



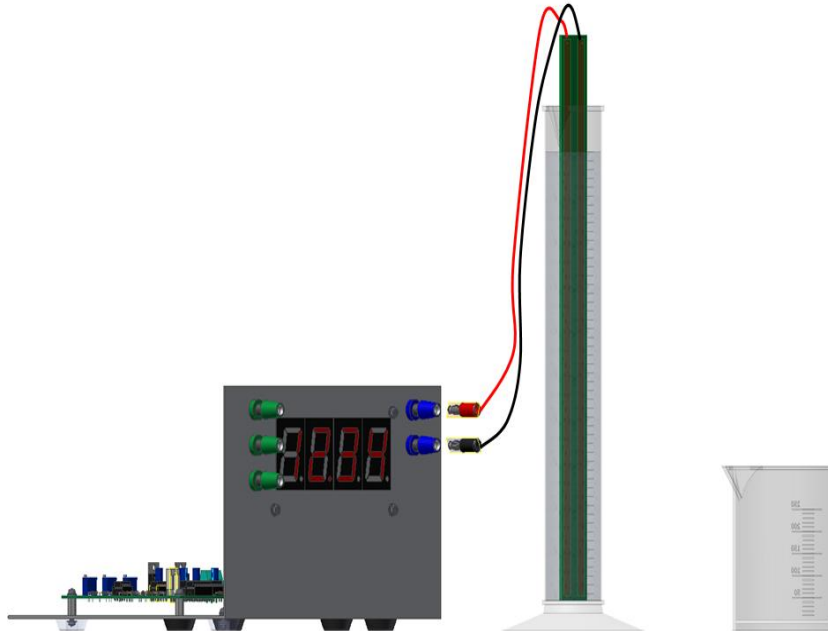
# 8th International Abilympics

## Vocational Skills Contest

### V16. Electronic Assembly and Testing

#### 1. Task Assignment

Assemble the liquid level meter according to the following requirements & instructions, and then check for normal operation.



#### 2. Allocated Time

6 Hours




#### 3. Requirements

- ① Contestants shall make sure the types and quantities of the provided materials accord with the materials specified in the [10. List of Materials to be Provided]. Contestants are not permitted to use any other materials than the ones provided by the organizing committee.

- ② If contestants find any defects with the materials provided and receive confirmation from the judges prior to the contest, replacements shall be made. Also, contestants may ask for replacements during the contest but points shall be deducted.
- ③ Contestants are only permitted to use the materials specified in the [10. List of Materials to be Provided].
- ④ No tools are permitted to be borrowed or lent during the contest.
- ⑤ No fingerprints or markings shall be left on the surface of the chassis and the print wiring board (hereinafter called as ‘Print board’). Remember to remove the protective film before using the chassis.
- ⑥ Contestants are responsible for their own safety during the contest. Appropriate clothing shall be worn.
- ⑦ Before producing the print board, contestants shall solve the problem in [5. Circuit Design], then arrange the parts onto the universal board of the print plate and wire.
- ⑧ Safety glasses must be worn when soldering.
- ⑨ Contestants must notify the judges when they complete the tasks.
- ⑩ Following the guidelines of the judges, contestants shall tidy their working area after the contest.
- ⑪ No memos are permitted to be taken on the provided tasks. Contestants are not permitted to bring any memos or referential data into the contest site.

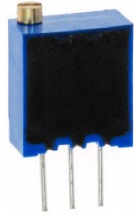




#### 4. List of Materials to be Provided

##### 4-1. Main PCB #1

No.	Part Code	Picture	Material	Specification	Qty	Note
1	U1		Regulator IC	kA7805	1	
2	U2		F/V Converters IC	LM2917	1	
3	U3		Regulator IC	kA7905	1	

