

# MCU-300 Automation Controller

## MCU-300-4

Hardware Installation Manual  
(Version 4.0.5.1)



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# Important Safety Information

**For the continuous safe operation of this product, the following points must be complied with.**

1. This equipment must be installed by a qualified electrician or fitter and on no account should it be installed by an unqualified end user
2. An EARTHED IEC power lead must be used to connect the MCU-300 to the mains power supply either by plugging into a domestic power socket (plug-top fuse rated at 5A) or directly via a switched fused spur (fuse rated at 5A) installed by a qualified electrician
3. **WARNING: LIVE MAINS IS EXPOSED WHEN THE COVER IS REMOVED AND THE MCU-300 IS CONNECTED TO A MAINS SOCKET**
4. **WARNING: THE SCREEN CONNECTOR (MARKED WITH BLUE) HAS LIVE MAINS CONNECTED TO IT. DO NOT PLUG OR UNPLUG WHEN MAINS IS CONNECTED**
5. This unit must be securely mounted to a joist, wall, ceiling or within a cabinet
6. This unit must be protected from rain or moisture and must not be installed outside
7. The unit is to be mounted in such a way that it is easy to withdraw the IEC plug and will allow the case to be opened to gain access to the internal fuse

## Principle of Operation

The MCU-300 has been designed to provide a simple automated control system for installations using projectors, motorised screens, motorised lifts, motorised curtains and any other motorised or electronically controlled devices.

The MCU-300 is microprocessor controlled and can be used "out of the box" with its default settings or it can be configured and controlled to operate in various installer-defined modes by connecting to a PC and running the supplied configuration software.

With the default settings the MCU-300 can be used to operate a motorised screen and up to two auxiliary devices when an incoming trigger signal is received. In its basic configuration the trigger input could be in the form of a dry contact closure or 5-30V DC trigger output from a connected device such as a video/data projector. Alternatively a trigger can be via an RS232 / RS485 command or from a pre-programmed Infra Red code.

When a trigger input is received, the MCU-300 screen relay will activate and provide operating mains voltage to lower a motorised screen or other motorised device (eg. Curtain track or blind, garage door, etc). The two Auxiliary relays will also activate providing a volts-free contact closure.

When the trigger input is removed (by breaking contacts, dropping trigger voltage to 0V, RS232 command or IR code) the relays will return to their normally closed position causing the screen to retract and the auxiliary devices to return to their "off" status.

By means of internal on-board variable resistors, a delay may be introduced to each of the relays so that on receipt of a trigger signal the relay switching may be sequenced with a 0 to

30 second delay. This is useful if for example, you want to synchronise motorised curtains to be fully opened or closed by the time the screen reaches its stop position. In this mode of operation it is not possible to set delays for the return sequence.

It is however possible to set return delays by configuring the MCU-300 using the software supplied. This will require a PC running Microsoft Windows 95, 98, 2000 NT or XP operating system

The supplied MCU-300 configuration software will allow each of the relay delays (both activate and deactivate) to be set accurately between 0 and 60 seconds; enable or disable any of the three relays; configure relays for latching or momentary; learn IR codes; set real time clock functions and actions; test the operation of system; and re-set MCU-300 to its factory default settings.

Using additional components the MCU-300 can perform more advanced tasks.

#### **IR receiver module (Part No. MCU-IRRX)**

This unit can be placed anywhere in the room where it is within line of sight of an IR transmitter. The MCU-IRRX module is supplied with a 1m length of cable terminated in a 3.5 mm in-line stereo jack socket and is connected to the MCU-300 using a low voltage stereo jack-jack cable (p/n MCU-JJ5-CAB). On receipt of an appropriate IR code the MCU-300 will be activated. On receipt of a different code the MCU-300 will be deactivated. When using a projector with a hard-wire compatible remote commander, the MCU-300 "IR Out" socket can be hard-wired directly to the IR In on the projector using a 3.5mm stereo jack-to-jack cable (p/n MCU-JJ5-CAB) whereby all functions of the remote commander will be transmitted to the projector. This is especially useful if the projector is concealed in the ceiling or in a cabinet where the transmitted IR beam cannot reach!

Using the configuration software supplied most RC5 compatible IR codes from can be "learned" and set to trigger the MCU-300 (e.g. from existing IR remote controls or programmable remote such as Philips Pronto, Marantz RC5000, E-Pilot etc.)

