OPERATION
MANUAL

New Wetness Sensing System RX69W1
For monitoring purpose in USA

By Nippon Kodoshi Corporation
September 4,1998

Table of Contents

FCC PART 15 CLASS B MANUAL
DESCRIPTION

NOTICE

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

FCC WARNING

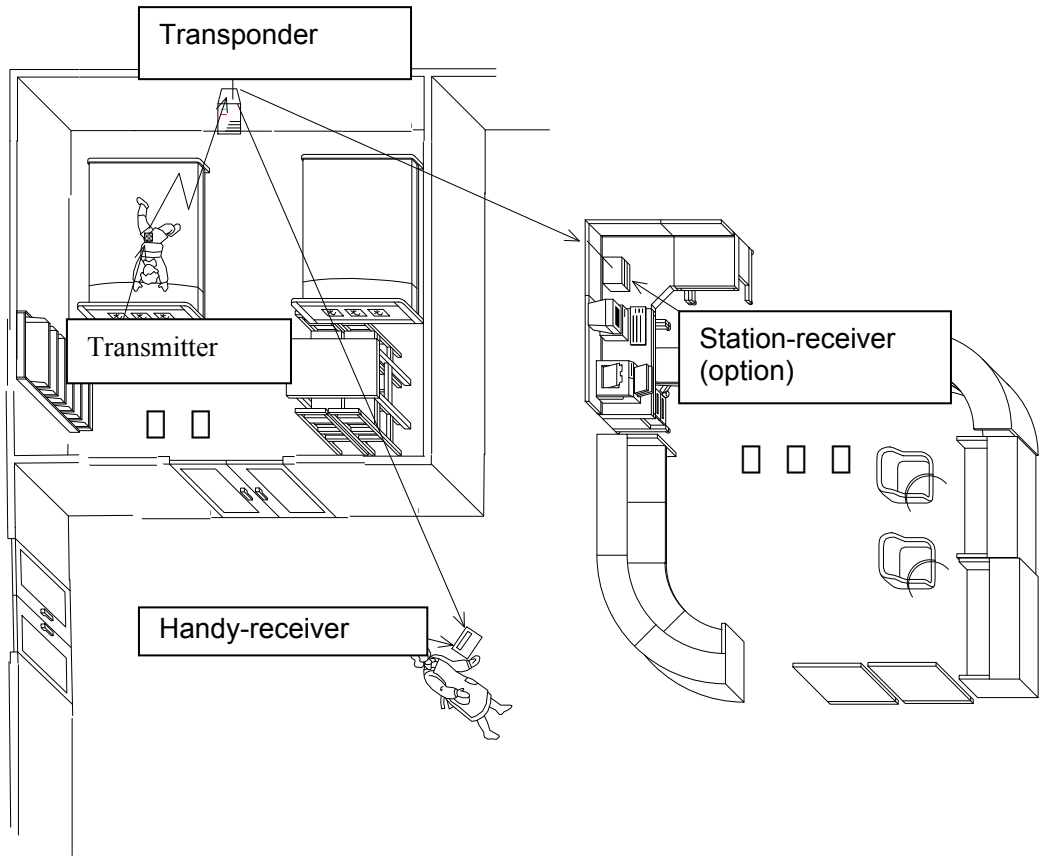
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The device is complies with part 15 of the FCC rules.
Operation is subject to the conditions that this device
does not cause harmful interference.

This device complies with part 15 of the FCC Rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received,
including interference that may cause undesired operation.

[1] Wetness Sensing System

(1) Overview



This Wetness Sensing System is comprised with transmitters, transponders and receivers, which inform caregivers of sensing moisture in a diaper. Once wetness sensor incorporated into diaper is aware of moisture, the transmitter including sensor puts out the signal to the transponder and then to the receiver.

□□Specifications

■□TRANSMITTER

□Frequency	□ 318.125M, 318.500M, 318.875M, 319.250MHz
□RF Output Power	□ 2400μV/m (67.6dBm) at 3 m
□Frequency stability	□ ±0.001□
□Identification	□ Area ID1□99, Individual ID 1□99
□Modulation system	□ Variable reactance frequency modulation
□Maximum Deviation	□ ±4 kHz
□Power Source	□ 3V (lithium battery CR2032)
□Battery Life	□ about 3 months (dropped to 2.5V)

■□TRANSPONDER

□Receive system	□ Double-conversion superheterodyne
□Receiving Frequency 1	□ 318.125M, 318.500M, 318.875M, 319.250MHz
□Receiving Frequency 2	□ 314.500M~314.725MHz(25kHz step)
□Sensitivity	□ -113dBm for 12dB SINAD
□Intermediate frequencies	□ 1st 21.7MHz
	□ 2nd □450kHz
□Transmitting Frequency	□ 314.500M~314.725MHz(25kHz step)
□RF output power	□ 2250μV/m (at 3 m)
□Frequency stability	□ ±0.001□
□Modulation system	□ Variable reactance frequency modulation
□Maximum Deviation	□ ±4 kHz
□Power supply requirement	□ DC,AC9V □0.1A AC adaptor
□Battery Life	□ about 12 hours

■□RECEIVER

□Receive system	□ Double-conversion superheterodyne
□Receiving Frequency 1	□ 318.125M, 318.500M, 318.875M, 319.250MHz
□Receiving Frequency 2	□ 314.500M~314.725MHz(25kHz step)
□Sensitivity	□ -113dBm for 12dB SINAD
□Intermediate frequencies	□ 1st 21.7MHz
	□ 2nd □450kHz
□Frequency stability	□ ±0.001□
□Power supply requirement	□ DC,AC9V □0.3A AC adaptor
□Battery Life	□ about 5 hours

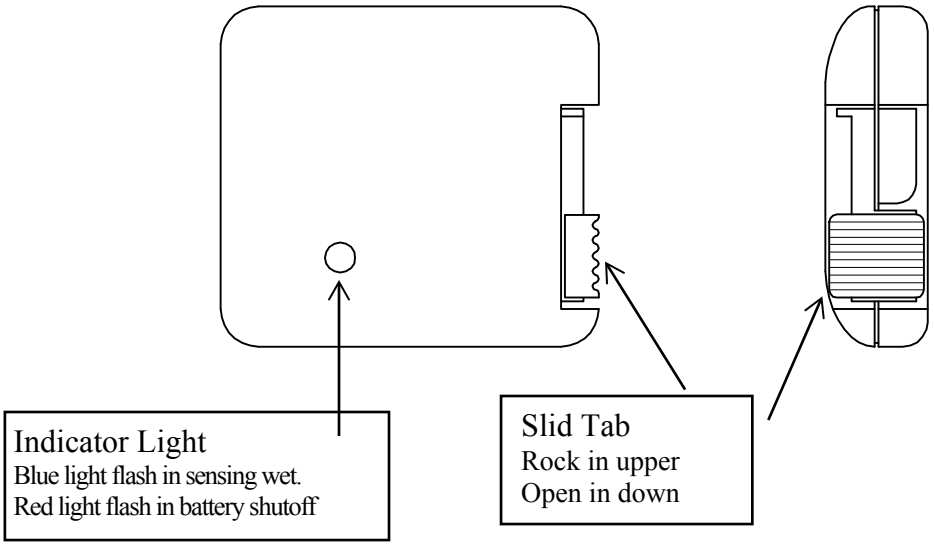
□□Location and Function of Controls

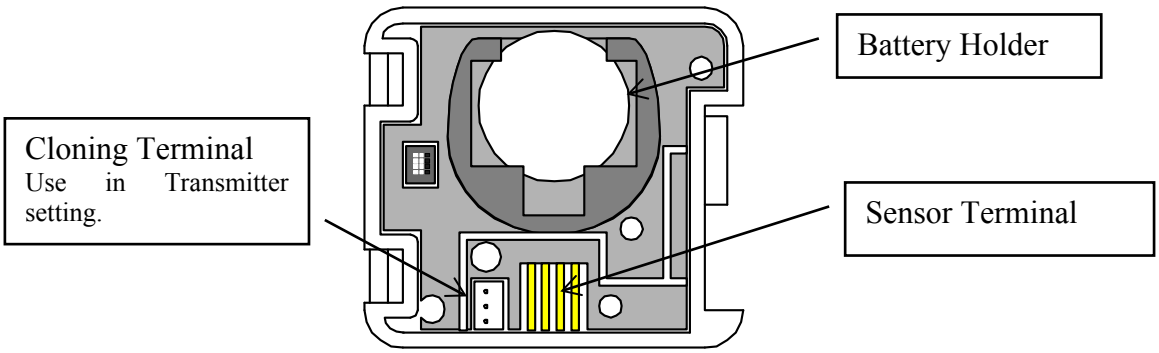
□□□□ Transmitter Introduction

(1) overview

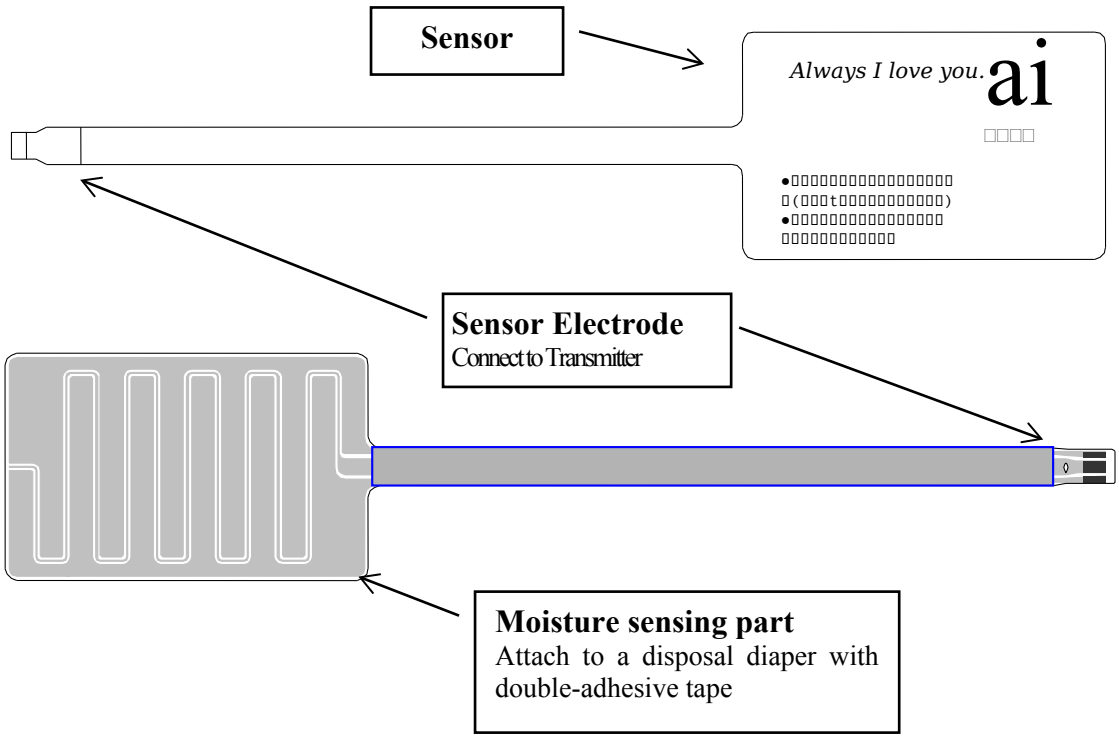
Sensing devise (sensor) is connected to transmitter. Once sensing devise senses moisture, transmitter will send signal to transponder.

(□)Each Designation



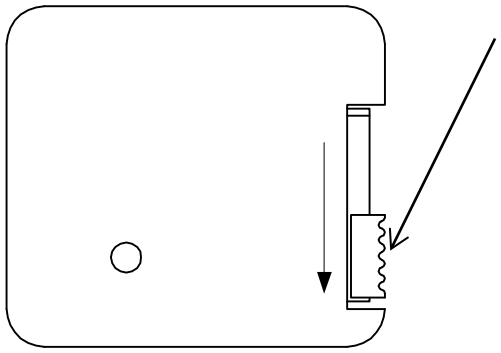


□□□□ Sensor Introduction



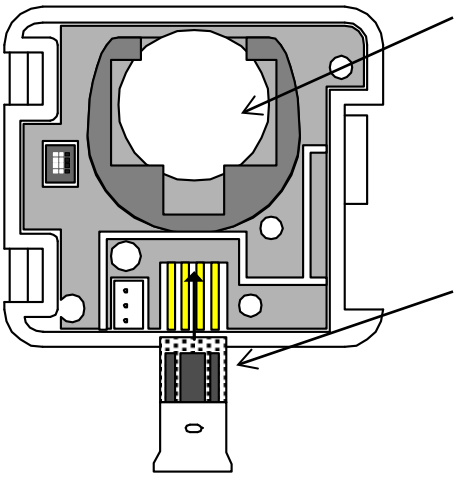
□□□□ Transmitter and Sensor Operating

□ Open-Close Operation



To open this case, release the lock by sliding this tab underneath.
To lock the case is sliding this tab upward in closed status.

