



ES-362U PRESETTABLE MASTER TIMER

OPERATION AND MAINTENANCE MANUAL

The ES-362U is a four digit, presettable 100 minute master timer (00:00-99:59) with five top-front mounted controls (UP, DOWN, STOP, RESET and PRESET). Pressing the appropriate switch actuates each of the controls. The timer runs continuously unless stopped (except in the case of options "X" and "Z", where it stops at 00:00). If stopped, the timer holds the time displayed when it was stopped. Pressing the "UP" switch starts the timer counting up from the time on the display; the "DOWN" switch starts the timer counting down from the time on the display. The "STOP" switch stops the timer count while the "RESET" switch returns the display to 00:00. The "PRESET" switch presets the timer to the time set on the front-mounted 4-digit thumbwheel switch. The timer may be reset or preset while it is stopped or while it is running. If the reset or preset switch is pressed while the timer is running, the timer does not count until the switch is released. All displays are 0.56" yellow LED digits.

The ES-362U may be remotely controlled via the rear-mounted 9-pin connector (pin designations are given below). A momentary short to ground or a 5 volt logic "0" is required to actuate the desired UP, DOWN, STOP, RESET or PRESET function. A remote input should be held low for at least 25 milliseconds to insure that it will be recognized. The 9-pin connector also provides access to the option "Y" and "Z" relay contacts.

An ESE Serial Time Code output of the displayed timer data is accessible on the rear-mounted BNC connector. This output is capable of driving up to 100 Remote Displays (such as the ES-372U, ES-361U, LX-361U, ES-366U, LX-366U, ES-364U or ES-369U) through up to 4000' of coaxial cable or twisted pair.

SPECIFICATIONS

ELECTRICAL: Input Voltage 117 VAC, 50/60 Hz; Power Requirement 5W Max.
MECHANICAL: Etched Aluminum case 2.5" High x 10" Wide x 6" Deep

CIRCUIT DESCRIPTION

The ES-362U is based on a single microprocessor chip, timer IC, Z4. It is powered by a +5 volt DC supply consisting of T1, diodes D1-D3, capacitors C1-C6 and regulator Z2. T1 provides 6 VAC to the voltage doubler circuit composed of D1-D2, C1-C4. Approximately +12 to +15 volts DC is developed across C1 and C3, which is regulated to 5 volts by Z2. This is used to power the timer logic. A separate 6 VDC supply is used to supply the segment driver chip Z6. IC Z4 provides all timing and control functions and generates serial control signals for the display driver chips, Z6 and Z7. The display operates in multiplex mode. Z6 and Z7 receive segment and digit drive data from Z4 via a data line (Z4 pin 28), a clock line (Z4 pin 27) and a strobe line (Z4 pin 26). A 50 or 60 Hz clock signal is taken from T1, logic-level converted by Q1 and used for the counting timebase. Z4 also provides the Serial Timer Code, which is buffered by IC Z3.

ES-362U CONNECTOR DESIGNATIONS

DB-9

Pin	Function
1	Up
2	Stop
3	Reset
4	Down
5	Preset
6	Relay Contact (Optional)
7	Relay Contact (Optional)
8	Not Used
9	Ground

