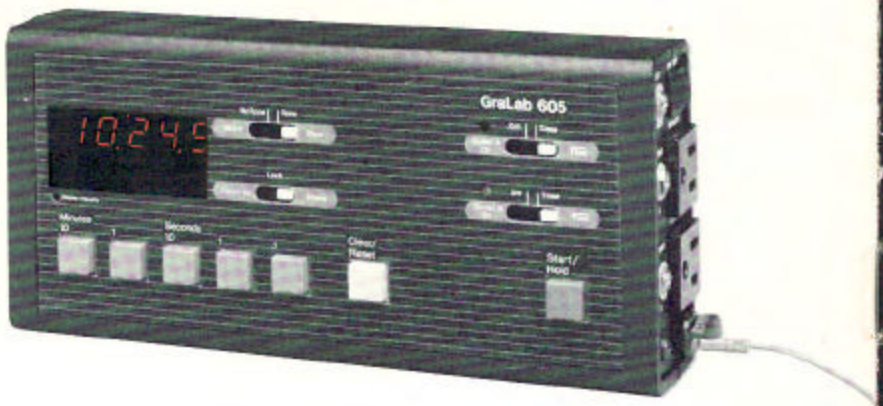
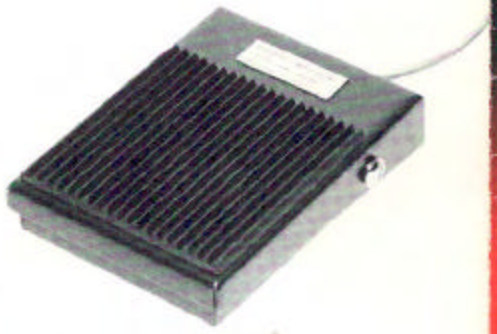




Electronic Switching Timers

If you want precise electronic timing for an application which doesn't require all the features of the Model 900, consider the GraLab 605 single memory, or the 625 dual memory timer. Both models offer push-button time settings ranging from 0.1 seconds to 59 minutes, 59.9 seconds plus automatic reset, quartz crystal accuracy and repeatability. They also have adjustable five-digit LED display, up or down counting, four audio signal options, two AC outlets with independent controls, two logic level outputs and foot-switch option. For more details, request GraLab Industrial/Scientific Catalog.

Model 560 Timer Foot Switch

Made for electronic timers, including GraLab Model 900 and the 600 series, this foot switch combines operating efficiency with a compact and attractive appearance. It has a heavy tread on the actuating treadle and a skid-proof base for ease of use. And it requires only a light pressure, so it can be operated for long periods without causing fatigue. The formed steel case is finished in black. An 8-foot cord with plug is included. Electrical rating is 7 AMP, 125-250 VAC.

DIMCO-GRAY COMPANY
GRALAB INSTRUMENTS DIVISION
8200 So. Suburban Rd., Centerville, Ohio 45458
(513) 433-7600 Telex 288367 Cable: DIMCOGRAY
FAX (513) 433-0520
An Employee-Owned Corporation

567-26 2-89

Printed in U.S.A.

Operating Instructions for GraLab Model 900 Programmable Electronic Timer

DIMCO-GRAY COMPANY
GRALAB INSTRUMENTS DIVISION
An Employee-Owned Corporation

Outstanding Features of GraLab Model 900

- 100% Solid State Circuitry
- Nine memory locations, including a display memory
- Maximum time entry of 59 hours, 59 minutes, 59.9 seconds for each memory location
- Four programming options for each memory location
- Memory locations can sequence forward or backward
- Recall (visual check) for all programmed functions
- Automatic clear and automatic reset operations
- Timer counts up or down
- Stop clock capability
- Long off-time/short on-time capability
- Linked timer capability
- Display brightness control
- Tone for end of timing cycle
- Metronome and warning tones
- Two A.C. outlet receptacles
- Quartz crystal time base assures precise accuracy and repeatability, with less sensitivity to line frequency changes

