

# MITSUBISHI

PROGRAMMABLE CONTROLLER

# MELSEC-A

**User's Manual**

**Analog timer module  
type A1ST60**

CATALOG # JUM-397  
\$ 5.00

 **MITSUBISHI  
ELECTRIC**

## REVISIONS

**\*The manual number is given on the bottom left of the back cover.**

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## INTRODUCTION

REV. 01/89

Thank you for choosing the Mitsubishi MELSEC-A Series of General Purpose Programmable Controllers. Please read this manual carefully so that the equipment is used to its optimum. A copy of this manual should be forwarded to the end User.

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## 1. GENERAL DESCRIPTION

This User's Manual explains the specifications, handling, and how to use the A1ST60 type analog timer module (hereafter called the A1ST60) used with an A1SCPU.

The A1ST60 can set and adjust timer time easily without using a peripheral device.

### 1.1 Features

- (1) The A1ST60 has 8 points of analog timer (T0 to T7).
- (2) The setting range of an analog timer can be set at every timer.
  - 0.1 to 1.0 sec.
  - 1 to 10 sec.
  - 10 to 60 sec.
  - 60 to 600 sec.
- (3) Timer time can be adjusted by operating an A1ST60 switch regardless of the presence or absence of a peripheral device while operating an A1SCPU.
- (4) The A1ST60 has a pause function that can temporarily stops the timer time of an analog timer.

#### POINTS

- (1) The analog timer (T0 to T7) of the A1ST60 is different from a CPU internal timer (T0 to T7).  
An analog timer (T0 to T7) on a sequence program programs an I/O signal X allocated to A1ST60 as a contact of an analog timer and programs Y as a coil.
- (2) I/O numbers X and Y are displayed when the A1ST60 is installed in the I/O slot 0 of a main base unit.

2. SPECIFICATIONS

2.1 General Specifications

Table 2.1 General Specifications

Item	Specifications				
Operating ambient temperature	0 to 55 °C				
Storage ambient temperature	-20 to 75 °C				
Operating ambient humidity	10 to 90 % RH, non-condensing				
Storage ambient humidity	10 to 90 % RH, non-condensing				
Vibration resistance	Conforms to *JIS C 0911	Frequency	Acceleration	Amplitude	Sweep Count
		10 to 55 Hz	—	0.075 mm (0.003 in)	10 times **(1 octave /minute)
		55 to 150 Hz	9.8 m/s <sup>2</sup> (1 g)	—	
Shock resistance	Conforms to *JIS C 0912 (98 m/s <sup>2</sup> (10 g) x 3 times in 3 directions)				
Noise durability	By noise simulator of 1500 Vpp noise voltage, 1 μs noise width and 25 to 60 Hz noise frequency				
Dielectric withstand voltage	500 VAC for 1 minute across DC external terminals and ground 1500 VAC for 1 minute across AC external terminals and ground				
Insulation resistance	5 MΩ or larger by 500 VDC insulation resistance tester across AC external terminals and ground				
Grounding	Class 3 grounding: If appropriate grounding is not available, connect the grounding wire to the electric panel.				
Operating ambience	Free of corrosive gases. Dust should be minimal.				
Cooling method	Self-cooling				

\* JIS = Japanese Industrial Standard

REMARK

One octave marked \*\* indicates a change from the initial frequency to double or half frequency. For example, any of the changes from 10 Hz to 20 Hz, from 20 Hz to 40 Hz, from 40 Hz to 20 Hz, and 20 Hz to 10 Hz are referred to as one octave.