OPTIONS

- C:** When this option Crystal Timebase is specified, a trimmer capacitor is included for greater accuracy. The crystal (.002% accuracy) is factory calibrated to provide an accuracy of 2-3 seconds per week and can also be field adjusted for greater accuracy.
- D:** When this option is specified, a standard 6' remote cable that attaches to a rear-mounted 25-Pin connector is provided. All function controls (UP, DOWN, STOP, RESET and PRESET) and thumbwheel switches are mounted on a 1/8" clear anodized aluminum switch plate. With this option, the unit is housed in an etched aluminum case 2.5" High x 8" Wide x 6" Deep. Extra cable length is available upon request.
- J:** When this option is specified, input voltage is 220 VAC, 50/60Hz.
- N:** When this option is specified, a change in count direction occurs when the Down count reaches zero.
- P:** When this option is specified, the unit is housed in an etched aluminum rackmount enclosure – 1.75" high x 19" wide x 10" deep.
- P2:** When this option is specified, a 19" rackmount panel allows any two units with a "P2" option to be mounted side by side. Option "D" is required.
- Q:** When this option is specified, the unit is housed in a console mount enclosure with an etched aluminum front panel – 3.5" high x 9" wide x 8" deep. Option "D" is required.
- T:** When this option (Tenths of Seconds display) is specified, a tenths digit is included to the right of seconds, with decimal point. The tenths digit is returned to zero when the reset switch is pressed.
- UL:** When this option is specified, the unit is supplied with a UL approved wall mount power supply.
- W:** When this option is specified, the unit is supplied with a three-wire line cord.
- X:** This option has been optimized for timing and controlling individuals who are engaged in public speaking. Typically, as a "speaker timer", the unit is operated in a countdown mode. The timer counts until it reaches 00:00, when it automatically stops.

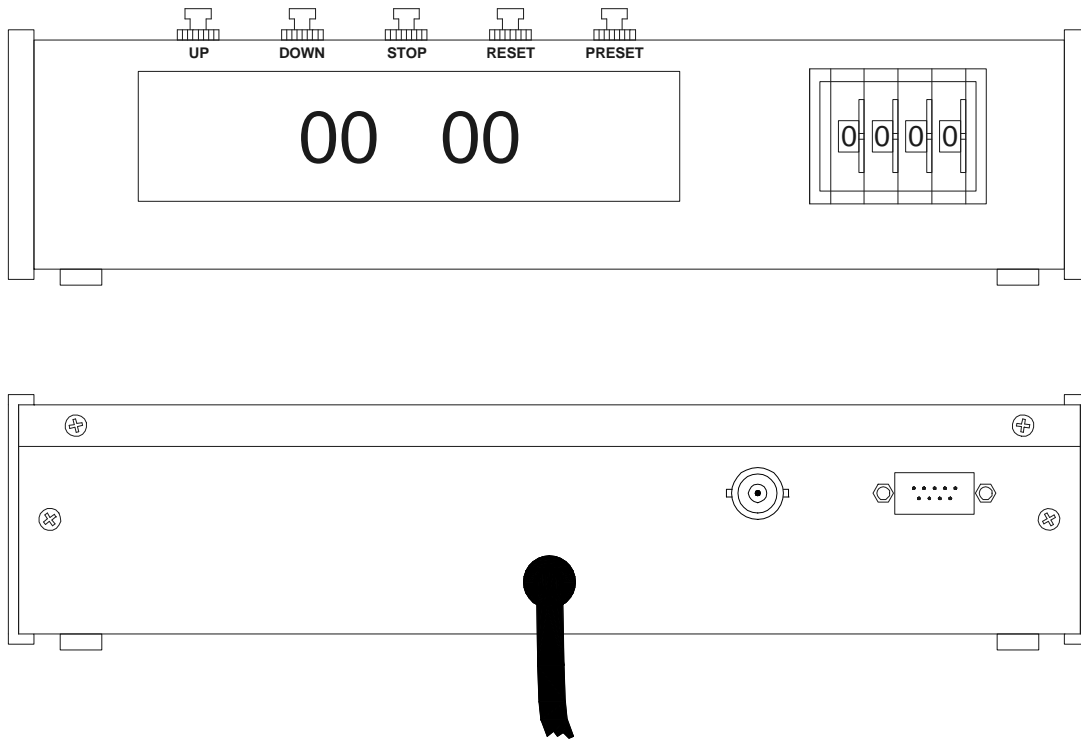
When the "PRESET" switch is pressed while holding down the "STOP" switch the thumbwheel setting is instead loaded to a special memory, called the "yellow time memory", to be described below. Normally, during operation, the thumbwheel is left set to the main timer preset time so that the timer may be easily preset to the beginning of the cycle.

