

FCC requirements § 2.1033 (b)(4)

**CIRCUIT DESCRIPTION.
SCHEMATIC DIAGRAM**

This page is followed by the Cell-man transmitter description, schematic diagram and part list.

Circuit description

The EUT, Cell-man, enables a "hands free" operation of a cellular phone in the car. The device consists of the microcontroller that handles the phone interface, the microphone and the FM transmitter that transmits the incoming audio from the cellular phone to the car radio. The transmitter operates in 88.1 – 107.9 MHz frequency range. The RF output power is 20 μ W.

The Cell-man is connected to a cellular phone and is powered by 12 V DC power source (cigarette lighter charger in a car).

The device comprises 3 main parts:

1. Charger

The charger resides in a cigarette lighter adapter. It is a sub-assembly containing a small DC/DC converter that supplies the power to the unit. It is current limited to less than 1A.

2. Main Unit

The Main Unit includes a microcontroller that operates at 4MHz. It controls an L.E.D 7 segment display, a keypad of two keys, and the frequency synthesizer. The synthesizer operates from the same 4MHz crystal, and is programmed to set the output frequency from 88.1MHz to 107.9MHz at 50KHz steps.

The incoming audio signal is amplitude limited and then modulates the VCO. The VCO is a transistor based oscillator, controlled by the synthesizer via a varicap.

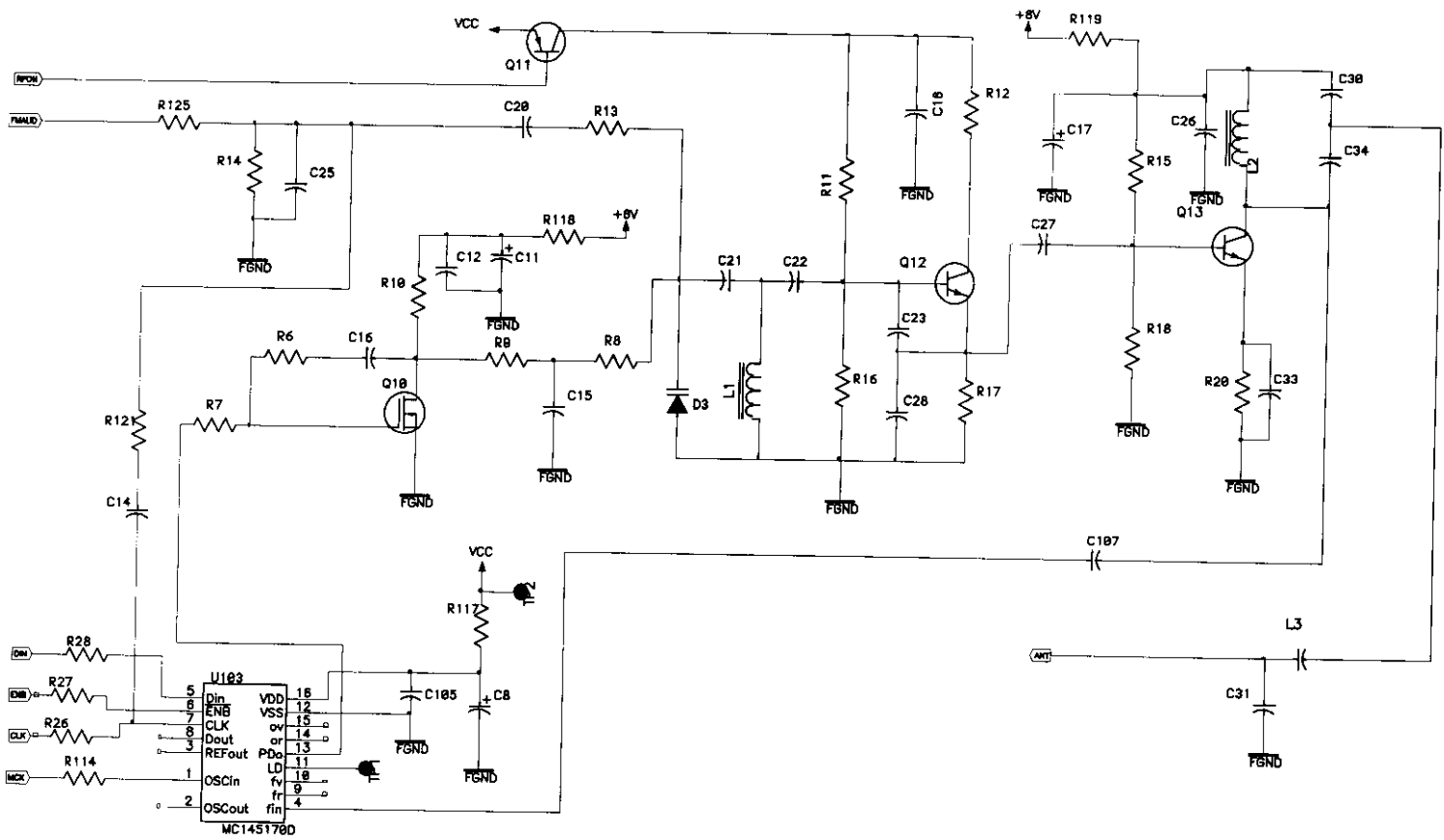
The output stage is a transistor that serves as a buffer and antenna driver.

