SMPTE STANDARD

SMPTE 269M-1999
Revision of
ANSI/SMPTE 269M-1994

for Television — Fault Reporting in Television Systems

1 Scope

This standard describes a simple interface over which television equipment can report the occurrence of internal failures and faults in incoming signals. It is intended for use in all television equipment, from the simplest active devices to the most complex.

The interface consists of an isolated closure which can assume one of three states: open, closed, or pulsing. These respectively signal that the reporting device is okay, has detected an internal fault, or is detecting incoming signal faults.

Fault occurrence data may be collected from equipment complying with this standard by several means, ranging from simple "follow the lights to the trouble" summary alarm schemes to computerized logging systems. While full specification of such systems is beyond the scope of this standard, a general outline of one possible implementation is given in annex A.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below.

IEC 60169-8 (1978-01), Radio Frequency Connectors — Part 8: R.F. Coaxial Connectors with Inner Diameter of Outer Conductor 6.5 mm (0.256 in) with Bayonet Lock — Characteristic Impedance 50 Ohms (Type BNC)

3 Fault states

3.1 A reporting device may be in one of three states:

3.1.1 Normal operation

The device is currently not detecting any internal failures and is receiving power.

3.1.2 Internal failure

The device is currently detecting an internal failure or has lost power.

3.1.3 Incoming signal fault

The device is not detecting any internal failures, but is currently detecting faults in incoming signal(s).

4 Interface definition

4.1 Interface

The interface consists of a two-wire connection from an electrically-isolated output closure in the reporting device. The interface reports faults only at the times that they are detected. The closure may be in one of three states:

4.1.1 Open

An open output signifies that the reporting device is operating correctly with valid input(s).

4.1.2 Closed

A closed output signifies that the reporting device has detected an internal fault or has lost power. The closure lasts only for the duration of the fault.

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4.1.3 Pulsing

A pulsing output signifies that the reporting device has detected errors in the signal(s) it is receiving. The pulsing lasts only for the duration of the errored field(s).

4.2 Pulsing

Pulsing is defined as a closed pulse from 1-2 ms long occurring once per field.

5 Electrical characteristics

5.1 Output

The output of the reporting device is a closure, electrically isolated from the rest of the device. The isolating mechanism shall withstand a common-mode potential of 60 V peak at frequencies from DC to 400 Hz. The shell of the connector may be bypassed to the chassis by a small-value capacitor, if needed, to limit rf radiation.

5.2 Output closure

The output closure must be in the closed state when power is removed from the device (see annex A).

5.3 Open-state characteristics

When in the open state, the leakage across the closure must be less than 100 μA at any voltage from 0 V to 5 V DC. The closure shall be able to withstand 24 V DC in the open state without damage.

5.4 Closed-state characteristics

In the closed state, the maximum voltage drop across the closure shall not exceed 2 V at 20 mA. The sensing device shall not supply more than 20 mA of current to the reporting device.

6 Connector

The chassis connector used shall be a female BNC type, as defined in IEC 60169-8. The center contact shall be connected to the positive side of the sensing mechanism.

Note – Only the mechanical dimensions are specified. Both 50- and 75-ohm connectors are available which meet these requirements.

Annex A (informative)
Possible implementation of a reporting scheme

There are many ways to implement a fault data collection and reporting system using the interface specified in this standard. The implementation described here is one of the simplest. It is a hierarchical system and is designed to lead a technician to the faulty device by means of visual and audible signals. No provision is made for automated logging of faults; however, such logging is not precluded.

The scheme works as follows: All fault reporting outputs in each rack or frame are connected in parallel to a summary alarm repeater, which consists of a power supply, an optoisolator circuit, and an alarm lamp and driver, as shown in figure A.1. The outputs of the repeaters are connected in parallel to an identical repeater at the end of the rack row. These in turn are connected to another repeater at the entrance to the rack area, and so forth, until all alarms are summed at a staffed monitoring point. Audible alarms may also be used where desired.

When an alarm occurs, the technician simply follows the lights to the correct room, rack area, rack row, rack, frame, and faulty module, and either resets or replaces it as required. Note that this scheme relies on the device originally reporting the fault to provide visual indication of the fault condition.

Schemes of this type have been used by telephone companies for years. They are simple to design and inexpensive to implement. Although they do not provide detailed fault logging, as noted, they greatly facilitate locating failures.

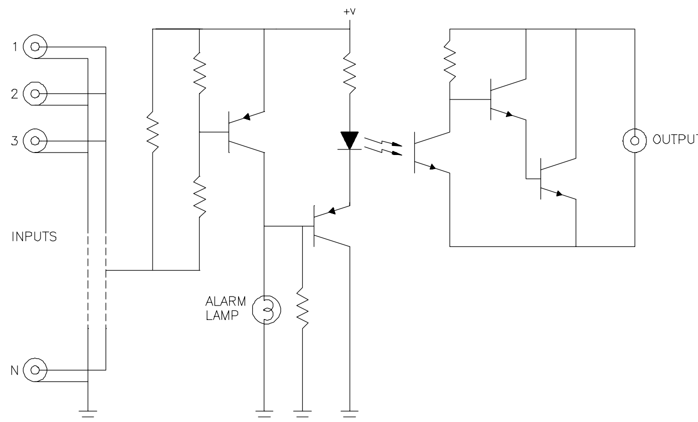

Figure A.1 – Summary alarm repeater

Annex B (informative)
Possible implementation of the output interface

The requirement to signal loss of power as a fault implies that the output must revert to the closed state when the power is off. Figure B.1 shows one possible implementation of such a circuit.

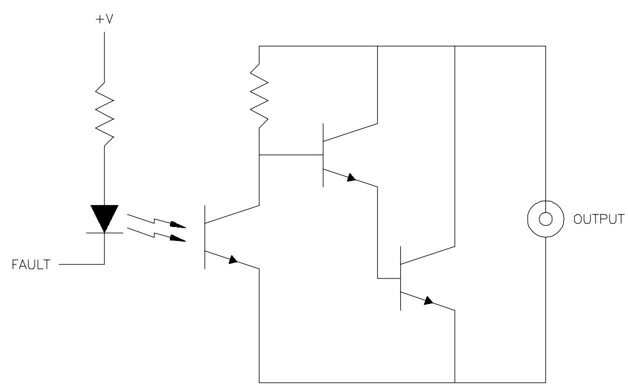

Figure B.1 – Output interface implementation example

Annex C (informative)
Output loss detection

Normal analog video system design practice is to have all outputs of a device driven by the same active components, with the different outputs isolated from each other by buil-dout resistors. With this arrangement, one can determine the condition of all outputs of the device with a high degree of confidence by monitoring only one of them.

In digital television systems, the bandwidths involved make commonly-driven resistively-isolated outputs impractical. Instead, each output is typically driven by a separate active stage, and noise considerations frequently dictate that half the output drivers are fed from the Q output of the previous stage, while the other half are fed by the not-Q output.

Given this topology, monitoring one output of a device does not indicate the health of the other outputs to the degree of confidence required. The only way to provide this level of confidence is for the device itself to monitor all outputs internally, signaling a fault if any of them fails while the device is receiving or generating a valid input.

Annex D (informative)
Bibliography

ANSI/SMPTE 259M-1997, Television — 10-Bit 4:2:2 Component and $4f_{sc}$ NTSC Composite Digital Signals — Serial Digital Interface

SMPTE RP 165-1994, Error Detection Checkwords and Status Flags for Use in Bit-Serial Digital Interfaces for Television