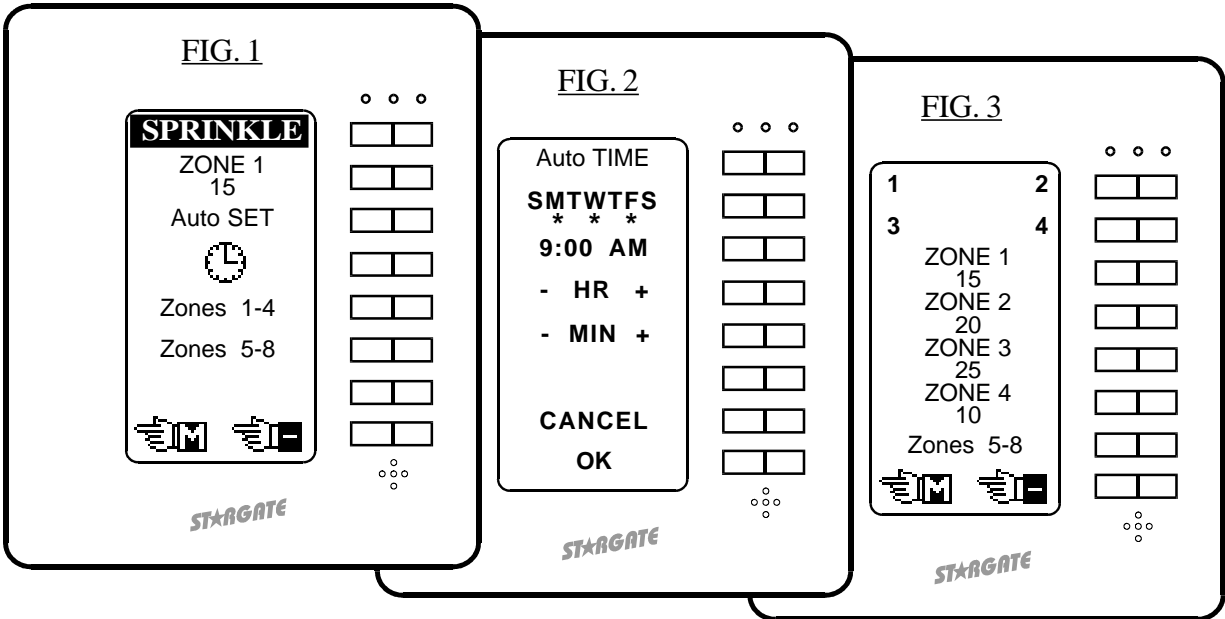


Sprinkler Control With The Stargate LCD-96M Keypad

In addition to all its other functions, the LCD-96M Multi-Menu Keypad provides a user-friendly platform for scheduling and controlling a multi-zone sprinkler system. The keypad comes pre-programmed with an 8-zone sprinkler menu (menu #49) that can be accessed by pressing the sprinkler button (raindrop icon) on Main menu #2. The following events and macros enable the sprinkler menu to schedule the time of day and days of the week to run the sprinkler routine and the number of minutes for each of the zones to run. It also allows manual control of each zone.



CONNECTIONS: The common ("C") terminals of Stargate's eight built-in relays (or 8-Channel Relay Xpander) all get wired to one side of an external 24VAC/1000mA power transformer. The normally open (N.O.) terminal of each relay connects to one wire of each sprinkler valve's solenoid. The remaining wires from the 8 solenoids connect to the other side of the 24VAC power transformer.

The top line (line 1) of the sprinkler menu (FIG. 1) is labeled "SPRINKLE" to identify the menu. The right side of button #1 triggers the CYCLE macro and the left side triggers the ALL OFF macro to let you manually start and stop the sprinkler cycle. When any sprinkler zone is running, the top line gets inverted (highlighted) as an indicator.

Menu line 2 is defined as the SprZONE variable. It displays which zone is in operation and the number of minutes remaining for that zone. Button #2 accesses the SprTIME variable so you can adjust the run time even while the zone is running.

Menu line 3 displays whether or not the automatic timer flag (AUTO TIMER) is set. Button #3 lets you set or clear the AUTO TIMER flag.

Menu line 4 has an icon of a clock. Pressing button #4 switches to the "AutoTime" Time Label menu (FIG. 2). From here you can set the time of day to begin the watering cycle and the days of the week you want the sprinklers to run.

Menu line 5 is labeled "Zones 1 - 4." Pressing button #5 takes you to a sub-menu (FIG. 3) for manually controlling and setting the run times for zones 1, 2, 3 and 4.

Menu line 6 is labeled "Zones 5 - 8." Pressing button #6 takes you to a similar zone sub-menu for manually controlling and setting the run times for zones 5, 6, 7 and 8. Each zone has its own button with a menu line that displays the zone name and the number of minutes it is programmed to run. Pressing the button lets you adjust the run time for the corresponding zone.

