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Instrument Automation

Executing events during the run

Instrument automation allows you to program events using run time programming via the run table or clock time programming via the clock table. Up to 25 timed events can be executed in each of these tables.

Run time programming

Run time programming allows certain setpoints to change automatically during a run as a function of the chromatographic run time. Thus an event that is programmed to occur at 2 minutes will occur 2 minutes after every injection.

Its uses include:

- Controlling column switching or other valves
- Changing signal definition, zero, range, or attenuation
- Controlling an auxiliary pressure channel
- Changing polarity of a thermal conductivity detector (TCD)
- Turning the hydrogen flow to a nitrogen-phosphorus detector (NPD) on or off
- Pausing (freezing) and resuming a signal value

The changes are entered into a run table that specifies the setpoint to be changed, the time for the change, and the new value. At the end of the chromatographic run, most setpoints changed by a run time table are returned to their original values.

Valves can be run time programmed but are *not* restored to their starting position at the end of the run. You must program the reset operation in the run table if this action is desired. See "Valve Control".

Using run time events

The [Run Table] key is used to program timed events.

You can control the following events during a run.

- Valves (1-8)
- Multiposition valve
- Signal type (see page 168)
- Analog signal zero, attenuation, and range
- Digital signal zero and baseline level shifts (see page 175)
- Auxiliary pressures (3, 4, 5)
- TCD negative polarity (on/off)
- NPD H_2 flow (on/off)
- Pausing (freezing) and resuming a signal value

Procedure: Programming run time events

1. Press [Run Table] to open the run time control table. The following message will be displayed if no programmed entries presently exist.

```
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
    RUN  TIME  TABLE
│ No  entries  in  table. │
│ (Press  MODE/TYPE │
│ to  select  new  entry) │
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
```

2. Press [Mode/Type] to see the run time event types.

```
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
    RUN  TIME  TABLE  TYPE
│ Valve │
│ Multipos  valve │
│ Signal  definition │
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
  Signal  zero
  Signal  range
  Detector  H₂O  flow
  Detector  polarity
  Store  Signal  value
  Sig  zero  -  value
  Freeze  sig.  value
  Resume  sig.  value
```

Note: Only those types that are possible with your configuration will appear.

3. Scroll to the event type to be programmed.

```
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
    RUN  TIME  TABLE  TYPE
│ RUN  TABLE  (1  of  1) │
│ Time:          0.00 ──── Run time for event to occur
│ Type:    Sig  1  zero ──── Event type for entry #1
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
  Setpoint          On ──── Setpoint parameter:
                              varies with event type
```

4. Enter values for the Time: and Setpoint: parameters.

The run table

The programmed events are arranged in order of execution time in the Run Table.
The following is a brief example:

```
RUN TABLE  (1 of 3)
Time:          0.10
Type:   Valve #2
Setpoint         On
RUN TABLE  (2 of 3)
Time:            3
Type:          Sig 1
att
Setpoint          2
RUN TABLE (3 of 3)
Time:          4.20
Type:    Valve #2
```

Event 1 rotates a valve, which
might be a column switching
valve.

Event 2 adjusts the signal attenu-
ation. It will be reset to its original
value at the end of the run.

Event 3 resets Valve #2 to its
original position in preparation
for another run. Valves do not
reset automatically

Figure 25   A run table example

Procedure: Adding events to the run table

1. To add new events to the run table, press [Mode/Type] while on the Time:
    or Type: line of any entry.

2. Select the event type.

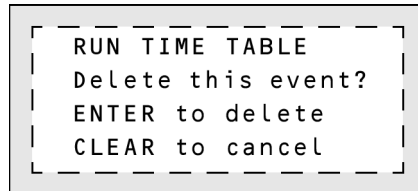3. Set appropriate Time: and Setpoint: parameters.

Repeat until all entries are added. Events are automatically placed in order by
execution time.

Procedure: Editing events in the run table

1. Press [Run Table].

2. Move the cursor to the event you want to change.

3. To edit the time for an event, move the cursor to the line labeled `Time`. Type the desired time and press [Enter].

4. To edit a setpoint value, scroll to the setpoint item and press the [On] or [Off] key or enter a numeric value for the setpoint. Press [Enter].
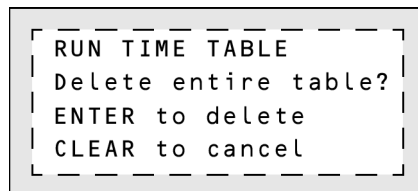
Procedure: Deleting run time events

1. Press [Run Table] to access the run time table.

2. From within this table press the [Delete] key to delete events from the run time table. Pressing [Delete] while in an existing time event table produces the following display.

```
RUN TIME TABLE
Delete this event?
ENTER to delete
CLEAR to cancel
```

3. Press [Enter] to delete the current timed event; press [Clear] to cancel this operation.

```
RUN TIME TABLE
Delete entire table?
ENTER to delete
CLEAR to cancel
```

Clock time programming

Clock time programming allows certain setpoints to change automatically at a specified time during a 24-hour day. Thus, an event programmed to occur at 14:35 hours will occur at 2:35 in the afternoon. A running analysis or sequence has precedence over any clock table events occurring during this time. Such events are not executed.

