OUTLINE OF SYSTEM

The KIC9316F-026 is a digital tuning system optimum for portable sets such as pocket radios, headphone stereo sets, etc.... By combining KIC9316F-026 with prescalar KID7101F or KID6134AF, 4-band of FM/MW/LW/SW are provided compatibly with worldwide destinations.

RECEIVING BAND

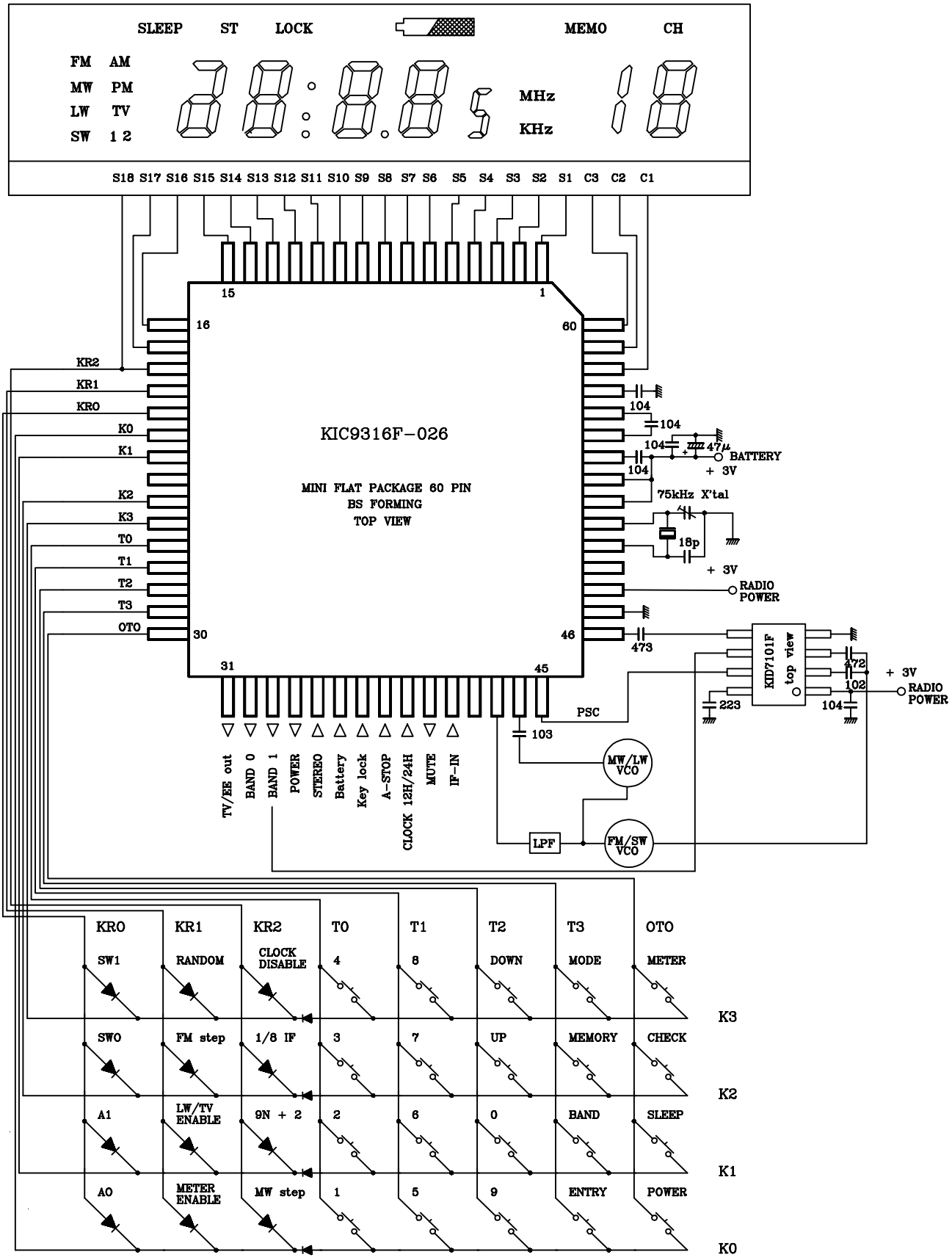
AREA	BAND	CODE		RECEIVING BAND (Hz)	STEP (Hz)	Fref. (Hz)	IF (Hz)
		A1/SW1	A0/SW0				
U.S.A.	FM	0	*1	87.5 ~ 108.0 M	100/200 k	12.5 k	10.7 M
	MW		0	522 ~ 1620 k	9 k	3 k	450 k
				520 ~ 1710 k	10 k	5 k	
	TV			2 ~ 13 ch	1 ch	6.25/12.5 k	10.7 M
general	FM	0	1	87.5 ~ 108.0 M	50/100 k	12.5 k	10.7 M
	MW			522 ~ 1620 k	9 k	3 k	450 k
				520 ~ 1620 k	10 k	5 k	
	LW			144 ~ 281 k	1 k	1 k	
Europe East / Europe *2	FM	1	0	64.0 ~ 75.0 M	50 k	12.5 k	10.7 M
				87.5 ~ 108.0 M	50 k	12.5 k	10.7 M
	MW			522 ~ 1620 k	9 k	3 k	450 k
				520 ~ 1620 k	10 k	5 k	
	LW			144 ~ 281 k	1 k	1 k	
Japan	FM	1	1	76.0 ~ 108.0 M	50/100 k	12.5 k	- 10.7 M
	MW			522 ~ 1629 k	9 k	3 k	450 k
				520 ~ 1620 k	10 k	5 k	
	TV			1 ~ 12 ch	1 ch	6.25/12.5 k	- 10.7 M
-	SW	0	1	5.95 ~ 15.6 M	5 k	5 k	450 k
		1	0	3.8 ~ 12.5 M			
		1	1	2.3 ~ 7.3 M			
				9.5 ~ 26.1 M			