Nomenclature

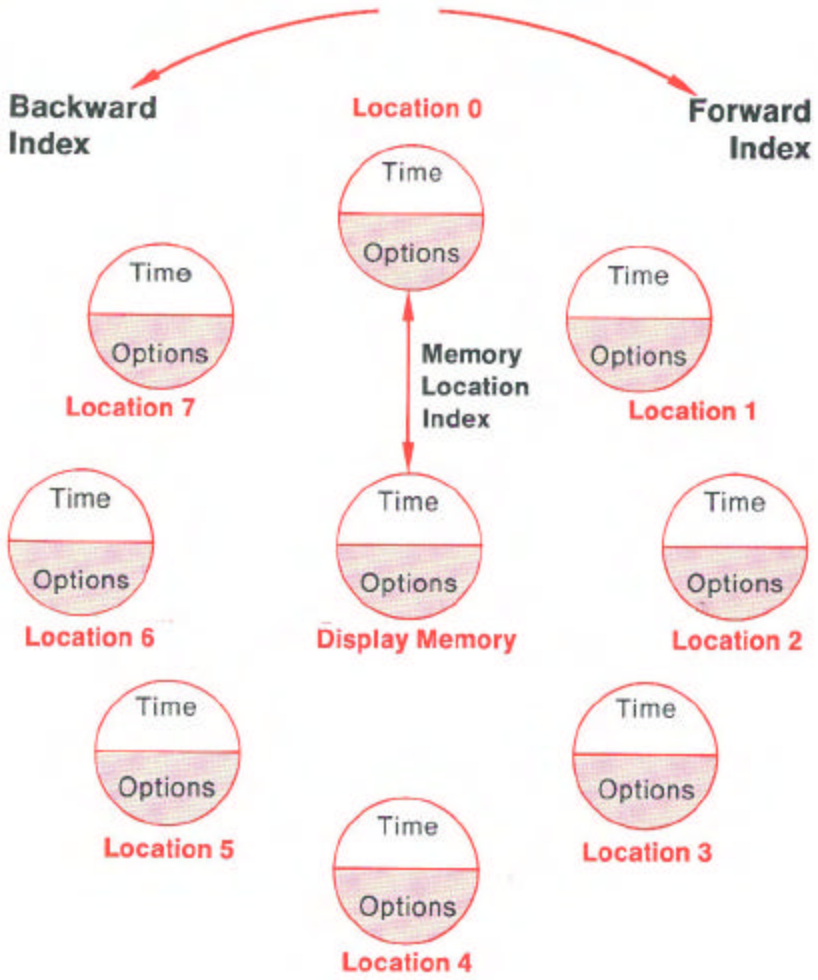
Keyboard View

1. Four-digit Display
2. Number Keys
3. Time Keys
4. Clear Key
5. Lights to indicate ongoing timing and outlet activity
6. Memory Location Sequence (programming option #1)
7. Function (programming option #2)
8. Audio (programming option #3)
9. Display (light intensity)
10. Count (programming option #4)
11. Key to switch Outlets A and B manually
12. Recall Key
13. Memory Location Key
14. Start/Hold Key

End View

15. Outlet A
16. Outlet B
17. Receptacle for optional footswitch
18. Output receptacle for external signal
19. On/Off Switch
20. Three-wire grounded cord
21. Slots for wall mounting

Memory Diagram



Operating Instructions GraLab Model 900

Introduction

GraLab Model 900 is a programmable electronic timer with 9 memory locations (see diagram at left). Each memory location holds a maximum time entry of 59 hours, 59 minutes, and 59.9 seconds. Each of these locations offers a choice of 4 programming options: Memory Location Sequence, Function, Audio, and Count. When you select the appropriate programming options, the 9 memory locations can be independent or interact with each other. A.C. power for appliances is switched between two outlets, depending on the timing program. In addition, output and input jacks provide a means for the timer to control or be controlled by an external signal.