No.	Part Code	Picture	Material	Specification	Qty	Note
4	U4		Timer IC	NE555	1	For circuit designing
5	U5, U6		Low Power Dual OP-Amp IC	LM358N	2	
6	U7		Hex Inverter IC	MC14069	1	
7	U8		4 1/2-Digit Precision A/D Converters IC	ICL7135CN	1	
8	U9		BCD-to-Seven Segment Latch/Decoder Driver IC	MC14543BCL	1	
9	D1, D2		Zener Diode	1N5225	2	
10	D3		DIODE	1N4148	1	
11	Q1 ~ Q4		NPN Bipolar Transistor	2SC1815	4	
12	C24		Electrolytic Condenser	0.47[ $\mu$ F]/16[V]	1	
13	C2, C5		Electrolytic Condenser	100[ $\mu$ F]/16[V]	2	
14	C3, C6		Electrolytic Condenser	220[ $\mu$ F]/16[V]	2	
15	C8, C22, C23		Electrolytic Condenser	1[ $\mu$ F]/16[V]	3	
16	C9, C10		Ceramic Capacitor	120[pF], CHIP-TYPE SIZE=2012	2	
17	C11~C18, C20, C21, C25		Ceramic Capacitor	0.1[ $\mu$ F], CHIP-TYPE SIZE=2012	11	
18	C19		Ceramic Capacitor	470[pF], CHIP-TYPE SIZE=2012	1	
19	C1, C7		Ceramic Capacitor	0.1[ $\mu$ F]	2	For circuit designing
20	C4		Ceramic Capacitor	0.01[ $\mu$ F]	1	For circuit designing






#### 4-1. Main PCB #2

No.	Part Code	Picture	Material	Specification	Qty	Note
1	VR1		Potential meter	20 k $\Omega$ , T93YA Type	1	For circuit designing
2	VR2		Potential meter	100 k $\Omega$ , T93YA Type	1	
3	VR3		Potential meter	1 k $\Omega$ , T93YA Type	1	
4	VR4		Potential meter	10 k $\Omega$ , T93YA Type	1	
5	R8, R11, R19~R22		Resistor	100 $\Omega$ , 1%	6	
6	R12, R25, R27		Resistor	100 k $\Omega$ , 1%	3	
7	R1, R6, R9, R10, R13, R14		Resistor	10 k $\Omega$ , 1%	6	
8	R4, R5		Resistor	1 k $\Omega$ , 1%	2	R4: for circuit designing
9	R23		Resistor	1 M $\Omega$ , 1%	1	
10	R7		Resistor	200 k $\Omega$ , 1%	1	
11	R15		Resistor	2 k $\Omega$ , 1%	1	
12	R3, R24,		Resistor	330 $\Omega$ , 1%	2	
13	R16, R18		Resistor	6.8 k $\Omega$ , 1%	2	
14	R2		Resistor	680 $\Omega$ , 1%	1	
15	R17		Resistor	68 k $\Omega$ , 1%	1	
16	R26		Resistor	27 $\Omega$ , 1%	1	
17	Socket		IC Socket	8PIN/DIP Type	3	
18	Socket		IC Socket	14PIN/DIP Type	2	
19	Socket		IC Socket	16PIN/DIP Type	1	
20	Socket		IC Socket	28PIN/DIP Type	1	



#### 4-1. Main PCB #3

No.	Part Code	Picture	Material	Specification	Qty	Note
1	Header2		Connector	MOLEX5045-2P	1	Male
2	Header3		Connector	MOLEX5045-3P	1	Male
3	Header5		Connector	MOLEX5045-5P	1	Male
4	Header7		Connector	MOLEX5045-7P	1	Male
5	Header2		Connector	MOLEX5051-2P	1	Female
6	Header3		Connector	MOLEX5051-3P	1	Female
7	Header5		Connector	MOLEX5051-5P	1	Female
8	Header7		Connector	MOLEX5051-7P	1	Female
9			Molex Housing	Receptacle (For MOLEX5045)	30	
10	P1		Power <u>Terminal</u>	3P, Green <u>terminal</u>	1	
11			Plate Cable	15 colors, 50cm	1	
12			WIRE	AWG 26, Red L=30cm	1	For connecting power
13			WIRE	AWG 26, Black L=30cm	1	For connecting power
14			WIRE	AWG 26, Green L=30cm	1	For connecting power
15			Print Board	Bare PCB (Main_PCB)	1	
16			Lead	Sn-3.0Ag-0.5Cuφ0.8	120cm	Resin Core
17			Lead	Sn-3.0Ag-0.5Cuφ0.6	15cm	3~6 flux included

#### 4-2. Front PCB

No.	Part Code	Picture	Material	Specification	Qty	Note	
1	FND1~FND4		Comon Anode Type Seven Segment	FND507 24×40×8mm	4		
2	R28 ~ R34		Resistor	330Ω, 1%	7		
3	Header5		Connector	MOLEX5045-5P	1	Male	
4	Header7		Connector	MOLEX5045-7P	1	Male	
5	Header5			Connector	MOLEX5051-5P	1	Female
6	Header7			Connector	MOLEX5051-7P	1	Female
7			Molex Housing	Receptacle (For MOLEX5045)	20		
8			Print Board	Bare PCB (Front_PCB)	1		