*1) If step is 200kHz, range is 87.5~108.1MHz.
*2) The frequency range of FM in Europe area is according to FM STEP jumper.

○ FUNCTIONAL OUTLINE

- Station Selection
  - 1push / 1step
  - seek tuning
  - SW meter band scan
- Memory Function
  - Fixed FM/MW/LW/(TV/SW)/SW(SW2) each band 6 stations
  - Random 15 stations
- Direct key in of frequency
- Sleep function.
- Clock function (12H/24H)

KIC9316F-026 Layout



KEY MAP

	K0	K1	K2	K3
T0	1	2	3	4
T1	5	6	7	8
T2	9	0	UP/HOUR	DOWN/MIN
T3	ENTRY	BAND	MEMORY / CLOCK ADJUST	MODE
0T0	POWER	SLEEP	CHECK	METER

KR0	* A0	* A1	* SW0	* SW1
KR1	* METER ENABLE	* LW/TV ENABLE	* FM STEP	* RANDOM
KR2	* MW STEP	* 9N+2	* 1/8 IF	* CLOCK DISABLE

tact switch	* diode jumper

KEY FUNCTION

SYMBOL	FUNCTIONS
MEMORY / CLOCK ADJUST	The writing preset memory in frequency display. The clock adjustment in clock display.
0 ~ 9	Calling and writing preset memory. After pushing [ENTER] key, direct input frequency.
UP/HOUR	The receiving frequency is up. The hour of the clock is adjusted by the [UP] key.
DOWN/MIN	The receiving frequency is down. The minute of the clock is adjusted by the [DOWN] key.
BAND	The receiving band is changed.
ENTRY	The direct input mode is set. The frequency inputted is received, when push again.
SLEEP	The sleep function is on/off.
CHECK	The all segment is on LCD
POWER	The power is on/off.
METER	The meter band is changed.
MODE	The change of frequency and clock. The display is changing to clock or frequency.

DIODE JUMPER FUNCTION

<table>
<tr><td>SYMBOL</td><td>FUNCTIONS</td></tr>
<tr><td>A0
A1</td><td>Setting area
<table>
<tr><td>A 1</td><td>A 0</td><td>AREA</td></tr>
<tr><td>0</td><td>0</td><td>U.S.A</td></tr>
<tr><td>0</td><td>1</td><td>General</td></tr>
<tr><td>1</td><td>0</td><td>Europe/
E-Europe</td></tr>
<tr><td>1</td><td>1</td><td>Japan</td></tr>
</table></td></tr>
<tr><td>SW0
SW1</td><td>Setting of the receiving band of SW
<table>
<tr><td>SW 1</td><td>SW 0</td><td>receiving band [MHz]</td><td>BAND</td></tr>
<tr><td>0</td><td>0</td><td>no SW</td><td></td></tr>
<tr><td>0</td><td>1</td><td>5.95 ~ 15.6</td><td>SW A</td></tr>
<tr><td>1</td><td>0</td><td>3.80 ~ 12.50</td><td>SW B</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">1</td><td>2.30 ~ 7.30</td><td>SW1</td></tr>
<tr><td>9.50 ~ 26.10</td><td>SW2</td></tr>
</table></td></tr>
<tr><td>METER
ENABLE</td><td>Setting of method of seek tuning.
The diode is set. : meter band tuning
The diode is no set. : normal tuning</td></tr>
<tr><td>LW / TV
ENABLE</td><td>Setting of LW/TV band
The diode is set. : LW or TV enable
The diode is no set. : LW or TV disable</td></tr>
<tr><td>RANDOM</td><td>Setting of preset memory method
The diode is set. : random memory
The diode is no set. : fixed memory</td></tr>
<tr><td>FM
STEP</td><td>Setting of FM step
Setting of step in areas except Europe
<table>
<tr><td>AREA</td><td>The diode is set.</td><td>The diode is no set.</td></tr>
<tr><td>U.S.A</td><td>100 kHz</td><td>200 kHz</td></tr>
<tr><td>general</td><td>50 kHz</td><td>100 kHz</td></tr>
<tr><td>Japan</td><td>50 kHz</td><td>100 kHz</td></tr>
</table>
Setting of receiving range in Europe
<table>
<tr><td>AREA</td><td>The diode is set.</td><td>The diode is no set.</td></tr>
<tr><td>Europe</td><td>87.5 ~ 108.0 M</td><td>64.0 ~ 75.0 M
87.5 ~108.0 M</td></tr>
</table></td></tr>
</table>

