

KIT 56. DTMF DECODING & DISPLAY

This kit connects to the telephone line and records the number dialed (assuming tone dialling) and the duration of the call. The kit can also be used to record any DTMF tones detected via the built in microphone input. The kit will not detect numbers dialed using pulse dialling. The source code for the K1 micro-controller is provided on the floppy disk for study.

Assembly

Check the components supplied in the kit against the Component Listing. There are several points to note:

- make sure Q3 does not poke up too high.
- pins 15 & 16 on the LCD display are not used they are for backlighting (which this model of LCD does not have.) So the male 14-pin single in-line header goes in from pins 1 to 14.

Solder the lowest height components first; the resistors and capacitors. Solder the two crystals quickly as they are easily damaged by excess heat. The tuning fork crystal can be soldered down by the two pads provided. Put the 9V battery snap through the hole next to the pads to provide strain relief.

Operation via telephone line

Ensure that switches SW2 and SW3 are in the "TEL" position. Connect the decoder to the telephone line and switch on the power. When connected to the telephone line the decoder should be left switched on. The decoder monitors the line condition and turns itself off when the line is not looped (phone is hung up!). Current consumption is less than 50uA when off.

The decoder is activated whenever the phone is picked up ('the line is looped' in telephone jargon.) The LCD display is turned on and the last number dialed, together with the call duration, is displayed. When using the decoder for the first time (or after switching off), the number dialed is blank and the call duration is set to "00:00:00". Hanging up without dialing any digits will not affect the current information.

Dialing any digit will clear the last number dialed and re-start the call duration timer. The first digit dialed and any subsequent digits will be saved automatically. The decoder will save up to a maximum of 16 digits. Any further digits will be ignored.

In order to prolong battery life, the DTMF decoder chip is disabled sixty seconds after the phone is picked up. All dialing must be completed within sixty seconds of picking up the phone. Any digits dialed after sixty seconds are not detected and therefore ignored.

Call progress detection is not implemented on this unit. This means that the decoder cannot detect when the called party answers. Therefore the call duration

time is the elapsed time from the first digit dialed to the phone being hung up.

Operation via microphone input

The microphone input can take a variety of different devices; a dynamic or ceramic microphone as well as a suction cup pickup coil. Be sure to insert the link next to the microphone jack if using a ceramic type microphone, otherwise leave open.

Disconnect the decoder from the telephone line, plug in a microphone or pickup coil and move switches SW2 and SW3 to the "MIC" position. The "MIC" position disables line monitoring and the decoder is unable to power down. Therefore the unit should be switched off when not in use.

Position the microphone close to the DTMF source. If using a pickup coil as input, attach the suction cup to the telephone handset next to the earpiece. Switch on the power. The last number detected will be blank and the call duration set to "00:00:00".

As each DTMF digit is detected it is displayed. If the decoder fails to respond to any DTMF tones, try positioning the microphone closer to the source or increasing the volume of the tones. Excessive volume may distort the signal presented to the DTMF decoder and cause the tones to be ignored. If using the pickup coil, try moving the coil to a different position relative to the earpiece (front, back or side). To reset the call duration time and clear the last number dialed, turn the power off then on again.

Power Consumption

The amount of current consumption varies depending on the mode of operation and the time elapsed since the decoder was activated.

TEL Mode: With the phone hung up, the decoder draws approximately 50uA from the battery. The current jumps to approximately 12mA for the first 60 seconds after picking up the handset. After 60 seconds the DTMF decoder chip and microphone circuitry are disabled and the current consumption drops to approximately 6mA. It will remain at 6mA until the unit is switched off or the phone is hung up.