The top two buttons of the zone sub-menu let you manually operate any zone. Pressing one of these buttons triggers a corresponding Then Macro ("Zone 1" - "Zone 8") which will run the associated sprinkler for the time specified for that zone.

Menu line 7 and button #7 are not used in this example. They can be used for additional zones (9 - 12) if required.

The left side of button #8 takes you back to the main menu and the right side to the previous menu.

The key to the system's operation is the use of variables and flags which can be loaded and set directly from the keypad's sprinkler menus. Separate variables (T1, T2, T3, T4, T5, T6, T7, T8) are used to store each zone's run time. When the sprinkler cycle begins, the SprZONE variable gets loaded with a value of 1 to indicate zone 1 is running. Menu line 2 on the sprinkler menu displays "Zone 1" and Stargate's relay #1 goes on to activate the sprinkler valve for zone 1. Another variable (SprTIME) gets loaded with the value of zone 1's run time (T1) which gets displayed under the zone name. Once loaded, the SprTIME variable serves as a count-down timer by decrementing once per minute while updating the display in real time. When it reaches zero, the display changes to "Zone 2," relay #1 goes off, relay #2 goes on to activate zone 2, the SprTIME variable gets loaded with variable T2 (zone 2's run time), and the SprZONE variable gets loaded with a value of 2 to indicate zone 2 is running. As long as the SprCYCLE flag is set, the cycle continues until zone 8 has completed.

REQUIRED DEFINED ITEMS

Relays: Zone 1, Zone 2, Zone 3, Zone 4, Zone 5, Zone 6, Zone 7, Zone 8

Variables: T1, T2, T3, T4, T5, T6, T7, T8, SprZONE, SprTIME

Flags: SprCYCLE, AUTO TIMER

Time Labels: AutoTime

Then Macros:

ALL OFF

MACRO BEGIN
(RELAY: Zone 1) OFF
(RELAY: Zone 1) OFF
(RELAY: Zone 1) OFF
(RELAY: Zone 1) OFF
(RELAY: Zone 1) OFF
(RELAY: Zone 1) OFF
(RELAY: Zone 1) OFF
(RELAY: Zone 1) OFF
(RELAY: Zone 1) OFF
(V:SprTIME) LOAD with 0
(V:SprZONE) LOAD with 0
(F: SprCYCLE) CLEAR
LCDKP: UnInvert Text Line 1 of Menu 49 [KP:ALL]
MACRO END

CYCLE

MACRO BEGIN
(F: SprCYCLE) SET
LCDKP: Invert Text Line 1 of Menu 49 [KP:ALL]
MACRO END

ZONE 1

MACRO BEGIN
(RELAY: Zone 1) ON
(V:SprTIME) LOAD with (V:T1)
LCDKP: Goto Menu Screen = Menu 49 [KP:ALL]
MACRO END

ZONE 2

MACRO BEGIN
(RELAY: Zone 2) ON
(V:SprTIME) LOAD with (V:T2)
LCDKP: Goto Menu Screen = Menu 49 [KP:ALL]
MACRO END

ZONE 3

MACRO BEGIN
(RELAY: Zone 3) ON
(V:SprTIME) LOAD with (V:T3)
LCDKP: Goto Menu Screen = Menu 49 [KP:ALL]
MACRO END

ZONE 4

MACRO BEGIN
(RELAY: Zone 4) ON
(V:SprTIME) LOAD with (V:T4)
LCDKP: Goto Menu Screen = Menu 49 [KP:ALL]
MACRO END

ZONE 5

MACRO BEGIN
(RELAY: Zone 5) ON
(V:SprTIME) LOAD with (V:T5)
LCDKP: Goto Menu Screen = Menu 49 [KP:ALL]
MACRO END

ZONE 6

MACRO BEGIN
(RELAY: Zone 6) ON
(V:SprTIME) LOAD with (V:T6)
LCDKP: Goto Menu Screen = Menu 49 [KP:ALL]
MACRO END

ZONE 7

MACRO BEGIN
(RELAY: Zone 7) ON
(V:SprTIME) LOAD with (V:T7)
LCDKP: Goto Menu Screen = Menu 49 [KP:ALL]
MACRO END

ZONE 8

MACRO BEGIN
(RELAY: Zone 8) ON
(V:SprTIME) LOAD with (V:T8)
LCDKP: Goto Menu Screen = Menu 49 [KP:ALL]
MACRO END

Required Events: (available for download at www.jdstechnologies.com/download/apnotes/sprinkle.sch)

EVENT: SPRINKLER MODE

```
If
  (F:SprCYCLE) is SET
  or (V:SprZONE) > 0
Then
  LCD: Invert Text Line 1 of Menu 49 [KP:ALL]
Else
  LCD: Un-Invert Text Line 1 of Menu 49 [KP:ALL]
End
```