DIODE JUMPER FUNCTION

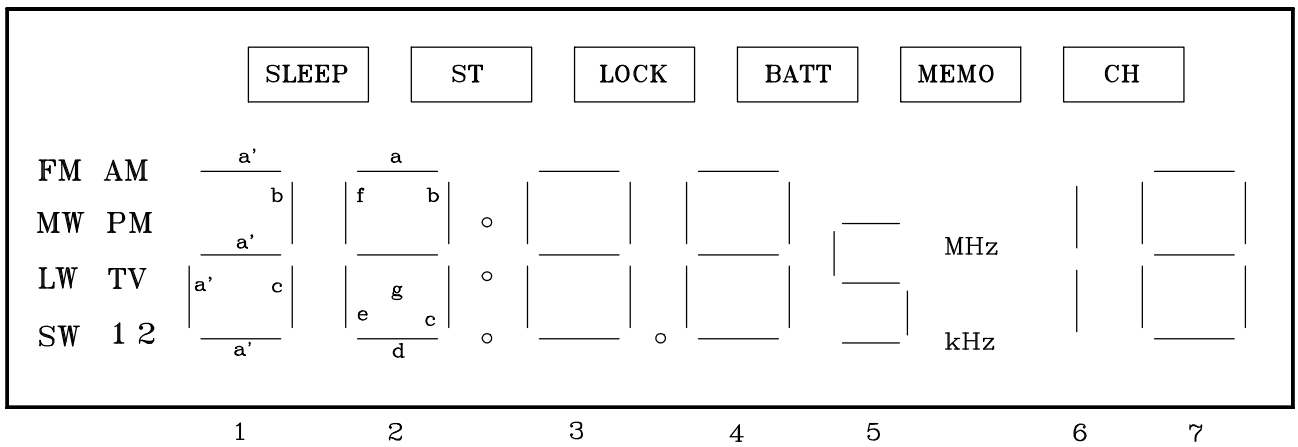
SYMBOL	FUNCTIONS
MW STEP	Setting of MW step The diode is set. : USA : 9kHz step other : 10kHz step The diode is no set. : USA : 10kHz step other : 9kHz step
9N + 2	Setting of LW step The diode is set : 9N+2 version The diode is no set. : 9N version
1/8 IF	Setting of IF counter input The diode is set. : IF 1/8 input The diode is no set. : IF normal input
CLOCK DISABLE	Setting of clock function The diode is set. : clock disable The diode is no set. : clock enable

I/O PORTS

<table>
<tr><th>PORT</th><th>NO.</th><th>NAME</th><th>I/O</th><th>FUNCTION</th><th>ACTIVE</th><th>INT.</th></tr>
<tr><td>OT 0</td><td>30</td><td>T4</td><td>OUT</td><td>Key timing output port</td><td>H</td><td>H</td></tr>
<tr><td>OT 1</td><td>31</td><td>TV/EE
out</td><td>OUT</td><td>TV/EE output :
It outputs "H" level when 7 to 13 ch of TV band in USA and 4 to 12 ch of TV band in JAPAN area.
In case of Europe area, it output "H" in FM-L
(64.0M ~ 75.0M)</td><td>H</td><td>L</td></tr>
<tr><td>P 10</td><td>32</td><td>BAND 0</td><td>OUT</td><td rowspan="2">band output :
<table><tr><th></th><th>FM</th><th>MW</th><th>LW,TV,SW1</th><th>SW2,
SWA, SWB</th></tr><tr><td>BAND 0</td><td>L</td><td>H</td><td>L</td><td>H</td></tr><tr><td>BAND 1</td><td>L</td><td>L</td><td>H</td><td>H</td></tr></table></td><td rowspan="2">-</td><td rowspan="2">L</td></tr>
<tr><td>P 11</td><td>33</td><td>BAND 1</td><td>OUT</td></tr>
<tr><td>P 12</td><td>34</td><td>POWER</td><td>OUT</td><td>Power output :
"H" output : power on
"L" output : power off</td><td>H</td><td>L</td></tr>
<tr><td>P 13</td><td>35</td><td>STEREO</td><td>IN</td><td>stereo input :
"H" input : ST indicator on
"L" input : ST indicator off</td><td>-</td><td>-</td></tr>
<tr><td>P 20</td><td>36</td><td>Battery</td><td>IN</td><td>battery input :
"L" input : no battery indicator on and off
"H" input : no battery indicator off</td><td>L</td><td>-</td></tr>
<tr><td>P 21</td><td>37</td><td>key lock</td><td>IN</td><td>key lock input :
key input is unavailable when this terminal is "H" level.</td><td>H</td><td>-</td></tr>
<tr><td>P 22</td><td>38</td><td>A-STOP</td><td>IN</td><td>auto stop input :
Auto stop signal is inputted by DC.
seek is stopped by "H" level.
terminal is "H" level.</td><td>H</td><td>-</td></tr>
<tr><td>P 23</td><td>39</td><td>CLOCK
12H/24H</td><td>IN</td><td>clock 12H/24H input :
"H" input : clock 12H
"L" input : clock 24H</td><td>-</td><td>-</td></tr>
<tr><td>MUTE</td><td>40</td><td>MUTE</td><td>OUT</td><td>mute output</td><td>H</td><td>H</td></tr>
<tr><td>IF IN</td><td>41</td><td>IF-IN</td><td>IN</td><td>IF input :
For inputting IF signal for seek tuning and memory scan.
At FM/TV band 10.7MHz, at AM/SW band 450kHz is inputted by condenser coupling.</td><td>AC</td><td>-</td></tr>
</table>