2. SPECIFICATIONS

MELSEC-A

2.2 Performance Specifications

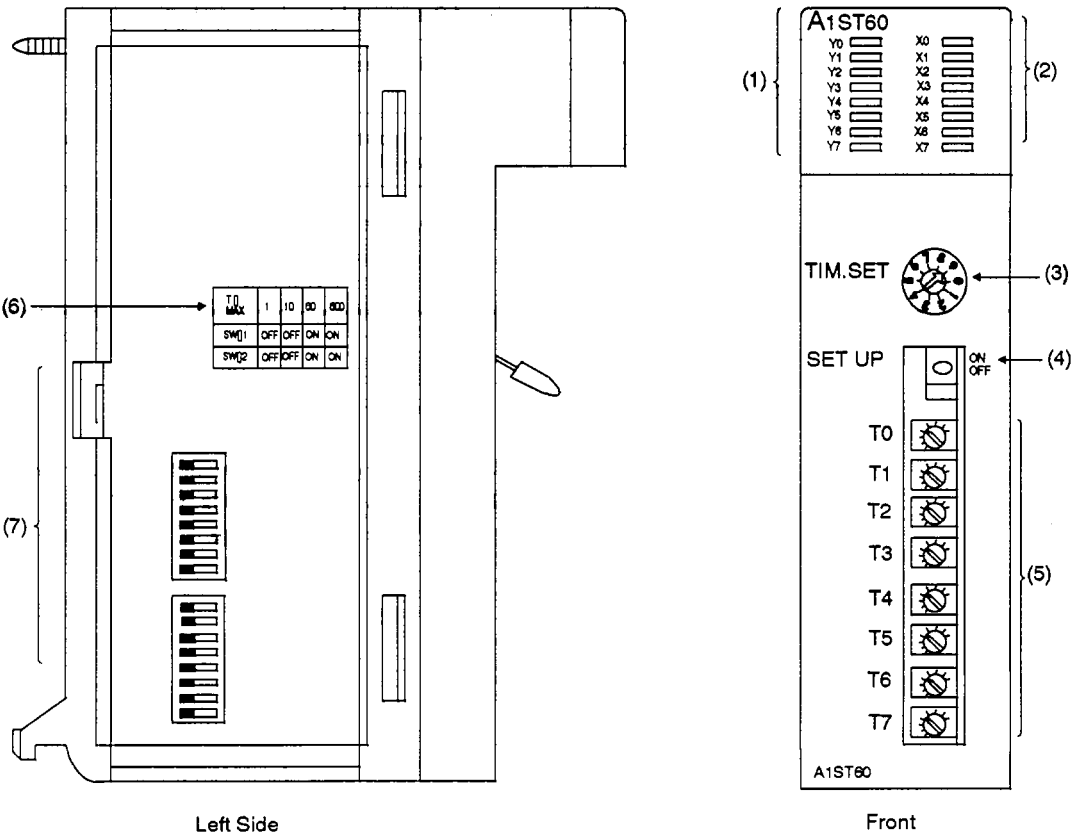
Table 2.2 Performance Specifications

Items	Specifications
Timer number of points	8 points (ON-delay operation)
Timer set value range (Can be selected for one point.)	0.1 to 1.0 sec., 1 to 10 sec., 10 to 60 sec., 60 to 600 sec.
Timer precision	±2.0 %
Number of I/O points	16 (I/O allocation: output 16 points)
Internal current consumption (5 VDC)	0.055 A
Weight kg (lb)	0.13 (0.29)

2.3 Applicable Systems

- (1) The A1ST60 applies only to an A1SCPU.
- (2) The number of A1ST60 modules is not restricted by the range of the number of A1SCPU I/O points.

