TI 212
Simple remote control circuits for A1 / P1200A / E-PAC mainframes

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Background

A1/P1200A Remote-Interface Circuit details

Control and switching signals connect to the mainframe remote interface via a 3 pin DIN connector. D1 ensures the correct polarity of the applied signals and R1/D2 protects the input against overvoltage. Opto-isolators ISO1-4 provide a barrier between the mainframe power supplies and those of the remote control system preventing the creation of paths for signal ground loops. Ground lift resistor R5 helps prevent electrostatic interference.
With the mainframe connected to the mains supply and its mains switch set to 'Remote', opto-coupler ISO3 conducts to complete the circuit through R2/ D3/ISO1-ISO3. With these elements activated the current drawn from the remote network can help provide confirmation that the mainframe has indeed powered-up. Applying a 16V minimum control voltage switches the mainframe on via opto-coupler ISO1. ISO2 is used as a receiver for serial transmission and is not relevant here.
If a fault condition occurs while the mainframe is powered on, then a periodic fault warning signal is generated and transmitted from the mainframe via opto-coupler ISO4 and transistor T1 This increases the current drawn by the interface. Resistor R1 limits the current to a safe value.

Fault indication

Simple remote controllers can give a general fault indication but cannot indicate the particular cause of a fault. Possible reasons for a fault indication are:

- one or both of the mainframe power amplifiers has an internal fault.
- one or both amplifier outputs has been short circuited.
- the mainframe power amplifiers has overheated.
- the mainframe mains transformer has overheated.
- no loudspeaker is connected to a mainframe output (applies only to the A1 which is fitted with Speaker ID).
- the wrong type of loudspeaker is connected to a mainframe output (applies only to the A1 which is fitted with Speaker ID).

Faults which cause the mainframe to switch off or prevent it powering-up, such as mains supply overvoltage, blown fuses, or the mainframe being switched off or disconnected from the mains, will certainly not generate a fault signal from the mainframe, since the mainframe is not running. A simple remote controller connected to a mainframe cannot identify or respond to this category of faults, but the error is detectable since the remote-interface will draw no current.

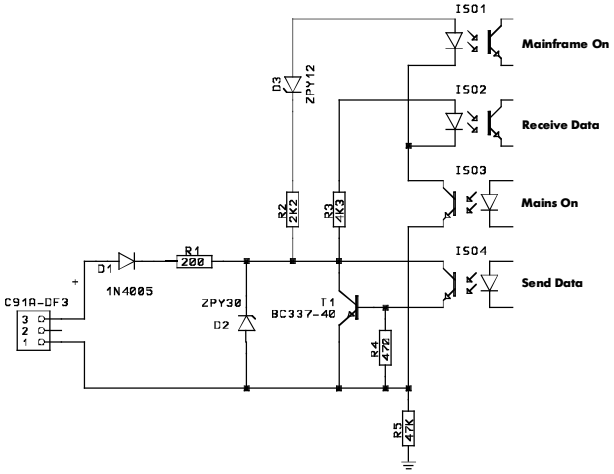


Fig. 1: A1/P1200A / E-PAC Remote-Interface circuit diagram

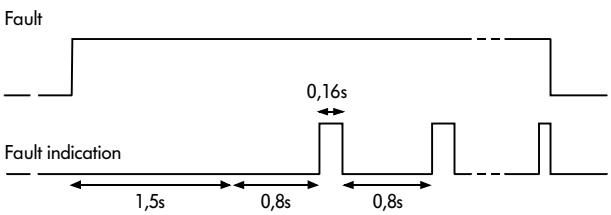
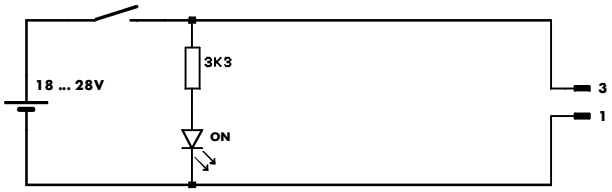


Fig. 2: Fault warning timing diagram

Applications

Example 1: Simple on/off control

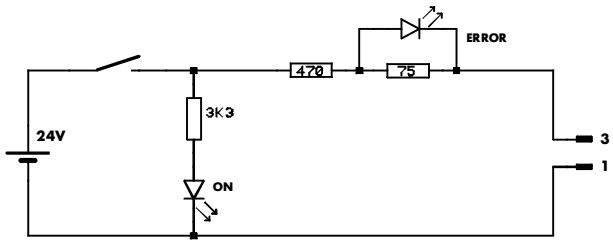


This basic remote control (figure 3) needs to be provided with an 18-28V dc power supply - an unstabilised, rectified and smoothed supply is all that's needed. To indicate whether the mainframe has switched on, an indicator lamp or LED and resistor are needed. The following table gives the (continuous) current requirement for each mainframe connected. Note that the (short term) current requirement will rise if mainframe faults occur and the error signal (figure 2) is generated.