LCD DISPLAY

SYMBOL	PIN NO.	SEGMENT NAME			FUNCTION
		COM1	COM2	COM3	
S 1	1	FM	MW		FM : FM band MW : MW band
S 2 S 3	2 3	1 2	SW TV	LW PM	SW, 1, 2 : SW band TV : TV band PM : PM of clock
S 4 S 5	4 5	1a′ 1c	AM 1b	SLEEP :	SLEEP : sleep mark 1a′, 1c, 1b : 21.855 AM : AM of clock AM of radio (2 band) : : colon mark for clock
S 6 S 7 S 8	6 7 8	2e 2d SWdot	2f 2g 2c	ST 2a 2b	2a~g : 21.855 ST : stereo mark SWdot : 21.855
S 9 S 10 S 11	9 10 11	3e 3d FM dot	3f 3g 3c	LOCK 3a 3b	3a~g : 107.95 LOCK : key lock mark FMdot : 107.95
S 12 S 13 S 14	12 13 14	4e 4d 5	4f 4g 4c	BATT 4a 4b	4a~g : 107.95 BATT : no battery mark 5 : 107.95
S 15	15	kHz	MHz	MEMO	kHz : kHz mark MHz : MHz mark MEMO : memory mark
S 16 S 17 S 18	16 17 18	7e 7d CH	7f 7g 7c	6bc 7a 7b	6bc : 107.95 15 CH : CH mark 7a-g : 107.95 15



BAND CHANGE

1. Principal function

The receiving band is changed.

2. Input ports and keys to be used.

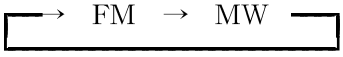
BAND 0, BAND 1, TV/EE OUTPUT, [BAND] key

3. Function

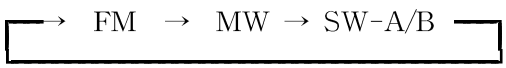
a. The receiving band is changed cyclically every pushing [BAND] key.

b. The receiving band is changed as shown below.

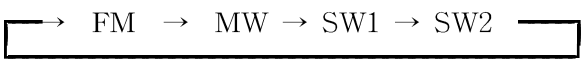
2 band selection



3 band selection



4 band selection



c. The output for receiving band is as shown below.

RECEIVING BAND / OUT PORTS	FM-H	FM-L	MW	SW-1	SW-2	
	FM-H	FM-L	MW	LW	SW-A	
	FM-H	- I	MW	TV-L	SW-B	TV-H
BAND 0	L	L	H	L	H	L
BAND 1	L	L	L	H	H	H
TV/EE	L	H	L	L	L	H

FM-L : 64.0 ~ 75.0 MHz, FM-H : 87.5 ~108.0 MHz

TV-H : from ch7 to ch13 in USA area.
from ch4 to ch12 in JAPAN area.

METER BAND

1. Principal function
   meter band change.

2. Input ports and keys to be used.
   [METER] key, METER ENABLE jumper

3. Function

   a. The range of meter band mode is as shown below.

BAND	Frequency	STEP
SW1	2.300 ~ 2.495	5kHz
	3.200 ~ 3.400	
	3.900 ~ 4.000	
	4.750 ~ 5.060	
	5.950 ~ 6.200	
	7.100 ~ 7.300	
SW2	9.500 ~ 9.900	5kHz
	11.650 ~ 12.050	
	13.600 ~ 13.800	
	15.100 ~ 15.600	
	17.550 ~ 17.900	
	21.450 ~ 21.850	
	25.600 ~ 26.100	

BAND	Frequency	STEP
SW-A	5.950 ~ 6.200	5kHz
	7.100 ~ 7.300	
	9.500 ~ 9.900	
	11.650 ~ 12.050	
	13.600 ~ 13.800	
	15.100 ~ 15.600	

BAND	Frequency	STEP
SW-B	3.800 ~ 4.000	5kHz
	4.750 ~ 5.060	
	5.950 ~ 6.200	
	7.100 ~ 7.300	
	9.500 ~ 9.900	
	11.650 ~ 12.500	

   b. When [METER] key is pushed, the receiving frequency is changed to lower edge of next meter band.

   c. The meter band is changed by 500mS step automatically when [METER] key was pushed for more than 500mS.

   d. It is meter band mode to set METER ENABLE jumper in SW band.

   e. If a receiving frequency over the upper band edge of meter band in meter band mode, it goes to the lower band edge of next meter band. In case of the lower band edge, it goes to the upper band edge of previous meter band.