2.4 Nomenclature



Number	Contents			
(1)	Timer operating LED			
	Displays the ON/OFF state of an analog timer (T0 to T7). ON: Lit, OFF: Not lit			
	LED	Analog Timer	LED	Analog Timer
	Y0	T0	Y4	T4
	Y1	T1	Y5	T5
	Y2	T2	Y6	T6
	Y3	T3	Y7	T7
(2)	Timer contact LED			
	Displays the ON/OFF state of an analog timer contact (T0 to T7). ON: Lit, OFF: Not lit			
	LED	Analog Timer	LED	Analog Timer
	X0	T0	X4	T4
	X1	T1	X5	T5
	X2	T2	X6	T6
	X3	T3	X7	T7
(3)	Timer Mode Conversion Switch			
	Selects the analog timer (T0 to T7) to adjust the timer time. (Factory-set to 9)			
	Number	Contents	Number	Contents
	0	Select T0.	5	Select T5.
	1	Select T1.	6	Select T6.
	2	Select T2.	7	Select T7.
	3	Select T3.	8	Select T0 to T7.
4	Select T4.	9	No processing (The switch is usually set to this position.)	
(4)	SET UP Switch			
	Checks the timer time of an analog timer (Factory-set to OFF) ON : An analog timer designated in (3) is turned ON. OFF : The switch is usually set to this position.			
(5)	Adjustment Volume			
	Adjusts the timer time of an analog timer (Factory-set to the minimum value)			
(6)	Setting Range Conversion Switch Display			
	Displays the setting range of the analog timer and the setting contents of the setting range conversion switch.			
(7)	Setting Range Conversion Switch			
	Switches the range of the timer time of each analog timer. (Factory-set to OFF)			
	<div><div><div><div>T0</div><div>T1</div><div>T2</div><div>T3</div></div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>SW01 SW02 SW11 SW12 SW21 SW22 SW31 SW31.32</div><div>... For analog timer T0 ... For analog timer T1 ... For analog timer T2 ... For analog timer T3</div></div><div><div><div>T4</div><div>T5</div><div>T6</div><div>T7</div></div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>SW41 SW42 SW51 SW52 SW61 SW62 SW71 SW72</div><div>... For analog timer T4 ... For analog timer T5 ... For analog timer T6 ... For analog timer T7</div></div></div></div></div>			



## 3. SETTING AND OPERATING PROCEDURES

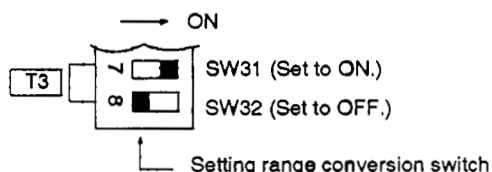
### (1) Setting the range conversion switch setting

Set the range of the timer time of an analog timer (T0 to T7) by using the setting range conversion switch.

Timer Time Ranges Switch Names	0.1 to 1 s	1 to 10 s	10 to 60 s	60 to 600 s
SW[ ]1	OFF	ON	OFF	ON
SW[ ]2	OFF	OFF	ON	ON

[ ]: Analog timer number (0 to 7)

Example: When setting the range of the timer time of analog timer T3 at 1 to 10s



### (2) Install A1ST60 in a base unit.

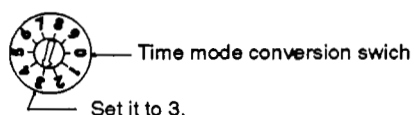
### (3) Tuning the adjustment volume

(a) Set the A1SCPU and A1ST60 to the following states and turn ON the power supply to the A1SCPU.

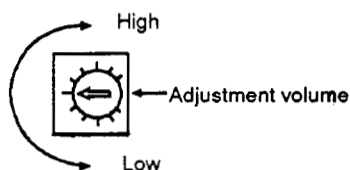
- Set the RUN keyswitch of the A1SCPU to STOP.
- Set the SET UP switch of the A1ST60 to OFF.

(b) Select the analog timer (T0 to T7) that adjusts the timer time by using the timer mode conversion switch.

Example: Selecting analog timer T3



(c) Set the adjustment volume at the target timer time in the range of timer time set in (1).



- (d) Turn ON the SET UP switch.

Then, confirm the timing by whether the timer contact LED is lit after the timer operation LED goes ON.

- (e) Turn OFF the SET UP switch after confirming the ON timing of the timer contact LED.

- (f) When microadjusting the timer time, repeat the operations in c) to d).

- (g) Set the timer time of an each analog timer in the order given in b) to f).