#### **External Processor with RS232 output (e.g. Crestron, AMX, lighting controllers)**

The MCU-300 has a full two-way serial communication for configuration and triggering (refer to software manual and protocol manual supplied). Optional cable MCU-SCOM-CAB is required for RS232 control.

#### **RS485 Expansion Modules**

The MCU-300 has an RS485 expansion bus capable of driving over 300m (1000ft) allowing additional modules to be connected and controlled by the incoming trigger. These include lighting controllers, additional relay modules (MCU-REM-4) etc.

#### **Other IR receivers and Emitters**

It is not recommended to hard-wire third-party IR receivers or emitters to the MCU-300. It is very likely that damage will occur to the connected items.

If the MCU-300 is to be used as part of an IR distribution system (e.g. Xantech products) it is recommended to use a standard Xantech emitter and fix it to the MCU-IRRX receiver. If in doubt, contact your supplier for further information.

#### **Other MCU Range Products**

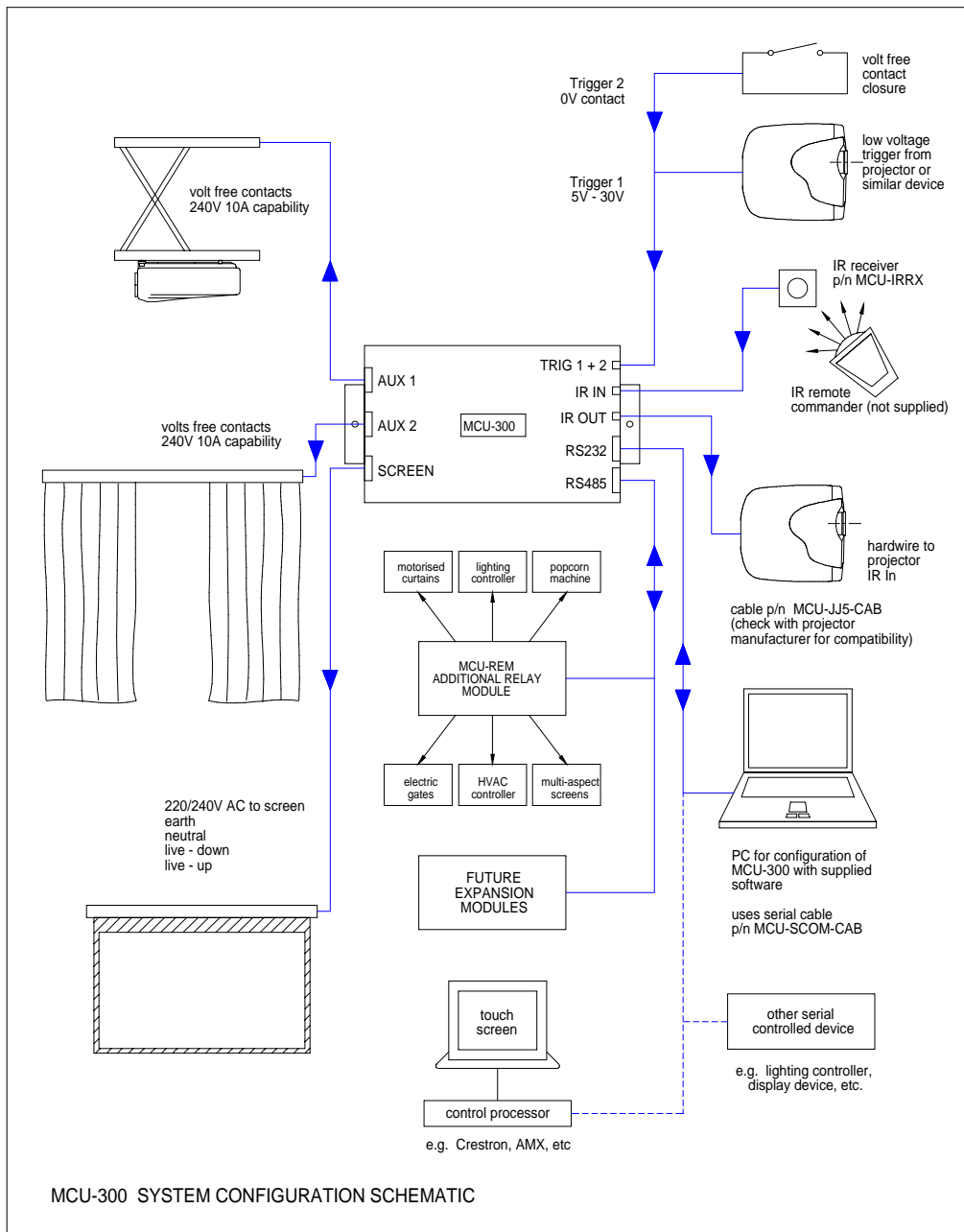
Other products available in the MCU range include:

MCU-REM-4 : Relay Expansion Module; 6 additional relays, control from 232 and 485 bus.