TUNING

1. Principal function

1 push / 1 step and seek tuning.

2. Input ports and keys to be used.

[UP] key, [DOWN] key, 9N+2 jumper

3. Function

a. 1 push / 1 step tuning by [UP] / [DOWN] key.

b. When [UP] / [DOWN] key is pushed for more than 500mS, seek tuning is started.

c. The seek tuning is stopped, if the stop signal specified is inputted on IF INPUT or A-STOP INPUT.

d. But seek tuning is not stopped even when a station was detected, in case [UP] / [DOWN] key is pushing continue.

e. The scan time is 100mS / step in FM band. In other bands, it is 200mS / step.

f. The tuning method is the saw tooth wave form method, and when the receiving frequency reach the band edge, it goes to the opposite side and the continuous tuning is held for 500mS. In case of meter band, refer explanation of the meter band.

g. In case 9N+2 jumper is set, the seek tuning in LW band is in 9N+2 step. If it is no set, the seek tuning is in 9N step.

PRESET MEMORY

1. Principal function
   Calling and writing in preset memory

2. Input ports and keys to be used.
   [0]~[9], [MEMORY] key, RANDOM jumper, METER ENABLE jumper

3. Function

   a. In case the RANDOM jumper is set, the preset memory is random memory method. In case it is no set, the preset memory is fixed memory method.

   b. In case of fixed memory method, the each band have 6 ch.

   c. In case of random memory method, there are 15 ch.

   d. The fixed preset memory is called when [1] ~ [6] was pushed.
   In case of random memory method, the [1] or [0] key at first pushing is only flashing a memory number. A preset memory number is fixed when [0] ~ [9] key was pushed during a memory number is flashed. If second pushing is nothing for 2 second, ch 1 is called in case a memory number "1" is flashing.

   e. The memory mode is set when [MEMORY] key was pushed.

   f. The memory mode is released automatically after 5 seconds.

   g. The "MEMO" mark is flashed in the memory mode.

   h. A receiving frequency is written in the fixed preset memory when [1] ~ [6] key was pushed in the memory mode. In case of random memory method, a preset memory number is fixed by the way that is same as calling preset memory.

   i. The tracking data is as shown below.

Without METER ENABLE jumper.

BAND	DATA 1	DATA 2	Remark
FM	78.0	88.0	Japan
	70.0	88.0	E-Europe
	90.1	98.1	other
MW	603	999	9 k
	600	1000	10 k
LW	164	209	
TV	6 ch	7 ch	USA
	4 ch	12 ch	JAPAN

With METER ENABLE jumper.

BAND	DATA 1	DATA 2	Remark
SW	7.10	11.65	SW-A
	5.00	7.10	SW-B
	3.20	4.75	SW1
	11.65	17.55	SW2

Without METER ENABLE jumper.

SW	6.50	10.00	SW-A
	5.00	7.00	SW-B
	3.00	4.50	SW1
	10.00	16.00	SW2

The data as shown above is written in the preset memory in order of changing band.

SLEEP

1. Principal function

The power is off when sleep time pass.

2. Input ports and keys to be used.

[SLEEP] key, [UP] key, [DOWN] key.

3. Function

a. When [SLEEP] key is pushed, sleep function is on and sleep time is indicated on LCD for 5 seconds.

b. The sleep time is 60 minutes.

c. The power is on, if [SLEEP] key is pushed when power is off.

d. The power is off when sleep time pass.

e. The power and sleep function are off, if [SLEEP] key is pushed when sleep function is on.

f. The sleep function is only off, if [POWER] key is pushed when sleep function is on.

DIRECT FREQUENCY INPUT

1. Principal function

A receiving frequency is inputted directly

2. Input ports and keys to be used.

[0] ~ [9], [ENTER] key

3. Function

a.. When the [ENTER] key is pushed, the direct mode is set.

b. The frequency can be inputted directly by pushing [0] ~ [9] key in the direct mode.

c. About input of lowest figure of frequency in the FM band in case a step is 50kHz, the [0] ~ [9] key is for input "5". The case that 5kHz of SW band is same.

d. In case the all rest of number is zero, the "0" is inputted automatically by pushing [ENTER] key.

e. The frequency inputted is judged whether it is valid or invalid by pushing [ENTER] key. If it is valid, it is set as receiving frequency. If it is invalid, "Err" is flashed at 1Hz for 3 seconds on main display. After pushing [ENTER] key, the direct mode is released.

f. The direct mode is automatically released after 10 seconds. But, the counter of 10 seconds is reset when [0] ~ [9] key is pushed.

