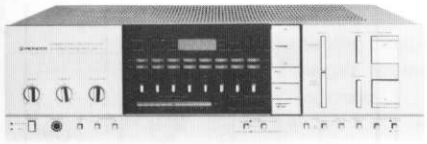
PIONEER

Service Manual

CIRCUIT DESCRIPTIONS



Shown in this photo is Model SX-7.

ORDER NO.
ARP-047-0

COMPUTER CONTROLLED STEREO RECEIVER

SX-7
SX-6
SX-5, SX-5L
SX-4, SX-4L

- **The AM tuner of SX-4L and SX-5L is a two wave-band tuner with MW (medium wave) and LW (long wave).**

Model SX-7 (and SX-6, SX-5 and SX-4) are new types of receivers featuring microcomputers for easier operation. The AM/FM tuner stages incorporate quartz PLL synthesizers for high stability, while the power amplifier stage is a non-switching amplifier which achieves class A quality with class B efficiency (not included in the SX-4 model).

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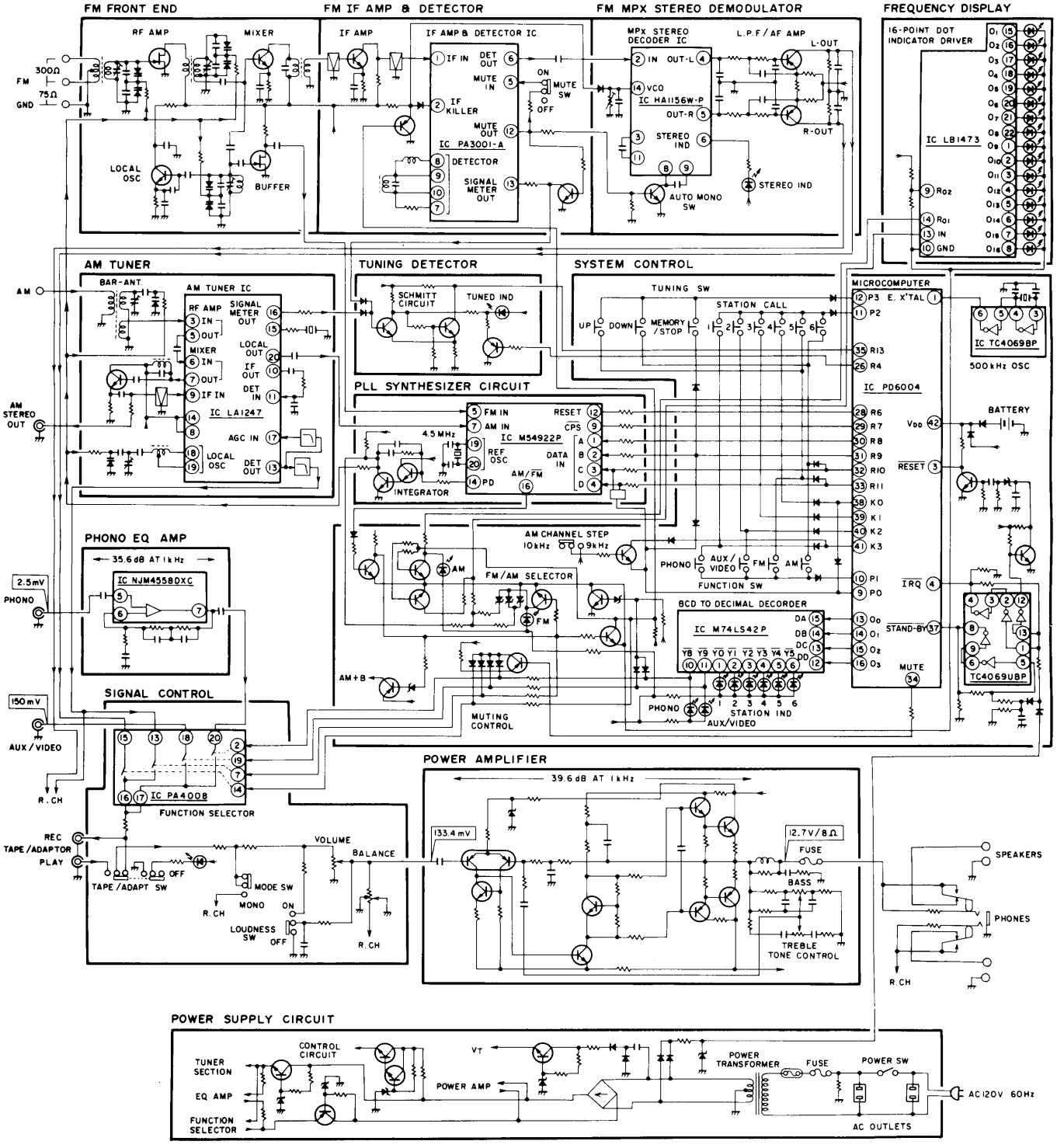
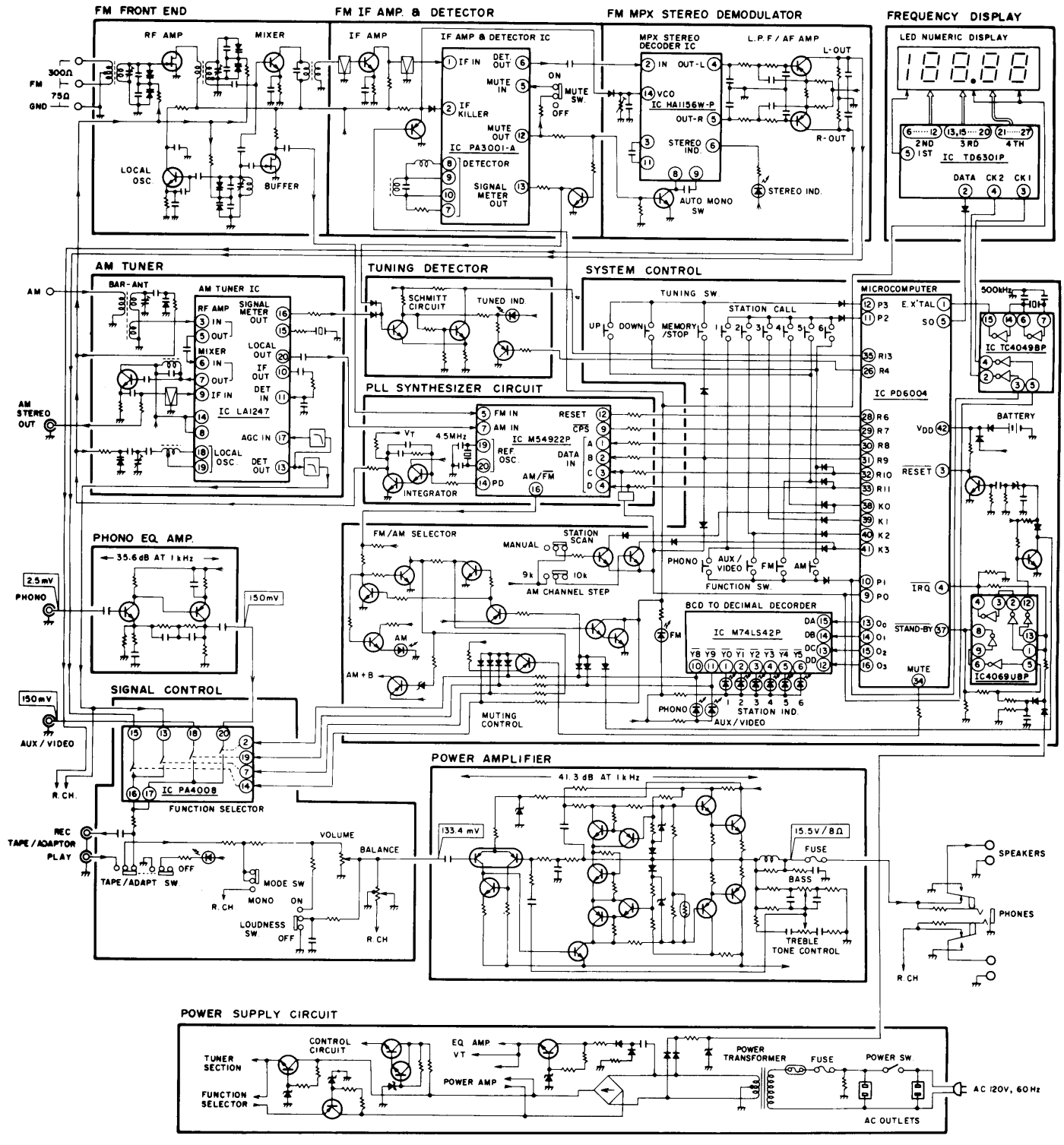
U.S. PIONEER ELECTRONICS CORPORATION 85 Oxford Drive, Moonachie, New Jersey 07074, U.S.A.
PIONEER ELECTRONIC (EUROPE) N.V. Luithagen-Haven 9, 2030 Antwerp, Belgium
PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia

BLOCK DIAGRAMS

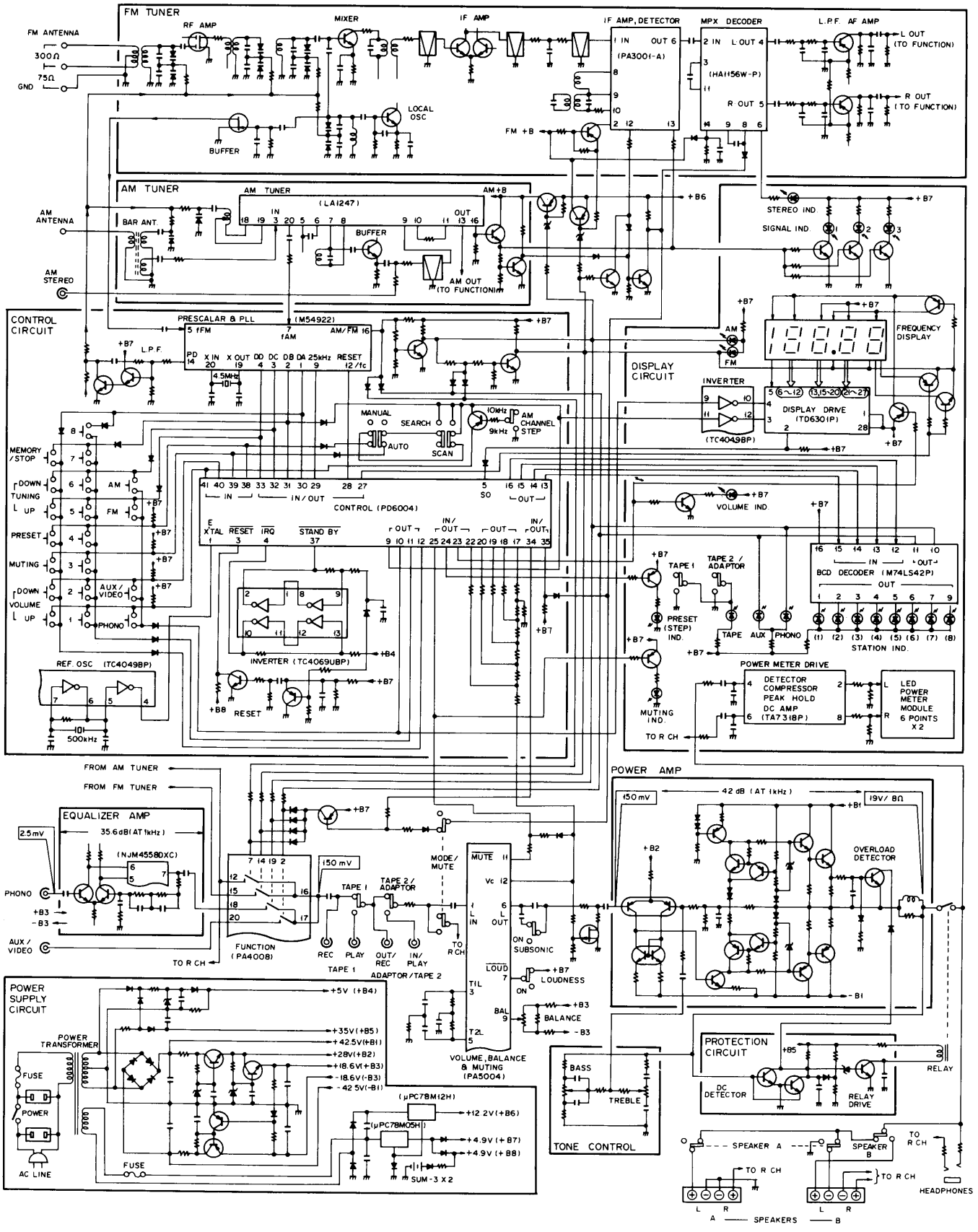
SX-4/KU

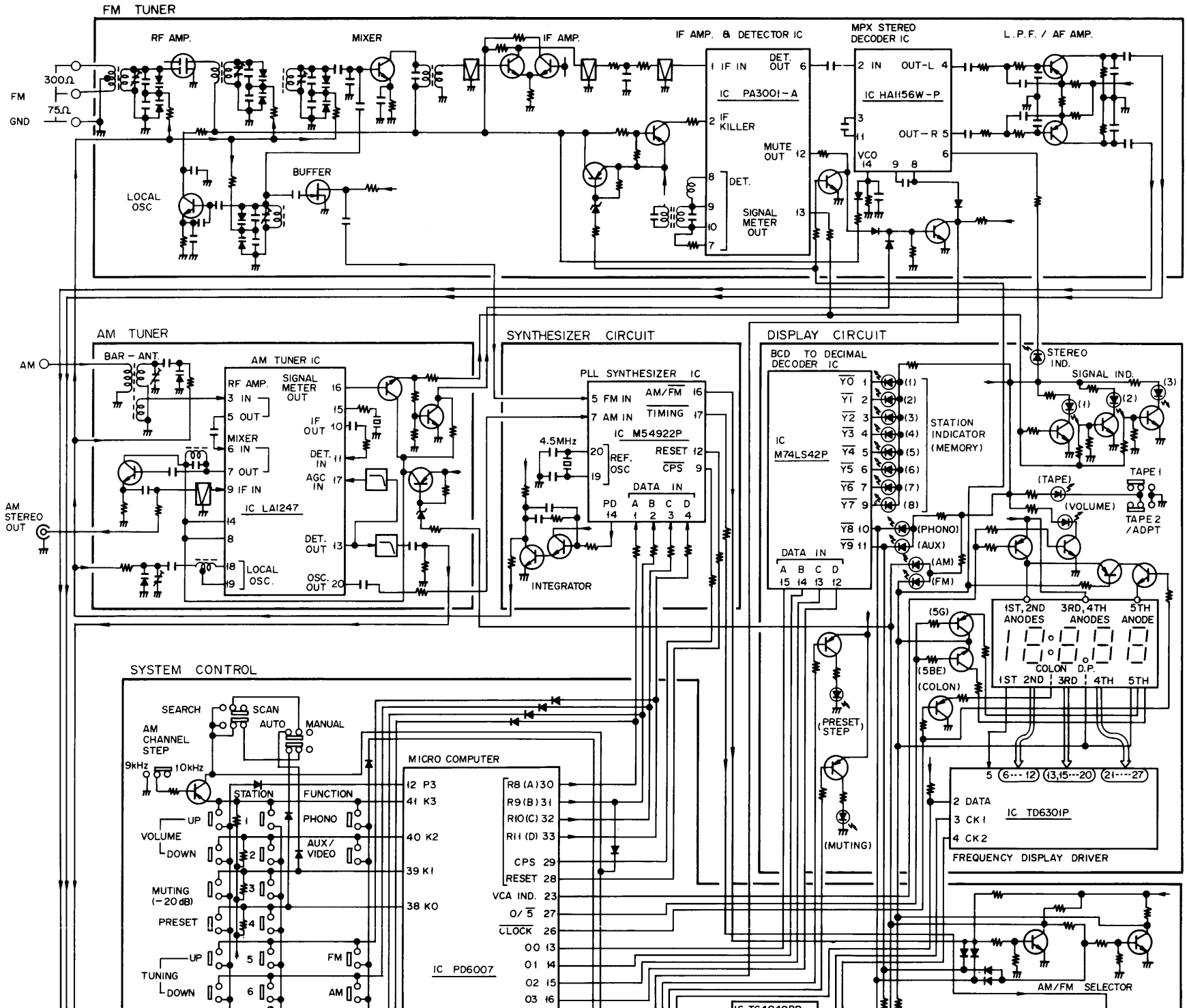


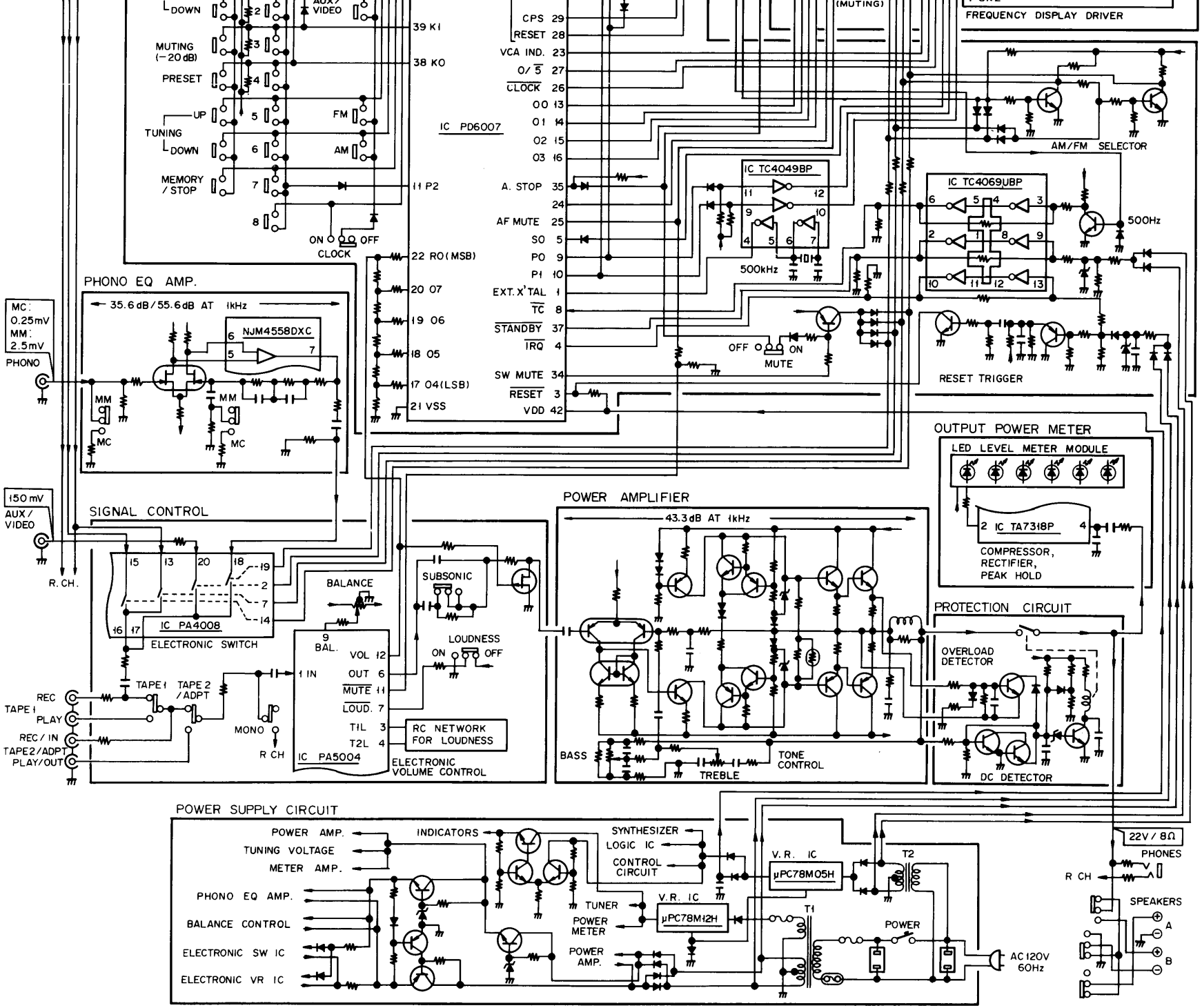
SX-5/KU


FM FRONT END
FM IF AMP. & DETECTOR
FM MPX STEREO DEMODULATOR
FREQUENCY DISPLAY
RF AMP
MIXER
IF AMP
IF AMP & DETECTOR IC
MPX STEREO DECODER IC
L.P.F / AF AMP
LED NUMERIC DISPLAY
LOCAL OSC
BUFFER
IC PA3001-A
IC HA11156W-P
IC TD6301P
AM TUNER
TUNING DETECTOR
SYSTEM CONTROL
BAR-ANT
AM TUNER IC
IC LA1247
SCHMITT CIRCUIT
TUNED IND.
TUNING SW.
STATION CALL
MICROCOMPUTER
IC PD6004
PLL SYNTHESIZER CIRCUIT
IC M54922P
INTEGRATOR
PHONO EQ. AMP.
35.6dB AT 1kHz
FM/AM SELECTOR
MANUAL
STATION SCAN
AM CHANNEL STEP
FUNCTION SW.
BCD TO DECIMAL DECORDER
IC M74LS42P
SIGNAL CONTROL
IC PA4008
FUNCTION SELECTOR
MUTING CONTROL
STATION IND.
POWER AMPLIFIER
41.3dB AT 1kHz
VOLUME
BALANCE
MODE SW
LOUDNESS SW
TAPE/ADAPT SW
BASS
TREBLE
TONE CONTROL
SPEAKERS
PHONES
POWER SUPPLY CIRCUIT
CONTROL CIRCUIT
EQ. AMP
POWER AMP
POWER TRANSFORMER
FUSE
POWER SW.
AC OUTLETS
AC 120V, 60Hz
TUNER SECTION
FUNCTION SELECTOR
AM
FM
PHONO
AUX / VIDEO
REC
TAPE / ADAPTOR
PLAY
R.CH
MONO
ON
OFF

