

DREAM-6800 "40th Anniversary" re-design by David Fry

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Errata (April 2019):

After conversing with David Roberts & Lucien Gisclong I have now updated the Dream 6800 Notes file (see below) which contains the BoM, hopefully it is now without errors. I have not made any changes to the KiCad schematic as it adheres to the original.

There are two other issues that have emerged during conversation:-

- 1) I had forgotten to route VMA.A15 to the expansion connector on the PCB. It has been decided to use Pin 31 on the edge connector if users wish to patch this signal with a wire. Pin 31 allows easy correction if a later PCB is produced.
- 2) It seems the design may be "a little sensitive" to which brand of 4040B counter device is used. Please see Lucien's notes below for recommended manufacturers. This will remove the need to add a RC network on the counter reset input.

Notes on CMOS counter type 4040B (by Lucien Gisclong):

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- * 100% of the Motorola 4040B work fine
- * 100% of the ST work fine
- * Texas Instrument 4040B works OK

<!> None of the NS, Fairchild or RCA work without circuit modification.

I noticed during these tests that all devices produce a display of 16 lines only and some have these weird lines missing inside dots!
So I installed a Motorola device and the system works fine.

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; Dream 6800 brief construction notes
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Welcome to the construction notes for this slightly modified version of the 1978 DREAM6800 by MJ Bauer.

The main changes centre around the upgrading of the original 2708 EPROM to a 2716/2732 permitting a single 5v power supply design, the PSU has been redesigned to use a fixed 5v buck switching regulator allowing for cool running and wider input voltage range. The final change was to upgrade address decoding logic to permit the use of UM6116 2k byte chips this gives a total of 4k byte RAM whilst keeping to vintage style IC's.

The parts list below provides a list of all parts required, notes have been added to indicate component specifics such as lead pitch, dielectric type etc...
Part numbers have not been supplied except for the more difficult parts to source where a parts list notes section shows the various suppliers I used to obtain these parts. Some parts such as the keyboard and speaker were obtained from Ebay, I know no other supplier for these specific parts.

It is highly recommended to proceed with the build in a structured manner whilst referring to the original DREAM6800 documentation and revised schematics :-

- 1) Inspect the PCB for any damaged traces using a magnifying glass if necessary.
- 2) Fit one value of the component type at a time, double checking your work as you go. Start with capacitors, then resistors, then IC sockets etc.. DO NOT FIT IC'S !!!!
- 3) DIL sockets are highly recommended for all IC's, removing soldered IC's can be tricky!!!
- 4) I would recommend making a little cardboard insulating washer to fit under oscillator crystal.
- 5) I have insulated the switching regulator from the heatsink but this is not strictly necessary.
- 6) Apply 12v DC power and verify switching regulator operation (5v output)
- 7) Insert all IC's and verify operation using original documentation.

*** Note ***

Resistor R19 may need adjustment to get the NE566 VCO to oscillate at 2400hz
In my board I found that 10k ohm gave correct operation

Finally, I hope the board brings you many hours of nostalgic fun

Regards

David Fry

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; COMPONENT LIST
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; Capacitors
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C1,C9	150pF	5mm Pitch Ceramic
C2	2.2uF	2.5mm Pitch Tant
C3	10uF	2.5mm Pitch Tant
C4	33nF	5mm Pitch Film
C5,C8	10nF	5mm Pitch Film
C6	1nF	5mm Pitch Film
C7	22nF	5mm Pitch Film

C10	3n3	5mm Pitch Ceramic
C12	47pf	5mm Pitch Ceramic
C13,C16,C17	100uF	2.5mm Pitch Low Imp Elect
C14	1500uF	5mm Pitch Low Imp Elect
C15,C18,C35	22uF	2.5mm Pich Tant
C11,C19,C20	100nF	5mm Pitch MLCC Ceramic
C21,C22,C23		
C24,C25,C26		
C27,C28,C29		
C30,C31,C32		
C33,C34		
C36	1uF	2.5mm Pitch Tantalum (Low Imp Elect)

