

Fire Alarm Example

A Much Better Idea : Logical : Unique



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Electronic Controllers

The Fire Alarm example is a multi-page AmbiLogique diagram which illustrates voting, latches and timing functions, and a way of implementing common and repeat blocks.

Disclaimer

This example is provided as an illustration of AmbiLogique PLC functions only. No representation is made which suggests that this example will meet the technical requirements of any specific Fire Authority. It is the responsibility of the user or applications engineer to determine whether a PLC system of this type will meet these technical requirements, and to design the system to meet all the provisions of such requirements.

This example is assumed to be a part of a multi-zone fire alarm system. Only one zone is shown; other zones can be created simply by drawing a selection box around everything on Sheet 1, copying it to the clipboard, then pasting it on to a new sheet. The "Zone 1" labels on functions and signals can then be renamed to "Zone 2" or "Paint Shop" or whatever is required. For a real multi-zone application, it is better to place the common diagrams on Sheet 1 and the per-zone diagrams on Sheets 2... etc.

Sheet 1 shows the per-zone logic. 5 Smoke detectors are shown; these are wired to a Vote gate which outputs the number of detectors which have been activated. When 3 or more detectors have been activated, two latches are set; the Initial Alarm IA and the Latched Alarm LA.

At this point, the Zone 1 Lamp (normally on a mimic diagram of the site, or a site map) will flash to indicate the location of the alarm.

Turning to Sheet 2, the Zone 1 Latched and Initial Alarms are wired to OR gates which can be expanded to accommodate other zones.

Any Initial Alarm will activate sirens throughout the site. Any Latched Alarm will cause the warning beacons (flashing or strobe lights) throughout the site.

When the source of the fire or smoke has been identified, and a fire crew dispatched, the Alarm Accept button is pressed. This clears the Initial Alarm, and stops the sirens.

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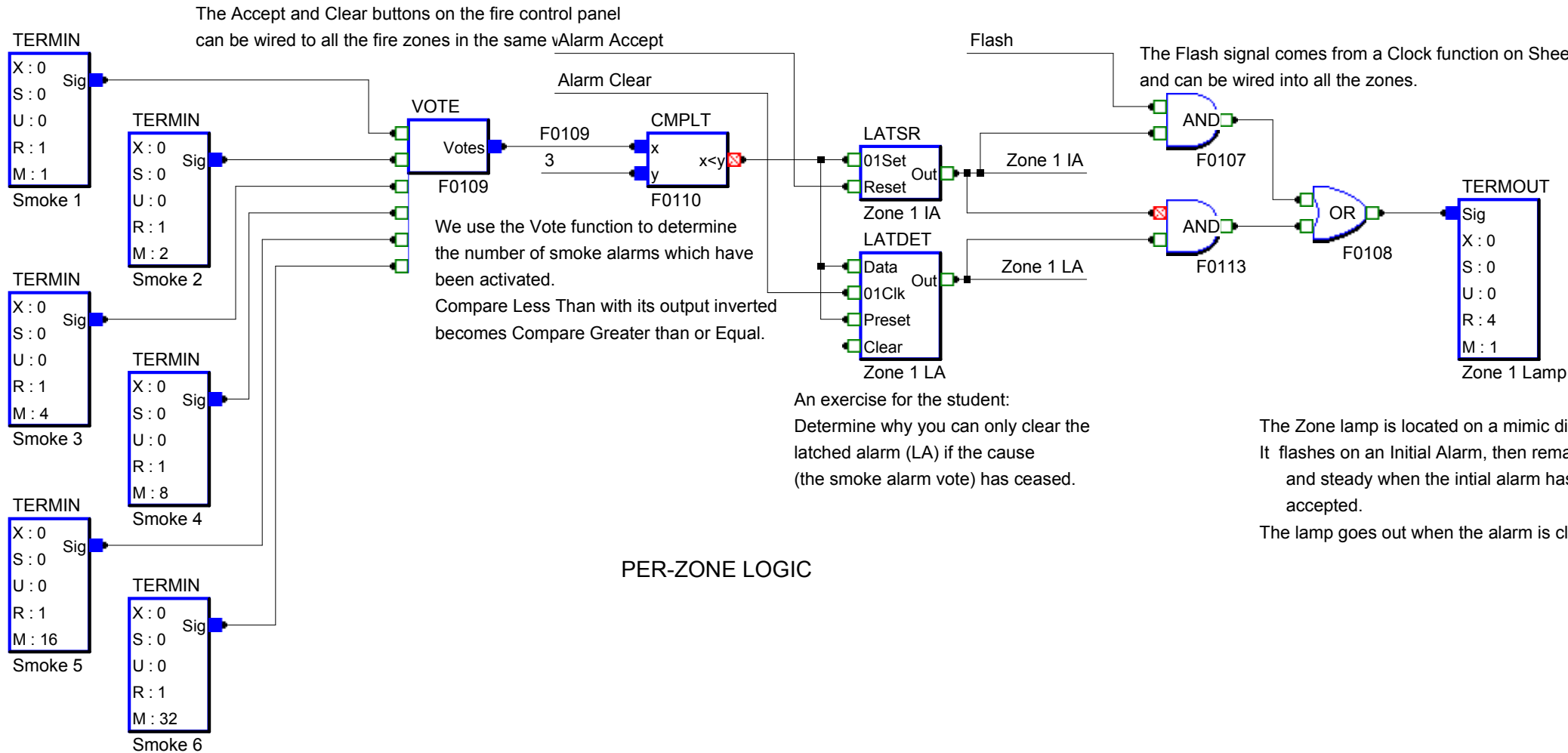
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Going back to Sheet 1, the situation where the Initial Alarm has been cleared but the Latched Alarm remains means that the mimic diagram zone lamp is now steady on, not flashing.