The coils of all analog timers (T0 to T7) can be turned ON simultaneously by setting the timer mode conversion switch to 8 and turning ON the SET UP switch.

- (h) After adjusting the timer time, set the timer mode conversion switch to 9.

After that, the SET UP switch operation becomes invalid.

**POINT**

If an analog timer is adjusted when the A1SCPU is in the RUN state, if either analog timer start signal (Y) from the SET UP switch or a sequence program goes ON, the corresponding analog timer starts.

4. PROGRAMMING

4.1 I/O Signals List

The following I/O signals are used for the input/output of an analog timer of an A1ST60.

Device No.	Signal Contents	Device No.	Signal Contents
X0	Contact of analog timer T0	Y0	Coil of analog timer T0
X1	Contact of analog timer T1	Y1	Coil of analog timer T1
X2	Contact of analog timer T2	Y2	Coil of analog timer T2
X3	Contact of analog timer T3	Y3	Coil of analog timer T3
X4	Contact of analog timer T4	Y4	Coil of analog timer T4
X5	Contact of analog timer T5	Y5	Coil of analog timer T5
X6	Contact of analog timer T6	Y6	Coil of analog timer T6
X7	Contact of analog timer T7	Y7	Coil of analog timer T7
X8	(Unusable)	Y8	Pause coil of analog timer T0
		Y9	Pause coil of analog timer T1
		YA	Pause coil of analog timer T2
		YB	Pause coil of analog timer T3
to		YC	Pause coil of analog timer T4
		YD	Pause coil of analog timer T5
		YE	Pause coil of analog timer T6
XF		YF	Pause coil of analog timer T7

### 4.2 Programming Methods

Use an analog timer as follows:

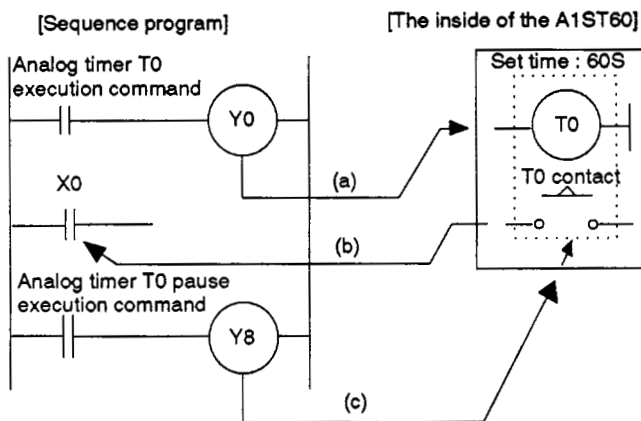
- (1) Use Y0 to Y7 as the coil of an analog timer.

Use X0 to X7 of the same I/O number for the timer contact.

- (2) The A1ST60 has a pause coil that temporarily stops an analog timer.

Use Y8 to YF for a pause coil.