MCU-IBAC : Intelligent Blind Automation Controller.

MCU-I3BAC : Intelligent 3 blind controller (High Voltage)

## Example System Diagram



# Technical Specifications

## Inputs

- Mains 220/240V 50Hz single phase with earth (110V 60Hz version available)  
IEC Main cable fused @ 5A (supplied)  
Unit fused @ 3.15A internally
- Four concurrent Trigger inputs

Input Name	Function	Connector
Trigger 1	5V-30V Input (standard)	<b>Trig In</b> 3.5mm <b>stereo</b> jack socket
Trigger 2	0V Contacts (standard)	
Trigger 3	RS232 Input	<b>RS232</b> RJ11 socket
Trigger 4	IR Remote Control Input	<b>IR In</b> 3.5mm stereo jack socket

- Internally Generated Triggers  
The Real time clock within the MCU can be set to generate Actions at pre-defined times, see software manual.

## Outputs

- Three Relay Control Outputs  
Each control output has a configurable **up** and **down** delay, adjustable from 0 to 60 seconds

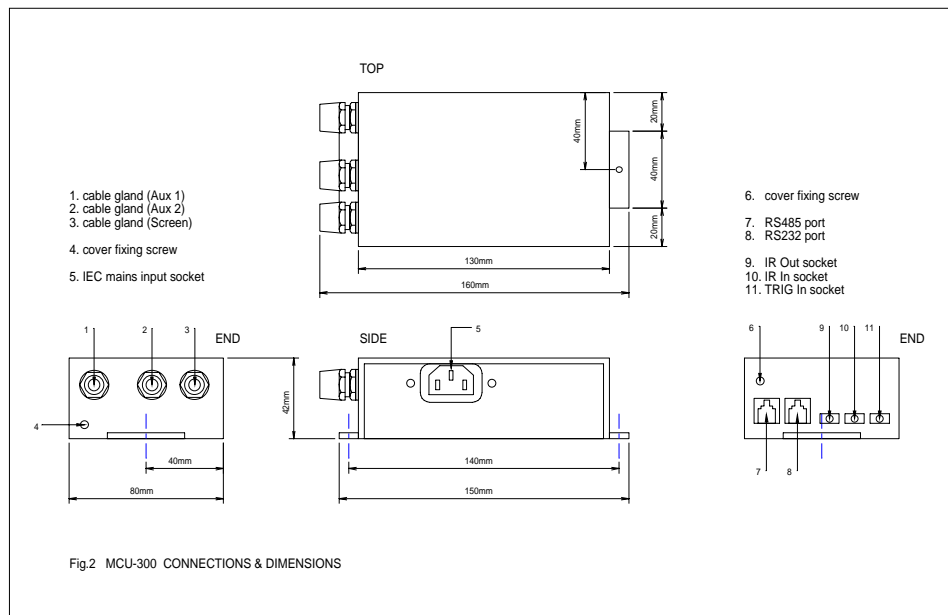
Output Name	Function	Connector
Screen	10A, 240V AC capability switched Live, Neutral provided	4 PIN 5mm Pitch Polarised (blue coloured)
Aux 1	10A, 240V AC capability, Volts free contacts	4 PIN 5mm Pitch Polarised (grey)
Aux 2	10A, 240V AC capability, Volts free contacts	4 PIN 5mm Pitch Polarised (grey)

## Communications Ports

- RS232 Port (RJ11 socket)  
Used to configure MCU-300 using software supplied  
RS232 Port can be used to trigger MCU-300 from external device or vice-versa
- RS485 expansion bus (RJ11 socket)  
Provides connection to add-on system components e.g. lighting controllers, relay expansion boxes, etc. Capable of driving over 1000ft(300m) in distance.
- IR Loop Out (3.5mm stereo jack socket)  
Provides output of received IR for distribution purposes using hard-wire.