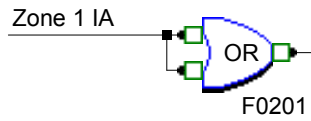
When the fire crew reports that the fire is out and the area secured, the Alarm Clear button is pressed. If the smoke detectors are deactivated, i.e. less than 2 are active, the Latched Alarm can be cleared by the Alarm Clear button; however if the detector condition has not cleared, the Latched Alarm cannot be cleared. Note the use of the D-type latch for this function.

Finally, at the bottom of Sheet 2 is the timebase for the flashing lamps. The Clock function is set to run continuously (1 input to the Run pin) and its period is set to 1 second (16 scan periods).

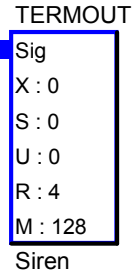
The output of the Clock function counts 15, 14, 13...0. so the Compare Greater than 7 outputs a 50:50 square wave with a 1 second period, which is ideal for flashing lamps on mimic diagrams.



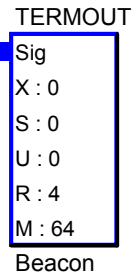
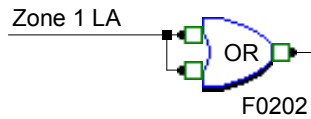
PER-ZONE LOGIC



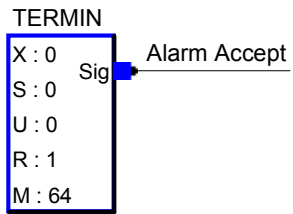
In a larger system, the signals from all the zones are OR'd together at this point.



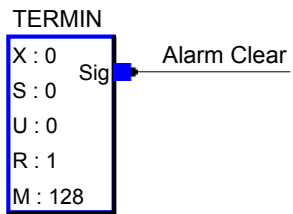
The sirens sound on an Initial Alarm, and are silenced when the Accept button is pressed.



The beacons are energised on an Initial Alarm, and remain on until the Latched Alarms are cleared.

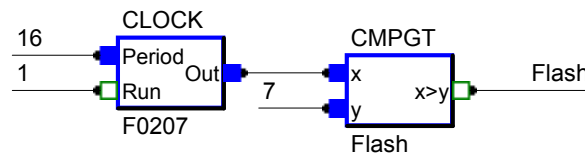


Alarm Accept



Alarm Clear

These are the system-wide Accept (Silence) and Clear buttons.



This is the 1 Hz (16 scans) timebase for flashing the alarm lamps.