DSO 068 Oscilloscope DIY Kit

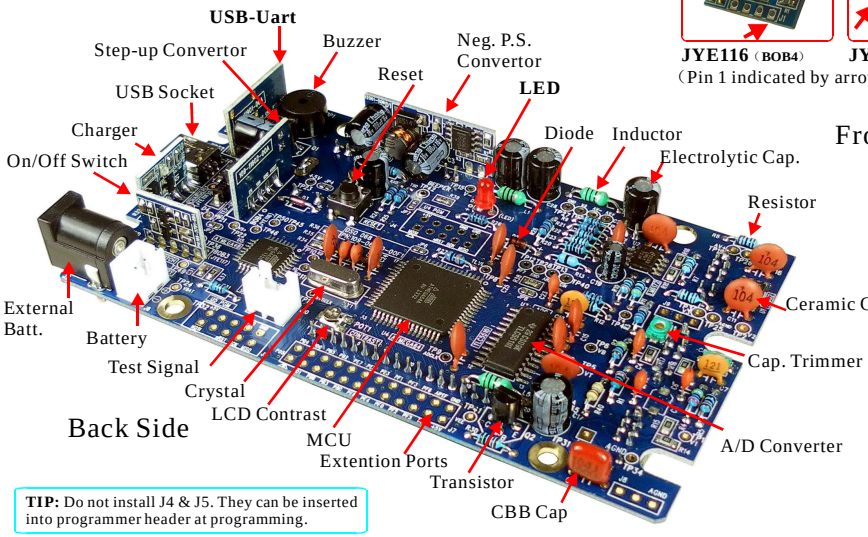
Assembly Guide Rev F01

Step 1 Assembly Main Board

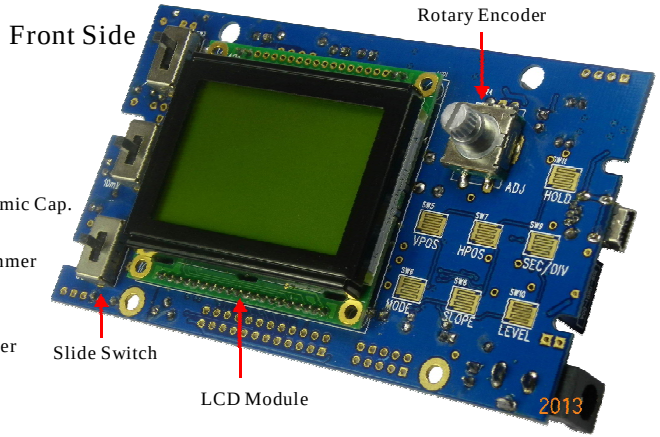
1. Complete the steps in "Get Ready" and understand soldering requirements.
2. Install parts by the order of part list. Start from the back side of main board.
3. Pay special attention to part polarity at soldering. Refer to photos to the right.
4. For BOB boards and LCD soldering refer to photos at bottom for details.
5. After all back side parts are finished perform powering-up test as explained at the reverse page. Continue rest installation if test result is good.

TIP: Resistor values are easily mis-read. Ohm meter check is strongly suggested.

TIP: C3 and R32 are not required.



TIP: Do not install J4 & J5. They can be inserted into programmer header at programming.



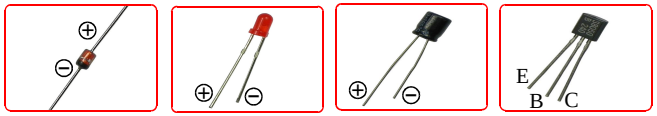
Tools

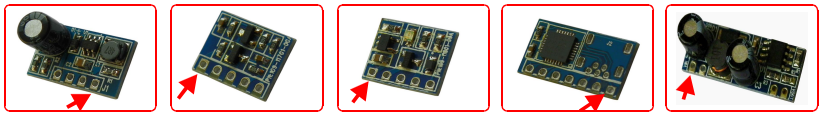
① Iron (20W) ④ Screw driver
② Solder wire ⑤ Flush cutter
③ Multimeter ⑥ Tweezers