## General specifications

- Case size (excluding mounting fixtures) 130mm x 80mm x 42mm (L x W x H)  
Length including mounting fixtures and cable glands: 160mm (approx.)  
Mounting holes: 2 no. 3.5mm  $\varnothing$  with 140mm centres along centre-line of case
- Weight 0.37kg
- Operating environment  
0 to 50° C  
20 to 80 % humidity, non-condensing
- Operating attitude  
Any orientation provided it is fixed to a secure flat surface  
Sufficient room must be provided for the withdrawal of the IEC plug and easy access to remove cover for servicing MCU-300 or connected equipment
- Safety Regulations  
Electrical safety EN 60065:1998  
EMC EN 50081:1992 & EN 50081:1998  
CE Low Voltage Directive 73/23/EEC amended by 93/68/EEC  
EMC Directive 89/336/EEC amended by 92/31/EEC & 93/68/EEC



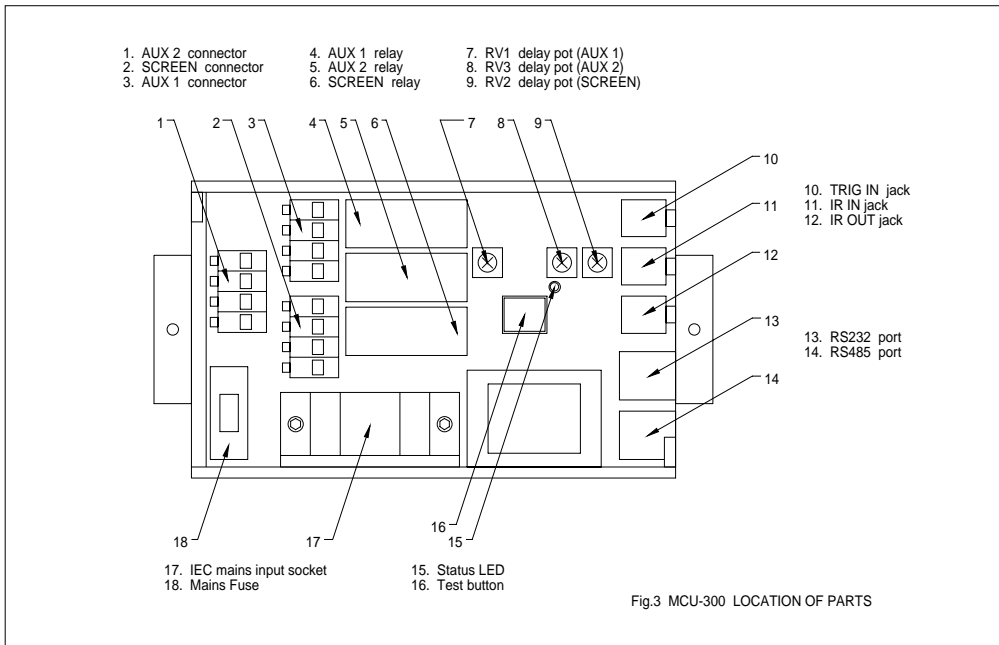
# Installation Guide

**Ensure that all mains power to the MCU-300 is disconnected before wiring or connecting any mains operated equipment to the MCU-300 and remember that control wires from Auxiliary equipment may still be live even if power is removed from the MCU-300**

## Opening the MCU-300

Before removing the cover of the MCU-300, remove the two cover securing screws, one at each end of the case. *Do not remove the screws on the side securing the IEC mains input socket.* The cover can now be removed by lifting out and up at each end, starting with the cable gland end.

## MCU-300 – Location of Parts



## Connecting the MCU-300

1. Choose a suitable location for the unit with regard to the safety information and technical details on the previous page. Ventilation is not required.
2. Run and install the low voltage fixed wiring to the **Trig In**, **IR In** (Remote IR Sensor - if used), **RS232** (Control In - if used), **IR Out** (Control S - if used) and **RS485** (Control Out - if used). Refer to **Low Voltage Connections** on Page 10 for pin assignments
3. Run and install the fixed wiring from the Mains Supply, Screen Motor, Aux 1, Aux 2 and bring to MCU-300. Use 4-core mains cable rated at 5A (minimum) for cabling to Screen and Aux equipment (check rating of connected equipment and use appropriate cable. Maximum 240V AC, 10A).