Automatic Clear Operation

Time is entered into the display memory by pressing one or two number keys (0-9). Valid numbers are 0 thru 59; above 59 the timer clears the display memory. After each number entry is completed, the time key (hours, minutes, seconds, tenths) must be pressed. Continue this number/time key sequence until the total time is entered. As number/time key sequences are entered, the appropriate hours/mins, mins/secs, or secs/tenths are lighted on the 4-digit display. Press Start/Hold key once and the display will begin counting down, with the longest numerical time being displayed first (hours/mins then secs/tenths). After the timing cycle is over, the display memory will show **00.0.** The timer is timed-out with an automatic clearing of the display memory.

Example of 15 Second Automatic Clear

Press On/Off switch to **On.**

Enter time into the display memory:

- Press number keys **1** and **5**.

  Lighted numbers appear in display.
- Press **secs.**

  Decimal appears in display.

  Light appears opposite **secs/tenths.**
- Press **Start/Hold.**

(Timer will count down to 0 and signal end of cycle.)

Automatic Reset Operation

Enter time into the display memory as outlined above for Automatic Clear. Be sure to press the time key for hours, minutes, seconds or tenths. Press the memory location **(Mem Loc)** key. An **L** appears in the display, indicating where the memory location index is positioned. Press a number key (0-7 valid numbers only) to record the time entry into the memory location selected. Press **Start/Hold** key once to begin the timing cycle. When the cycle is completed, the display memory will read **00.0** for an instant, then immediately reset and display the time that was previously selected and entered. The timer has remembered the time entry and has reset, ready to time out again.

Note: Whenever the timer is turned on, all memory locations including the display memory are cleared to zeros and the memory location is indexed to 0. It is important not to switch off the timer or pull the plug as this automatically wipes out any data programmed.

Example of 15 Second Automatic Reset

Press On/Off switch to **On**.

Enter time into the display memory:

- Press number keys **1** and **5**.

  Lighted numbers appear in display.

- Press **secs**.

  Decimal appears in display.

  Light appears opposite **Secs/Tenths**.

- Press memory location **(Mem Loc)** key. **L** appears in the display and number (0-7) indicates where memory location index is positioned.

- Press number key **0** to record the time entry into memory location **0** or any other valid number 0-7.

- Press **Start/Hold**.

  Timing cycle will begin.

  At end of cycle, display memory will read **00.0** for an instant, then immediately reset and display the 15 seconds that was previously entered. Timer is ready to cycle again, and will continue to reset automatically until cleared.

Programming Options

Each memory location records time and a series of programming options. The program option series consists of 4 categories: Memory Location Sequence, (S), Function, (F), Audio, (A), and Count, (C). When a category key is pressed, the letter associated with that category is displayed **(S, F, A, C).** Pressing the selection key **(0, 1, 2, 3)** enters that option into the display memory. The following list summarizes each category of programming options:

1. Memory Location Sequence (S)

A. **S-0** (same): At the end of the timing cycle, the memory location index remains at the same memory location.

B. **S-1,** forward: At the end of the timing cycle, the memory location index moves forward by one memory location. A move from location 7 to location 0 is valid.

C. **S-3,** back: At the end of the timing cycle, the memory location index moves backward by one memory location. A move from location 0 to location 7 is valid.

2. Function (F)

A. **F-0** (reset): At the end of the timing cycle, the outlets are switched and the memory location currently indexed is reset.

B. **F-1,** reset/same outlets: At the end of the timing cycle, the outlets are not switched and the memory location currently indexed is reset.

C. **F-2,** autostart: At the end of the timing cycle, the outlets are switched and the timing cycle begins automatically where the memory location is indexed.

D. **F-3,** autostart/same outlets: At the end of the timing cycle, the outlets are not switched and the timing cycle begins automatically where the memory location is indexed.