Get Ready

① Check part values & quantities against part list
② Meter and identify resistor values by ohm meter
③ Understand all part polarities and orientations

Identify Polarity & Orientation



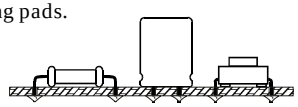


JYE116 (BOB4) **JYE117** (BOB3) **JYE118** (BOB2) **JYE119** (BOB1) **JYE120** (BOB5)

(Pin 1 indicated by arrow)

Soldering Skills and Requirements

① Put leads through mounting from installation side of PCB. Ensue they evenly touch PCB (picture below).
② Solder at the other side of PCB. Solder should fully fill and cover soldering pads. Avoid bridges with neighbering pads.
③ Cut unused leads flush with cutter.



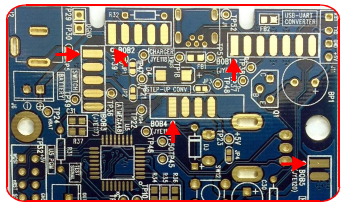
Note: Please install by the order given in the Part List below.

Part List

Catagory	Seq.	Type/Spec	Qty	Designator/Location
Main PCB	1	101-06802	1	
Resistor	2	510KΩ, 5%, 1/8W	2	R1, R27
	3	200KΩ, 1%, 1/8W	1	R3
	4	2MΩ, 1%, 1/8W	2	R2, R4
	5	20KΩ, 1%, 1/8W	1	R5
	6	300Ω, 1%, 1/8W	2	R6, R23
	7	180Ω, 1%, 1/8W	1	R7
	8	120Ω, 1%, 1/8W	2	R8, R12
	9	3.3KΩ, 1%, 1/8W	2	R10, R22
	10	470Ω, 1%, 1/8W	3	R11, R31, R33
	11	0Ω, 5%, 1/8W	1	R13
	12	10KΩ, 1%, 1/8W	4	R9, R21, R20,R30
	13	1KΩ, 5%, 1/8W	5	R24,R25,R26,R28,R29
	14	10MΩ, 5%, 1/8W	1	R40
Diode	15	1N4148, DO-35	2	D2,D3
Inductor	16	100uH, Φ2.5 X 6mm	3	L1,L4,L5
Crystal	17	20MHz, HCM-49	1	Y1
Connector	18	USB socket, MiNi-B type	1	J1
Switch	19	Tact, 6 X 6 X 5mm	1	SW12
Capacitor	20	300pF, ceramic disk	2	C2,C23
	21	3pF, ceramic disk	1	C4
	22	1pF, ceramic disk	1	C6
	23	120pF, ceramic disk	2	C7, C13
	24	0.1uF, ceramic disk	12	C9,C10,C11,C12,C14, C15,C16,C18,C20,C24, C25,C26
	25	15pF, ceramic disk	2	C21,C22
	26	0.1uF/100V, CBB	1	C1
Buzzer	27	5V, passive, Φ9 X 5.5mm	1	BP1
Diode	28	LED, Φ3mm, red	1	D1
Connector	29	2pins, 2.54mm	2	J6, J10
Transistor	30	8550, TO-92 (E-B-C)	2	Q1, Q2
Electro. Capacitor	31	10uF,16V, Φ4 X 5mm	1	C19
	32	100uF,16V, Φ6X 7mm	5	C17,C27,C28,C29,C30
Connector	33	DC005, Φ2.1mm core	1	J2
BOB Board	34	JYE116, step-up convertor	1	BOB4
	35	JYE120, neg. P.S. convertor	1	BOB5
	36	JYE117, On/Off switch	1	BOB3 (optional)
	37	JYE118, battery charger	1	BOB2 (optional)
	38	JYE119,UART-USB conv.	1	BOB1 (optional)
Now perform power-up test. See steps at the reverse page. Continue following assembly after test.				
Switch	39	Slide switch, SS-23D06	3	SW1,SW2,SW3
Switch	40	Rotary Enc., EC11, 10mm	1	SW4
Pin Strip	41	SIP, 2mm, 20X1	1	ASSY1
	42	SIP, 2mm, 2X1	2	ASSY2,ASSY3
LCD	43	128X64 graphic, 12864-16	1	LCD1
Pin strip	44	DIP, 2.54mm, 5X2	2	J4,J5 (Do not install)
Enclosure	45	Top(1), bottom(1), stand(1) switch caps(3), dial cap(1)	1 set	
Switch	46	7-key silicone button pad	1	
Connector	47	BNC, BNC-KY	2	
Wire	48	2-core hood-up wire, 10cm	1	
Screw	49	2.3*8mm, self tapping	4	
Acrylic	50	Tool for holding BOB	1	