4. Thread the cables through the glands, strip cables and crimp on bootlace ferrules to the bare ends of the wires. Ensure there are no loose strands of wire. Note that the glands will accept cables up to 6mm in diameter. Do not tighten cable glands at this stage.
5. Connect to appropriate connector (Screen, Aux 1, and Aux 2). To avoid undue stress on the board, unplug the connector, make the connections and reinsert the finished plug to the appropriate on-board connector. *Make sure that the blue coloured Screen plug is inserted ONLY into the Screen connector. Failure to do so will DAMAGE the MCU and connected items.*

Refer to **Mains Voltage Connections** on Page 11 for pin assignments

6. Ensure that any loose debris is removed from the unit and check for correct cable installation. Do not replace lid on MCU-300 at this stage
7. Insert the IEC plug into socket on MCU-300

## **Commissioning the MCU-300**

1. If already connected, disconnect Screen, Aux 1 and Aux 2 on-board connectors and ensure they are a safe distance away from the MCU-300
2. Switch on all power supplies
3. Check that on-board **Status** LED is flashing to indicate “normal” status
4. Ensure that on-board pots RV1, RV2, RV3 are turned fully clockwise
5. Press on-board **Test** button and listen for “clicks” from relays to confirm activation. The MCU-300 is now in Trigger On status
6. Press on-board **Test** button a second time and listen for “clicks” from relays to confirm activation. The MCU-300 is now in Trigger Off status

*If the relays do not activate, refer to **Troubleshooting** section at the end of this manual*

7. Set manual delays to relays by adjusting on-board pots **RV1** (Aux 1), **RV2** (Screen) and **RV3** (Aux 2). Turning RV1-3 fully clockwise will set “zero” seconds delay (i.e. all relays will activate on trigger signal). Turning RV1-3 fully counter-clockwise will set maximum 31 second delay. Each pot can be adjusted independently so for example, if RV1 is set to 1/3 rotation, RV2 to 2/3 rotation and RV3 to max rotation then on trigger signal (or by pressing **Test** button) there will be 10 second delay (approx.) and Aux 1 relay will activate, after a further 10 seconds (approx.) Screen relay will activate and after a further 11 seconds (approx.) Aux 2 relay will activate.
8. Test delay settings by pressing **Test** button (relays should activate after appropriate delay). During delay times, the **Status** LED will blink rapidly.
9. Once all relays have activated, the **Status** LED will blink at normal speed and the relays will remain activated until the **Test** button is pressed a second time. Press **Test** again to deactivate relays.

*Note that there are no manual delay settings for Trigger Off. If Trigger Off delays are required these must be set using MCU-300 configuration software (supplied). Refer to Software Manual for further instructions*

10. Next check relay operation using appropriate trigger input:

- a) **Trigger In 1:** 5-30V Input  
Apply voltage and check for relay operation (activate)  
Remove voltage and check for relay operation (deactivate)
- b) **Trigger In 2:** 0V contact closure  
Make contact and check for relay operation (activate)  
Break contact and check for relay operation (deactivate)
- c) **IR In**  
Ensure IR sensor (Part No: MCU-IRRX) is connected.  
RC5 IR codes are required for triggering, these must be set using the MCU-300 configuration software (supplied).  
Refer to Software Manual for further instructions
- d) **RS232 trigger**  
Ensure appropriate controlling device is connected using a suitable serial cable  
If using a PC to control the MCU-300, use MCU-SCOM-CAB serial cable and ensure the PC has MCU-300 configuration software loaded. Refer to Software Manual for further instructions.  
If using any other RS232 device to control the MCU-300, refer to MCU-300 Protocol Manual for further information.

*If the relays do not activate, refer to **Troubleshooting** section at the end of this manual*

### **Important**

**Before testing the connected devices, ensure that you will be in visual range of the motorised screen, lift and other connected devices while testing the lowering and raising functions.**

- 11. Disconnect **IEC** lead from MCU-300 and connect **Screen** connector to on-board socket
- 12. Reconnect IEC lead to MCU-300 and press **Test** button. The screen will drop and stop at its lower end stop. Press **Test** button again and the screen will retract back into it's housing, stopping at the upper end stop. *Note: pressing the Test button when the screen is dropping will cause the screen to reverse direction immediately*  
  