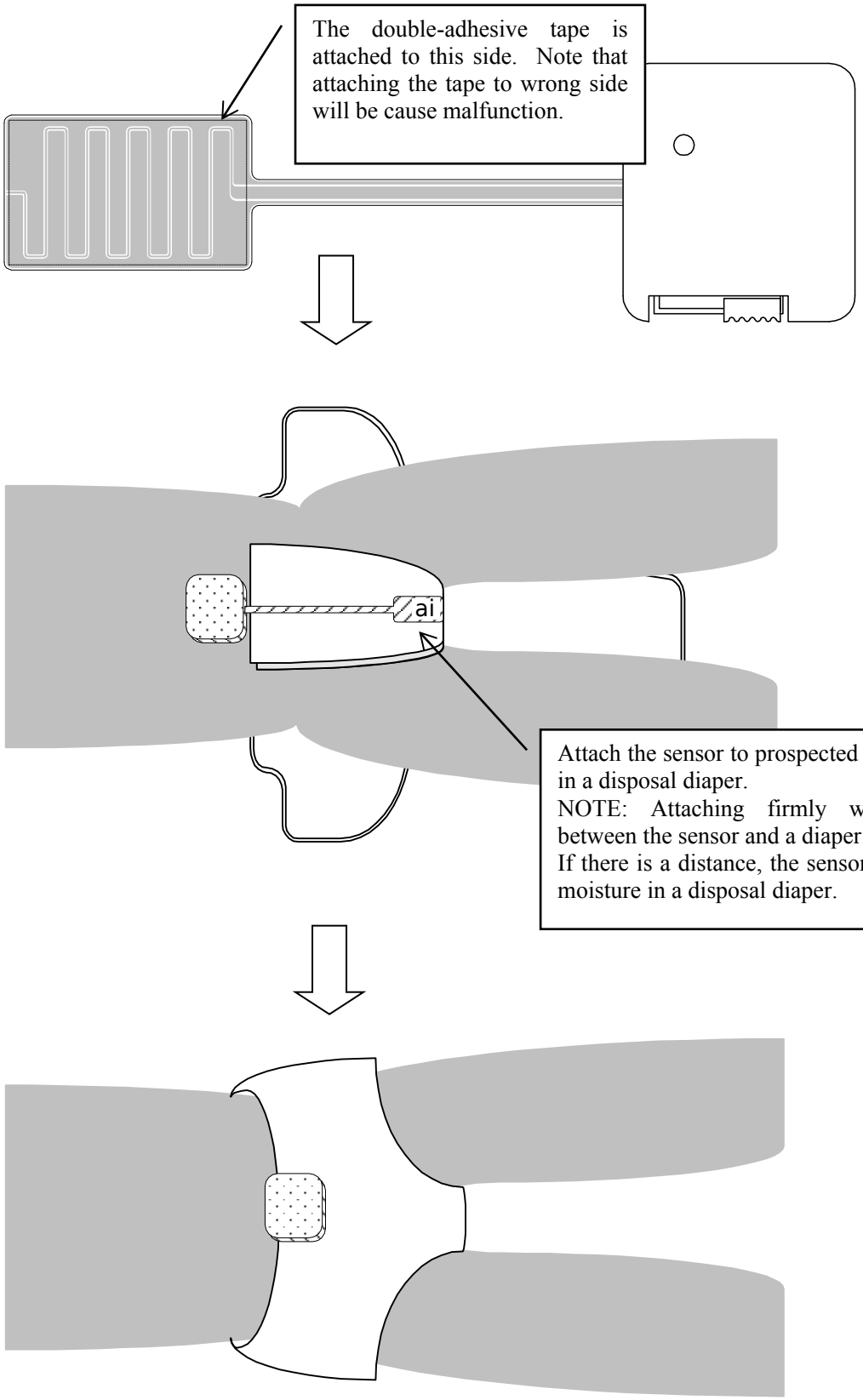
□ Method of Battery desorption and Sensor Attachment



Battery desorption
□**Installation**
Cant the battery slowly.
□**Disinstallation**
□Push the battery upward.

Sensor Installation
Put the Sensor into the connector deeply and embed in guide pin from above to prevent to drop out.

□□□□Sensor Installation to Disposal Diaper



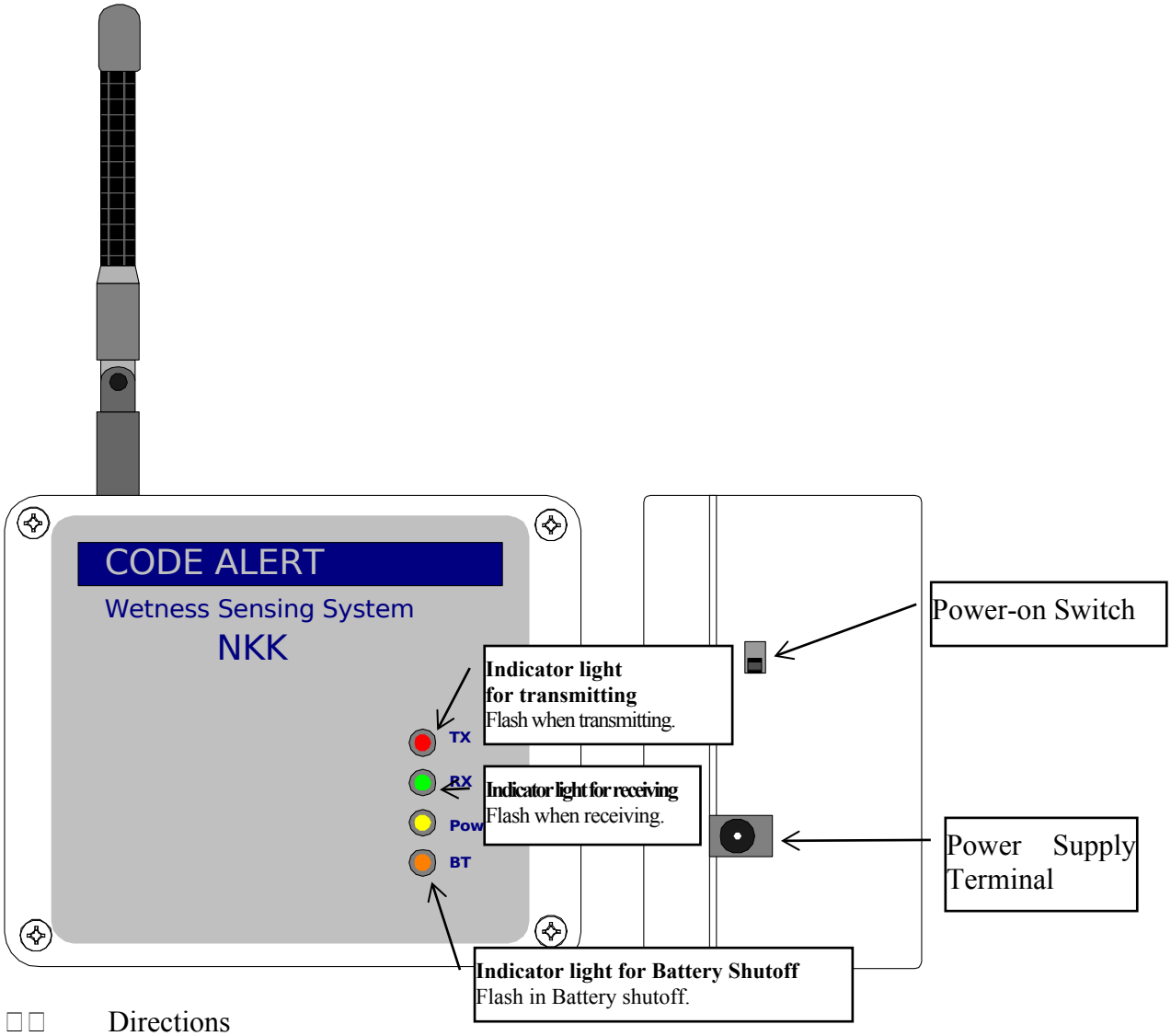
□ After attach the sensor, put the cover on a diaper and then fix the transmitter.

□□□□□Transponder Introduction

Overview

Transponder receives signal from Transmitter and then transmits to Receiver.
It transmits the signal received from Transmitter to another Transponder.

□□ Each Designation



□□ Directions

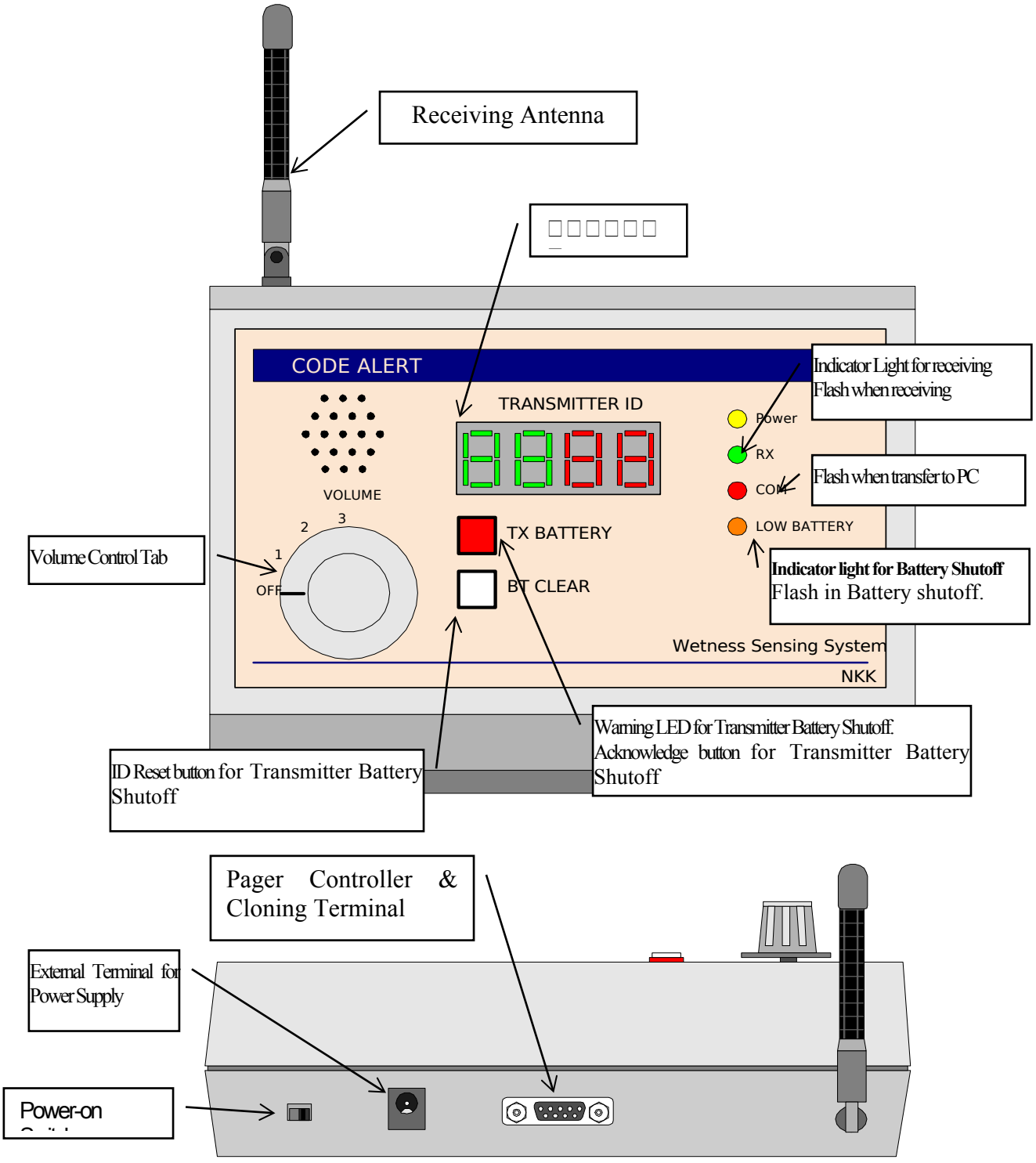
The transponder is located in the signal receivable area from Transmitter.

□□□□□Receiver Introduction

1. Overview

When the receiver receives signal from the transponder, it informs caregivers of received signal information (e.g. sense moisture or battery shutoff) by alarm of melodies and display.