SX-6/KU


FM TUNER
FM ANTENNA
300Ω
75Ω
GND
RF AMP
MIXER
IF AMP
IF AMP, DETECTOR
(PA3001-A)
MPX DECODER
(HA1156W-P)
L.P.F. AF AMP
L OUT (TO FUNCTION)
R OUT (TO FUNCTION)
LOCAL OSC
BUFFER
FM +B
AM TUNER
AM ANTENNA
BAR ANT
AM STEREO
(LA1247)
AM OUT (TO FUNCTION)
+B6
+B7
STEREO IND.
SIGNAL IND.
CONTROL CIRCUIT
PRESCALAR & PLL
(M54922)
L.P.F.
4.5MHz
10kHz
9kHz
AM CHANNEL STEP
MANUAL
SEARCH
AUTO
SCAN
DISPLAY CIRCUIT
FREQUENCY DISPLAY
INVERTER
(TC4049BP)
DISPLAY DRIVE (TD6301P)
MEMORY /STOP
DOWN TUNING UP
PRESET
MUTING
DOWN VOLUME UP
AUX / VIDEO
PHONO
CONTROL (PD6004)
XTAL
RESET
IRQ
STAND BY
VOLUME IND.
TAPE 1
TAPE 2 / ADAPTOR
PRESET (STEP) IND.
BCD DECODER (M74LS42P)
STATION IND.
REF. OSC (TC4049BP)
500kHz
INVERTER (TC4069UBP)
RESET
POWER METER DRIVE
DETECTOR COMPRESSOR PEAK HOLD DC AMP (TA7318P)
LED POWER METER MODULE 6 POINTS X2
MUTING IND.
TO R CH
FROM AM TUNER
FROM FM TUNER
EQUALIZER AMP
35.6dB (AT 1kHz)
(NJM4558DXC)
2.5mV
150mV
PHONO
AUX / VIDEO
FUNCTION (PA4008)
TAPE 1
TAPE 2 / ADAPTOR
REC
PLAY
OUT / REC
IN / PLAY
MODE / MUTE
MUTE
ON SUBSONIC
LOUD
LOUDNESS
BAL
BALANCE
TIL
T2L
VOLUME, BALANCE & MUTING (PA5004)
POWER AMP
42dB (AT 1kHz)
19V / 8Ω
OVERLOAD DETECTOR
POWER SUPPLY CIRCUIT
POWER TRANSFORMER
FUSE
POWER
AC LINE
+5V (+B4)
+35V (+B5)
+42.5V (+B1)
+28V (+B2)
+18.6V (+B3)
-18.6V (-B3)
-42.5V (-B1)
(μPC78M12H)
(μPC78M05H)
+12.2V (+B6)
+4.9V (+B7)
+4.9V (+B8)
SUM-3 X2
PROTECTION CIRCUIT
DC DETECTOR
RELAY DRIVE
RELAY
BASS
TREBLE
TONE CONTROL
SPEAKER A
SPEAKER B
TO R CH
HEADPHONES
SPEAKERS


FM TUNER
RF AMP.
MIXER
IF AMP.
IF AMP. & DETECTOR IC
MPX STEREO DECODER IC
L.P.F. / AF AMP.
300Ω
FM
75Ω
GND
LOCAL OSC
BUFFER
IC PA3001-A
IC HA11156W-P
AM TUNER
BAR-ANT.
AM
AM STEREO OUT
AM TUNER IC
IC LA1247
SYNTHESIZER CIRCUIT
PLL SYNTHESIZER IC
IC M54922P
4.5MHz
INTEGRATOR
DISPLAY CIRCUIT
BCD TO DECIMAL DECODER IC
IC M74LS42P
STATION INDICATOR (MEMORY)
STEREO IND.
SIGNAL IND.
TAPE 1
TAPE 2 /ADPT
(VOLUME)
(TAPE)
(PHONO)
(AUX)
(AM)
(FM)
1ST, 2ND ANODES
3RD, 4TH ANODES
5TH ANODE
COLON
D.P.
1ST 2ND 3RD 4TH 5TH
(5G)
(5BE)
(COLON)
IC TD6301P
2 DATA
3 CK1
4 CK2
FREQUENCY DISPLAY DRIVER
SYSTEM CONTROL
SEARCH
SCAN
AUTO
MANUAL
AM CHANNEL STEP
9kHz
10kHz
STATION
FUNCTION
VOLUME
UP
DOWN
PHONO
AUX/ VIDEO
MUTING (-20dB)
PRESET
TUNING
FM
AM
MICRO COMPUTER
IC PD6007
(PRESET) STEP
(MUTING)
AM/FM SELECTOR


IC PD6007
FREQUENCY DISPLAY DRIVER
AM/FM SELECTOR
IC TC4049BP
IC TC4069UBP
500Hz
500kHz
RESET TRIGGER
MUTE
PHONO EQ AMP.
35.6dB/55.6dB AT 1kHz
NJM4558DXC
MC: 0.25mV
MM: 2.5mV
PHONO
SIGNAL CONTROL
150mV
AUX/VIDEO
R.CH.
IC PA4008
ELECTRONIC SWITCH
BALANCE
SUBSONIC
LOUDNESS
IC PA5004
ELECTRONIC VOLUME CONTROL
RC NETWORK FOR LOUDNESS
TAPE1
TAPE2/ADPT
REC
PLAY
REC/IN
PLAY/OUT
MONO
R CH
POWER AMPLIFIER
43.3dB AT 1kHz
BASS
TREBLE
TONE CONTROL
OUTPUT POWER METER
LED LEVEL METER MODULE
IC TA7318P
COMPRESSOR, RECTIFIER, PEAK HOLD
PROTECTION CIRCUIT
OVERLOAD DETECTOR
DC DETECTOR
POWER SUPPLY CIRCUIT
POWER AMP.
TUNING VOLTAGE
METER AMP.
PHONO EQ AMP.
BALANCE CONTROL
ELECTRONIC SW IC
ELECTRONIC VR IC
INDICATORS
SYNTHESIZER
LOGIC IC
CONTROL CIRCUIT
TUNER
POWER METER
POWER AMP.
V.R. IC
μPC78M12H
V.R. IC
μPC78M05H
T1
T2
POWER
AC 120V 60Hz
22V/8Ω
PHONES
R CH
SPEAKERS
A
B
UP
DOWN
TUNING
MUTING (−20dB)
PRESET
MEMORY / STOP
CLOCK
FM
AM
39 K1
38 KO
11 P2
22 RO(MSB)
20 07
19 06
18 05
17 04(LSB)
21 VSS
CPS 29
RESET 28
VCA IND. 23
O/5 27
CLOCK 26
00 13
01 14
02 15
03 16
A. STOP 35
24
AF MUTE 25
SO 5
PO 9
P1 10
EXT. X'TAL 1
TC 8
STANDBY 37
IRQ 4
SW MUTE 34
RESET 3
VDD 42

CIRCUIT DESCRIPTIONS

Outline of Main Stage

The overall composition is outlined in the block diagrams on pp.2-6.