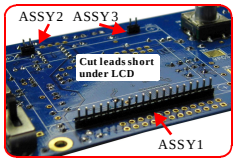
BOB Boards Installation

Pin 1 location indicated by arrow (square pad)

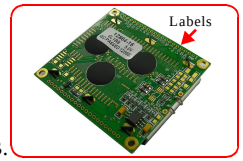


LCD Installation

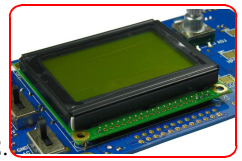
Important! Unused leads under LCD must be cut flush to avoid short to LCD module!



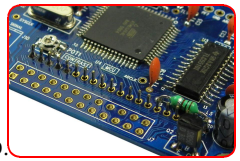
A. Lay PCB flat. Insert mounting strips with longer pins into holes.



B. Identify the holes with labels on LCD. They should go with the long strip.



C. Put LCD onto strips as shown. Solder pins at corners first. Do the rest after flatness ensured.



D. Turn LCD and main boar over. Complete soldering following same procedures as in C.

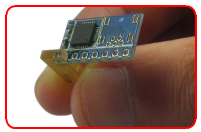
BOBs and Jumpers

Keep JP1 open if BOB2 is installed. Otherwise short it.

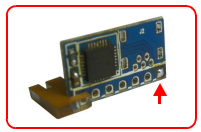
Keep JP2 open if BOB3 is installed. Otherwise short it.

More at the reverse page

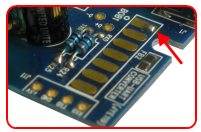
BOB Board Installation



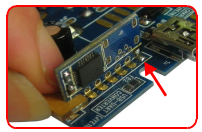
A. Use the small acrylic tool provided.



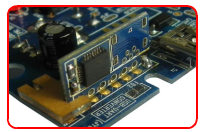
B. Apply solder to one pin.



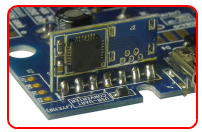
C. Apply solder to the corresponding pin on main PCB.



D. Put BOB to place and align pads.



E. Maintain BOB upright and fix it by melting the solder.



F. Finish the rest pins.

Step 2 Power Up the First Time

Powering-up Test

- ▶ Double check to ensure no missed, cold solder or shorts
- ▶ Make sure BOB4 and BOB5 have been installed
- ▶ Close JP2 for the time being (even BOB3 is in place)
- ▶ Keep JP3、JP4 open

USB powered / Battery powered

- Close JP1 if no BOB2
- ▶ Keep JP1 open ▶ Make sure BOB2 in

Power up. Check voltage at +5V test point. Is it +5V? No → Follow "No Power" flow chart to check

Yes → Power off. Close JP4 (★) You can continue to install front side parts if reached here

Power up and check +5V again. Is it still +5V? No → Check for soldering mistakes. Wrong polarity, shorts, etc.

Yes → Press SW12. Do you see LED blink once (if bootloader installed) and then twice ? No → ▶ LED reversed ? ▶ U4 pin 20 voltage low ? ▶ Check Y1、C21、C22

Yes (★) → LCD backlight on ? No → Follow "LCD Dark" flowchart to check

Yes → Adjust contrast. Can you see display? No → Follow "No display" flowchart to check

Yes → Press buttons. Do you see reaction on screen ? No → Check U5 and soldering of button related pins

Yes → Set cursor to timebase. Turn [ADJ] dial. Do you see timebase change ? No → Check U5 and soldering of rotary encoder pins

Yes → Now the digital part is working

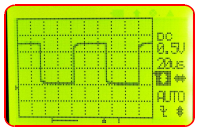
TIP: If JP7 is closed you will here beeps while LED blinks