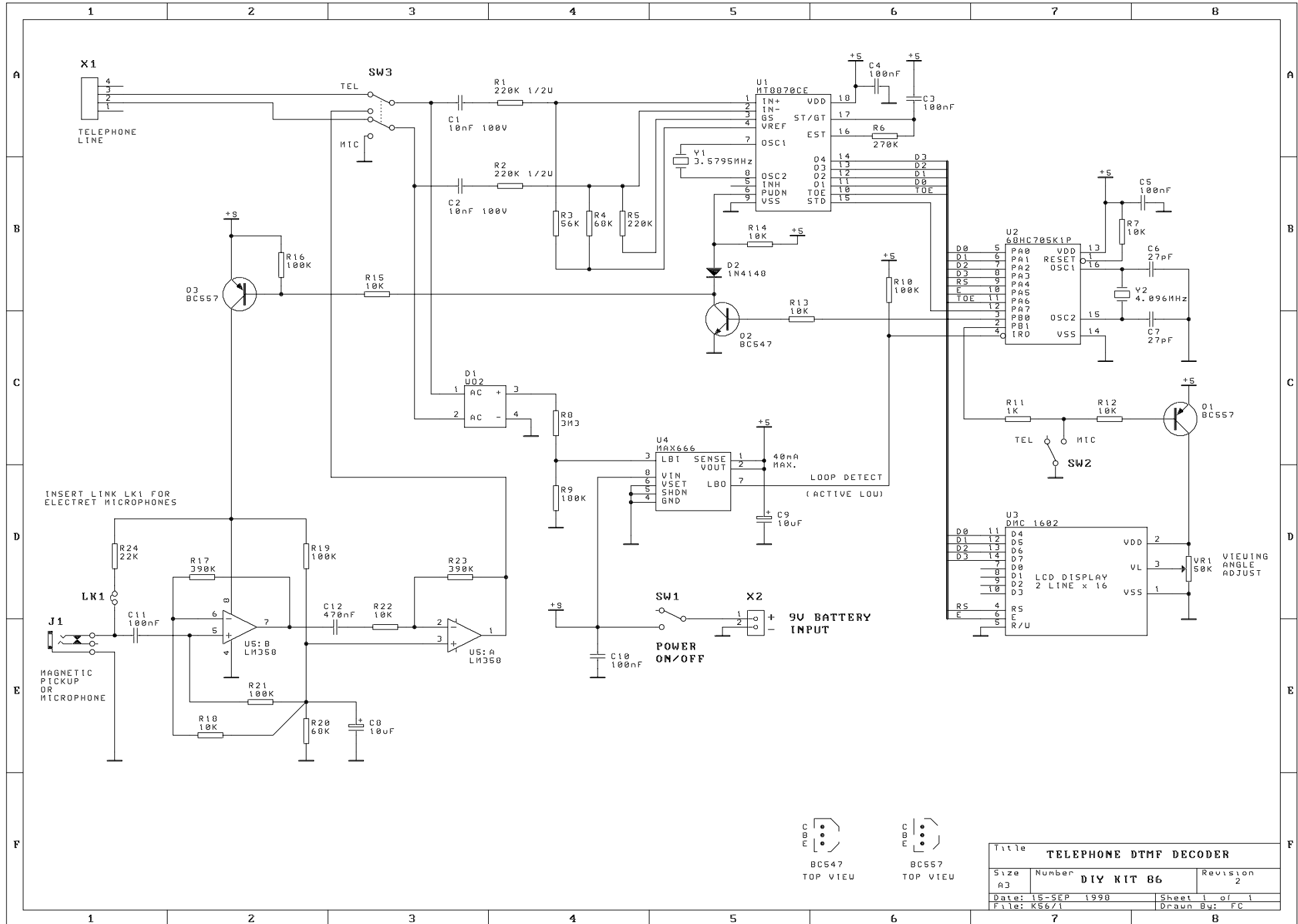
MIC Mode: The decoder draws approximately 12mA from the battery while switched on.

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Components - Kit 56

220K 1/2W resistors	R1 R2	2
Resistors 1/4W, 5%		
1K	R11	1
10K	R7 12 13 14 15 18 22	7
22K	R24	1
56K	R3	1
68K	R4 R20	2
100K	R10 R16 R19 R21	4
180K	R9	1
220K	R5	1
270K	R6	1
390K	R17 R23	2
3M3	R8	1
10K 103 Koa trimpot	VR1	1
1N4148	D2	1
W02 bridge rectifier	D1	1
2-pin header	LK1	1
Jumper		1
3.579MHz crystal	Y1	1
4.096mhz crystal	Y2	1
10nF/63V box capacitor	C1 C2	2
10uF mini electrolytic	C8 C9	2
100nF 104 monoblok	C3 C4 C5 C10 C11	5
0.47uF 474 monoblok	C12	1
27pF ceramic	C6 C7	2
BC557 transistor	Q1 Q3	2
BC547	Q2	1
SPDT switch	SW1 SW2	2
DPDT switch	SW3	1
2.5mm audio jack	J1	1
Telephone jack	X1	1
LCD 2x16		1
14-pin male single-in-line header		1
14-pin female single-in-line header		1
LM358 IC	U5	1
MAX666 IC	U4	1
Programmed 68HC705K1P	U2	1
8870 decoder IC	U1	1
8 pin IC socket		2
16 pin IC socket		1
18 pin IC socket		1
9V battery snap		1
Plastic box & 4 screws		1
K56 PCB		1
Floppy disk		1

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Title			TELEPHONE DTMF DECODER		
Size	Number	Revision			
A3	DIY KIT 86	2			
Date:	15-SEP 1998	Sheet	1 of 1		
File:	K56/1	Drawn	By: FC		

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