The antenna is a non adjustable, fixed length antenna.

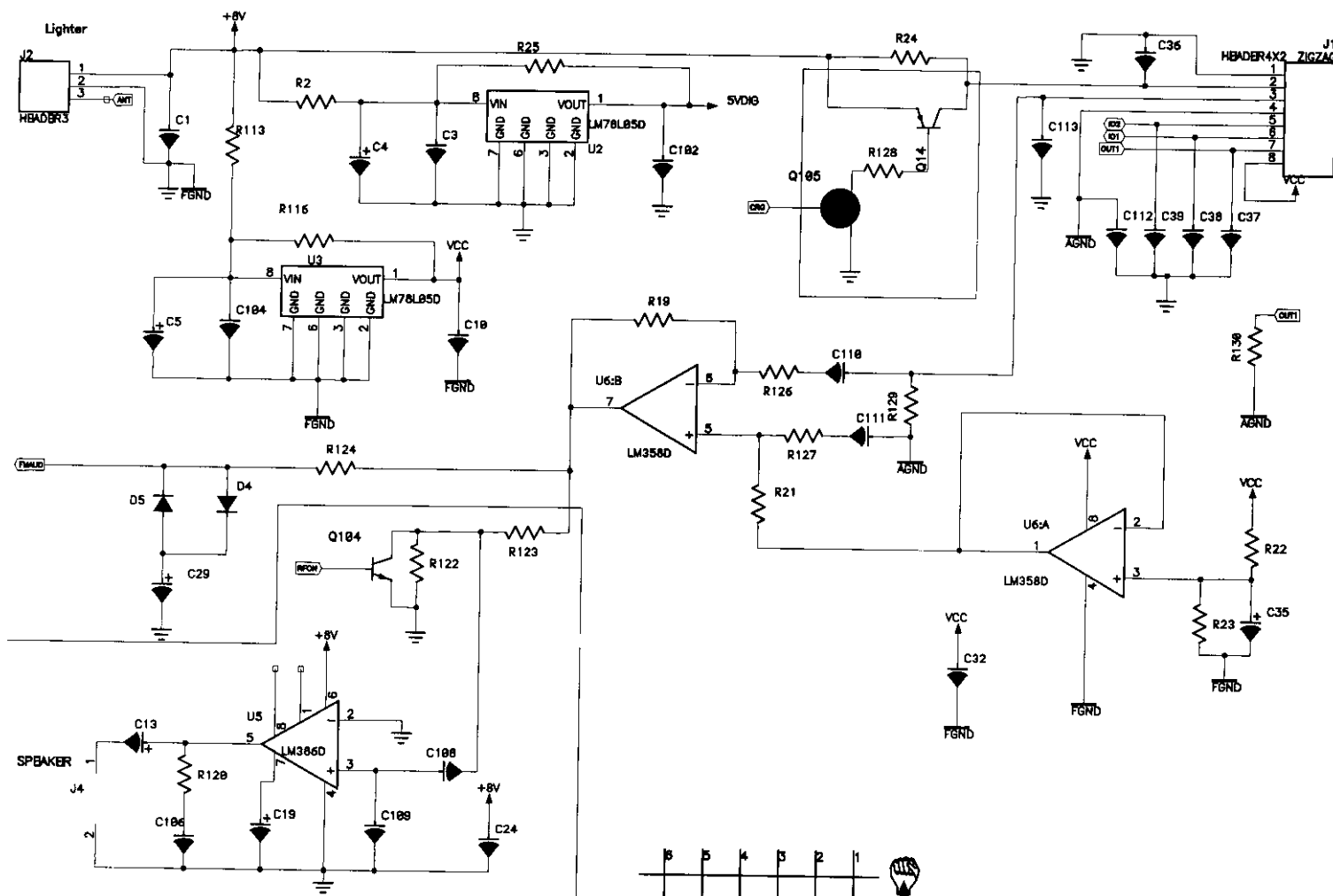
3. Microphone Unit

The Microphone Unit comprises an electret microphone hooked to an operational amplifier. This unit drives the phone directly and has no communication with the main unit.