Voltage	**18 V**	**24 V**	**28 V**
Normal current	5 mA	8 mA	11 mA
Fault current (intermittent)	80 mA	115 mA	160 mA

If a mainframe fault draws a short term current which exceeds the capability of the supply this should not affect the continued operation of the other mainframes - the mainframes will tolerate the disruption of the control voltage for short periods - less than 0.5 seconds. In theory more than 3 mainframes (3 x 0.16s) would need to go faulty in order to jeopardise the continued operation of the other mainframes linked to a controller.

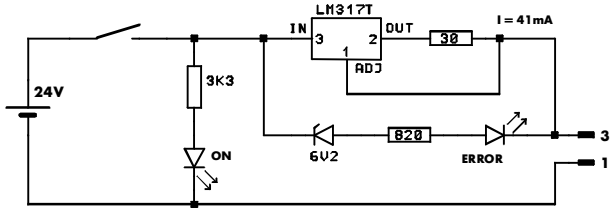
Example 2: On/Off control with fault indicator



The controller illustrated here is the same as that used in application 1 but with the addition of 2 resistors and a fault indicating LED.
A regulated 24V dc supply should be provided. If a connected mainframe develops a fault then the controller fault LED will flash at the rate shown in the timing diagram. Up to 3 mainframes may be connected in parallel to this controller to construct switching groups using a shared fault indicator. As in the previous controller application, if one mainframe develops a fault it should not jeopardise the continued operation of the other mainframes linked to the controller.

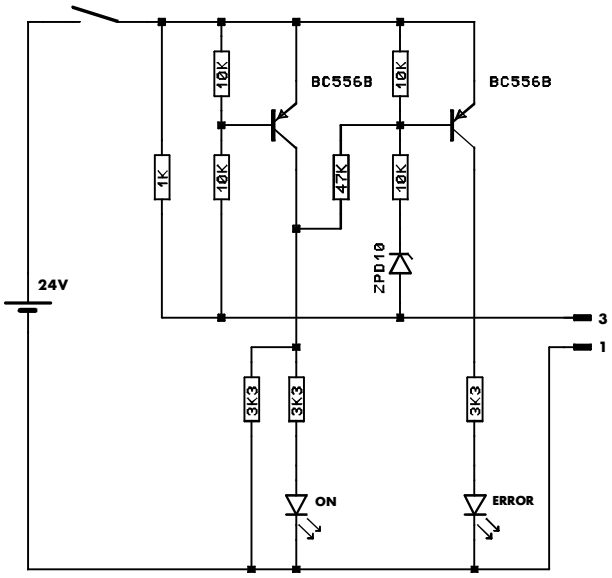
Example 3: On/Off control with fault indicator

The following circuit allows more than 3 mainframes to be connected in parallel to a single remote on/off control switch.



Example 4: On/Off remote control switch with fault and power failure indicators

To differentiate between the usual types of faults, and those due to mainframe mains power failure, a slightly more complicated remote control switch can be employed. Unfortunately, this particular remote control switch can only be connected to a single mainframe.



Mainframe status	"On" LED state	"Error" LED state
Normal operation	illuminated	off
Fault	illuminated	flashing in time with the fault warning signal
Power failure	off	illuminated

Cable length and conductor thickness

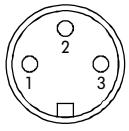
The resistance of the cable used between mainframe(s) and the remote control switches described in this technical information sheet should not exceed 100 Ohms. The following table gives examples of the maximum cable length possible with different conductor thicknesses (conductor thickness expressed in mm^2). The maximum cable length is governed by the following relationship : L (length in meters) = 2800 x A (conductor thickness in mm^2).

Conductor thickness A (mm^2)	Maximum cable length l (m)
0,14	400
0,25	700
0,4	1100

Were the long term integrity of the control wiring is an important consideration then it's recommended that the minimum conductor thickness should be 0.25 mm^2 or greater. Screened cables, whilst not usually necessary, can provide a degree of protection against external interference from nearby electrical equipment and are thus recommended for use in adverse situations. If used, the cable screen should be connected to ground at the controller end of the cable.

Parts:

Description	d&b part number
3 Pin DIN plug with locking ring (Amphenol T-3260-001)	S2401.000.00



Connector wiring - solder side

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