- **Tuner Stage**

SX-7	SX-6	SX-5	SX-4
I.D. MOS FET single-stage RF amplifier plus twin vari-cap tuning circuit (equivalent to 4-ganged tuning capacitor) in FM front-end.	Same as SX-7	J-FET single-stage RF amplifier plus twin vari-cap tuning circuit (equivalent to 3-ganged tuning capacitor) in FM front-end.	Same as SX-5
PLL IC stereo decoder stage	Same as SX-7	Same as SX-7	Same as SX-7
Vari-cap tuning circuit (equivalent to 2-ganged tuning capacitor) in AM tuning stage and AM tuner IC (LA1247).	Same as SX-7	Same as SX-7	Same as SX-7

- **AM/FM Synthesizer Stage**

SX-7	SX-6	SX-5	SX-4
Improved S/N ratio achieved by pulse-swallow system for FM reception.	Same as SX-7	Same as SX-7	Same as SX-7
S/N ratio 80dB(Mono) 75dB (Stereo)	S/N ratio 80dB(Mono) 75dB(Stereo)	S/N ratio 75dB(Mono) 70dB(Stereo)	S/N ratio 75dB(Mono) 70dB(Stereo)
Frequency memory (presetting) capability for up to 8 stations in each band.	Same as SX-7	Frequency memory (presetting) capability for up to 6 stations in each band. In models including two AM bands (LW and MW), any LW or MW frequencies may be stored in the 6 AM memories.	Same as SX-5
3 tuning modes: MANUAL STATION SCAN STATION SEARCH	Same as SX-7	2 tuning modes: MANUAL STATION SCAN	Only the STATION SCAN tuning mode is available.

**MANUAL : Frequency changed in single steps each time the TUNING UP or DOWN key is pressed. Frequencies scanned when pressed continuously, the scanning being stopped as soon as the key is released.*

**STATION SCAN : Frequencies scanned when either TUNING UP or DOWN key is pressed. Scanning pauses for 5 seconds when a broadcasting station is tuned, and stops altogether if the MEMORY/STOP key is pressed within that 5 second period. Otherwise, the scanning is resumed.*

**STATION SEARCH : Frequencies scanned when either TUNING UP or DOWN key is pressed, and stopped when a broadcasting station is tuned.*

• Amplifier Stage

SX-7	SX-6	SX-5	SX-4
Equalizer amplifier features low-noise twin FET ICL differential amplifier in first stage, and operational amplifier (IC) in second stage for MC cartridges.	Equalizer amplifier features low-noise transistors differential amplifier in first stage, and operational amplifier (IC) in second stage.	Operational amplifier (IC) euqalizer amplifier.	Same as SX-5
S/N ratio 80dB(MM) 67dB(MC)	S/N ratio 79dB	S/N ratio 70dB	S/N ratio 70dB
Microcomputer controlled electronic switching IC (PA4008) for function selector.	Same as SX-7	Same as SX-7	Same as SX-7
Microcomputer controlled VCA IC(PA5004) volume control features 32-step control, presettable levels and audio muting (−25dB).	Same as SX-7	Conventional volume control with variable resistor.	Same as SX-5
Non-switching amplifier employed in power amplifier stage.	Same as SX-7	Same as SX-7	Conventional class B amplifier
Output power 60W+60W (20Hz—20kHz) Rated distortion 0.009%	Output power 45W+45W (20Hz—20kHz) Rated distortion 0.009%	Output power 30W+30W (20Hz—20kHz) Rated distortion 0.02%	Output power 20W+20W (20Hz—20kHz) Rated distortion 0.04%

• Display Stage

SX-7	SX-6	SX-5	SX-4
5-digit LED numeric display of tuned frequency.	Same as SX-7	Same as SX-7	16-point scale LED display of tuned frequency.
LED numeric display of electronic volume control levels.	Same as SX-7	Not featured in SX-5	Not featured in SX-4
LED numeric display of time (built-in quartz clock function).	Not featured in SX-6	Not featured in SX-5	Not featured in SX-4
6-point LED display of output power.	Same as SX-7	Not featured in SX-5	Not featured in SX-4
3-point LED SIGNAL indicator indicating signal strength of tuned frequency.	Same as SX-7	TUNED indicator to show that broadcast station has been tuned.	Same as SX-5

Tuner Stage

- **I.D. MOS FET**

The FM front-end RF amplifier in model SX-7 (and SX-6) features an I.D. MOS FET (ion-implantation dual gate MOS FET) - P001 manufactured by Pioneer Semiconductor Laboratory. The major features of this FET - P001 include high gain, low noise, low distortion and low IM (P.G. 25dB/100MHz, N.F. 2dB/100MHz, I.M. −54dB/107dBμ) as a result of an extremely accurate short channel obtained by a "self aligning" operation involving a "local silicon oxidation" process. Furthermore, a 0.4μ narrow channel (1/3rd to 1/5th the width in normal components) has been achieved by the ion-implantation double diffusion construction. Use of this FET in the FM front-end greatly assists in improving sensitivity and reducing interference.

- **Pulse-Swallow PLL Synthesizer**

When the VCO (Voltage Controlled Oscillator) frequency is very high and the CMOS programmable divider operating frequency is exceeded, the PLL will cease to function. Two methods are presently available to resolve this problem. In one of these methods (the fixed divider system), an ECL (Emitter to Emitter Coupled Logic) prescaler is positioned in front of the programmable divider. And when, for example, a 1/10 prescaler is employed to obtain 25kHz step frequencies, the reference frequency will be 2.5kHz. This frequency is very low and cannot be adequately removed by the low-pass filter. As a result, signal components are leaked into the mixer leading to deterioration in the S/N ratio. This is one of the main disadvantages of the fixed divider system.

The other method available is the pulse-swallow system which employs a special frequency divider called a "two-modulus prescaler" instead of the prescaler used in the fixed divider system. In this method, a 25kHz step synthesizer will generate a 25kHz reference frequency and a 50kHz step synthesizer will generate a 50kHz reference frequency, resulting in a much higher S/N ratio than in the fixed prescaler system.

The pulse-swallow system employed in the SX-7 is incorporated in an IC (M54922P) controlled by microcomputer.

Amplifier Stage

- **Non-Switching Amplifier (SX-7, SX-6, SX-5)**

In non-switching amplifiers, the output stage transistor bias is controlled on the basis of class B operating point in order to maintain the operation within the operating region (between cutoff and saturation) and thereby suppress the generation of switching distortion.

The basic non-switching amplifier circuitry is outlined in Fig. 1-2. To simplify the diagram, transistor V_{BE} and diode V_f, E_1 and E_2 are assumed to be 0.6V and the transistor base current is disregarded. While no input signal is applied, the voltage drop across R_5 and R_6 may also be disregarded. And if the voltage across R_1 and R_2 due to idle current is ignored, the voltages at different positions will be as shown in the diagram.