Example: When analog timer T0 is executed with a sequence program

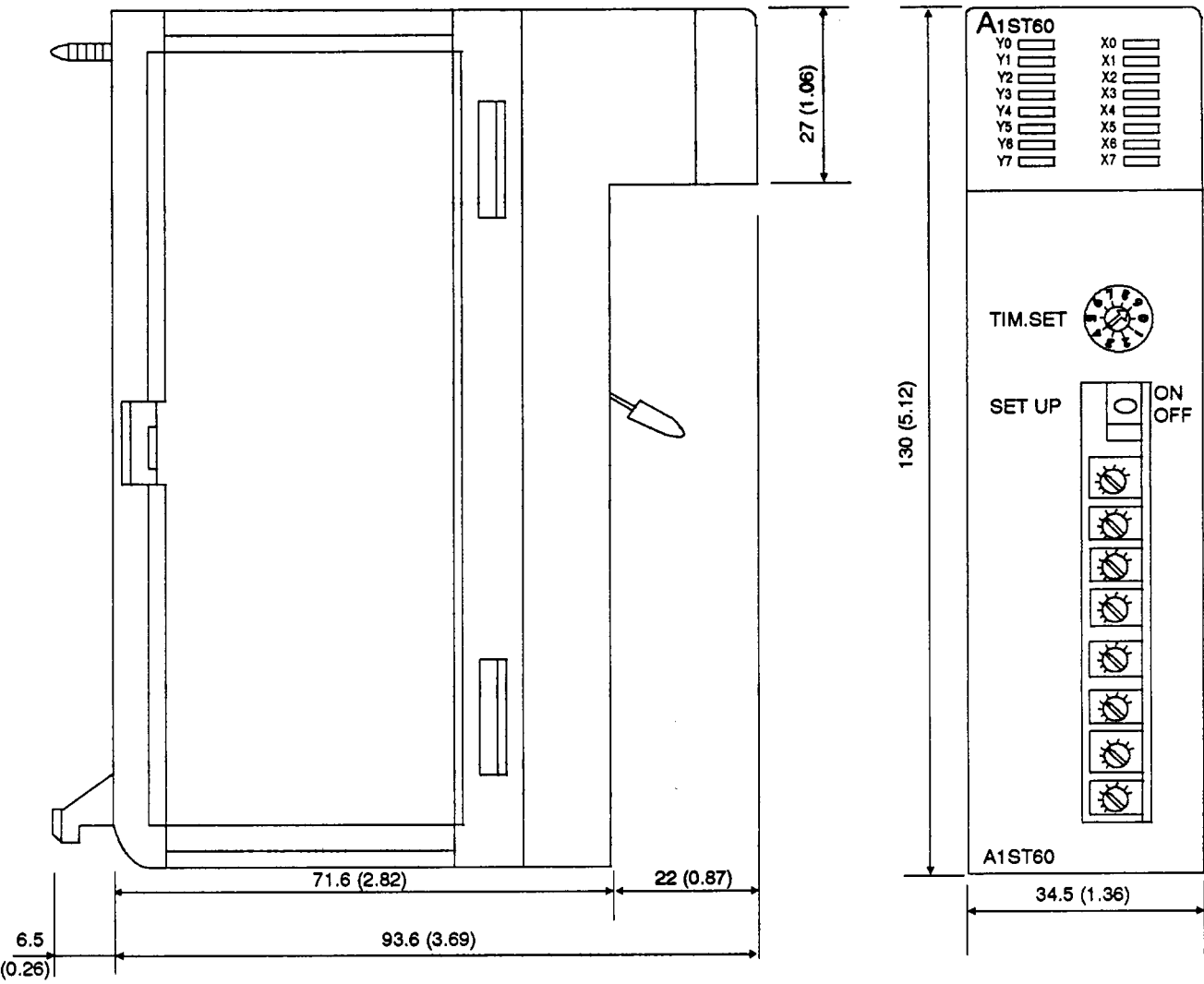


- (a) If output Y0 goes ON, analog timer T0 goes ON, and a timer count is started.
- (b) Analog timer contact T0 goes ON and input X0 goes ON 60 seconds after output Y0 goes ON.
- (c) When output Y8 goes ON, the timer time of analog timer T0 temporarily stops.

Then, if output Y8 goes OFF, the count is started continuously from the temporarily stopped timer time.

APPENDIX

APPENDIX 1 Outside Dimensions



**IMPORTANT**

- (1) Design the configuration of a system to provide an external protective or safety interlocking circuit for the PCs.
- (2) The components on the printed circuit boards will be damaged by static electricity, so avoid handling them directly. If it is necessary to handle them take the following precautions.
  - (a) Ground human body and work bench.
  - (b) Do not touch the conductive areas of the printed circuit board and its electrical parts with and non-grounded tools etc.

Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.

All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.

Owing to the very great variety in possible applications of this equipment, you must satisfy yourself as to its suitability for your specific application.



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