Installation and Safety Instructions

For Models without a Power Switch:
The socket outlet shall be installed near the equipment and shall be accessible.

For all Models:
No serviceable parts inside the unit. Refer service to a qualified technician.

For Models with Internal or External Fuses:
For continued protection against fire hazard, replace only with same type and rating of fuse.

Instructions d’installation et de sécurité

Pour les modèles sans interrupteur de courant:
La prise de courant d’alimentation sera installé près de l’équipement et sera accessible.

Pour tout les modèles:
Pas de composants à entretenir à l’intérieur. Confiez toute réparation à un technicien qualifié.

Pour les modèles équipés de fusibles internes ou externes:
Afin d’éviter tout danger d’incendie, ne remplacez qu’avec le même type et la même valeur de fusible.

Installations- und Sicherheitshinweise

Für Geräte ohne Netzschalter:
Die Netzsteckdose soll in der Nähe des Gerätes installiert und frei zugänglich sein.

Für alle Geräte:
Keine Wartung innerhalb des Gerätes notwendig. Reparaturen nur durch einen Fachmann!

Für Geräte mit internen oder externen Sicherungen:
Für dauernden Schutz gegen Feuergefahr darf die Sicherung nur gegen eine andere gleichen Typs und gleicher Nennleistung ausgewechselt werden.

Instalacion E Instrucciones de Seguridad

Modelos Sin Interruptor:
La conexión debe ser instalada cerca del equipo y debe ser accesible.

Para Todos Los Modelos:
Dentro de la unidad , no hay partes para reparar. Llame un tecnico calificado.

Modelos con Fusibles Internos o Externos:
Para prevenir un incendio, reemplace solo con el mismo tipo de fusible.

CE COMPLIANCE

All products exported to Europe by Inline, Inc. after January 1, 1997 have been tested and found to comply with EU Council Directive 89/336/EEC. These devices conform to the following standards:

EN50082-1 (1992 and 1994), EN60950-92

Shielded interconnect cables must be employed with this equipment to ensure compliance with the pertinent Electromagnetic Interference (EMI) and Electromagnetic Compatibility (EMC) standards governing this device.

FCC COMPLIANCE

This device has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide against harmful interference when equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their own expense.
CTL101 QUICK START

This section provides basic, step-by-step directions for installing the CTL101 Control Interface. Additional instructions can be found on page 3, and Application Diagrams are provided on pages 7-11.

1. **Set the Dipswitches** (if applicable). Dipswitch settings are discussed on pages 13 & 14.

2. **Install** the CTL101 Interface at the desired location, making sure that the IR sensor window remains unobstructed (available mounting hardware is listed on page 24).

3. **Connect the Computer Serial Port** to the RS-232 / RS-422 / RS-485 Serial Port Input. Wiring Diagrams are provided on pages 4-6 and a front and rear panel Connectors & Controls Diagram is included on page 13.

4. **Installation Options:**
   - Connect the INLINE IN1402 / IN1403 / IN1404 Video Scaler, IN3600 Series Switcher or IN31608 Matrix to the RS-232 / RS-422 / RS-485 Serial Output Port.
   - **For Contact Closure:** Connect all switches to the Contact Closure Input Ports.
   - **For applications involving IR controlled products:** Connect the CTL130 IR Emitter to the CTL101 IR Out Port. The mouse type emitter attaches directly over the unit’s IR sensor (when used to control a single unit) or can be mounted up to three feet away when used to control multiple units.
   - **For Remote Sensor Applications:** Connect the CTL131DB / CTL131DW IR Remote Sensor to the CTL101 IR Sensor Input Port. The sensor can relay signals up to 1000 feet. Set the Sensor Mode Button to the EXT position.

5. **Turn on** the computer / control system and all other devices connected to the CTL101.

6. **Apply power** to the CTL101 using the IN9230 power cord. The front panel power LED will illuminate.

7. **Set-Up the Terminal Emulation Program:** Users can access the Set-Up Menu by typing an asterisk (*). Complete details are provided on pages 16-22.