The ES-362UX provides three isolated relay outputs that may be used for controlling different colored lamps. These are identified as the "GREEN", "YELLOW" and "RED" outputs. The "GREEN" output contacts close when the "DOWN" switch is pressed, signaling the speaker to begin talking. When the timer reaches the time set in the "yellow time memory" the "GREEN" output opens and the "YELLOW" output contacts close, signaling the speaker to begin summing up. By default, the "yellow time" is 00:30 (thirty seconds remaining) unless set otherwise as described above. When the timer reaches 00:00, the "YELLOW" output opens, and the "RED" output closes, signaling the speaker that his time is up. The timer may then be preset to the beginning of the cycle in preparation for the next speaker. The outputs remain in their present state (red lamp on) until the "DOWN" switch is again pressed.

A 25-pin connector provides access to the relay outputs (pin designations are given on page 3). The relay contacts are rated at 10 watts maximum resistive load, 500 mA maximum switching current, 30 volts maximum. When using incandescent (filament) lamps, care should be taken to operate well under these ratings, as there is a large current surge when the lamp is energized. Using a larger buffer relay with an external DC supply is recommended for driving higher powered lamps; the coil of such a relay should have a spike suppression diode connected across it. LEDs, suitably current-limited with a resistor, are easily driven by the ES-362UX relays up to the stated rating.

- Y:** When this option (relay closure output) is specified, a relay closure with a duration of 1 second (100 milliseconds for option "T") occurs when the timer completes a countdown to zero. The relay contacts are rated at 10 watts maximum resistive load, 500 mA maximum switching current.
- Z:** When the option (Relay contact closure and stop at zero) is specified, the timer will stop and a reed relay contact closure output occurs when the timer completes a countdown to zero. The contacts remain closed until the timer is restarted. The relay contacts are rated at 10 watts maximum resistive load, 500 mA maximum switching current.

FRONT AND REAR VIEWS



ES-362UD AND ES-362UX

When option “D” is ordered, the DB-9 connector is replaced with a DB-25 connector. If options “Y” or “Z” are specified, access to the relay contacts is found on pins 6 and 7 of the DB-9 connector. When option “X” is ordered, a DB-25 connector is provided for the three relay closures. The pin designations are shown below.

“D” PLATE CONNECTOR DESIGNATIONS

Pin	Function	Pin	Function
1	T1	13	T1
2	T2	14	T2
3	T4	15	T4
4	T8	16	T8
5	T1	17	UP
6	T2	18	DOWN
7	T4	19	STOP
8	T8	20	RESET
9	T1	21	PRESET
10	T2	22	Seconds Common
11	T4	23	Minutes Common
12	T8	24	Ground (Control Common)
		25	Not Used

DB-25 (Option X only)

Pin	Function	Pin	Function
1	Green Relay Contact	6	Not Used
2	Green Relay Contact	7	Red Relay Contact
3	Not Used	8	Red Relay Contact
4	Yellow Relay Contact	9-25	Not Used
5	Yellow Relay Contact		

ES-362U PARTS LIST**PCB COMPONENTS**

QTY	DESIGNATION	DESCRIPTION	PART NUMBER
1	Z2	INTEGRATED CIRCUIT	LM330T-5.0
1	Z3	INTEGRATED CIRCUIT	4503
1	Z4	INTEGRATED CIRCUIT	P87C51SBPN-CT5
1	Z6	INTEGRATED CIRCUIT	UCN5895A
1	Z7	INTEGRATED CIRCUIT	UCN5841A
1	X1	CRYSTAL	11.0592MHZ
1	Q1	TRANSISTOR	PN2222
3	D1 - D3	DIODE	1N4003
16	D5 - D20	DIODE	1N4148 or 1N914
1	R8	RESISTOR	27 OHM 1/4W
7	R22 - R28	RESISTOR	47 OHM 1/4 W
1	R29	RESISTOR	68 OHM 1/4 W
5	R17 - R21	RESISTOR	1K 1/4 W
8	R30 - R37	RESISTOR	10K 1/4 W
1	R6	RESISTOR	51K 1/4 W
1	R5	RESISTOR	120K 1/4 W
1	C10	CERAMIC CAPACITOR	10pf 50v Cer K
1	C11	CERAMIC CAPACITOR	25pf 50v Cer K
1	C8	CERAMIC CAPACITOR	.01uf 50v Cer Z
2	C5, C7	CERAMIC CAPACITOR	.1uf 50v Cer Z
1	C12	ELECTROLYTIC CAPACITOR	4.7uf 10v R EI
1	C6	ELECTROLYTIC CAPACITOR	100uf 25v R EI
4	C1 - C4	ELECTROLYTIC CAPACITOR	3300 UF 25V
2		SOCKET	16 PIN DIP SOCKET
1		SOCKET	18 PIN DIP SOCKET
1		SOCKET	40 PIN DIP SOCKET
2	N1 - N2	LED DISPLAY	LTD6840Y
1		PCB	UCT2 DISPLAY
1		PCB	UCT-2 LOGIC