#### 4-3. Sensor

No.	Material	Picture	Specification	Qty	Note
1	Print Board		Bare PCB (Sensor _ PCB)	1	
2	Beaker		250 ml, Scale marked	1	Clear Plastic
3	Math Cylinder		250 ml, Scale marked	1	Clear Plastic
4	WIRE		AWG 26, Red L=50cm	1	
5	WIRE		AWG 26, Black L=50cm	1	
6	Plug		Banana Plug(Male), Red TB-302		
7	Plug		Banana Plug(Male), Black TB-302		

#### 4-4. Chassis

No.	Material	Picture	Specification	Qty	Note
1	Terminal (TP1~TP3)		TB-302-RK/Red	3	For measuring
2	Terminal (TP2)		TB-302-YK/Yellow	2	
3	Bolt		M3, L=5mm	15	
4	Bolt		M3, L=10mm	15	
5	Bolt		M3, L=15mm	15	
6	Nut		3Φ	40	
7	Vice Washer		3Φ	40	
8	Spring Washer		3Φ	40	
9	Chassis		A5052P 1.5t (Hard) H83 or similar	1	
10	Hexagon Spacer		3Φ, L=10mm, Female	8	
11	Rubber feet		Rubber feet for Chassis	6	BU692B or similar

#### 5. List of Tools to be Brought

Type	No.	Tool	Specification	Unit	Qty	Note
Tools	1	Lead Wire Pincers		Each	As needed	Needle nose pliers and other types of pliers are permitted. However, height adjusted or grooved pliers are not permitted.
	2	Nippers		Each	1	
	3	Print board support		Each	1	
	4	Ruler		Each	1	

Type	No.	Tool	Specification	Unit	Qty	Note
Tools	5	Wire Stripper		Each	1	
	6	Phillips Screw Driver	M2, M3	Each	1 each	Electronic tools not permitted.
	7	Box Driver	M2, M3	Each	1 each	
	8	Spanner	Nominal 8	Each	1	S1
	9	Spanner	Nominal 10	Each	1	For terminal
	10	Electronic soldering iron		Each	As needed	Industrial products permitted only. Soldering iron stand, soldering iron tip cleaner, temperature adjusting controller, soldering iron, thermometer, and spare tips may be brought.
	11	Solder sucker		Each	As needed	Electronic products permitted. Spare filter, nozzle, nozzle cleaner may be brought.
	12	Tweezer		Each	1	
	13	Table tab		Each	1	
	14	Hand file		Each	1	
	15	Working mat		Each	1	
Gauge	16	Tester (Circuit Gauge)		Each	1	
Others	17	Cleaning Tools		Each		Cleansers are not permitted
	18	Gloves		Each		
	19	Gauze		Each		
	20	Safety glasses		Each		Excepting contestants who wear glasses
	21	Magnifying Glass		Each		Magnifying glass with scales not permitted. Magnifying glass with lighting permitted.





※ Contestants who wish to bring tools and equipments shall prepare a list of such tools and present it to the judges for approval in advance. However, the judges may ban the use of any tools or equipments that are considered to give the contestant an unfair advantage.



※ Contestants are not permitted to bring any tools other than the tools specified in the <List of Tools to be Brought>, but contestants may choose not to bring any unnecessary tools specified on the list. However, all contestants must bring safety glasses to be worn during the contest.

※ Tools and equipments that have been modified to accommodate the contestant's disabilities are permitted to be brought to the contest, but tools or equipments that have been modified for any other reasons are not permitted to be brought.

## 6. List of Facilities Installed at Contest Site

No.	Equipment	Picture	Specification	Unit	Qty	Note
1	Worktable		750 × 1800mm or similar	Each	1	According to no. of contestants
2	Extension cord		AC220V (3 or more)	Each	1	According to no. of contestants
3	Digital circuit tester		Able to measure DCV, ACV $\Omega$ , mA	Each	1	According to no. of contestants
4	DC power supply		$\mp$ 30V, 2A	Each	1	According to no. of contestants
5	Oscilloscope		100 MHz, 2 channels	Each	1	According to no. of contestants
6	Operation tester		For confirming IC, LED	Each	1	According to no. of contestants
7	Stand		Fixed on table	Each	1	According to no. of contestants
8	File		For A4	Each	1	According to no. of contestants

## 7. Evaluation Criteria

No.	Main Items to be Evaluated	Marks
1	Operation	25
2	Assembly	35
3	Cable Grappling	20
4	Chassis Assembly	10
5	Tidiness (cleaning)	10
Total		100