Check Analog Part

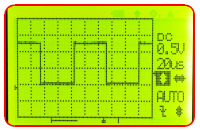
- Is AV+ normal (+5V) ? No → Check L4, C29, C9, and C10
- Yes → Is V- normal (-5V) ? No → Check BOB5 and C27
- Yes → Is AV- normal (-5V) ? No → Check L1, C28, C11, and C12
- Yes → Is VA normal (+5V) ? No → Check L5, C16, and C17
- Yes → Set SW1, SW2, SW3 to GND, 10mV, and X1 respectively
- Is V2 measured 0V? No → Check SW1, SW2, and R1
- Yes → Is V3 measured 0V? No → U1 may have been damaged
- Yes → is V4 measured ~1.6V? No → Check SW3, R9, R10, R11
- Yes → Adjust VPOS. Can you see trace displayed ? No → Follow "No Trace" flowchart to check
- Yes → Scope is working now

Powered by USB: V+ ≈VBUS - 0.7V
Powered by Batt.: V+ ≈ VBAT

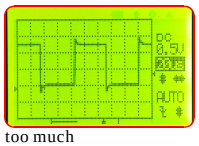
Step 3 Adjust Compensation Capacitors



Not enough



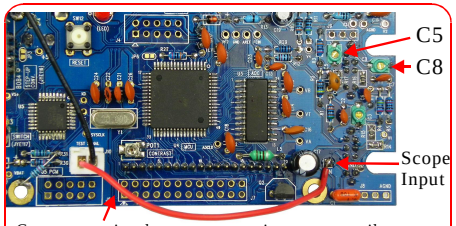
Good



too much

Compensation capacitors can be adjusted using the built-in signal generator. Follow steps below:

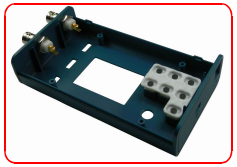
1. Connect test signal output to scope input (see photo below) and set SW1 to DC.
2. Power up. Set test signal to 10KHz and 5V. Set scope timebase to 20us.
3. Set SW & SW3 to 1V & X2 respectively. Adjust trigger level to make display stable if necessary. Change C8 to obtain waveform as the middle of photos left.
4. Keep signal frequence unchanged and set amplitude to 1V. Set SW2 & SW3 to 0.1V and X5 respectively. Make display stable. Change C5 to obtain waveform as the middle of photos left.
5. Remove connection between test signal output and scope input. Adjustment is done.

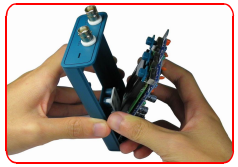


Connect test signal output to scope input temporarily

Step 4 Install Batter & Enclosure

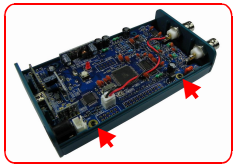
Tech Support: www.jyetech.com/forum

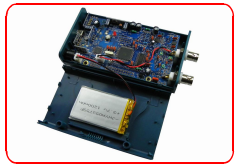

A. Install BNC connectors and place silicone pad.


B. Cap slide switches. Insert board to connector holes.

C. Hold board tight towards USB end and push in.

D. Connect BNC connectors to main board as shown.


E. Tight two screws as indicated by arrows.


F. Attach batt. to back cover. Avoid high parts (J10, C30).

G. Put on back cover. Tight the two screws as shown.

H. Put dial cap on and you are done.

Check Mode and Its Usage

What is "Check Mode"

Check Mode is to assist connection checking for most MCU pins. Once in Check Mode MCUs will generate high and low levels at those pins. These levels can be easily checked with a volt meter and consequently find out pin connections. This is particularly useful for checking out suspecious SMD solderings.

How to Enter "Check Mode"

Close JP6 and power up the system. It will anter "Check Mode". You should see LED flashes at about 3 second cycle.

Remember restore JP6 to open after checking.

Use of "Check Mode"

We want to check the connection between U3 pin12 and U4 pin17, for example. First enter Check Mode as stated earlier. Measure voltage at U3 pin12 with a volt meter. If voltage change between 0V and 5V is observed the connection is good. Otherwise is bad.