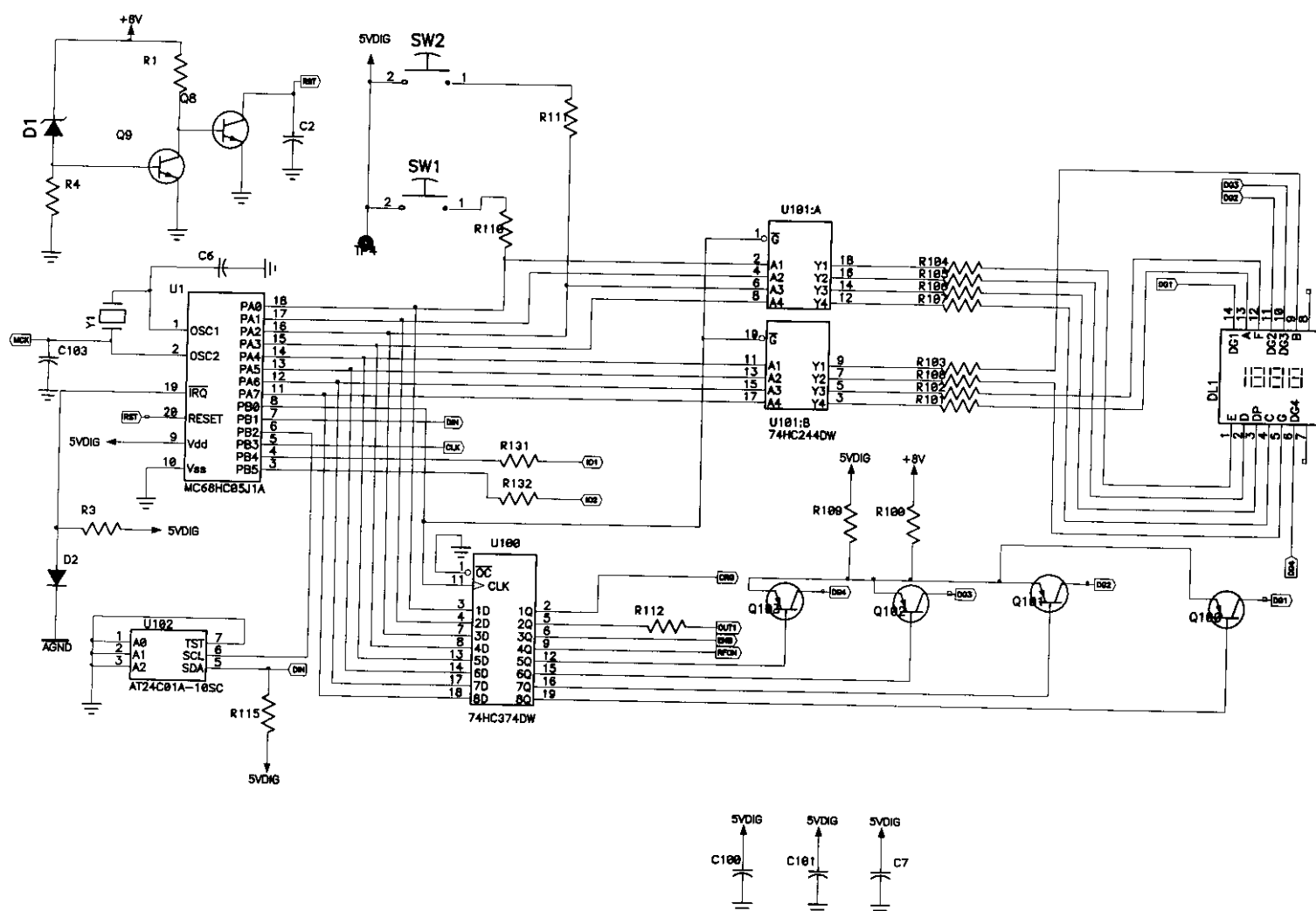
Cell-man schematic diagram
(Part 1)



Cell-man schematic diagram (Part 2)



Cell-man schematic diagram (Part 3)