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; Resistors
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R1	1k	All resistors are 0.25w metal film
R2	100R	
R3,R7,R20	4k7	
R6	47	
R8,R26	470	
R4,R5,R9	2k2	
R22,R27,R29		
R10,R25	220	
R11,R14,R18	10k	
R23,R28		
R12,R13	22k	
R15,R16,R17	1k5	
R19	5k6 (10k)	Adjust for 2.4Khz osc tone
R21	6k8	
R24	120	
R30	75	
R31	10	

| RV1 5k

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; Semiconductors
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| D1,D2,D3 1N4148
| D4

| D5 BAT43

| D6 1N5402

| D7 MBR350

| D8 1N4002 (1A Std Rectifier)

| Q1 2N3906

| Q2 2N3904

| U1 MC6800

| U2 2716 (Or 2732 EPROM)

| U3,U4 6116

| U5,U6 74LS367

| U7 CD4014

| U8 MC6875

| U9 MC6821

| U10 74LS10

| U11,U17 74LS04

| U12 74LS08

| U13 CD4040

| U14,U15 74LS93

| U16 74LS20

| U18 74LS11

U19	74LS123	
U20	7440	*** SEE PART NOTES ***
U21	74LS74	
U22	74121	*** SEE PART NOTES ***
U23	LM741	
U24	NE566	*** SEE PART NOTES ***
U25	74LS138	
U26	LM2576-5.0	*** SEE PART NOTES ***
U27	LT1054	*** SEE PART NOTES ***
X1	4Mhz	*** SEE PART NOTES ***
J1	Video_Out	*** SEE PART NOTES ***
J2	180_DIN	*** SEE PART NOTES ***
L1	10uH Axial	*** SEE PART NOTES ***
L2	120uH	*** SEE PART NOTES ***
CON1	12v DC	*** SEE PART NOTES ***
P1	EPROM	3 pin 0.1" header
P2	Spkr	3 pin 0.1" Molex KK connector
P3	I/O Pins	8 pin 0.1" Molex KK connector
P4	Key Matrix	8 pin 0.1" Molex KK connector
P5	Keys	3 pin 0.1" Molex KK connector
P6	Expansion	NOT FITTED

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; PARTS NOTES
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Due to obsolesence some parts for this project are either tricky to locate or

are component footprint specific, here is a list of suppliers and part numbers from where I obtained these parts..

It maybe that you can locate these parts elsewhere, but I doubt it will be possible to obtain all parts from a single supplier...

;;; DIGIKEY PARTS

<https://www.digikey.co.uk/>

-RV1-	5k Preset Resistor	3386H-1-502LF	3386H-502LF-ND
-L1-	FIXED IND 10UH 370MA 750 MOHM	78F100J-RC	M10135-ND
-L2-	FIXED IND 120UH 3.2A 82 MOHM	AIUR-15-121K	AIUR-15-121K-ND
-U26-	IC REG BUCK 5V 3A T0220-5	LM2576T-5.0/NOPB	LM2576T-5.0/NOPB-ND
-D7-	DIODE SCHOTTKY 50V 3A D0201AD	MBR350RLG	MBR350RLGOSCT-ND
-D5-	DIODE SCHOTTKY 30V 200MA D035	BAT43	497-2492-1-ND
-D6-	DIODE GEN PURP 200V 3A D0201AD	1N5402RLG	1N5402RLGOSCT-ND
-X1-	CRYSTAL 4.0000MHZ SERIES T/H	ECS-40-S-1	X081-ND
-CON1-	2.1mm Power Jack	EJ508A	EJ508A-ND
-C14-	1500uF 25v SMPS Capacitor	UHW1E152MHD	493-6948-ND
	HEATSINK T0220	530614B00000G	HS278-ND
-J1-	CONN RCA JACK MONO 3.2MM R/A	PJ1RAN1X1U04X	PJ1RAN1X1U04X-ND

;;; UTSOURCE PARTS

<https://uk.utsOURCE.net/>

-U24-	NE566
-U27-	LT1054

;;; EBAY PARTS (Use Advanced Search by keyword & seller)

-J2-	5 PIN DIN PCB SKT	Ebay seller - lyn3009
	20 KEY HEX KEYBOARD ASSY	Ebay seller - wonderco_buy
	57mm 80HM SPEAKER	Ebay seller - szdepot88
-U20-	7440 TTL	Ebay seller - vila_restor
-U22-	74121 TTL	Ebay seller - vila_restor