CTL120-2 REMOTE OPERATION

CTL120-2 IR Remote Control sends infrared commands to the CTL101. The CTL101 will convert these IR signals to serial commands so you can control functions on IN1402 / IN1403 / IN1404 Video Scalars, IN3600 Series Switchers and IN3808 / IN20804 / IN21608 / IN31208 / IN31608 Matrix Switchers. A diagram outlining the location and function of each button is provided on pages 27-29.

**KEY CONCEPT**

Press the appropriate device selector button: Video Scalener, Switcher or Matrix (located along the top edge of the remote control) before executing any commands.
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Product Overview

DESCRIPTION

The CTL101 interface converts contact closures and infrared (IR) signals to RS-232, RS-422 or RS-485 serial commands. The unit allows complete systems integration and system control via a single computer workstation, contact closure and / or infrared remote. The CTL101 can also be used to remotely control a VCR, DVD, INLINE unit or any other IR receiver equipped device by passing along IR remote signals.

PRODUCT FEATURES

- **Three Command Sources** - Commands can come directly from the host computer. Preprogrammed commands can be sent by using an IR remote control or via any of the 16 contact closure ports.

- **Infrared Remote Control** - provides one touch operation of programmed system functions and allows the presenter to move freely around the room.

- **Remote Operation** - The CTL101 allows operators to connect a local IR emitter directly to control equipment (that is IR receiver equipped) and transmit remote signals from over 1000 feet away.

- **Serial Input and Output Ports** - allow the CTL101 to pass along commands from a computer or other control system to the controlled equipment.

- **On Screen Display Menus** - are provided by the CTL101 for the control computer monitor.

- **Easy Setup** - A Terminal Emulation Program is the only software necessary to set up the CTL101...no special software is required!

- **Versatile Mounting Capability** - The CTL101 can be placed / mounted in a variety of locations or fits neatly in a 1U rack space (when mounted in a standard 19” equipment rack).

Optional Equipment:

- **CTL120-1 IR Remote Control** - sends infrared commands to the CTL101. This handheld generic unit can be customized with labels to match specific installation requirements.

- **CTL120-2 IR Remote Control with Overlay** - is the same remote with an overlay that specifies which buttons control the IN1402 / IN1403 / IN1404 Video Scalers, IN3600 Series Switchers and IN31608 Matrix. A diagram outlining the location and function of each button can be found on pages 27 - 29. Complete operating / programming instructions are provided in the CTL120 Operations Manual.

- **CTL130 IR Emitter** - acts as a signal transponder in that it allows operators to control video equipment that may be out of the IR remote’s line-of-sight (i.e. rack-mounted equipment, devices located in another room, etc.).

- **CTL131DB / CTL131DW IR Sensor** - is an IR sensor (housed in a double size A/V connector module) that can be mounted in a remote location and relay control signals up to 1000 feet (available in black or white).
This section offers step-by-step instructions for installing the **CTL101 Control Interface**. **Serial Port Wiring Diagrams** are provided on pages 4 - 6, **Application Diagrams** are included on pages 7 - 11, and a Front and Rear Panel **Connectors and Controls** Diagram can be found on page 13. All connectors and controls are located on the back of the unit.

*Note: Installation of the CTL101 must only be carried out by qualified technicians. Read the instructions carefully before initiating the installation procedure. Make sure that there is no power connected to any of the units.*

1.) **Set the Dipswitches** - as appropriate for your installation (if applicable). See pages 13 & 14 for more details.

2.) **Place / Install the CTL101 Interface** - at the desired location. Make sure that the IR sensor window remains unobstructed.

3.) **For Rack-Mount Installations** - Secure the CTL101 to the optional IN9080 rack mount shelf using two (2) #6 - 32 x ¼" long screws (provided with the rack shelf). Two interfaces can be mounted side-by-side on a single rack shelf, or a single unit may be mounted along with an optional IN9088B blank plate. Together, the CTL101 and the IN9088B fit snugly in a 1U rack space.

*Note: When attaching any INLINE unit to an INLINE rack mount shelf, the four (4) rubber feet must be removed from the bottom of the unit.*

4.) **Control Signal Connections** - Make one or more control signal input / output connections as appropriate for your installation:

- **Connect the Computer or Control System Serial Port** to the RS-232 / RS-422 / RS-485 Serial Port Input (see **Wiring Diagrams** on page 4 thru 6 and **Application Diagram A** on page 7). The CTL101 is configured from the input port using a host computer in terminal emulation mode. See the **Terminal Emulation Parameters** Section on page 16 for more details on configuring the CTL101.