□□ Each Designation

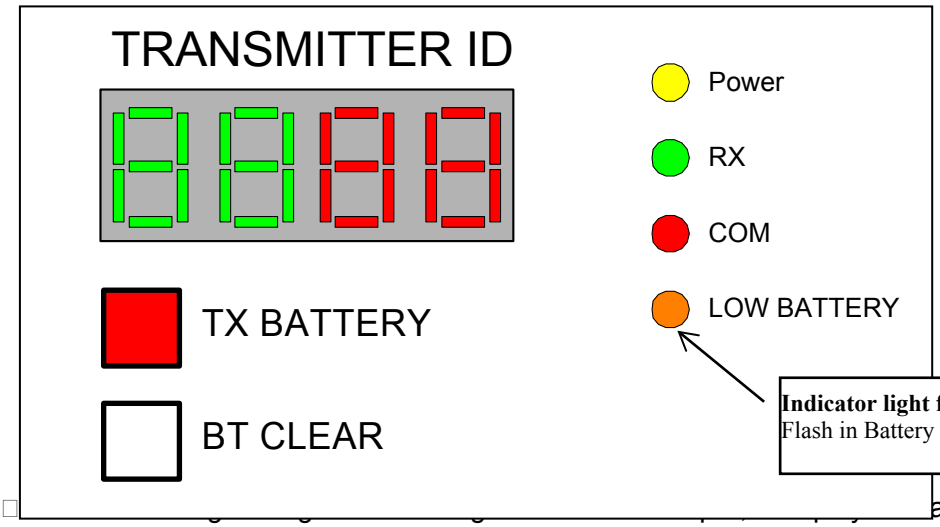


a.□□□□□□□

□ Display Receiver Battery Shutoff

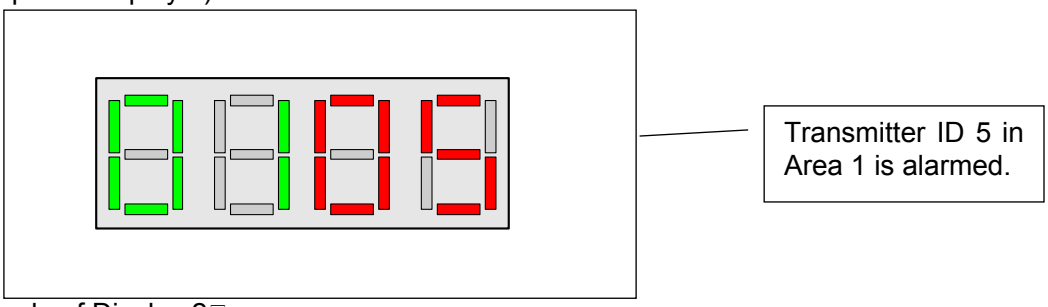
□ When the battery of receiver run down, LED will flash.

Information Display



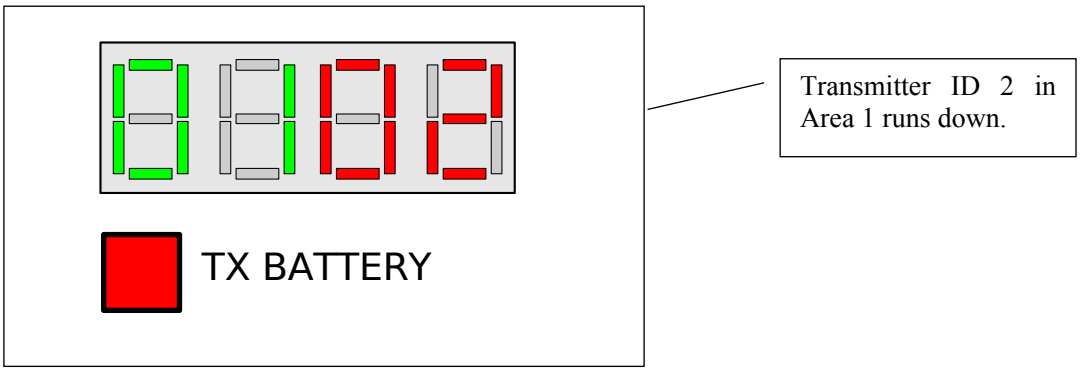
□ a ID in right two-digit and transmitter ID in left two-digit. (NOTE: In case of sensing multiple IDs, it displays those IDs in turn.)

(Example of Display 1)



□Example of Display 2□

When flashing "Warning LED for Battery Shutoff", push "Acknowledge button for Transmitter Battery Shutoff", □□□□ is displayed.



□□7□Receiver Operation

Turning on power, current receiving channel for the transmitter is displayed in 7 segment Display with red LED and current receiving channel for the transponder in 7 segment display with green LED, like □□□□□for 5sec, after that it will clear the ID.
When the transmitter senses moisture in a diaper, the receiver displays Area ID and Transmitter ID and puts melodies on.

Once Transmitter IDs are received, it continues displaying these IDs till the signal from the transmitter is cut off for 30sec. Those IDs will be cleared automatically when the signal is aborted (i.e. it displays those IDs till the diaper attached the sensor is changed.).

□□ Volume Control SW

It changes Volume of melodies as four stage (large, middle, small and OFF).

□□TX□BATTERY□SW□□□□LED□

Square red LED flashes in Transmitter Battery Shutoff.
Transmitter ID which runs out is displayed during pushing this SW. (In case of detecting multiple IDs, it displays those IDs in turn.)

□□BT CLEAR SW

Battery Shutoff LED will be lighted out and its IDs will be cleared after checking which ID is detected by pushing TX Battery SW and changing the battery.
□NOTE: Be sure to clear detected IDs after changing the battery□

□□Power Supply

AC adapter more than 0.3A, 9V(DC, AC) is available.
In electricity failure, this system can work about for 5 hours by using built-in rechargeable battery.

3□Inside Views, Dip-SW Setting

□□□□Transmitter Inside View

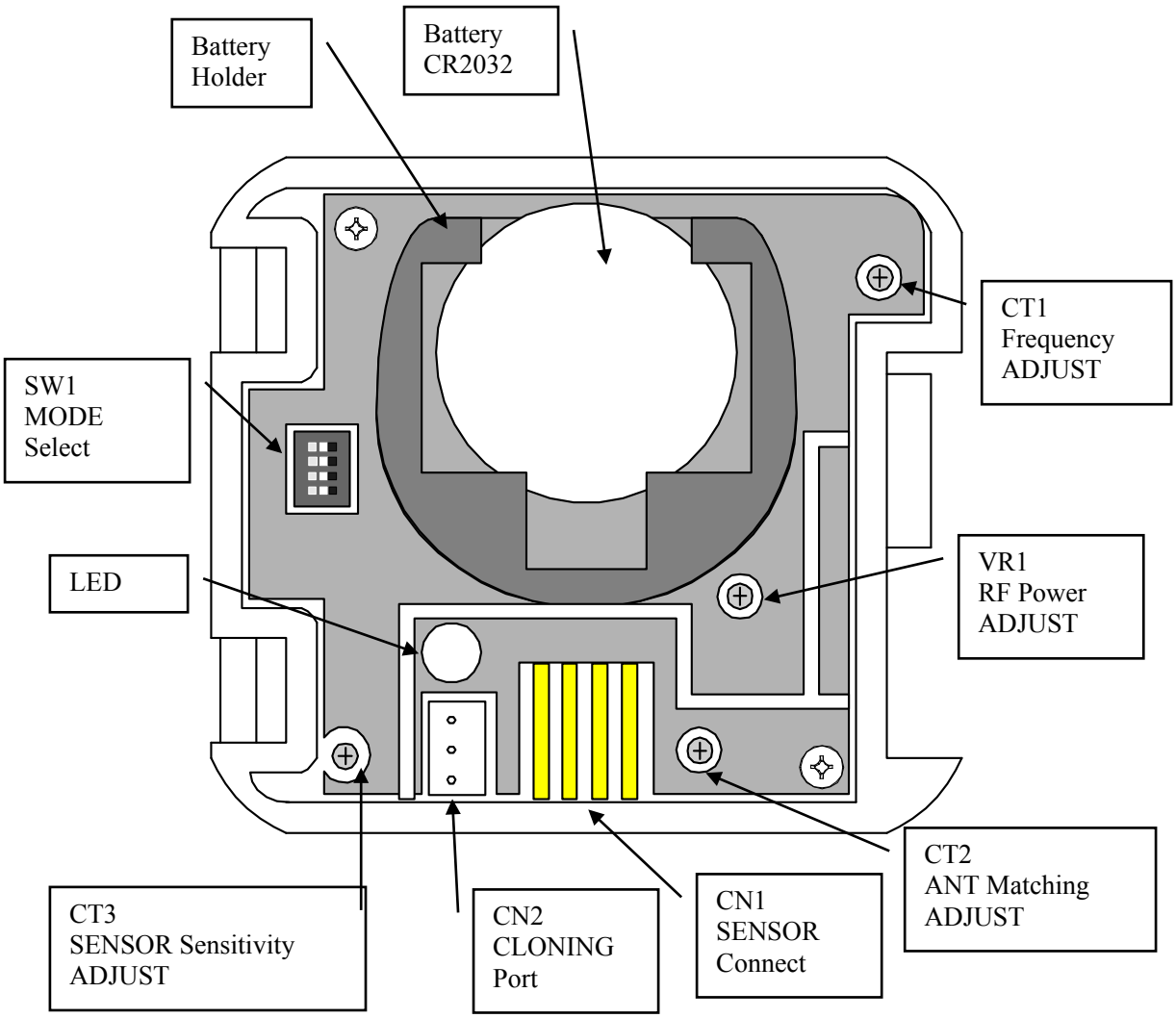
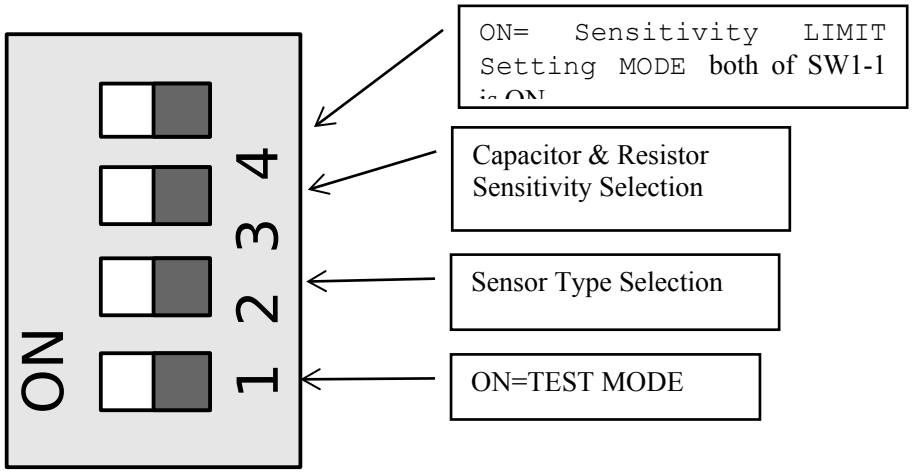


Fig.3-1 TRANSMITTER

□□□□Transmitter Dip-SW Setting

□SW1□MODE□SELECT



□TEST□MODE□SELECTION□□SW1-1□

SW1-1 is ON when turning on power, it will enter into Test Mode.
It will be transfered data continuously in the Test Mode. To stop the continuous transfer is turning SW1-1 off in Test Mode.
Turning on power again with SW1-1 OF enters into Normal Mode.

□Sensitivity LIMIT Setting MODE (SW1-4 ON,SW1-1 ON)

To change the sensitivity of detection is switching both of SW1-4 and SW1-1 to the on position.

□

□SENSOR TYPE SELECTION□SW1-2□

SW1-2	SENSOR TYPE
OFF	Capacitor□type Sensor
ON	Resistor□type Sensor

□Capacitor Sensitivity Selection□SW1-3,4□

SW1-3	Capacitor Sensitivity	Resistor Sensitivity
OFF	High Sensitivity about □3.5pF	High Sensitivity about □510kΩ
ON	Low Sensitivity about □5.5pF	Low Sensitivity about □300kΩ

Note: The sensitivity of detection can be changed in Setting Mode.