If the screen does not drop down it is possible that the up and down connections to the MCU-300 screen connector have been reversed – check and try again! (Normally, brown is down and black is up. *Check with your screen manufacturer if you are not sure*)
- 13. Disconnect **IEC** lead from MCU-300 then disconnect **Screen** connector
- 14. Repeat steps 11-13 for Aux 1 and Aux 2 to check for correct operation of Auxiliary devices. Check each item independently before connecting all devices and testing together. **Warning: disconnect power to auxiliary devices when changing MCU-300 connections one or more contacts may be live**
- 15. Disconnect IEC lead from MCU-300 and connect appropriate trigger input
- 16. Check correct operation of controlled devices using trigger signal to activate and deactivate MCU-300

17. When all is confirmed to be operating correctly, replace MCU-300 cover, replace cover securing screws and tighten cable glands

# Connection Details

## Low Voltage Connections

The numbering convention for the Jack Plug is shown below, note that all 3.5mm connections are Stereo



JACK 3 WAY

3 = ground ring  
2 = inner ring  
1 = tip

Connector	Pin No	Description	Notes
<b>Trigger In</b> 3.5mm stereo jack	1 2 3	Trig 1: 5-30V input DC Trig 2: volts free contact 0V / Ground	For Trig 1 apply voltage to pins 1 & 3 For Trig 2 make contact using pins 2 & 3
<b>IR In</b> 3.5mm stereo jack	1 2 3	Demodulated IR signal in +5V (+12V link selectable) 0V / Ground	Only use IR receiver module MCU-IRRX with this input. Refer to manufacturer for location of 12V link
<b>IR Out</b> 3.5mm stereo jack	1 2 3	Received IR signal out Not Used 0V / Ground	Always use stereo jacks at both ends of cable if connecting directly to Sony Control In. Use cable Part No: MCU-JJ5-CAB
<b>RS232</b> RJ11	1 2 3 4 5 6	MCU Tx RS485 I/O - 0V / Ground 0V / Ground RS485 I/O + MCU Rx	When connecting MCU-300 to a PC for configuring MCU, use cable Part No: MCU-SCOM-CAB
<b>RS485</b> RJ11	1 2 3 4 5 6	(Not connected) RS485 I/O - 0V / Ground 0V / Ground RS485 I/O + (Not connected)	Applies to MCU-300-4 s/n 100101 and above  When connecting to MCU-REM S/n 200021 and above use MCU-485 cable  When connecting to MCU-REM s/n 200020 and below use special MCU-485-1 cable

**Table 3 Low Voltage pin connections**

## Mains Voltage Connections

1. **Power Input**  
Accepts standard 5A IEC line socket (supplied)
2. **Screen Power Output / Aux Relay Contacts**

Connector	Pin No	Description
<b>Screen</b> (Blue Line)	1	Earth
	2	Normally Closed – Screen Up <b>(Live !!)</b>
	3	Normally Open – Screen Down <b>(Live when activated !!)</b>
	4	Neutral
<b>Aux 1</b> (Grey)	1	Earth
	2	Normally Closed
	3	Common
	4	Normally Open
<b>Aux 2</b> (Grey)	1	Earth
	2	Normally Closed
	3	Common
	4	Normally Open

**Table 4 Mains voltage pin connections**

# Troubleshooting

The only problem likely to be encountered is inverse action, i.e. the screen or lift going down when it should go up! If this is the case, swap the down and up connections for the appropriate item.

Should the fuse blow, there must be a short circuit in the wiring to the screen or auxiliary device. Rectify the fault then replace the fuse. Rating: 20mm glass 3.15AT (time lag).

If relay(s) do (es) not activate it is possible the contacts have fused due to incorrect operation or connection of a device operating at above the recommended voltage/current. Check power requirements of connected device. If in doubt, refer to supplier

There are no installer serviceable parts inside and no attempt should be made to disassemble the unit.

If you encounter a problem which can not be resolved by the above, refer to supplier

Having completed your installation using the MCU-300 the end user should be told the following.

1. How to **isolate all** the connected devices in the event of a problem.
2. Not to interfere with the unit in any way and that even with the IEC power cord removed, live cables from connected devices may be present inside the unit.

When using only one of the 5-30v or 0v triggers you must still use a **stereo** 3.5mm jack plug, as using a mono jack will cause the triggers to work incorrectly.

# Acknowledgements

Windows 95, Windows 98, Windows 2000, Windows NT and Windows XP are registered trademarks of Microsoft Corporation

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