When an input signal is applied, a voltage will be generated across R_1 by NPN stage (Q_1/Q_3) operation during the positive portion of the signal. This voltage is applied to the Q_5 emitter-follower (voltage gain of about 1) resulting in almost the same voltage being generated across R_5. This voltage is then added to the output stage bias voltage. Hence, the PNP stage (Q_2/Q_4) maintains the same bias conditions as when no signal was applied, which means there is no cutoff. Likewise, the NPN stage maintains the same bias conditions during the negative portion of the signal as when no signal was applied, again eliminating any cutoff.

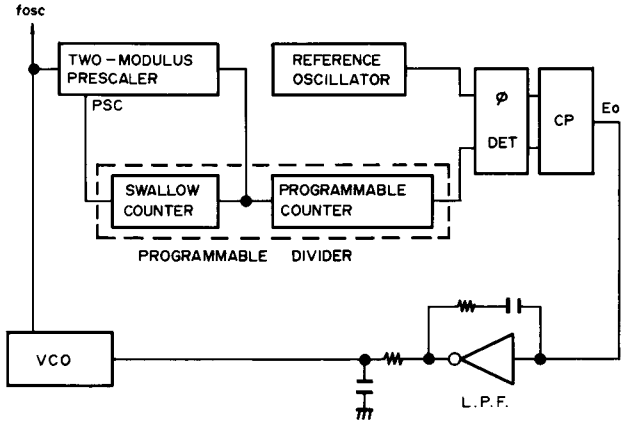


Fig. 1-1 Pulse swallow system

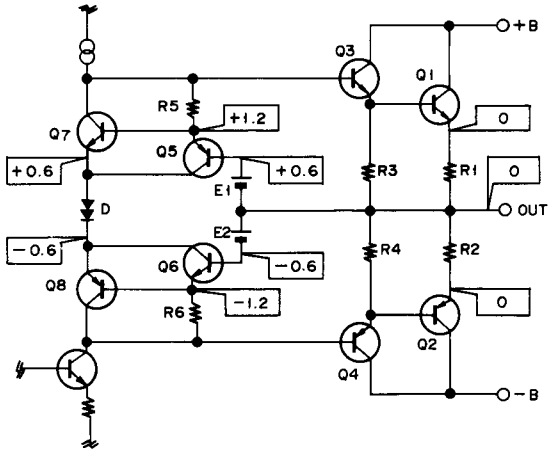


Fig. 1-2 Basic circuitry of Non Switching Amplifier

Control Stage

The incorporation of microcomputers in these receivers has further simplified operational procedures. The PD6007 (SX-7) and PD6004 (SX-6, SX-5 and SX-4) ICs are both basically the same 4-bit microcomputer (with 2k-bit memory capacity), the main difference lying in the software program. Whereas the PD6007 incorporates a clock function, the PD6004 features a 2 band (LW/MW) AM tuner switching function.

The PD6007 and PD6004 pin configurations are shown in Fig. 1-3.

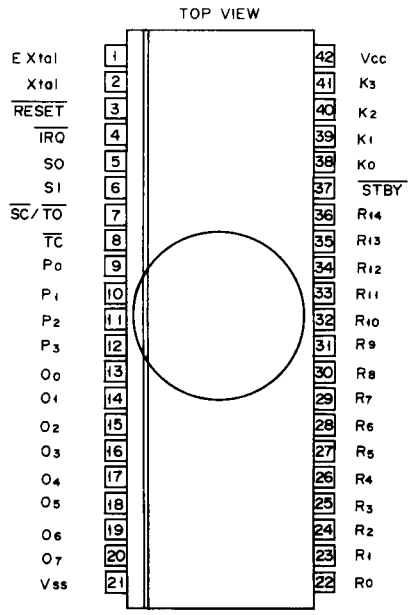


Fig. 1-3 Pin configuration of PD6007 (PD6004)

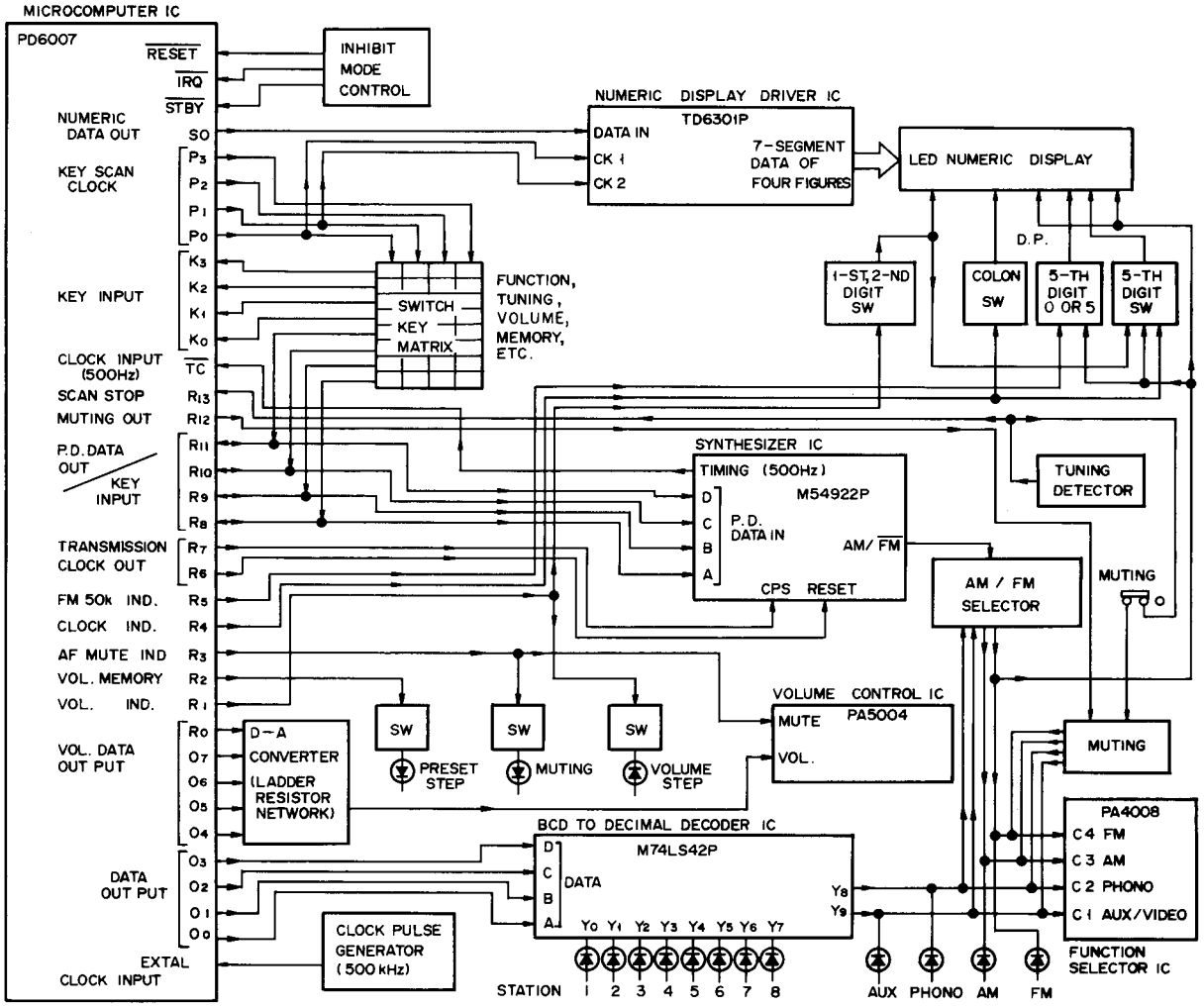


Fig. 1-4 System diagram of control section (SX-7)

- **Synthesizer Control**

Fig. 1-5 outlines the tuner-related computer operation command input key matrix.