EVENT: Update LCD SprTIME

```
If - Always
  (V:SprTIME) Changes Value
Then
  LCD: Update LCD Variable <V:SprTIME> [KP:ALL]
End
```

EVENT: AUTO TIMER SET

```
If
  (F:AUTO TIMER) is SET
Then
  LCD: Change Text Line 3 Menu 49 to 'Auto SET ' [KP:ALL]
Else
  LCD: Change Text Line 3 Menu 49 to 'Auto OFF ' [KP:ALL]
End
```

EVENT: Manual Timeout

```
If
  (F:SprCYCLE) is CLEAR
  and (V:SprTIME) = 0
Then
  (THEN MACRO:ALL OFF)
End
```

EVENT: Sprinkler Time Countdown

```
If - Always
  (V:SprTIME) > 0
Then
  DELAY 0:01:00
  (V:SprTIME) DECREMENT
End
```

EVENT: Sprinkler Cycle SET

```
If
  Time is After (TL:AutoTime)
  and (F:AUTO TIMER) is SET
Then
  (F:SprCYCLE) SET
End
```

EVENT: Sprinkler Cycle RUN

```
If
  (F:SprCYCLE) is SET
Then
  If
    (F:SprCYCLE) is SET
  Then
    LCD: Change Text Line 2 Menu 49 to ' ZONE 1 ' [KP:ALL]
    (RELAY:Zone 1) ON
    (V:SprTIME) LOAD with (V:T1)
    (V:SprZONE) LOAD with 1
  Nest End
  If
    (F:SprCYCLE) is SET
    and (V:SprZONE) = 1
    and (V:SprTIME) = 0
  Then
    LCD: Change Text Line 2 Menu 49 to ' ZONE 2 ' [KP:ALL]
    (RELAY:Zone 1) OFF
    (RELAY:Zone 2) ON
    (V:SprTIME) LOAD with (V:T2)
    (V:SprZONE) LOAD with 2
  Nest End
```

```
If
  (F:SprCYCLE) is SET
  and (V:SprZONE) = 2
  and (V:SprTIME) = 0
Then
  LCD: Change Text Line 2 Menu 49 to ' ZONE 3 ' [KP:ALL]
  (RELAY:Zone 2) OFF
  (RELAY:Zone 3) ON
  (V:SprTIME) LOAD with (V:T3)
  (V:SprZONE) LOAD with 3
Nest End
```

```
If
  (F:SprCYCLE) is SET
  and (V:SprZONE) = 3
  and (V:SprTIME) = 0
Then
  LCD: Change Text Line 2 Menu 49 to ' ZONE 4 ' [KP:ALL]
  (RELAY:Zone 3) OFF
  (RELAY:Zone 4) ON
  (V:SprTIME) LOAD with (V:T4)
  (V:SprZONE) LOAD with 4
Nest End
```

```
If
  (F:SprCYCLE) is SET
  and (V:SprZONE) = 4
  and (V:SprTIME) = 0
Then
  LCD: Change Text Line 2 Menu 49 to ' ZONE 5 ' [KP:ALL]
  (RELAY:Zone 4) OFF
  (RELAY:Zone 5) ON
  (V:SprTIME) LOAD with (V:T5)
  (V:SprZONE) LOAD with 5
Nest End
```

```
If
  (F:SprCYCLE) is SET
  and (V:SprZONE) = 5
  and (V:SprTIME) = 0
Then
  LCD: Change Text Line 2 Menu 49 to ' ZONE 6 ' [KP:ALL]
  (RELAY:Zone 5) OFF
  (RELAY:Zone 6) ON
  (V:SprTIME) LOAD with (V:T6)
  (V:SprZONE) LOAD with 6
Nest End
```

```
If
  (F:SprCYCLE) is SET
  and (V:SprZONE) = 6
  and (V:SprTIME) = 0
Then
  LCD: Change Text Line 2 Menu 49 to ' ZONE 7 ' [KP:ALL]
  (RELAY:Zone 6) OFF
  (RELAY:Zone 7) ON
  (V:SprTIME) LOAD with (V:T7)
  (V:SprZONE) LOAD with 7
Nest End
```

```
If
  (F:SprCYCLE) is SET
  and (V:SprZONE) = 7
  and (V:SprTIME) = 0
Then
  LCD: Change Text Line 2 Menu 49 to ' ZONE 8 ' [KP:ALL]
  (RELAY:Zone 7) OFF
  (RELAY:Zone 8) ON
  (V:SprTIME) LOAD with (V:T8)
  (V:SprZONE) LOAD with 8
Nest End
```

```
If
  (F:SprCYCLE) is SET
  and (V:SprZONE) = 8
  and (V:SprTIME) = 0
Then
  LCD: Change Text Line 2 Menu 49 to ' OFF ' [KP:ALL]
  (RELAY:Zone 8) OFF
  (V:SprZONE) LOAD with 0
  (F:SprCYCLE) CLEAR
Nest End
```

End