ATTACHMENT E.

- USER'S MANUAL

Service Manual

(DN-308)

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Rev 1.0

Federal Communications Commission Requirements

Warning : Changes or modifications not expressly approved by the party responsible for compliance with the FCC'S rules could void the user's authority to operate the equipment.

Because of the limited space on the model DN-308 Digital Voice Recorder case, the notice of Compliance with FCC Rules is printed here

> **Dyne Telecom Co., Ltd**
>
> **FCC ID : N5ZDN308**
>
> **THIS DEVICE COMPLIES WITH PARTS 15 OF FCC RULES**
> **OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS**
> **THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE,**
> **AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE**
> **RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE**
> **UNDESIRED OPERATION.**

NOTE : 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 communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment dose 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**

1.   Outline

The Digital Voice Recorder (DN-308)

- The Voice Recorder that can save (compression) and play the voice

- Smallest size, easy to carry

- Control the unit with Wireless Remote controller (REC/STOP keys)

2.   Features

Digital Voice Recorder

- Automatic Voice Operated Recording (VOR)
- Automatic Power Off
- Intro-Scan/Monitoring
- (400 Messages per 1Folder)
- Erase Function
- Hearing Aid Facility
- LCD Back Lighting
- Large LCD and User Friendly Interface
- 4 Steps Battery Indicator
- Telephone/ Mobile Phone Recording with Special Kit
- Fast Download to PC Through USB Interface

3 . Digital Voice Recorder & Receiver Specification

3-1. Digital Voice Recorder

Recording Time	DN 308(LP:250Min, SP:125Min)
Recording System	Flash Memory
Number of Message	Max.400
Voice Freq. Bandwidth	350Hz~4KHz
Maximum output	80mW or more(16Ω Speaker)
Speaker	Built-in 28mm round dynamic speaker 3.5mm mini-jack, impedance 16Ω
Input	Built-in Microphone 3.5mm mini-jack, impedance 2kΩ
External Connection Earphone	3.5mm mono
Jack	External Mic Jack :3.5mm mono
Power Supply	Rated Voltage : DC3V Battery : Two " AAA " Size Battery (LR03 or R03)
Battery Life	Approx. 9 hours(Play Mode, Vol:10) 11 hours(Rec. Mode)
Dimension	H:101mm x W:3441 X D:15mm (without protrusions)
Weight	43g(without Battery)

3-2. Receiver

Sensitivity	-95dBm @400Ω, BR=20Kbit/s, BER<10^{-3}
Maximum Bit Rate	20Kbit/s
Frequency Band	315.16MHz
IF Bandwidth	400KHz
Crystal Frequency	4MHz
Antenna Type	T-Loop Antenna On PCB
Frequency Channel No	1 Ch

4. Circuit Description

DN 308 unit consists of three circuit boards; Main board, and Key board. The Main board is the core of the unit whereas other boards are simple,1that is, the Key board has only contact switches.

4-1. Main Board

Main Board circuit can be divided into several blocks, which are CPU block to control the whole system, DSP block to manipulate the audio signal, and analog block to control the input/output audio signal, and power amplifier.

4-1-1. CPU block

Microprocessor(IC1) is powered by 3V DC/DC converter and controls the power of the DSP and Memory to save the batteries. It controls the LCD and check whether a key is pressed. Every time the CPU detects an event like key-in, it updates the contents of LCD and control the peripherals as the action of event which can be recording or playing back, etc. Mainly the important processes are to control DSP and Memory.

Every Input from the Key board is connected to an input port of the CPU and it can be checked and activated by its falling edge.

4-1-2. DSP(Digital Signal Processor) block

DSP Chip D6571E receives the digitized analog signal from the audio CODEC and compress it to reduce the data size when recording. After compressing, the CPU gets the compressed data from DSP and save it to the Memory. On the opposite way, DSP gets the compressed data from CPU, of course CPU reads the data from the memory, and then decompress the data and send it to the audio CODEC for D/A conversion while playing back.

There is a simple command protocol between the CPU and the DSP to communicate each other. Every time the CPU sends command and then waits the response from the DSP. If there is no response, the CPU cannot proceed the action and writes D-err on LCD.

4-1-3. Memory Block

Model	Flash Memory(Nand Type)	Manufacture
DN 308	8Mbyte x 8bit(64Mbit)	Samsung/Toshiba

Flash memory on the memory block is used to store the voice data. DN 308 is only different from the memory size. The table below shows the memory device for each model.

4-1-4. Audio block

- Mic. Amp

Input audio signal from the built-in microphone or external microphone is amplified by this block and sent to the CODEC IC.

This circuit also includes AGC(Automatic Gain Controller) circuit. The power of the Mic. Amp. circuit is controlled by the CPU.

- Speaker Amp.

The output audio signal from the CODEC is too small to drive Speaker. So this amplifier circuit using Low Voltage Audio Amp.

(IC2) amplifies the small audio signal and make it proper to be played back with the built-in speaker.

- Codec IC

CODEC IC is a single powered(+3VDC) device and has the built-in low pass filter with the frequency response characteristics of 300 to 3400Hz.

This device is used for conversion of AD(Analog to Digital) or DA(Digital to Analog). During the record, the signal from the Mic. amp. is digitized by this device and then sent to DSP for compression. Decompression is done by its reverse order process, that is, DSP decompresses the data and sends them to CODEC. CODEC receives the data from DSP and make it analog signal. When playing back, this analog signal from the CODEC is amplified by the speaker amp. and the speaker will sound.

DC/DC Converter

DC/DC Converter IC(IC4) is a PWM power generator, which is used to supply the stable 3VDC power with the CPU, DSP, etc.

4-2. Key Block

There are 6 keys on the Logic board. They are tied each other on the data bus(Matrix structure). The CPU reads the data bus and checks which key is pressed.

4-3. RX Receiver

RX Receiver Designed to get the High 'Q' on the Carrier Frequency 315.16MHz by connecting IC7(Pin No 15&16)'s T-Type PCB ANT.

Amplify the fc and fL by LNA which placed inside of the IC7. Amplified fc and fL changed to Low Injection Mixer that supply 400KHz IF Frequency(fIF). fIF will be the output of 10pin(Audio Data Output) IC7 after went throw the IF Filter and Demodulator.

The output Data from Audio Data Port input to the 20pin of IC1(CPU) that control the On/Off the "REC".