□□□□Transponder Inside View

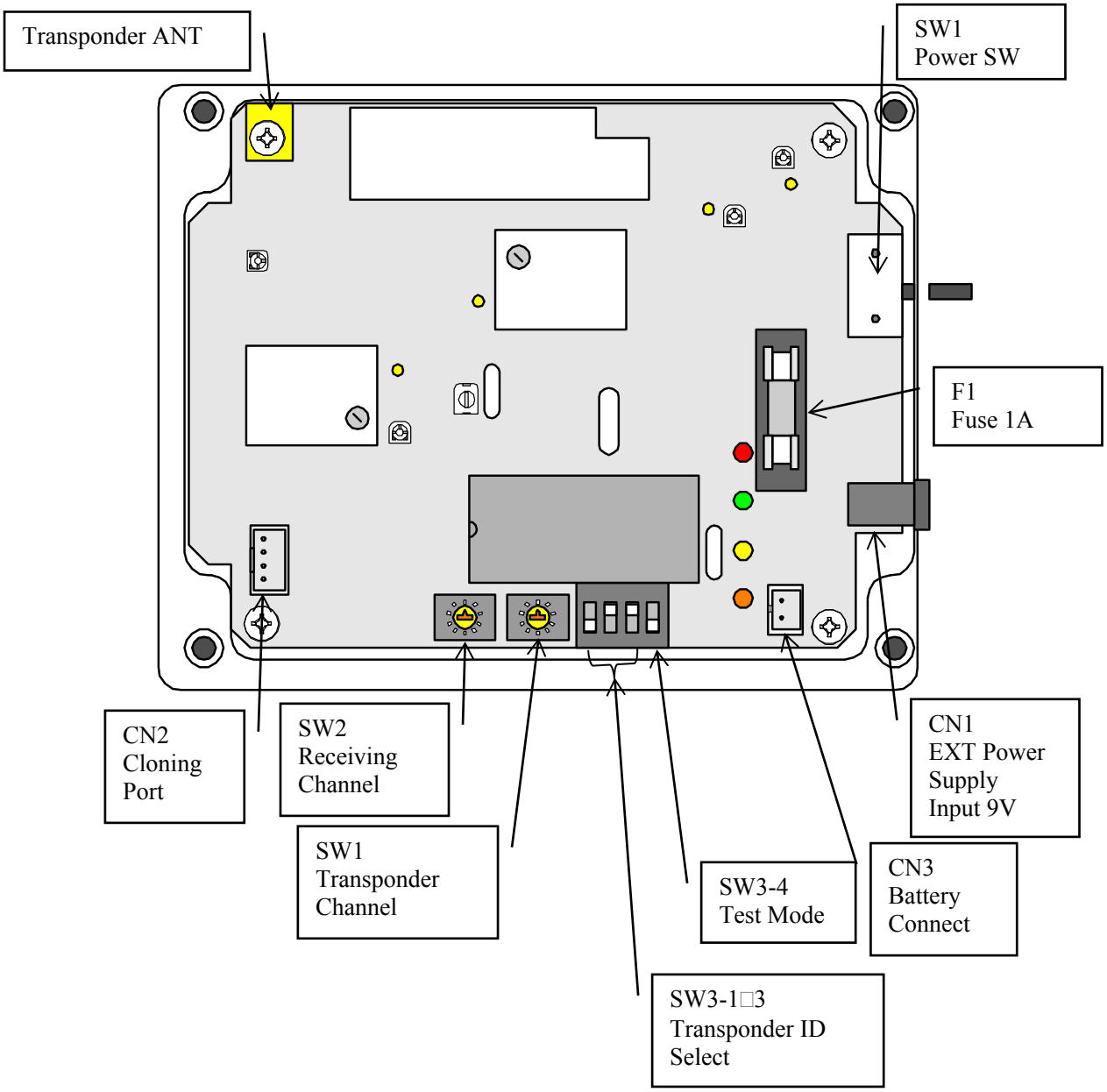
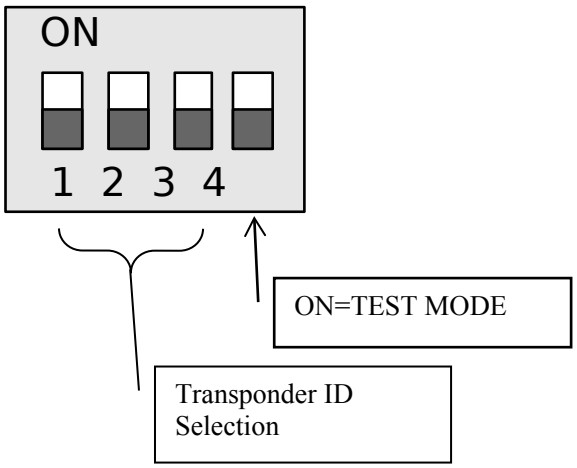


Fig.3-2 TRANPONDER

□□□□Transponder Dip-SW Setting

□SW□□MODE□SELECT



□TEST□MODE□SELECT□□SW3-4□

SW1-1 is ON when turning on power, it will enter into Test Mode.

Data will be received continuously in the Test Mode. When SW3-1 is OFF, it receives data at Transmitter receiving frequency. When SW3-1 is ON, it receives data at Transponder receiving frequency. In that case, if RSSI is ON green LED will be flashed, if N-DET is ON red LED will be flashed.

In Test Mode, changing SW3-4 into OFF will be in Transfer Mode. At that time, if SW3-1 is OFF it transfers only carrier wave, if ON it transfers □□□□ID continuously.

Restart with SW3-4 OFF, it returns to normal mode.

□Transponder ID Selection □SW3-1□3□

SW3-1	SW3-2	SW3-3	ID
OFF	OFF	OFF	1
ON	OFF	OFF	2
OFF	**ON**	OFF	3
ON	**ON**	OFF	4
OFF	OFF	**ON**	5
ON	OFF	**ON**	6
OFF	**ON**	**ON**	7
ON	**ON**	**ON**	8

NOTE: In case of connecting multiple transponders, be sure not to set same Transponder IDs.

□ Receiving Channel Selection □SW2□

Receiving channel means receiving frequency when receiving the signal from Transmitter.

SW2	Receiving CH	Receiving Frequency
0	1 CH	318.125MHz
1	2 CH	318.500MHz
2	3 CH	318.875MHz
3	4 CH	319.250MHz

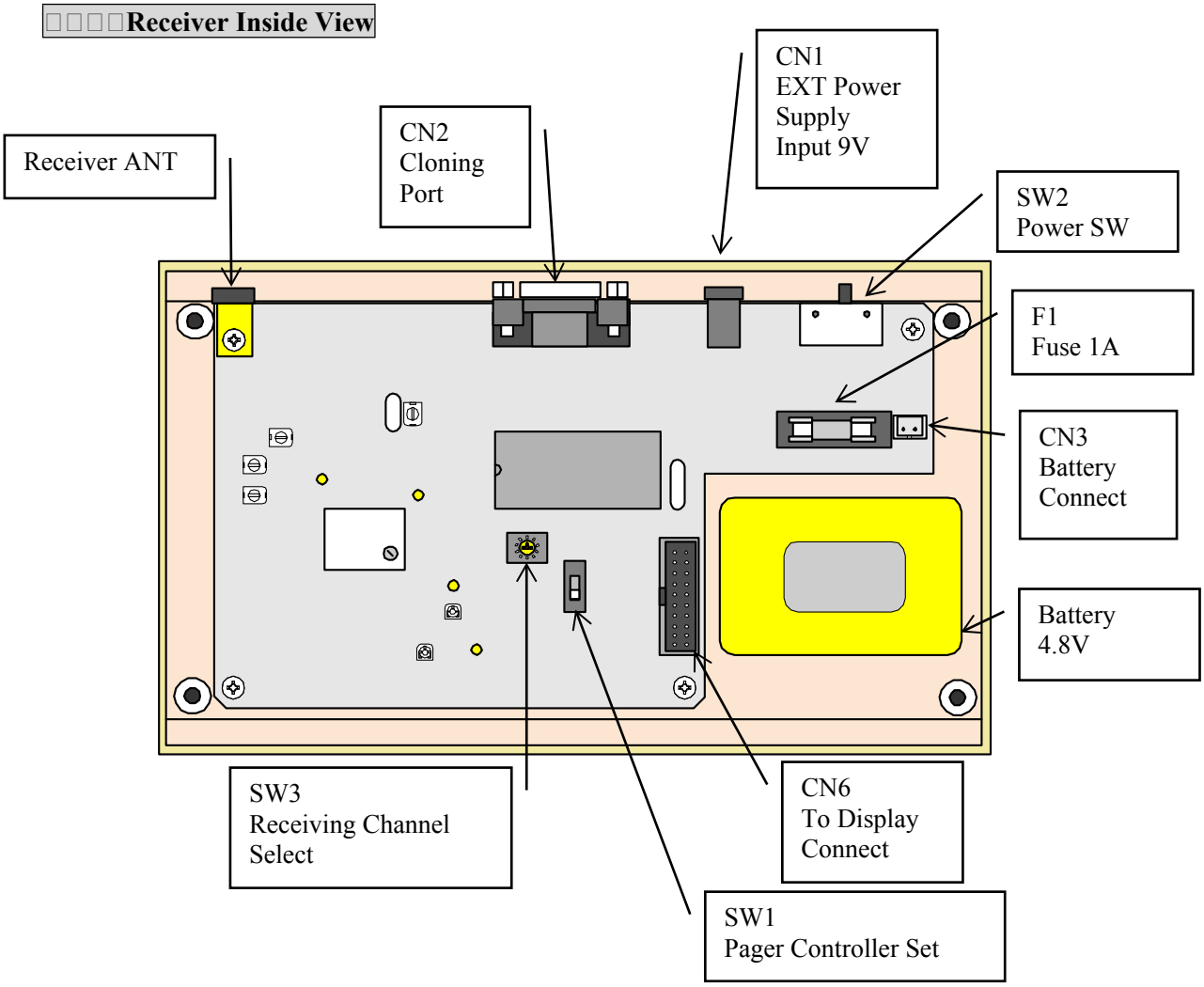
NOTE: It is impossible to receive the signal if the transmission wave has no accordance with receiving wave.

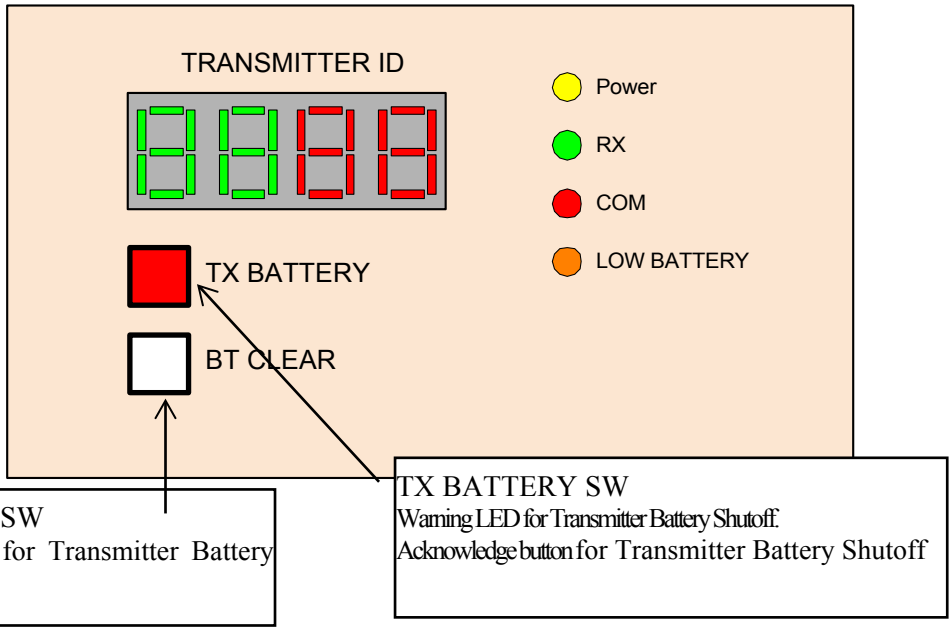
□ Transponder Channel Selection □SW1□

Transponder Channel means identical frequency at which multiple Transponders transfers and receives mutually.

SW1	Transponder CH	Transponder Frequency
0	1 CH	314.500MHz
1	2 CH	314.525MHz
2	3 CH	314.550MHz
3	4 CH	314.575MHz
4	5 CH	314.600MHz
5	6 CH	314.625MHz
6	7 CH	314.650MHz
7	8 CH	314.675MHz
8	9 CH	314.700MHz
9	10 CH	314.725MHz

□□□□Receiver Inside View





BT CLEAR SW
ID Reset button for Transmitter Battery Shutoff

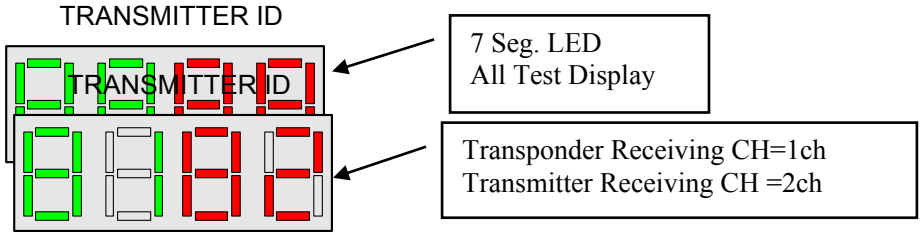
TX BATTERY SW
Warning LED for Transmitter Battery Shutoff.
Acknowledge button for Transmitter Battery Shutoff

□□□□Receiver Test Mode 1

□TEST□MODE□□□SELECT

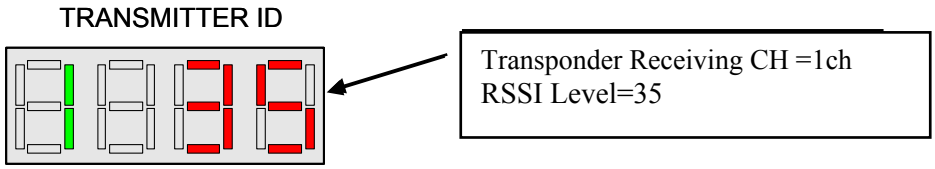
When Power SW is ON in pushing BT CLEAR SW on Front Panel, it will be Test MODE 1.

First, when BT CLEAR SW is pushing □□□□ is displayed in 7segment LED for 1sec and then the LED of RX, COM and TX□BATTERY is flashed sequentially.

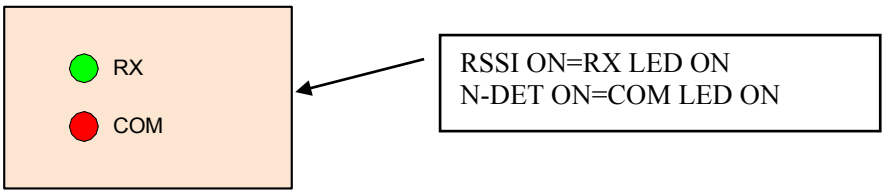


Second, it displays the receiving channel of transmitter and transponder which are in memory, like 0102□Transponder = 1CH, Transmitter = 2CH□.