AUTO STOP and IF COUNTER

1. Principal function
   Detecting A-STOP signal or Counting IF

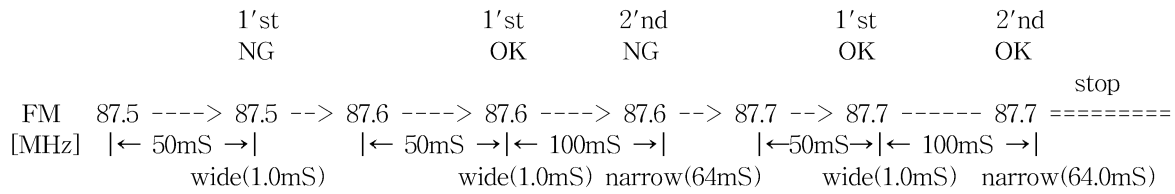
2. Input ports and keys to be used.
   IF-IN INPUT, A-STOP INPUT, 1/8 IF jumper

3. Function
   a. The stop signal is checked as condition of stopping for the seek tuning and the memory scan.

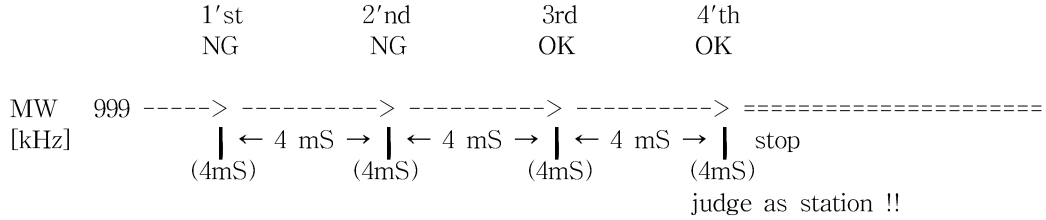
   b. The intermediate frequency (IF) is counted on the IF-IN INPUT.

   c. The auto stop signal is inputted on the A-STOP INPUT.

   d. IF check in FM/TV band.
      If the IF counted is in wide range, after 150mS the IF is counted on same receiving frequency again. If the IF counted is in narrow range, it is judged to be the station.



   e. IF check in MW/LW/SW band.
      e-1. IF is checked 4 times every 4mS.
      e-2. If 2 times of checks is OK, it is judged to be the station.



   f. A-STOP check
      f-1. When IF is checked, A-STOP input is checked in same time.
      f-2. The check is OK when the A-STOP INPUT is inputted "H", even in case IF check is NG.

g. Setting value of IF check

BAND	REFERENCE FREQUENCY (Hz)	1′st counting (WIDE)		second counting (NARROW)	
		DETECTED WIDTH (Hz)	GATE TIME (mS)	DETECTED WIDTH (Hz)	GATE TIME (mS)
FM (normal)	12.50 k	10.7M ± 60k	1.0	10.7M ± 15k	64.0
FM (1/8 IF)		1.3375M ± 8k		1.3375M ± 2k	
TV (normal)	6.25 k / 12.50 k	10.7M ± 60k	1.0	10.7M ± 30k	64.0
TV (1/8 IF)		1.3375M ± 8k		1.3375M ± 4k	
MW/LW/SW	5 k	450k ± 1k	4.0	× 4 times	
	3 k				

CLOCK

1. Principal function
   The clock is displayed and the clock is adjusted.

2. Input ports and keys to be used.
   [MODE], [MEMORY/ADJ.], [UP/H-ADJ.] key, [DOWN/M-ADJ] key, CLOCK 12H/24H input, CLOCK disable jumper.

3. Function
   a. The clock function is enable in case CLOCK disable jumper is no set.

   b. The clock is 12H-clock in case of CLOCK 12H/24H input is "H" input.
      While the CLOCK 12H/24H input is "L" input, it is 24H-clock.

   c. The display is changed to frequency or clock by pushing [MODE] key when radio is on.
      And the display can be turned on or off by pushing [MODE] key when radio is off.

   d. The clock display return back to frequency display automatically after 5 seconds, in case power is on.

   e. The time adjustment mode is set when [MEMORY/ADJ.] key is pushed in the time display.

   f. The time display is flashed in the time adjustment mode.

   g. The time adjustment mode is released automatically after 5 seconds.

   h. The hour can be adjusted by pushing [UP/H-ADJ.] key in the time adjustment mode.
      While the minute can be adjusted by pushing [DOWN/M-ADJ.] key.

   i. The hour and minute are adjusted by 1 push / 1 step. If the key is pushing continue for more than 500mS, the minute is adjusted by 1 minute / 150mS, the hour is adjusted by 1 hour / 250mS.

   j. The time adjustment mode is continue when the power is off by sleep function.