Key description

9k/10k : AM-MW band frequency step switch. ON for 9kHz steps, and OFF for 10kHz steps.

9k/1k (PD6004) : AM-LW band frequency step switching. ON for 9kHz steps, and OFF for 1kHz steps.

TUNING AUTO/MANUAL : ON for auto tuning (*1), and OFF for manual tuning.

SCAN/SEARCH : ON for short-time hold search (*2), and OFF for operation according to TUNING AUTO/MANUAL switch (*6).

FM : Display of tuned frequency by single push (*3), and pin 16 of synthesizer IC (M54922P) switched to L level (*4).

AM : Display of tuned frequency by single push (*3), and pin 16 of synthesizer IC (M54922P) switched to H level (*4).

LW/MW (PD6004) : LW-MW switching with each push.

M1 - M8 : Tuned frequency presetting keys. Corresponding STATION indicator lights up (*5).

TUNING UP, DOWN : Frequency tuning keys.

MEMORY/STOP : Memory store enable key. STATION indicators (1 to 8) and the PRESET STEP indicator blinks on and off for 5 seconds when pressed once. A broadcasting station and volume step may be stored in memory during this 5 second period. And when pressed during frequency scanning, the scanning operation is halted.

E1, E2 : Switching for different regions (USA, Europe etc.) Wired up according to region without switching.

B1, B2 (PD6004) : FM IF offset adjustment.

*(*1) Station search where frequencies are scanned by pressing TUNING UP or DOWN key once. Scanning stops when broadcast station frequency is tuned.*

*(*2) Station scan where frequencies are also scanned by pressing TUNING UP or DOWN key once. Scanning pauses for 5 seconds when broadcasting station frequency is tuned. Scanning will be resumed after the 5 second pause unless the MEMORY/STOP key is pressed.*

*(*3) 16-bit serial data from the SO pin is sent to the frequency display driver IC (TD6301P), converted to 7-segment decimal data by transfer clock (output from P_0 and P_1 pins) for driving the LED numeric display.*

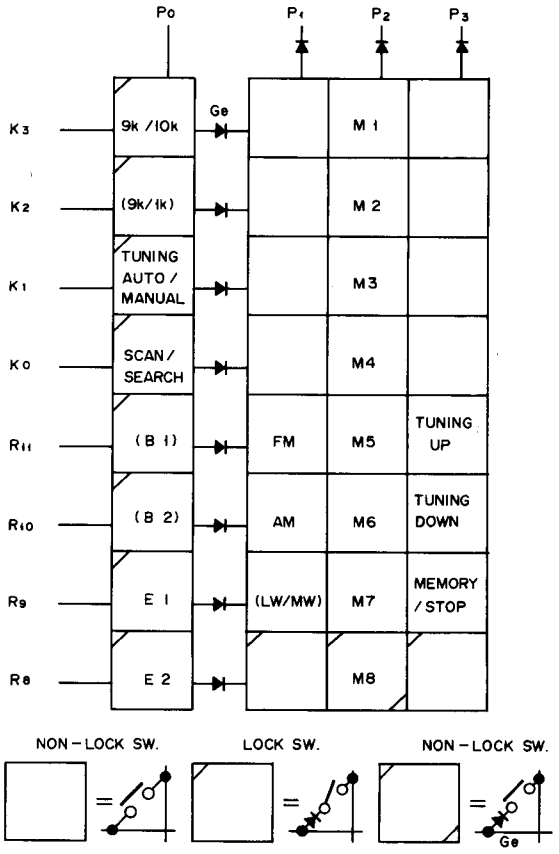


Fig. 1-5 Switch key matrix for synthesizer control

*(*4) The data transferred to M54922P contains 20 bits. These are divided into 5 groups of 4 bits each by the 4 pins R_8 to R_{11}. The transfer output clock is obtained from R_6 and R_7. The first 4 data items (16 bits) are used in programmable divider frequency division, while the 5th data item (4 bits) is used for operation mode designation.*

*(*5) BCD encoded data from pins O_0 - O_3 is applied to the BCD to decimal decoder IC (M74LS42P). Pins 1 to 9 (excluding pin 8) correspond to M1 to M8, and are switched to L level resulting in the LEDs being lit up.*

*(*6) Actual circuits are wired so that the K_0 line to the SCAN/SEARCH switch is cut when the AUTO/MANUAL switch is in the MANUAL position. The SCAN/SEARCH switch will be operative only when in the AUTO position.*

- **Function Selector Control**

The computer operation command input key matrix for function selector control is outlined in Fig. 1-6.

Key description

PHONO : Pin 10 of the IC (M74LS42P) referred to above (*5) is switched to L level (*7), and volume steps are displayed (00 - 31) in the LED numeric display.

AUX : Pin 11 of IC (M74LS42P) switched to L level (*8), and volume step also displayed in LED numeric display.

FM : Pin 16 of IC (M54922P) switched to L level as described above (*9).

AM : Pin 16 of IC (M54922P) switched to H level as described above (*9).

LW/MW (PD6004) : AM band switching.

CLOCK (PD6007) : Time displayed in LED numeric display when pressed (*10). Displayed time is adjusted by TUNING UP and DOWN keys while the CLOCK key is depressed. In the SX-7, time is displayed as long as the POWER switch is left in the STD-BY position.

*(*7) L level here results in PHONO indicator being turned on, and the PHONO channel of the electronic switch (PA4008) used by the FUNCTION selector also being turned on.*

*(*8) L level here results in the AUX indicator plus the IC (PA4008) AUX channel being turned on.*

*(*9) Depending on whether pin 16 of IC (M54922P) is at L level or H level, and the level of pin 10 (L level for PHONO) and pin 11 (L level for AUX) of IC (M74LS42P), the AM-FM switching circuit is activated, the AM or FM indicator turned on, and the IC (PA4008) AM or FM channel switched ON.*

*(*10) A 500Hz pulse signal obtained by dividing the crystal oscillator signal (source of the synthesizer reference signal) appears at pin 17 of IC (M54922P), and is applied to the TC pin of PD6007 to activate the clock functions.*

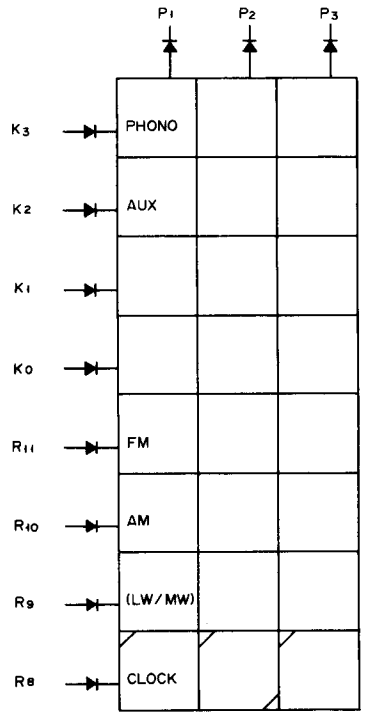


Fig. 1-6 Switch key matrix for function selector

- **Volume Control (SX-7 and SX-6)**

Models SX-7 and SX-6 have been equipped with an electronic volume control IC (PA5004). This IC has the following 4 functions.