Possible clock time events include:

- Valve control
- Method and sequence loading
- Starting sequences
- Initiating blank and prep runs
- Column compensation changes
- Adjustments of the detector offset

Using clock time events

The Clock Table function allows you to program events to occur during a day based on the 24-hour clock. Clock table events that would occur during a run or sequence are ignored.

For example, the clock table could be used to start an analysis before you even get to work in the morning.

Procedure: Programming clock time events

1. Press [Clock Table] to access the clock time control table. The following message will be displayed if no events are programmed.

```
CLOCK TIME TABLE
No entries in table
(Press MODE/TYPE
to select new entry
```

2. Press [Mode/Type] to view the clock time program types.

```
CLOCK TIME TABLE
TYPE
Valve
Multipos valve
Load method
Load sequence
Start sequence
Blank run
Prep run
Col comp 1
Col comp 2
Col comp 1&2
Adjust det offset
```
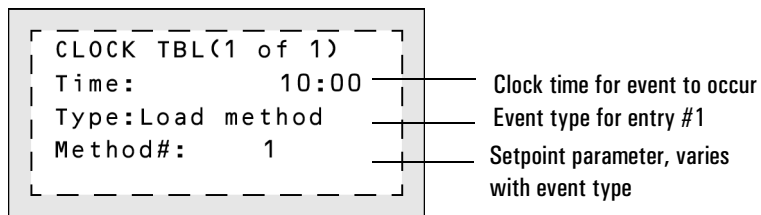
These only show if the instrument is equipped with valves.

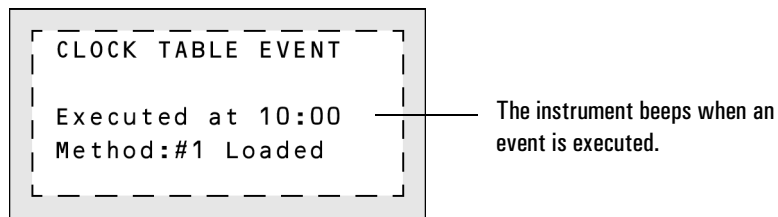3. Scroll to select the parameter to be programmed.

    For example, if the option "Load Method" is chosen for clock time event #1, the display would look similar to the one below.

4. Edit `Time:` and `Method#:` setpoints for this event.

```
CLOCK TBL(1 of 1)
Time:          10:00 ──────── Clock time for event to occur
Type:Load method     ──────── Event type for entry #1
Method#:     1       ──────── Setpoint parameter, varies
                               with event type
```

    This allows you to program a specific time at which your GC will load a predetermined method.

5. When the clock event is executed, the following screen appears:

```
CLOCK TABLE EVENT

Executed at 10:00  ──────── The instrument beeps when an
Method:#1 Loaded            event is executed.
```

```
CLOCK TBL(1 of 9)
Time:    01:25
Type: Multipos valve          Event 1 of 9
Stream #    1
Time:    03:00                 Event 2 of 9
Type:Prep run
Time:    03:30
Type:B det-polar              Event 3 of 9
Setpoint    On
Time:    08:46                 Event 4 of 9
Type:Blank run
Time:    10:25
Type:Adjust offset            Event 5 of 9
Detector:Back
Time:    11:00                 Event 6 of 9
Type:Start sequence
Time:    13:20
Type:Load sequence            Event 7 of 9
Sequence #   2
Time:    21:35                 Event 8 of 9
Type:Col comp2
Time:    23:54
Type: Valve#2                 Event 9 of 9
Setpoint: Off
```

The clock table will resume at 01:25 the next
morning with the multiposition valve event.

Figure 26   A clock table example

Note: This is *not* a "realistic" clock table. It is intended to show the variety of
events that can be programmed and to demonstrate that the size of any entry
depends on the parameters required for that event.

Up to 25 clock time events can be programmed.

Procedure: Adding events to the clock table

1. Press [Clock Table].

2. To add new events to the clock table, press [Mode/Type]. When entries are added, they are automatically ordered chronologically.

3. Select next event type.

4. Set appropriate parameters.

Repeat this process until all entries are added.

Procedure: Editing clock time events

1. Press [Clock Table] to view all events programmed.

2. Scroll to the event you want to change.

3. Edit the time for an event, move the cursor to the line labelled `Time`: and type the desired time.

4. Edit a setpoint value by scrolling to the setpoint item and pressing the [On] or [Off] key, or enter a numerical value for the setpoint.

Procedure: Deleting clock time events

1. Press [Clock Table].

2. Press the [Delete] key to remove events from the clock time table. Pressing
    the [Delete] key while in an existing time table produces the following
    display:

```
CLOCK TABLE EVENT
Delete this event?
ENTER to delete,
CLEAR to cancel
```

3. Press [Enter] to delete the current timed event; press [Clear] to cancel
    this operation.

    To delete the entire table, press [Delete] [Clock Table]. The following
    display appears.

```
CLOCK TABLE EVENT
Delete entire table?
ENTER to delete,
CLEAR to cancel
```