CHASSIS COMPONENTS

QTY	DESIGNATION	DESCRIPTION	PART NUMBER
4		THUMBWHEEL SWITCH	THUMBWHEEL SWITCH
1		END PLATE	LEFT END PLATE
1		END PLATE	RIGHT END PLATE
1		LINE CORD	2 WIRE LINE CORD
1		BUSHING	2 WIRE BUSHING
5		SWITCH	#44 CREAM PB SWITCH
1		CONNECTOR	BNC (UG-1094)
1		CONNECTOR	9 PIN MALE D-SUB
1		CONNECTOR	9 PIN FEMALE D-SUB
1		CONNECTOR	9 PIN D-SUB HOOD
1	T1	TRANSFORMER	P6134
1		CASE & HARDWARE	ES-362U

ES-362U PARTS LIST (CONTINUED)

OPTIONAL COMPONENTS

QTY	DESIGNATION	DESCRIPTION	PART NUMBER
1	C9 (C)	VARIABLE CAPACITOR	5-30 PF TRIMM 5MM V
1	(D)	CONNECTOR	25 PIN MALE D-SUB
1	(D)	CONNECTOR	25 PIN FEMALE D-SUB
1	(D)	CONNECTOR	25 PIN D-SUB HOOD
1	T1 (J)	TRANSFORMER	SSA6-6.3/230
2	T1, T2 (LX)	TRANSFORMER	P6465
2	T1, T2 (J AND LX)	TRANSFORMER	P8705/SSA5-6.3/230
1	(LX)	AC SOCKET	AC SOCKET (IEC 300)
1	(LX)	LINE CORD/PLUG	3 WIRE CORD/PLUG
2	T1, T2 (P)	TRANSFORMER	P6465
2	T1, T2 (J AND P)	TRANSFORMER	P8705/SSA5-6.3/230
1	N3 (T)	LED DISPLAY	LTD6840Y
1	(UL)	POWER PLUG	UL PWR PLUG
1	T1 (UL)	TRANSFORMER	AA-061A5-206 "UL"
1	(W)	LINE CORD	3 WIRE LINE CORD
1	(W)	BUSHING	3 WIRE BUSHING
3	Q2 - Q4 (X)	TRANSISTOR	2N2907 or PN2907
3	D4, D21, D22 (X)	DIODE	1N4003
3	R7, R38, R39 (X)	RESISTOR	5.1K 1/4 W
3	K1 - K3 (X)	RELAY	1A5A RELAY
1	(X)	PCB	ES-1424M DUAL RELAY
1	(X)	CONNECTOR	25 PIN MALE D-SUB
1	(X)	CONNECTOR	25 PIN FEMALE D-SUB
1	(X)	CONNECTOR	25 PIN D-SUB HOOD
1	Q2 (Y AND Z)	TRANSISTOR	2N2907 or PN2907
1	D4 (Y AND Z)	DIODE	1N4003
1	R7 (Y AND Z)	RESISTOR	5.1K 1/4 W
1	K1 (Y AND Z)	RELAY	1A5A RELAY

IF COMPONENT REMOVAL IS REQUIRED, WE RECOMMEND REMOVING ALL SOLDER USING A 35W OR SMALLER SOLDERING IRON AND SOLDER WICK TO PREVENT DAMAGE TO THE PRINTED CIRCUIT BOARD.

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