3. Audio (A)

A. **A-0** (tone): At the end of the timing cycle, a tone sounds for 7/10 of a second.

B. **A-1,** no tone: At the end of the timing cycle, there is no tone.

C. **A-2,** metronome and tone: A tone burst sounds once every second during timing cycle. At the end of the cycle, a tone sounds for 7/10 of a second.

D. **A-3,** warning: A tone burst sounds once on the whole minute and once on the half minute throughout the entire cycle. During 10 thru 0 seconds, a tone burst sounds once every second. At the end of the timing cycle, a tone sounds for 7/10 of a second.

4. Count (C)

A. **C-0,** (down): Timer counts down from preset time to **00.0** for end of cycle.

B. **C-1,** up: Timer counts up to preset time in the memory location that is indexed.

Display Intensity

The brightness of the displays and lights can be controlled thru 4 positions: (high), med, low, and off. When the timer is turned on, the brightness is in the high position. To adjust the brightness, first press the **Display** key and then the level of intensity. Display intensity remains constant, and is not programmable.

Outlet Control

The **A-B** key alternates A.C. power from Outlet A to Outlet B, or vice versa. Lights at the top of the keyboard indicate which outlet has power to it.

Memory Location Operation

In order for the timer to remember the time and programming options for a timing cycle, the contents of the display memory must be entered into one of the 8 program memory locations (0-7). Press the memory location **(Mem Loc)** key and it will display an **L-#**. The display is indicating where the memory location index is positioned now. When a valid number key (0-7) is pressed, the memory location index is moved to the numeric memory location, and the contents of the display memory are entered into the numeric memory location.

Example of 3-Location Memory Operation

	Memory Location 0	**Memory Location 1**	**Memory Location 2**
Time	5 secs	10 secs	20 secs
Memory Location Sequence	forward	forward	back
Function	autostart	autostart same outlets	reset same outlets
Audio	no tone	(tone)	metronome and tone
Count	(down)	up	(down)

Press On/Off switch to **On**.

Memory location index is positioned at location 0.

Enter program options for memory location 0 as follows:

Press **Clear** Key.
Press number key **5**.
Press time key **secs**.
Press **Memory Location Sequence** and **forward**.
Press **Function** and **autostart**.
Press **Audio** and **no tone**.
Press **Count** and **(down)**.
Press memory location **(Mem Loc)** and Number key **0**.
Memory location number 0 is now programmed.

Enter program options for memory location 1 as follows:

Press **Clear** key.
Press number keys **1** and **0** (for **10**).
Press time key **secs**.
Press **Memory Location Sequence** and **forward**.
Press **Function** and **autostart same outlets**.
Press **Audio** and **(tone)**.
Press **Count** and **up**.
Press memory location **(Mem Loc)** and number key **1**.
Memory location number 1 is now programmed.

Enter program options for memory location 2 as follows:

Press **Clear** key.
Press number keys **2** and **0** (for **20**).
Press time key **secs**.
Press **Memory Location Sequence** and **back**.
Press **Function** and **reset same outlets**.
Press **Audio** and **metronome and tone**.
Press **Count** and **(down)**.
Press memory location **(Mem Loc)** and number key **2**.
Memory location number 2 is now programmed.

To begin timer cycling through memory locations 0, 1, and 2:

Press **Recall, Mem Loc** and number **0** keys to return memory location index to location **0**.
Press **Start/Hold** key.
Timer will cycle through programmed options entered for each memory location. After completing cycle for memory location 2, the timer will index back to memory location 1 and will stop cycling. Memory location will remain in location 1 until **Start/Hold** is pressed again to repeat cycle for locations 1 and 2.

Timing programs can be linked to proceed through the entire memory cycle from memory locations 0 through 7 and around again. Proper program options must be entered into each memory location to do this. Zero time is valid in memoy location; however, each use of zero time in a memory location adds 1/10th of a second to the program. An additional 7/10 of a second will be added by each use of the end of cycle tone option when moving from one memory location to another.