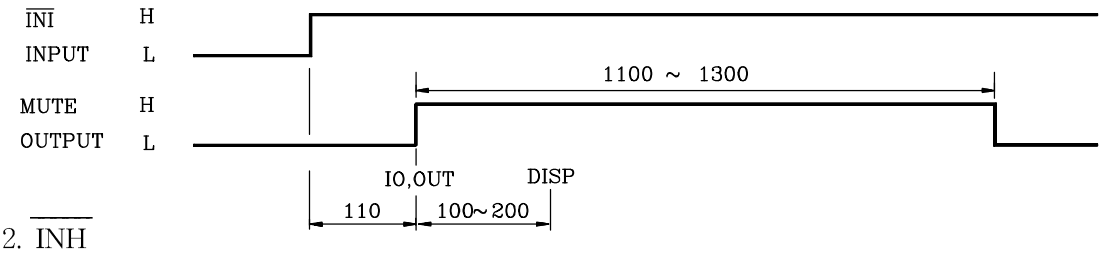
   k. The second of clock is reset when [MEMORY/ADJ.] key is pushed in the time adjustment mode of clock.

TIMING

PLL ····· The timing to set the PLL data
DISP ····· The timing to set the display data
IO ····· timing to the outputs of the I/O ports (PIN30 ~ PIN39)
1′st ····· The timing to check the IF frequency (The IF tolerance is WIDE)
2′nd ····· The timing to check the IF frequency (The IF tolerance is NARROW)
IF check ····· The timing to check the IF frequency
SD check ····· The timing to check the A-STOP signal
CAUTION) If there is not instruction about the numerical value, their unit is milliseconds.

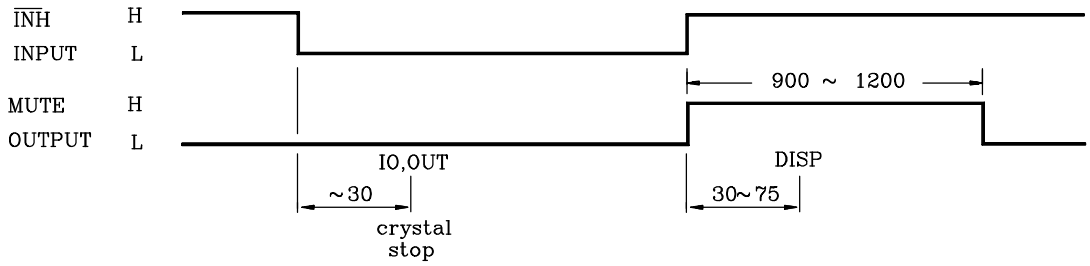
1. $\overline{INT}$

a. $\overline{INI}$ "L"→"H" ($\overline{INH}$="H")

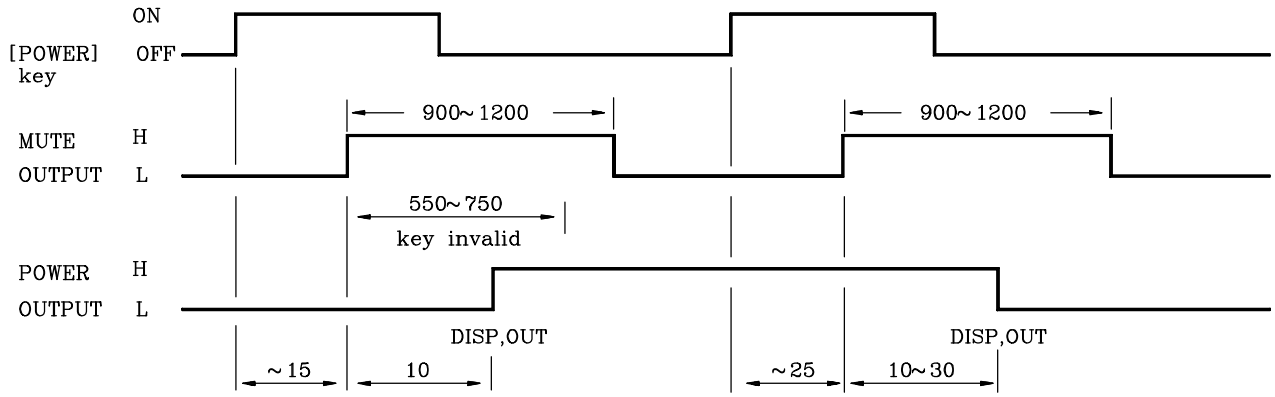


2. $\overline{INH}$

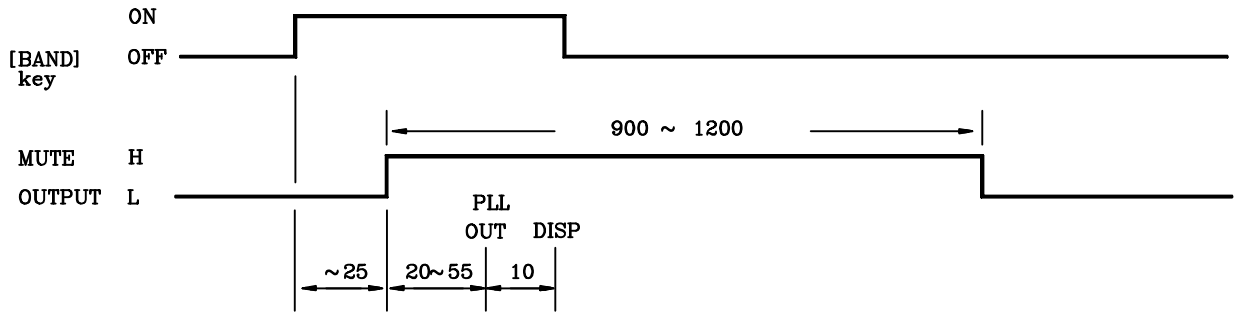
a. $\overline{INH}$ "H"↔"L"