"Check Mode" Related Pins

Not all pins have the Check Mode function. The pins that do are listed as following:

U4: PB[7:5, 3:0], PC[7:0], PD[7, 5, 3, 1, 0], PE[7:3], PF[7:0], PG[4:0]

U5: PB[5:1], PC[3:0], PD[7, 6, 4:1]

Major Jumpers Explained

JP1: This by-pass of charger BOB2. If battery is not used (as result, no BOB2) keep JP1 closed.

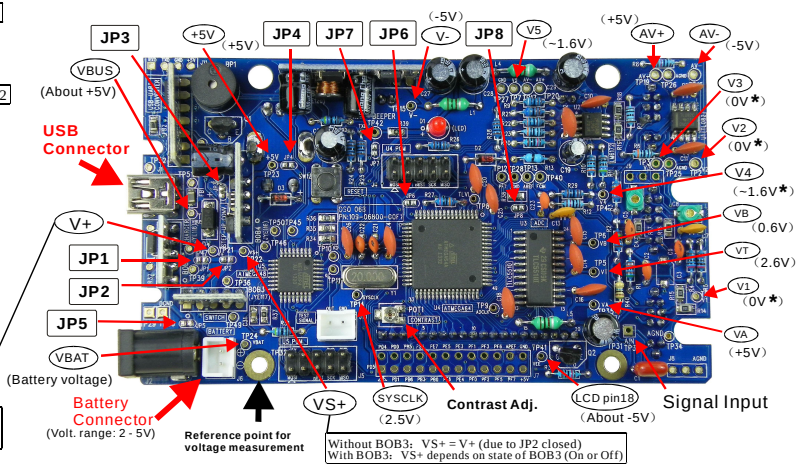
JP2: This is by-pass of switch BOB3. If BOBs is not used JP2 should be closed. In order to focus on the main circuit we temporarily close JP2 at power-up test even BOBs is installed. It is kept open after test.

JP3: This is by-pass of step-up converter BOB4. Usually JP3 is kept open.

JP4: This is the connecting point of power supply and the rest circuits. For the safety of the rest circuit only close JP4 after power supply is tested good.

Troubleshooting

Notes:
1. All voltages are measured with volt meter's (-) pole at reference point (indicated in photo below) and (+) pole at points of measurement.
2. Voltages with " ★ " are measured when SW1 (couple) is placed at GND position.



Without BOB3: VS+ = V+ (due to JP2 closed)
With BOB3: VS+ depends on state of BOB3 (On or Off)

No Power

USB powered / Battery powered

- Check USB ← No ← Is VBUS measured ok? Yes → Check D4 ← No ← Is V+ measured ok ? Yes → Is VS+ measured ok ? No → BOB3 installed ? No → Check JP2; Yes → BOB3 installed ? Yes → Check BOB3
- Yes → Is VS+ measured ok ? Yes → Check BOB4 ← No ← Is +5V measured ok ? Yes → Power good
- Battery voltage ok ? No → Check batt. Yes → Is V+ measured ok ? No → Check BOB2 Yes

LCD Dark

- Is voltage at LCD pin 19 5V? No → Check related connections
- Yes → Short C and E of Q2. Does LCD light up? No → Possible LCD issue
- Yes → Check Q2, R30 and connection with U5

No Trace

- Ensure all analog voltages are normal (see photo)
- VT and VB normal? No → U3 damaged
- Yes → Connection between U4 pin17 and U3 pin12 good ? No → Check out the cause
- Yes → U3 has bad soldering or has been damaged

No Display

- Press SW12. Does LED blink as it should be ? No → ▶ Check Y1, C21, C22 ▶ Volt at U4 pin20 too low ? ▶ Re-program U4
- Yes → Is contrast changeable by POT1? No → Volt. at LCD pin18 negative? No → Check POT1 and related
- Yes → Volt. at LCD pin18 negative? Yes → Check POT1 and related
- Yes → Check all connections between U4 and LCD for opens or shorts.
- U4 and LCD connection good ? No → Eliminate bad connections
- Yes → LCD defective