The display memory can be used to develop a memory cycle with 9 memory locations. The 8 memory locations are first programmed. The display memory is then programmed as the first time in the memory cycle along with the proper options. When the time in the display memory has timed out, the next time processed in the cycle will be where the index is pointing. Since the display memory is where the "time keeping" is occurring, the first time processed in this memory cycle will be lost.

Recall

The **Recall** key is used in conjunction with the time key, the memory location key, and the programming option keys.

To recall the contents of a memory location, press **Recall** key and then memory location **(Mem Loc)** key. An **L-#** will be displayed, indicating where the memory location index is pointing. Then when a number key (0-7 valid) is pressed, the memory location index is moved to the numeric memory location selected and the contents of that numeric memory location are displayed.

To recall time, press **Recall,** then hours, minutes, seconds, or tenths. The time will be displayed, and the lights at the top of the keyboard will indicate hours/mins, mins/secs or secs/tenths. To recall a program option, press **Recall** and then Memory Location Sequence, Function, Audio or Count. The respective letter will be displayed **(S, F, A, C,)** plus the numeric code **(0, 1, 2, 3)**. Use the keyboard nomenclature to interpret each programming step.

Pressing **Recall** when the timer is cycling displays the index location, allowing the operator to know where in memory he is timing.

Clear

When the time is not cycling (idle), pressing the **Clear** key will clear the display memory to show **0000**. When the timer is cycling and counting down, pressing **Clear** acts as an abort/reset function, returning the timer to the idle mode.

See **Stopwatch Operation** for use of **Clear** key when counting up.

Start/Hold

A. Pressing **Start/Hold** for the first time starts a timing cycle.

B. Pressing the **Start/Hold** key again freezes the timing cycle but does not put it into non-cycle (idle).

C. Another press of the key continues the timing.

NOTE: In the cycle mode, only **Start/Hold, Clear, Recall,** and **A-B** keys are acknowledged by the timer. Holding **Recall** and **A-B** keys down will momentarily freeze the display but does not affect the timing. In the idle mode, all keys are acknowledged by the timer.

Stopwatch Operation

The timer can be used as a stop watch. This implies no preset time; therefore, the index must be pointing to a memory location containing "zero" time.

Enter **Count-up** and press the **Start/Hold** key once to begin the cycle. To stop the cycle, press the **Start/Hold** key again. Press the **Clear** key to put the timer in the idle mode. The display memory contains the elapsed time and all time elements can be read by using the **Recall** key and the appropriate time key.

Precautions

- Use timer only at A.C. voltage and cycle printed on the nameplate.
- Be sure outlet load does not exceed maximum specified on each outlet receptacle.
- Always protect timer from jars and shocks.
- Avoid spilling liquids on timer.

A certain Dimco timer may suit your requirements better than other models. Please request bulletins describing Dimco's range of timer models and specifications.

Specifications

Accuracy
@ 20°C Ambient ± .015% @ 1 Min. No Load.

Repeatability
@ 20°C Ambient ± .010% @ 1 Min. No Load.

Temperature Range
0°C-55°C @ No Load. Above 25°C Ambient Temperature, Derate Power Handling At 25 Watts @ °C.

Humidity
0-95% Non-Condensing.

Voltages
Input voltage 100 to 130 VAC, 50/60 Hz (U.S. and Canada). 220/250 VAC, 50/60 Hz for use in other countries.

Power Rating
1000 Watts Max. each outlet @ 115 VAC.

Footswitch & Output Jacks

The footswitch jack is an extension of the Start/Hold Key. It can be optically coupled and sinks 30mA when grounded.

The output jack is an optically coupled transistor with the emitter to the shield and the collector to the tap. It's "On/Off" state follows the actuation of outlet B. BV_{ceo} = 30V. I_c max = 30mA.