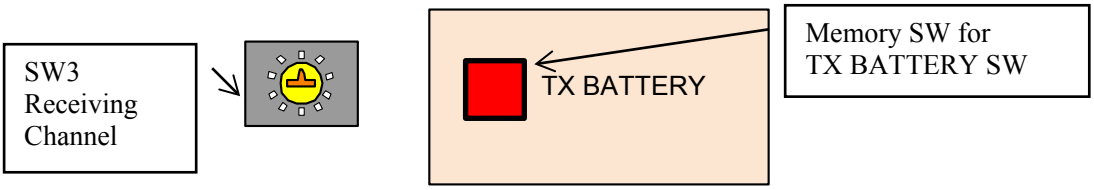
When BT CLEAR SW is released, it will be in Transponder receiving acknowledge Mode. Transponder receiving channel is displayed in left side LED with green and RSSI Level□radio field intensity□ is displayed in right side LED with red.



When RSSI is ON□RSSI□40□, RX□LED is flashed with green and when N-DET is ON, COM□LED is flashed with red.



To change the Transponder receiving channel is switching over SW3 of Rotary Dip SW in the Main Board to target channel, and then push the TX BATTERY SW in the Front Panel to memory the setting.

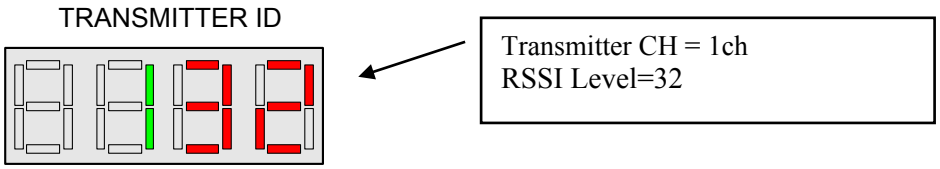


Transponder Channel Select □SW3□

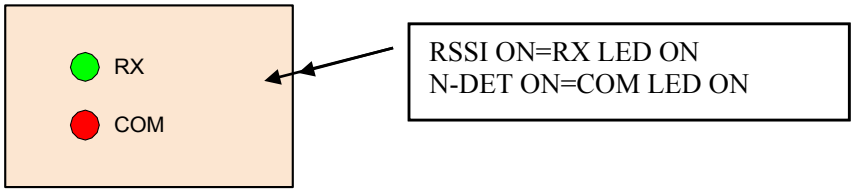
Transponder Channel means receiving frequency when receiving the signal from Transponder.

SW1	Transponder CH	Transponder Frequency
0	1 CH	314.500MHz
1	2 CH	314.525MHz
2	3 CH	314.550MHz
3	4 CH	314.575MHz
4	5 CH	314.600MHz
5	6 CH	314.625MHz
6	7 CH	314.650MHz
7	8 CH	314.675MHz
8	9 CH	314.700MHz
9	10 CH	314.725MHz

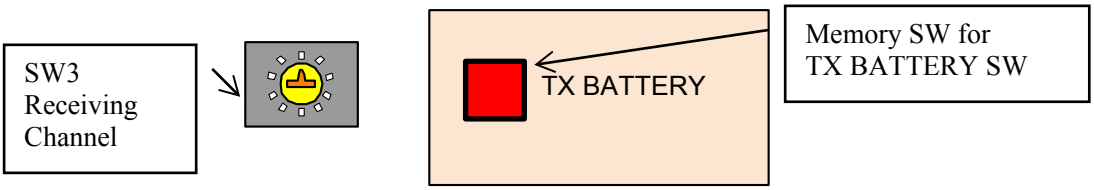
After pushing BT CLEAR SW in Front panel again, it will be in Transmitter receiving acknowledging Mode. Current Transponder receiving channel is displayed in left side LED with green and RSSI Level□radio field intensity□ is displayed in right side LED with red.



When RSSI is ON□RSSI□40□, RX□LED is flashed with green and when N-DET is ON, COM□LED is flashed with red.



To change the Transponder receiving channel is switching over SW3 of Rotary Dip SW in the Main Board to target channel, and then push the TX BATTERY SW in the Front Panel to memory the setting.



□ Transmitter Receiving Channel Select □SW3□

Receiving channel means receiving frequency when receiving the signal from Transmitter.

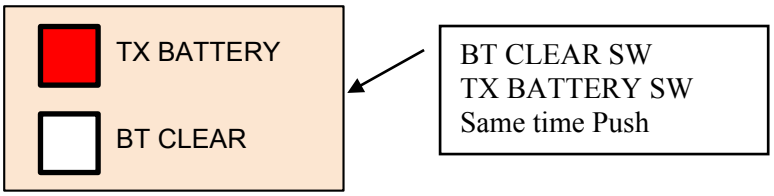
SW3	Receiving CH	Transmitter Receiving Frequency
0	1 CH	318.125MHz
1	2 CH	318.500MHz
2	3 CH	318.875MHz
3	4 CH	319.250MHz

NOTE: It is impossible to receive the signal if the transmission wave has no accordance with the receiving wave.

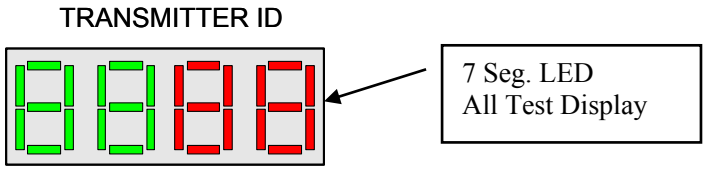
□It returns to normal mode by restart.

□□□□Receiver Test Mode 2 (Melody Test)□

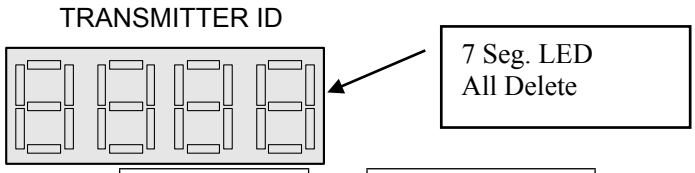
When□POWER SW is ON in pushing BT CLEAR SW and TX BATTERY SW on Front Panel simultaneously, it will enter into Test MODE 2.



First, when BT CLEAR SW and TX BATTERY SW is pushing, □□□□ is displayed in 7segment LED for 1sec and then the LED of RX, COM and TX□BATTERY is flashed sequentially.

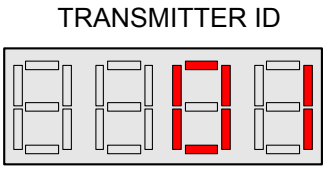


The display of □Seg. LED is cleared after 2sec.



Second, release BT CLEAR SW and TX BA T CLEAR SW once. It displays Melody Number 01 in7 seg. LED w lody of Yankee Doodle from a loudspeaker only once except that Volume Control is OFF

01=Yankee Doodle



In addition, if BT CLEAR SW is pushed again, it displays Melody Number 02 in7 seg. LED with red and sounds the melody of Oh Bury Me Not On The Lone Prairie only once.

Each time BT CLEAR SW is pushed, it sounds 16 melodies and 1 audible alarm to test these sounds.

□It returns to normal mode by restart.

□□□□Pager□Controller□Protocol

In case of using PAGER□CONTROLLER, SW1 in Main Board should be ON.

If the SW1 is ON without connecting Pager Controller by mistake or Pager Controller power is OFF, it alarms sound each 30sec.

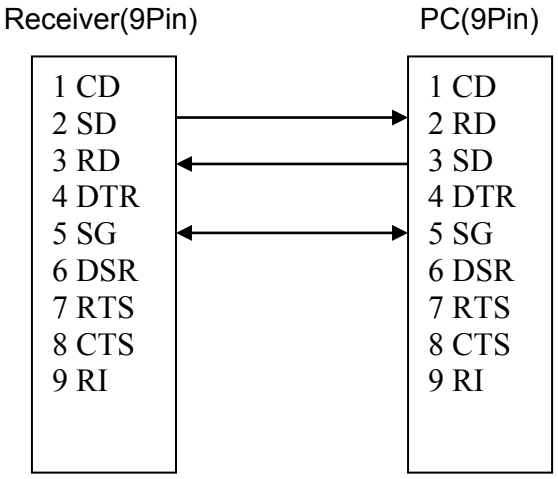
1. Pager Controller communication□Form

BAUD RATE	9600BPS
DATA BIT	8-BIT
PARITY	NONE
STOP BIT	1BIT

2.Data Format

Start BIT (1bit)	DATA (8bit)	Stop BIT (1bit)

3.RS-232-C Connector



4.Cominucations Protocol

	[PC]		[Receiver]
[□□ Sensing Data Transfer] The Receiver transfers sensing information and battery shutoff information. It transfers the data periodically each 5sec.		←	□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□… □□□□□□□□□□[BCC][CR] Transmitter ID (4-digits) which is sensing moisture or battery shutoff is transferred after [:][K], and then Transmitter status ("1" = Sensing moisture, "2" = Battery shutoff, "3" = "1" and "2") is transferred as single-digit. When multiple IDs or status is transferred, they are broken by □□□and added [BCC][CR] at the end. When there are nothing of transmitting information, □□□[K][BCC][CR] are transferred.

□□BCC Calculating Methods

:	K	0101	1	CN
(STX)	(CMD)	(ID)	(DATA)	(BCC)

□□□□□□□□□□□ Calculating Range

□□□It gets the SUM from CMD to DATA and divides into MSB 4bits and LSB 4bits, and
then adds 40H and converts into 2 bytes word as hexadecimal.

□□Example 1□□□□□□□□□□□□□
□□□□□□'□'□'□'□'□'
□□□□□□□□41□□42□□□43
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
□□□□□□□□□□□□□□□□□□□LSB□□□□□□□
□□□□□□□□□□□□□□□□□□□MSB□□□□□□□
□□□□□□□□□□□□□□□□

Example 2 □□□
□□□□□□'
□□□
□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□
□□□□□□□□□□□□□□□□□□□LSB□□□□□□□
□□□□□□□□□□□□□□□□□□□MSB□□□□□□□
□□□□□□□□□□□□□□□□

□□ID Types

Transmitter ID

Transmitter ID "0608" is 4-digit number, first 2-digit is Area ID and last two-digit is individual unique ID.

□16 types of Area ID□"01"□"16"("01"□"10"[Hex])

□99 types of Unique ID□"01"□"99"("01"□"63"[Hex])

□□□□□□□□□□□□□□

□□□□Transmitter Clone Mode

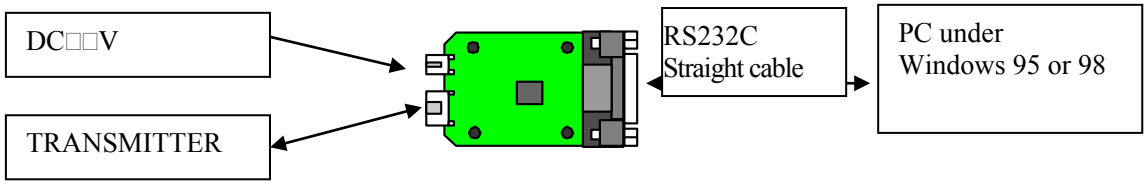


Fig.4-1 CONNECTION OF CLONING UNIT

□Connect the cloning unit like above chart, and start up PC and then run “Hyper Terminal” of Windows accessory.

Fig.4.2 Initial window of Hyper Terminal

□After running Hyper Terminal, the following window will open. Set as below.

Fig.4-3-1 Start-up window of Hyper Terminal

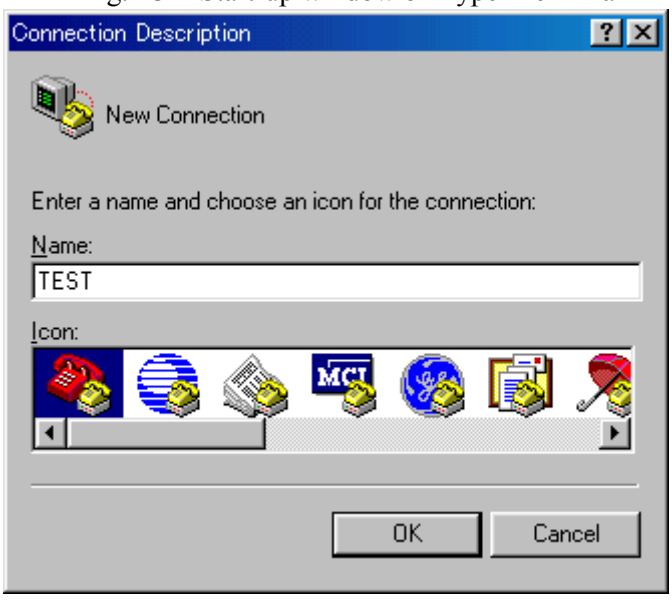


Fig.4-3-2 Setting window of COM PORT

Fig.4-3-3 Setting window of COM PORT

□The following Transmitter start-up screen (Fig.4-4) will be displayed after setting Communication Port and Communication protocol and insert a battery.

