



Application Note – T1 Channel Banks and Relay-Controlled Systems

Application

This application note describes a technique for controlling and/or monitoring equipment that uses relay contacts (sometimes referred to as “dry contacts”). This is common in equipment such as

- Fire alarm systems
- Security systems
- Secure door lock/un-lock systems
- HVAC (Heating, Ventilating, Air-Conditioning) systems
- Elevator control systems
- Air-to-ground radio communications systems
- Railroad switch and track control systems

Description

When connecting two pieces of equipment in which one must send a simple 2-state signal (ON/OFF, GO/NO-GO, Normal/Alarm, etc.) to the other, this is commonly done using relay contacts. The sending device will change the relay contact (from Open to Closed, or vice versa) to signal a change in state. The receiving device detects, or “sees” the relay contact transfer of the sending device, and interprets this to mean a state change has occurred. The sending device can de-energize the relay to signal a return to the normal state. An example is shown in Figure 1.

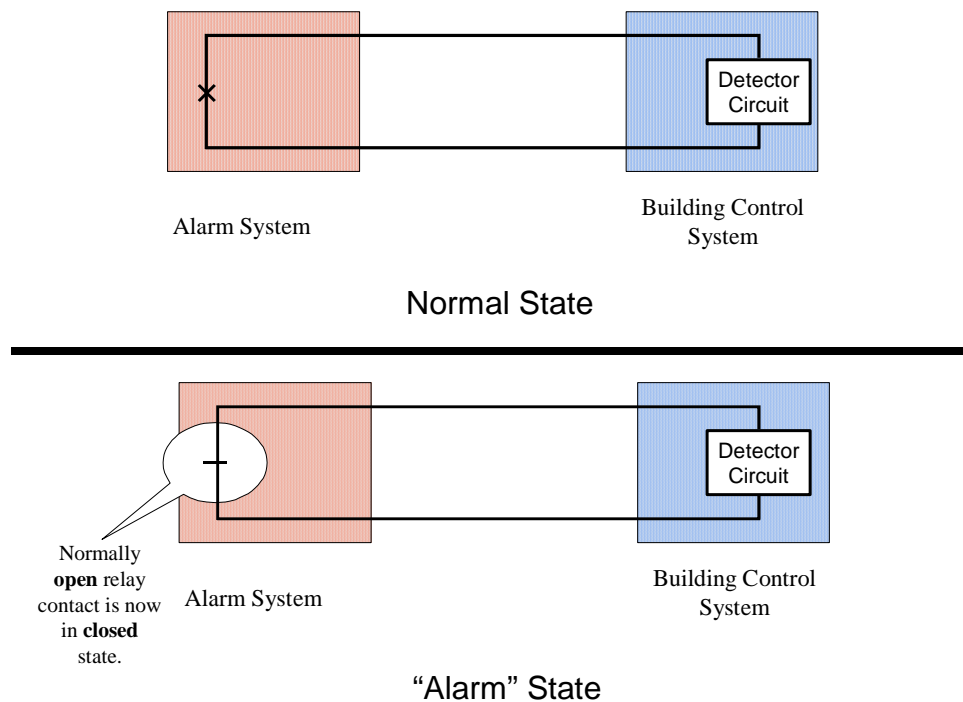


Figure 1 – Relay control example



In Figure 1 an Alarm System is connected to a Building Control System. In the Normal State, the relay contact in the Alarm System is open. However, when there is an alarm, the Alarm System closes the relay contact. The Building Control System can detect this change and take action, such as shutting down a building's air-conditioning system to keep from circulating the smoke from a fire, for example.

The 360-80 channel bank with its E&M card is an excellent solution for this application, especially if the sending and receiving systems are physically far apart, perhaps in separate buildings of a campus-type environment. Figure 2 shows the relay control configuration using the 360-80 channel bank populated with E&M cards. The 360-80's E&M cards support either 6 channels (for the half-size card) or 12 channels (for the full-size card). Therefore, up to 24 relay-control type circuits can be connected between 2 locations using the 360-80 channel bank with E&M cards.