Handsfree Kit B.O.M

Description	Value	Qty	Reference
Main Board			
CAP CERAMIC X7R 25V 10%	0.01u	6	C7,C15,C32,C32,C100,C101,C105
CAP CERAMIC X7R 25V 10%	0.1u	11	C2,C3,C10,C14,C16,C20,C24,C102,C104,C106,C108
CAP CERAMIC NPO 50V 10%	2pf	1	L3
CAP CERAMIC NPO 50V 10%	12pf	1	C27
CAP CERAMIC NPO 50V 10%	18p	2	C6,C103
CAP CERAMIC NPO 50V 10%	22p	1	C22
CAP CERAMIC NPO 50V 10%	33p	1	C23
CAP CERAMIC NPO 50V 10%	47p	1	C30
CAP CERAMIC NPO 50V 10%	68p	1	C28
CAP CERAMIC NPO 50V 10%	220p	1	C34
CAP CERAMIC NPO 50V 10%	330p	10	C1,C21,C36,C37,C38,C39,C107,C109,C112,C113
CAP CERAMIC X7R 25V 10%	1000p	3	C12,C18,C26
CAP CERAMIC X7R 25V 10%	1800p	1	C33
CAP CERAMIC X7R 25V 10%	4700p	3	C25,C110,C111
CHIP INDUCTOR FOR HIGH FREQUENCY	68nH	2	L1,L2
CAP ALUM ELECT 16V 20% HIGH=5mm F=2.5mm D=8mm	100uF	7	C4,C5,C8,C11,C13,C17,C19
TANTALUM CHIP CAPACITOR CASE A 6.3V	10uF	2	C29,C35
RESISTOR 5% 1/4W	0	1	R24
RESISTOR 5% 1/16w	3.3	4	R2,R12,R109,R113
RESISTOR 5% 1/16w	10	1	R120
RESISTOR 5% 1/16w	100	2	R20,R118
RESISTOR 5% 1/16w	150	1	R122
RESISTOR 5% 1/16w	1.5K	3	R10,R17,R123
RESISTOR 5% 1/16w	100K	1	R22
RESISTOR 5% 1/16w	10K	4	R1,R4,R16,R115
RESISTOR 5% 1/16w	1K	4	R110,R111,R114,R124
RESISTOR 5% 1/16w	2.2K	1	R18
RESISTOR 5% 1/16w	22K	5	R8,R26,R27,R28,R131
RESISTOR 5% 1/16w	2M	1	R121

Description	Value	Qty	Reference
RESISTOR 5% 1/16w	33	2	R117,R119
RESISTOR 5% 1/16w	300	8	R101,R102,R103,R104,R105,R106,R107,R108
RESISTOR 5% 1/16w	5.1K	2	R11,R14
RESISTOR 5% 1/16w	5.6K	1	R9
RESISTOR 5% 1/16w	51K	8	R3,R6,R13,R19,R21,R125,R126,R127
RESISTOR 5% 1/16w	56K	2	R23,R132
RESISTOR 5% 1/16w	560K	1	R7
RESISTOR 5% 1/16w	6.8K	1	R15
RESISTOR 5% 1/16w	750K	2	R19,R21
EEPROM 1K (128X8) 24C01	AT24C01A-10SC	1	U102
REGULATOR 5V	LM78L05D	2	U2,U3
DUAL OPERATION AMPLIFIER	LM358D	1	U6
LOW VOLTAGE AUDIO POWER AMP	LM386MX-1	1	U5
PLL FREQUENCY SYNTHESIZER	MC145170-1D	1	U103
MICROCONTROLLER	MC68HC05J1A	1	U1
BUFFER	74HC244DW	1	U101
D FLIP-FLOP	74HC374DW	1	U100
FET TRANSISTOR	2N7002LT1	1	Q10
NPN TRANSISTOR	MMBT3904LT1	1	Q8
RF TRANSISTOR	MMBTH10LT1	2	Q12,Q13
DIGITAL NPN TRANSISTOR	MMUN2215LT1	2	Q9,Q104
DIGITAL PNP TRANSISTOR	BCR166	5	Q11,Q100,Q101,Q102,Q103
VARICAP	BB639	1	D3
DIODE ZENER 6.2V	BZX6V2LT1	1	D1
SIGNAL DIODE	BAS216	3	D2,D4,D5
7-SEG DISPLAY RED	A-284CE-14_188.8	1	DL1
CRYSTAL LOW PROFILE	4MHz	1	Y1
PCB		1	
SPEAKER 16 OHM WITH WIRES		1	
CHARGER CABLE		1	
CABLE 7 WIRES		1	
MOTOROLA MICRO-TAC CABLE+CONNECTOR		1	
Microphone Board			
CAP CERAMIC X7R 25V 10%	0.1u	2	C51,C52
CAP CERAMIC NPO 50V 10%	47p	1	C55
CAP CERAMIC NPO 50V 10%	330p	6	C50,C53,C54,C56,C57,C59
TANTALUM CHIP CAPACITOR 6.3V	68uF	1	C58
RESISTOR 5% 1/4W	0	1	R53
RESISTOR 5% 1/16w	100	1	R59
RESISTOR 5% 1/16w	100K	1	R58
RESISTOR 5% 1/16w	51K	1	R57
RESISTOR 5% 1/16w	1.2K	2	R51,R60
RESISTOR 5% 1/16w	2.2K	1	R54
RESISTOR 5% 1/16w	22K	1	R56
RESISTOR 5% 1/16w	5.1K	1	R52
RESISTOR 5% 1/16w	680K	1	R55
DUAL OPERATION AMPLIFIER	LM358D	1	U50
MICROPHONE FOR PCB 64DB	AL-CMD-64DB	1	M1
MICROPHONE PCB		1	