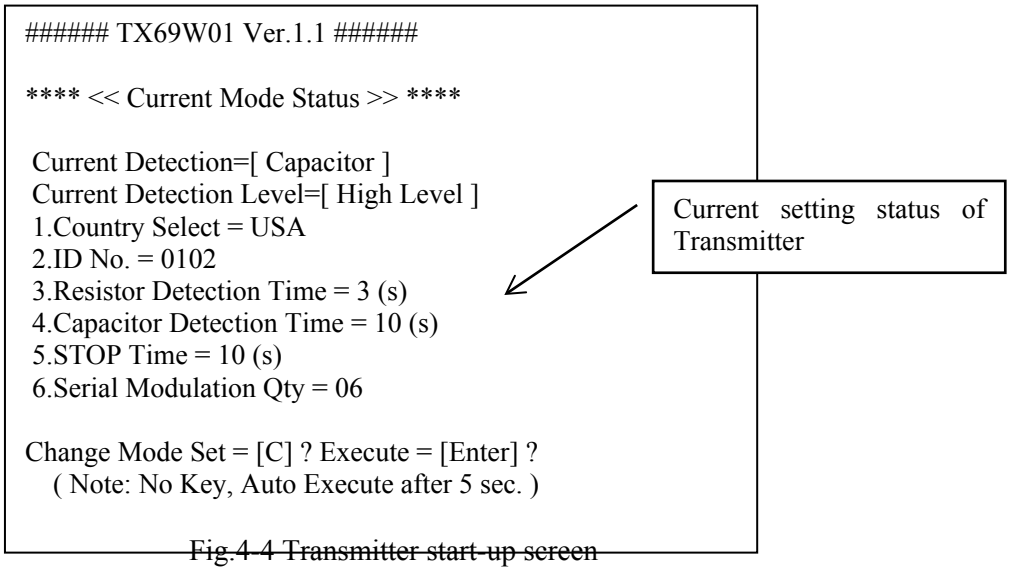


Fig.4-4 Transmitter start-up screen

□At this point when pushing C key within 5sec, the following screen (Fig.4-5) is displayed and Mode Set can be changed. Pushing Enter key terminates the setting.

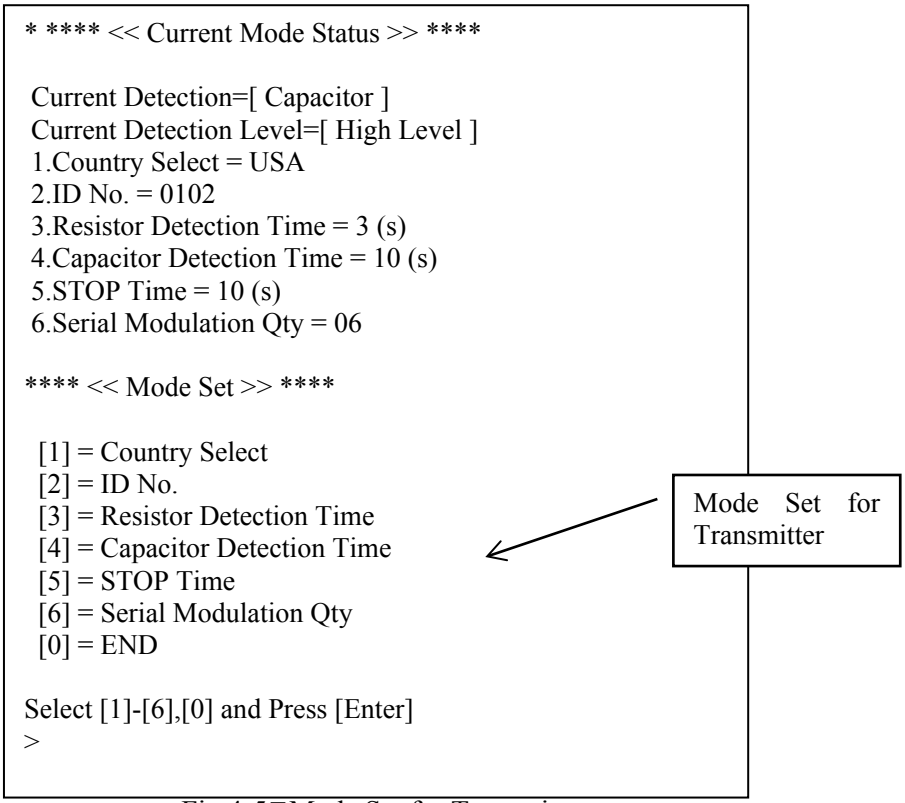


Fig.4-5□Mode Set for Transmitter

□Country Set (Select [□] in Fig. 4-5)

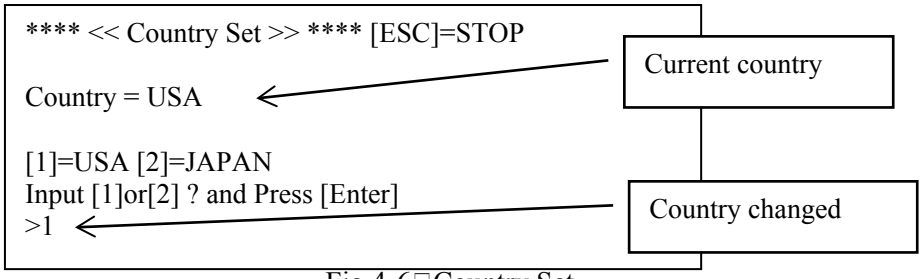


Fig.4-6□Country Set

□Transmitter ID Set (Select [□] in Fig.4-5)

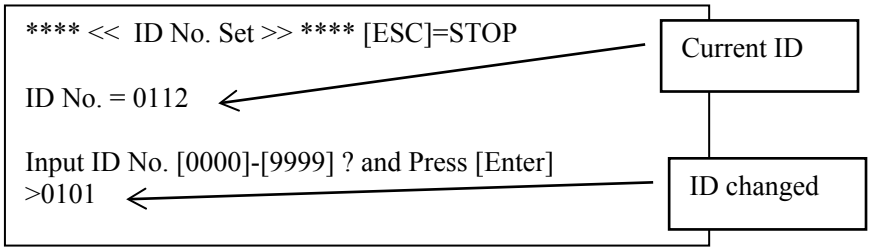


Fig.4-7□Transmitter ID Set

□Setting of Resistor Detection Time. (Select [□] in Fig.4-5)

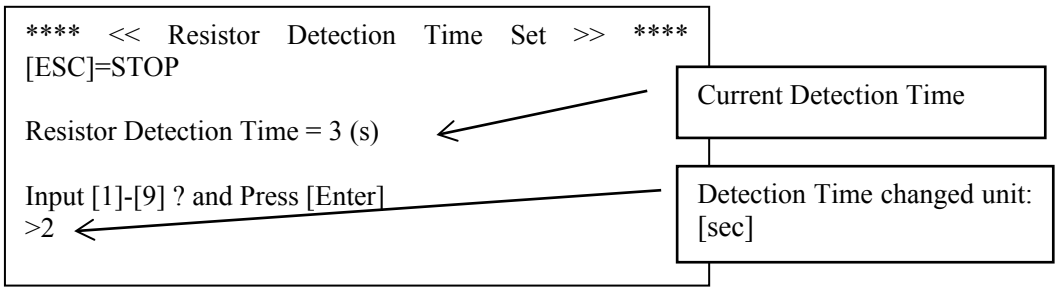


Fig.4-8□ Setting of Resistor Detection Time

□Setting of Capacitor Detection Time. (Select [□] in Fig.4-5)

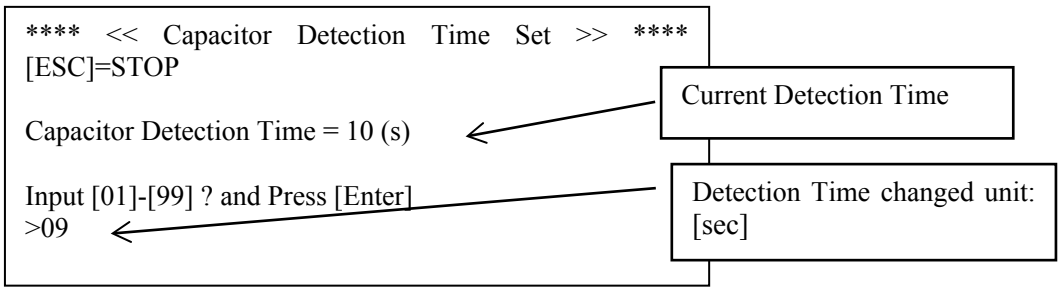


Fig.4-9□ Setting of Capacitor Detection Time

□Setting of Transmission Stop Time. (Select [□] in Fig.4-5)

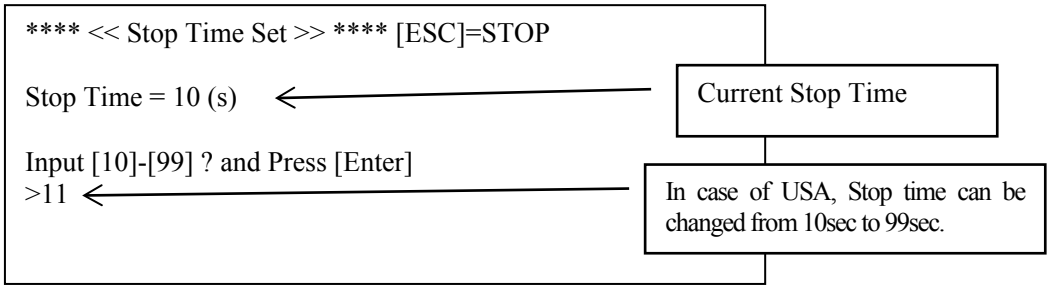


Fig.4-10□ Setting of Transmission Stop Time

□Setting of Modulation number of times. (Select [□] in Fig.4-5)

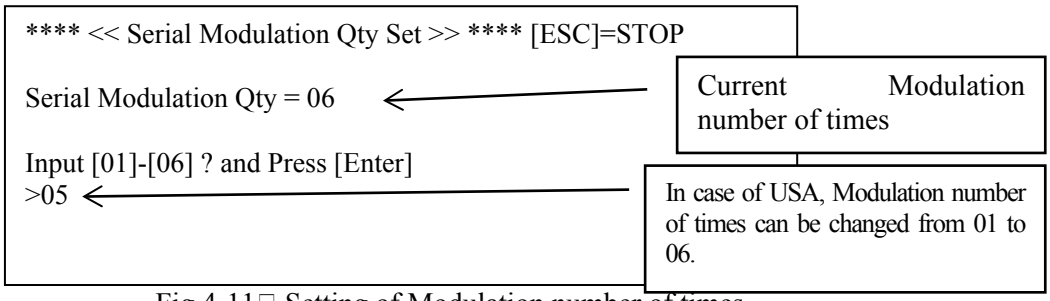


Fig.4-11□ Setting of Modulation number of times

□Setting Mode(SW1-1 & SW1-4 ON)
□At this point when pushing C key within 5sec, Mode Set can be changed.

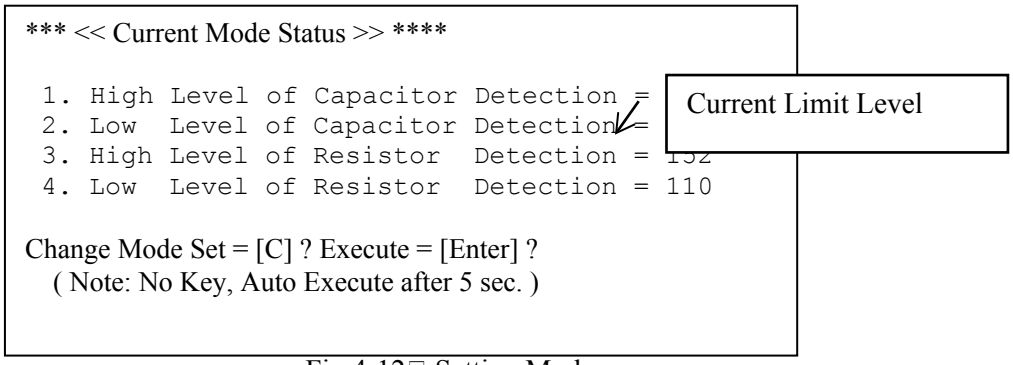


Fig.4-12□ Setting Mode

□Select [□] in Fig. 4-5, and then CLONING MODE will be terminated.
After terminated CLONING□MODE, it returns to Normal Mode.

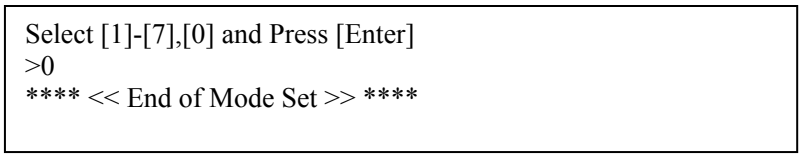


Fig.4-13□ CLONING□MODE Termination

□□□□□Transponder Clone Mode

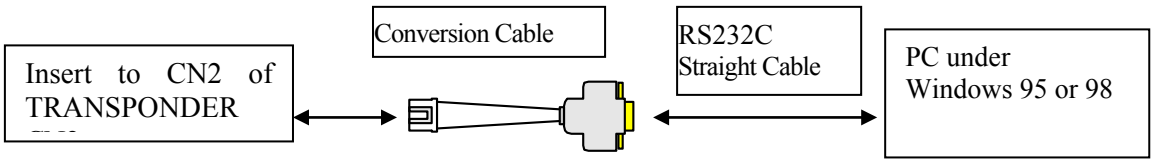


Fig.4-14 CONNECTION OF CLONING UNIT

□Connect the cloning unit like above chart, and start up PC and then run "Hyper Terminal" of Windows accessory.
□When TRANSPONDER turned ON, the following screen (Fig.4-15) is displayed.