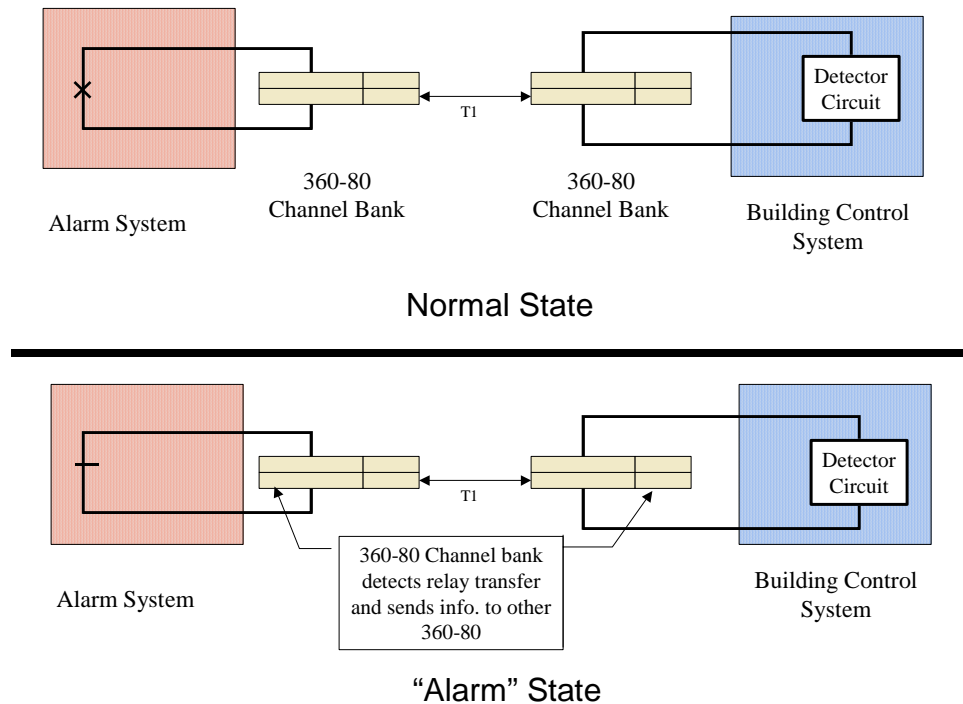


Figure 2 – Relay control using 360-80 Channel Bank with E&M cards

E&M circuits can be configured one of 5 different ways – referred to as E&M types I, II, III, IV, or V. E&M types II and IV support the “dry contact” relay configurations shown in Figure 1. E&M types I, III, or V require the channel bank and the equipment connected to it to have a common ground or common battery (-48 volts) connection. Types II and IV, however, do not require common grounds or battery connections. In fact, using E&M types II and IV, the channel bank can interface to equipment that is powered from, say, 120 VAC, instead of -48 volts DC as the 360-80 channel bank is.

The circuit can even be wired to provide a 2-way path between the 2 devices as shown in Figure 3. In this configuration the left-hand system can close a relay contact and the right-hand system will detect it. Also, the right-hand system can close a relay contact



and the left-hand system will detect it. Therefore, this arrangement provides 2-way signaling – left-to-right, or right-to-left – between the two systems.

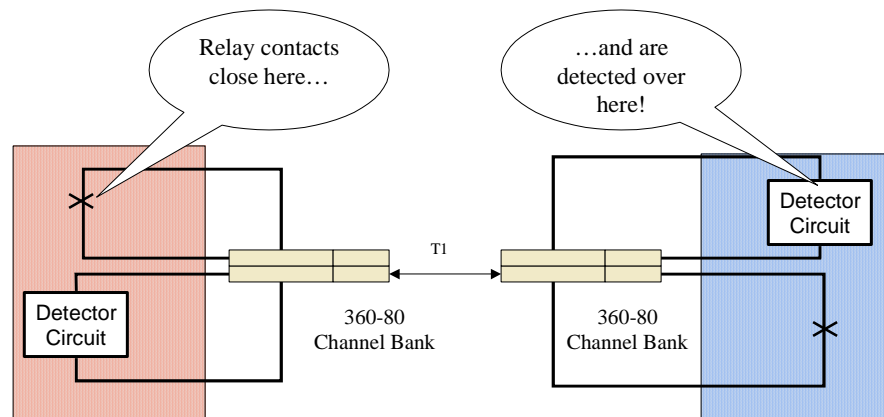


Figure 3 – 2-way relay control circuit

A customer is using the 360-80 and E&M cards for a radio communications application. Referring to Figure 3, a radio operator can “key” a microphone at the left-hand location. This action causes a relay contact to close, which is detected by the left-hand 360-80 channel bank. This change in state is sent from the left-hand 360-80 to the right-hand 360-80 over the T1 link. Finally, the right-hand 360-80 energizes a relay on its own E&M card, which causes a radio transmitter (the right-hand system) to activate and broadcast the radio transmission.

Further Information:

Further information on Charles Industries products may be found at:
<http://www.charlesindustries.com>

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