1. The gain is changed from −90dB to 0dB by changing the voltage on the VOL terminal (pin 12) from 0 to 3.2V.
2. The balance is changed continuously from right channel only (−5V) to center (0V) and left channel only (+5V) by changing the voltage on the BAL terminal (pin 9) from −5V to +5V.
3. Audio muting of approximately −25dB is applied when the MUTE terminal (pin 11) is switched to L level.

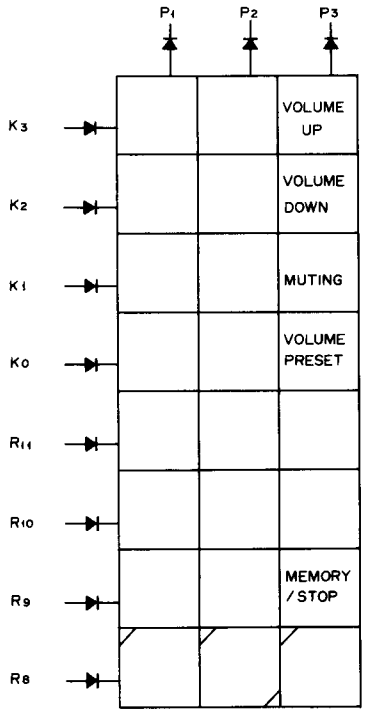


Fig. 1-7 Switch key matrix for volume control

4. Loudness as determined by a twin T-shaped filter connected between pin 3 (6) and pin 5 (14) is activated when the LOUD terminal (pin 7) is switched to L level.

The operation command input key matrix for the VOLUME control is outlined in Fig. 1-7.

Key description

VOLUME UP, DOWN : Increase and decrease of 5-bit electronic volume control data (*11). 32 positions are available (00 to 31).

MUTING : Audio muting switch (*12).

VOLUME PRESET : Memory switch for the electronic volume control steps positions (32 positions from 00 to 31).

MEMORY/STOP : Memory store enable key. A single push enables VOLUME position and STATION frequency to be stored in memory during a 5 second period.

*(*11) The 5-bit output data from O_4 - O_7 and R_0 pins is converted from digital to analog data by ladder resistor and applied to pin 12 of PA5004.*

*(*12) The R_3 pin is switched alternately to H and L levels each time this switch is pressed. This H/L level is applied to pin 11 of PA5004, the L level resulting in activation of the muting circuit.*

• Other Terminals

R1 : Switched to L level when the electronic volume control position (00 - 31) is displayed. The VOLUME indicator is controlled by this signal (SX-7 and SX-6).

R2 : Switched to L level when the VOLUME PRESET key is pressed once, and when the MEMORY/STOP key is pressed, L level and H level are switched alternately for a 5 second period. The PRESET STEP indicator is controlled by this signal.

R3 : Switched to L and H level alternately each time the MUTING key is pressed. The PA5004 audio muting operation (—25dB) and the MUTING indicator are both controlled by this signal.

R4 : Switched to L level during time display by PD6007. The colon (:) in the time display is controlled by this signal (SX-7).
And with the PD6004, this pin is switched to L and H levels alternately during frequency scanning operations, the signal being used to turn the TUNED indicator on and off (SX-5 and SX-4).

R5 : Switched to L level when 50kHz unit included in the FM tuning frequency (during tuning mode where FM frequencies are changed in 50kHz steps). This signal controls the "0" and "5" in the 5th digit position (10kHz unit) in the FM frequency display.
And with the PD6004, this pin is switched to L level when the LW band is selected (in models equipped with 2-band AM tuner section).

R6 : Synthesizer IC (M54922P) control output (data transfer clock I). Data transfer is commenced by the trailing edge of this signal (i.e. the moment that the pin is switched to L level).

R7 : Synthesizer IC (M54922P) control output (data transfer clock II). Data reading timing signal. The M54922P reads data by synchronizing with the trailing edge of this signal.

R8, R9, R10, R11 : Data output and key inputs applied to M54922P.

R12 : Muting output. Switched to L level for about 1 second when PHONO, AUX, FM and AM (LW/MW) key is pressed. Also switched to L level (for about 0.7 seconds) when the M1 to M8, TUNING UP or TUNING DOWN key is pressed. These signals control the electronic switching IC (PA4008) in order to suppress switching noise.

R13 : Scanning operation stopped when an H level input signal is applied during STATION SCAN or STATION SEARCH tuning mode. Input of detector signal from tuner section tuning detector circuit.

Memory Hold

Model SX-7 is equipped with an auxiliary power supply circuit used to supply the microcomputer with power irrespective of the POWER switch position. In this way, the microcomputer RWM (read write memory) contents can be preserved for about 2 weeks when the AC mains power is completely switched off. The clock function is inhibited in this case. If the AC mains power is left off for more than 2 weeks, the RWM contents will disappear, and will therefore have to be rewritten if the memory is to be used again.

The RWM hold period in the SX-6, SX-5 and SX-4 models when the POWER switch is left off is about 3 days. When two new size "AA" dry batteries are used, however, memory contents can be maintained for several years.

The RWM hold period in the SX-7 has been extended by inhibiting the microcomputer (consumption current is less than 10μA). And in the SX-6, SX-5 and SX-4, the battery life has likewise been extended in much the same way. This inhibition operation is controlled by the $\overline{\text{IRQ}}$ and $\overline{\text{STBY}}$ terminals. The switching sequence involved in switching to inhibit mode must follow the order shown in Fig. 1-8. Normal memory functions are lost once the inhibit mode Vcc drops below 2.5V. Note that the $\overline{\text{RESET}}$ terminal has to be at H level during inhibit mode. Furthermore, approximately 1mA of current is consumed until cessation of the clock pulse input (Extal).

Although the switch on sequence during restart has not been specified, the reset signal is applied only after all prescribed values have been returned to normal.

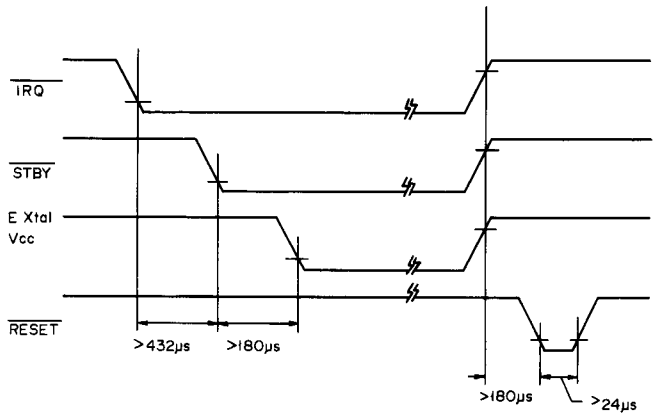


Fig. 1-8 Power supply sequence for inhibit mode