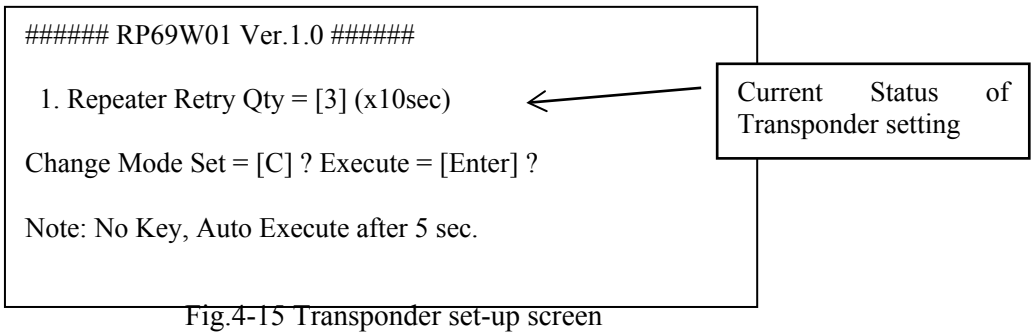


Fig.4-15 Transponder set-up screen

□At this point when pushing C key within 5sec, the following screen (Fig.4-16) is displayed and Mode Set can be changed. Pushing Enter key terminates the setting.

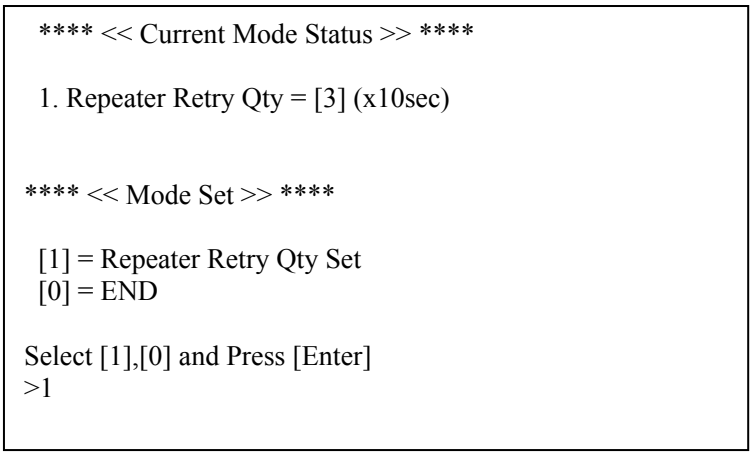


Fig.4-16□Setting for Transponder

□Setting of Transponder Re-try number of times (Select [□] in Fig.4-16)

It means even the signal from Transponder is aborted, it holds IDs for re-try number of times multiplied by 10sec.

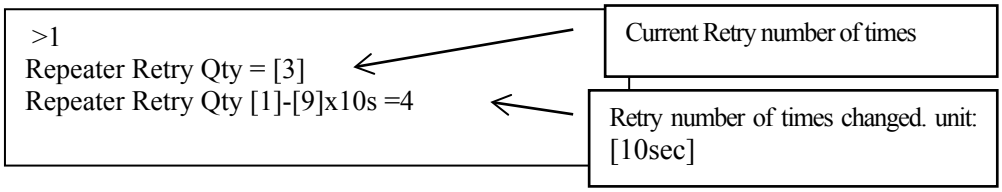


Fig.4-17□ Setting of Transponder Re-try number of times

□Select [□] in Fig. 4-5, and then CLONING MODE will be terminated.
After terminated CLONING□MODE, it returns to Normal Mode.

```
**** << Mode Set >> ****

  [1] = Repeater Retry Qty Set
  [0] = END

Select [1],[0] and Press [Enter]
>0
Mode set end.
```

Fig.4-18□ CLONING□MODE Termination

□□□□Receiver Clone Mode

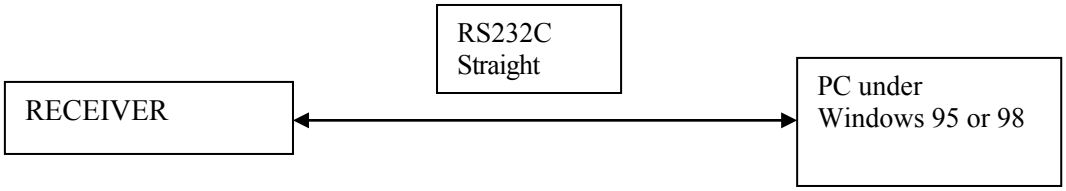


Fig.4-19 CONNECTION OF CLONING UNIT

□Connect the cloning unit like above chart, and start up PC and then run "Hyper Terminal" of Windows accessory.
□When Receiver turned ON, the following screen (Fig.4-20) is displayed.

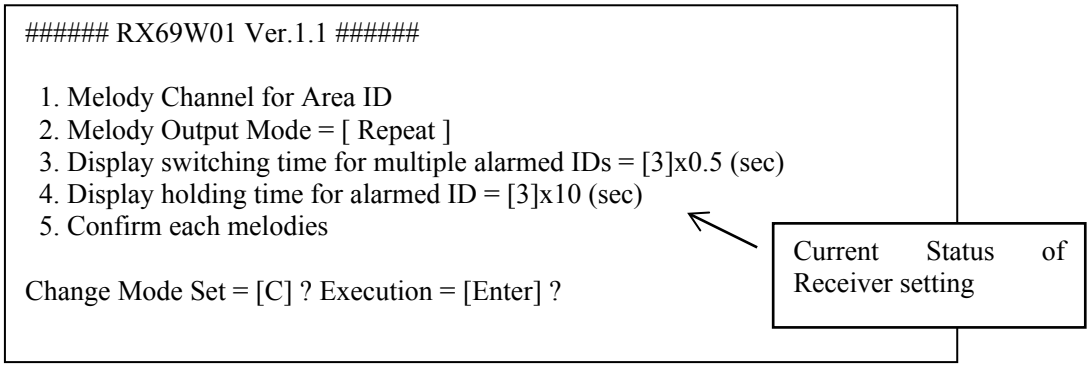


Fig.4-20 Initial screen of Receiver

□At this point when pushing C key within 5sec, the following screen (Fig.4-5) is displayed and Mode Set can be changed. Pushing Enter key terminates the setting.

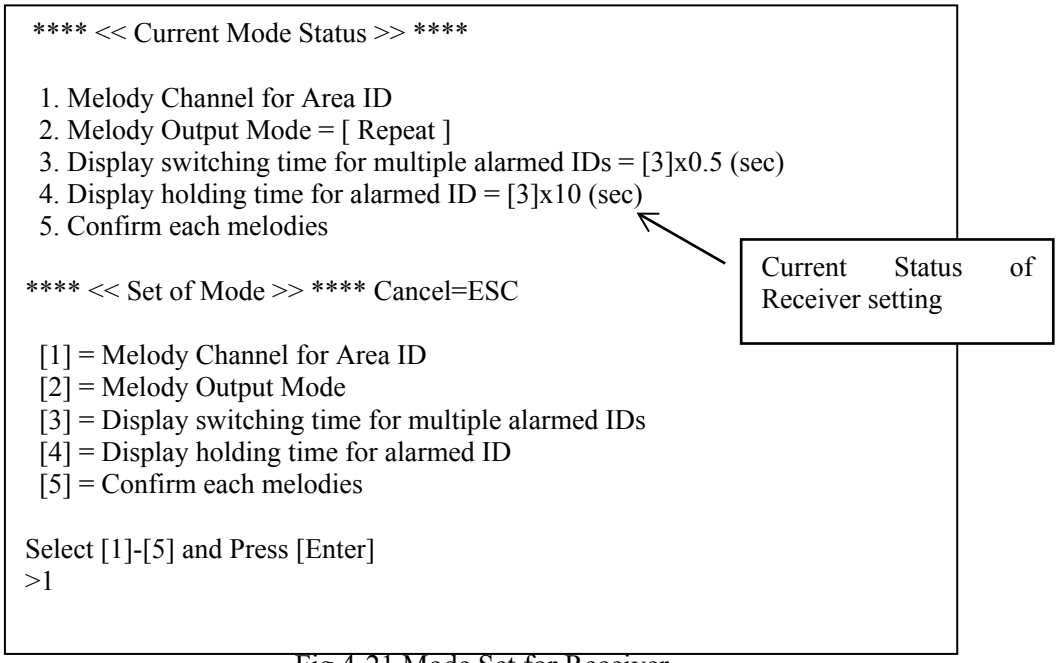


Fig.4-21 Mode Set for Receiver

□Change Melody for Area Id

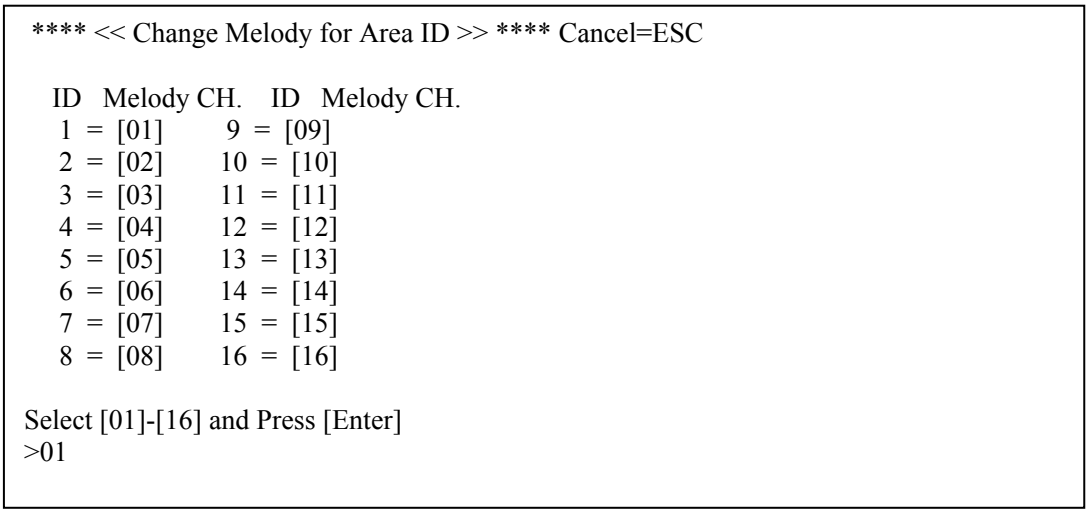


Fig.4-22 Setting Melody Channel for Area ID

□Change Melody for Area Id (Select [□] in Fig.4-22)

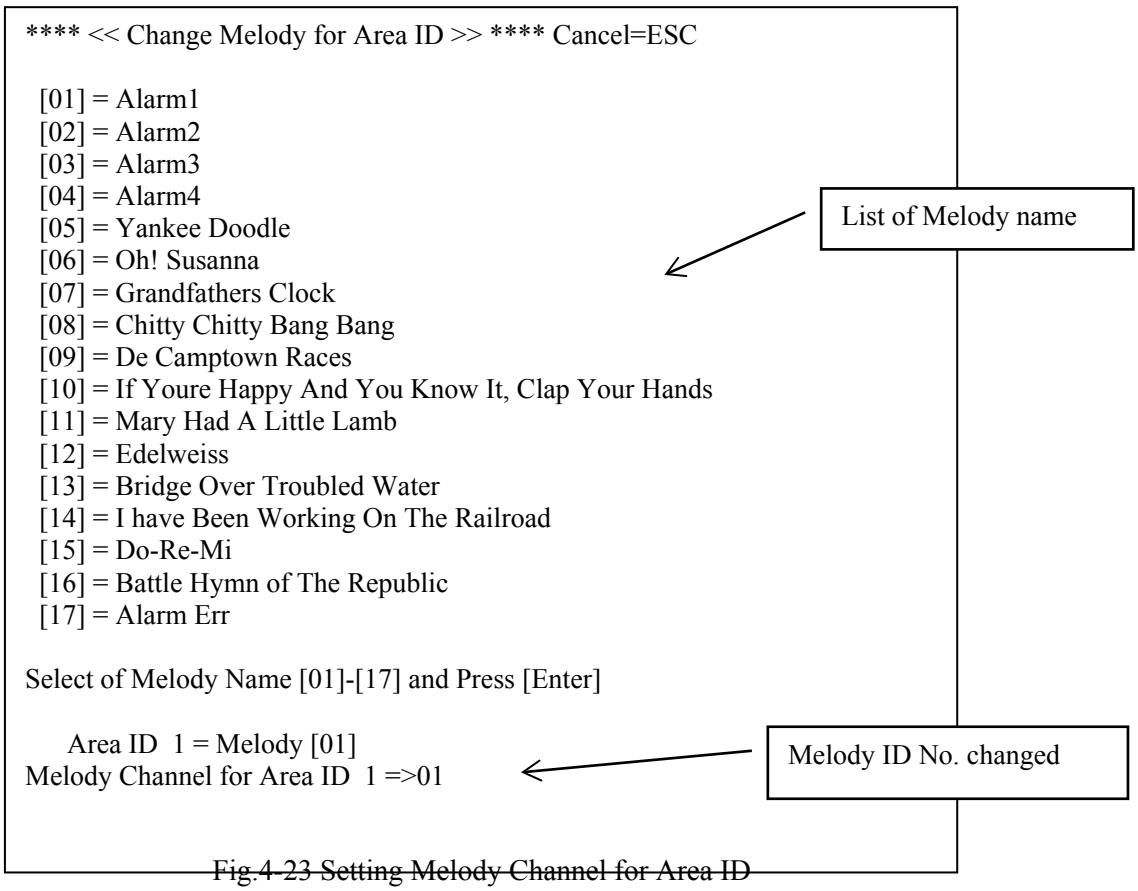


Fig.4-23 Setting Melody Channel for Area ID

□Setting of Melody Output Method (Select [□] in Fig.4-21)

