHz (Linear) (SP mode)
Audio Signal to Noise Ratio	better than 40 dB (Linear)
Hifi Sound performance	
Frequency Response	20 Hz - 20K Hz
Harmonic Distortion	less than 0.3%
Dynamic Range	better than 90 dB
Wow and Flutter	less than 0.005%
Channel Separation	better than 60 dB
Operating Temperature	41° F to 104° F (5°C to 40°C)
Weight	approx. 3.8 kg
Dimensions	16.7" (W), 12.4" (D), 3.7" (H)
Timer	8 programmers for any channel in 4 weeks/week day 24 hour digital type
Timer Accuracy	Synchronized with Crystal Oscillator
Channel Selection	125 position frequency synthesized auto tuning system
Recording Band Width (-3dB)	2.2 MHz
Timer for scanning 1 horizontal line	approx. 17 mS
Use in Water	Impossible