3. POWER

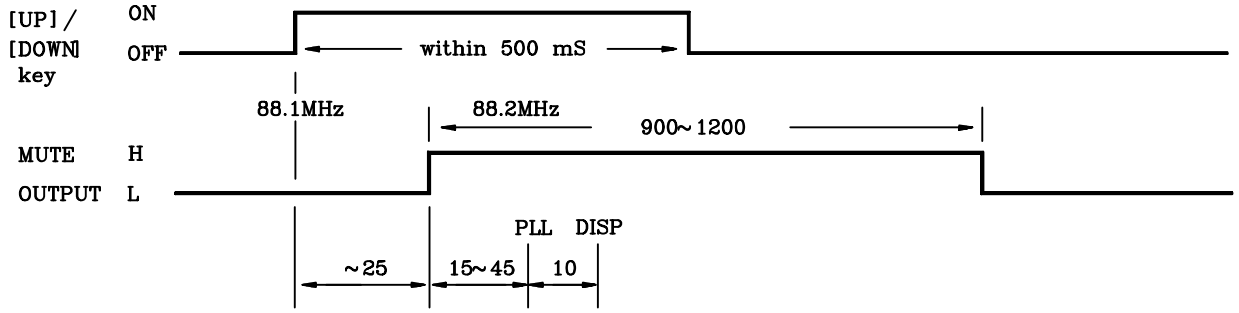


4. BAND CHANGE

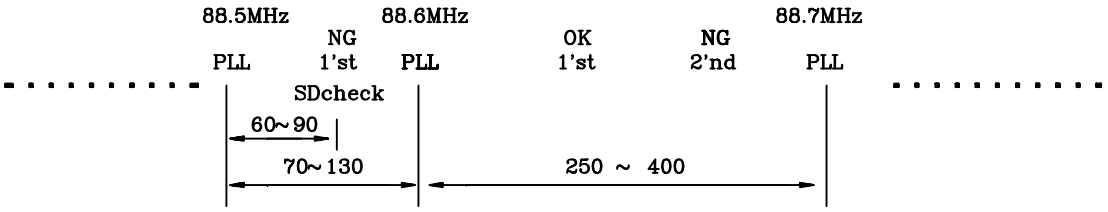


5. TUNING

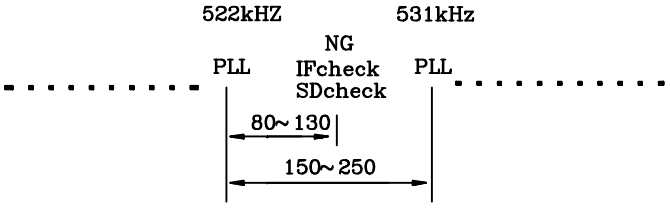
a. In case of 1 STEP / 1 PUSH



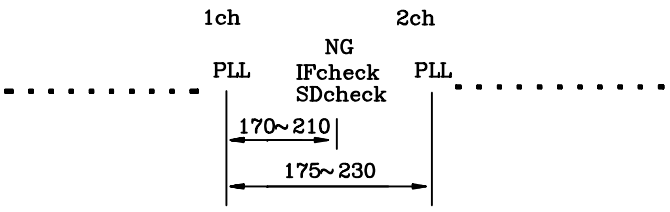
b. In case of auto tuning in FM band.



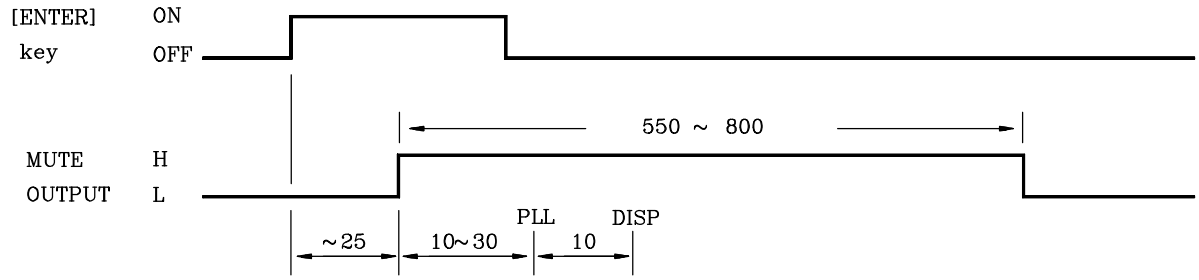
c. In case of auto tuning in MW/SW/LW band.



d. In case of auto tuning in TV band.



6. FREQUENCY INPUT DIRECTLY



7. PRESET MEMORY