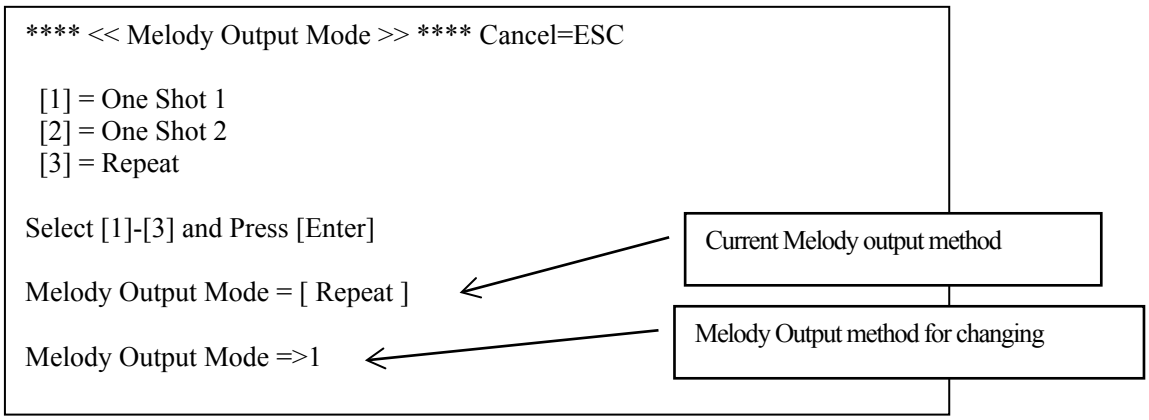


Fig.4-24 Melody output method Set

□Display switching time for multiple ID's Set (Select [□] in Fig.4-21)

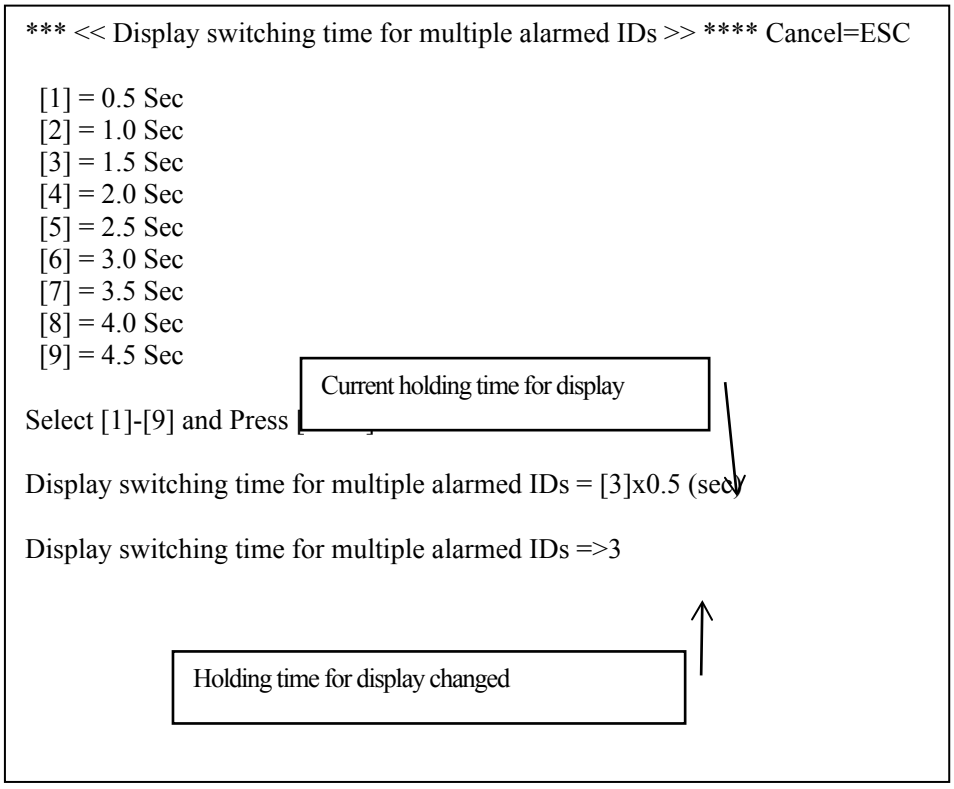


Fig.4-25 Changing Display holding time for Multiple IDs

□Display holding time for alarmed ID Set (Select [4] in Fig.4-21)

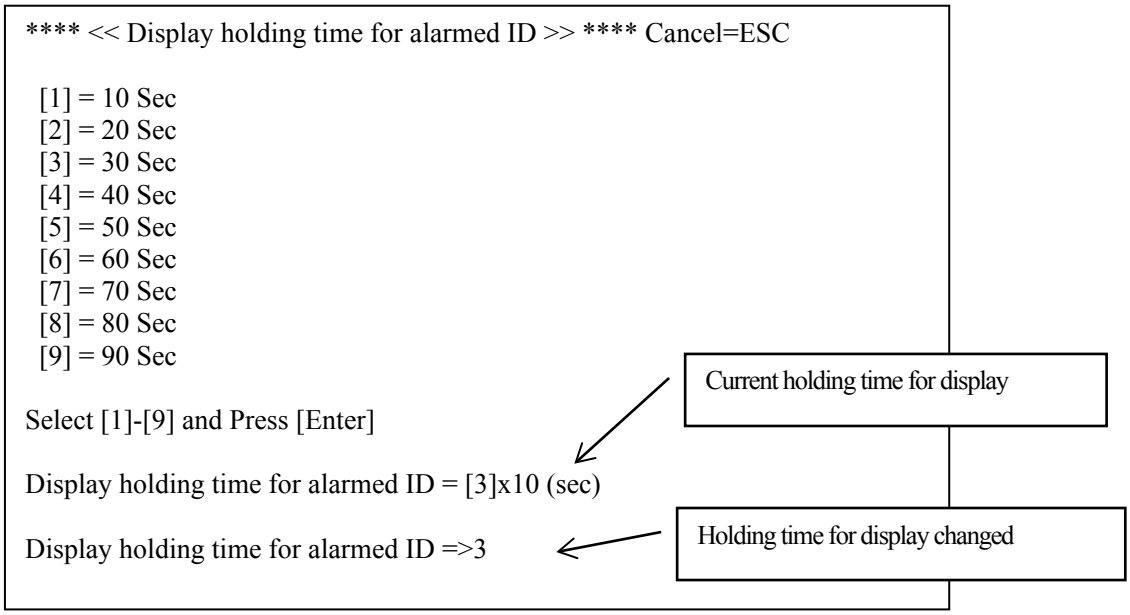


Fig.4-26 Changing Display holding time

□Confirm each melodies (Select [□] Confirm in Fig.4-21)

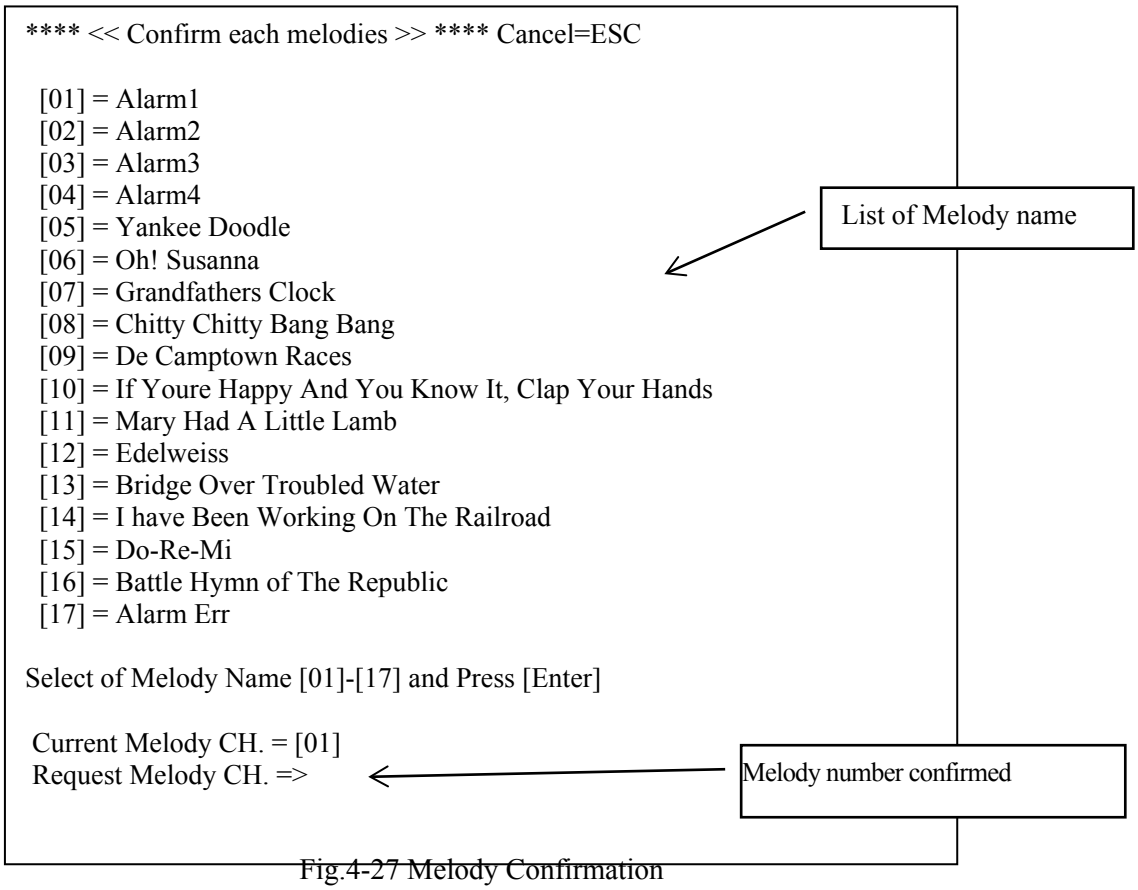


Fig.4-27 Melody Confirmation

□Push [Esc] in Fig. 4-21, and then CLONING MODE will be terminated.
After terminated CLONING□MODE, it returns to Normal Mode.

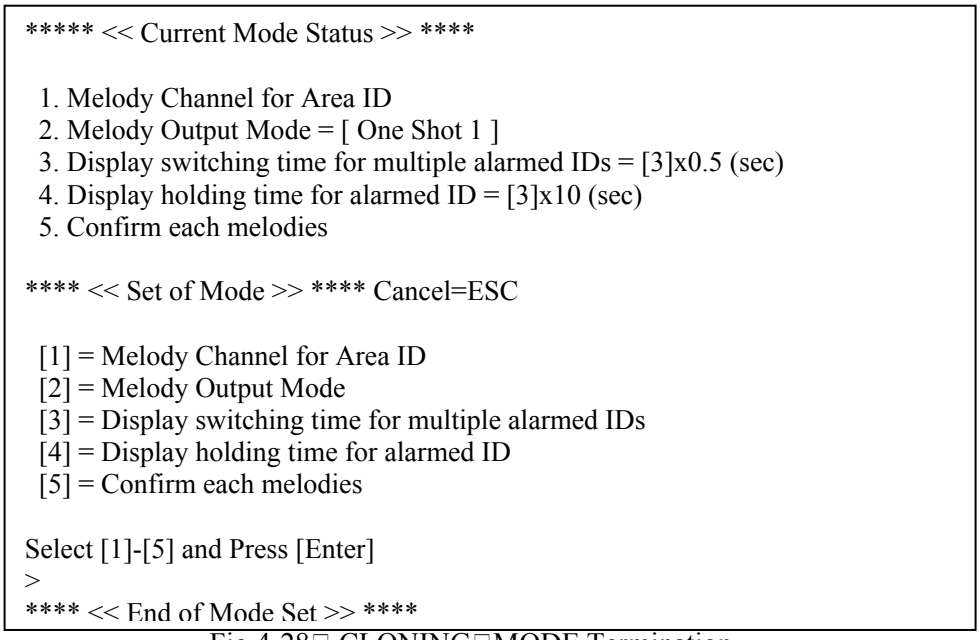


Fig.4-28□ CLONING□MODE Termination