- **Connect Serially Controlled Devices** such as the IN1402 / IN1403 / IN1404 Video Scaler, IN3600 Series Switcher or IN31608 Matrix to the RS-232 / RS-422 / RS-485 Serial Port Output (see **Application Diagram A** on page 7).

- **For Contact Closure** - connect all switches to the Contact Closure Input Ports. The CTL101 has 16 isolated ports. See the **Wiring Diagram** on page 6 and **Application Diagram C** on page 9.

- **For Applications Involving IR Controlled Products** - connect the 2-pin captive screw connector on the CTL130 IR Emitter to the CTL101 IR Out Port (see **Application Diagrams** on page 6).
Diagram D on page 10). The mouse type emitter attaches directly over the IR sensor of the device being controlled (when used to control a single unit) or can be mounted up to three feet away from the IR controlled devices when used to control multiple units.

Note: Emitters are to be used for local control of video equipment only (i.e. the video equipment and the CTL101 are in the same room).

**KEY CONCEPT**

Do not place the CTL101 in a location where the unit’s sensor window will detect the emitter signal, or in an area in which the signal could feed back into the unit. This condition is evident whenever a remote control command is issued and the remote light on the CTL101 remains "ON" even after the remote control button is released.

- **For Remote Sensor Applications** - Connect the CTL131DB / CTL131DW IR Remote Sensor to the IR Sensor Input Port (see the Wiring Diagram on page 6 and Application Diagram D on page 10). The sensor can be mounted in a remote location and can relay signals to the CTL101 from up to 1000 feet away. Set the Sensor Mode button to the EXT position.

6.) **Turn on** - the computer, monitor, INLINE equipment and all other connected / controlled devices.

7.) **Apply power to the CTL101** - using the IN9230 power cord (included). The power LED on the front of the unit will illuminate.

8.) **Set-Up the Terminal Emulation Program.** Users can access the Set-Up Menu by typing an Asterisk (*). Complete details are provided on pages 16 - 23.

**CTL101 SERIAL PORT WIRING DIAGRAMS**

**Full Duplex RS-232**

Default, Switch Bank 1 Switches 1-6 set to 0

<table>
<thead>
<tr>
<th>CTL101 Serial Port</th>
<th>Computer Serial Port (DB-9 Connector)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX+ 3</td>
<td>2RX</td>
</tr>
<tr>
<td>RX+ 5</td>
<td>3TX</td>
</tr>
<tr>
<td>GND 1</td>
<td>5GND</td>
</tr>
</tbody>
</table>
Full Duplex RS-422/485
Menu Setup: Select Full Duplex Mode for Applicable Ports
SW Bank 1 Input Port: Switch 1-3 set to 1
Output Port: Switch 4-6 set to 1

CTL101 Serial Port

Computer Serial Port (DB-9 Connector)

(A) TX+ 3
(B) TX- 2
(A) RX+ 5
(B) RX- 4
GND 1

120 ohm termination

TX+

Input SW 3
Output SW 6

TX-

RX+

Input SW 2
Output SW 5

RX-

120 ohm termination

Note: In Full Duplex Mode, terminate both TX and RX lines. In Half-Duplex Mode, terminate only one (TX or RX), they are connected together.

Half Duplex RS-485
Menu Setup: Select Half Duplex Mode for Applicable Ports
SW Bank 1 Input Port: Switch 1 & 2 = 1, 3 = 0
Output Port: Switch 4 & 5 = 1, 6 = 0

CTL101 Serial Port

Computer Serial Port (DB-9 Connector)

(A) TX+ 3
(B) TX- 2
(A) RX+ 5
(B) RX- 4
GND 1

3 RX+ (A)
7 RX- (B)
5 RX+ (A)
2 TX- (B)
6 TX- (B)
1 GND

When using the RS-485 option you can connect multiple CTL101 units in parallel.
When multiple devices are connected only the start and end units should be terminated.
CTL101 Contact Closure Inputs
CTL101 Supplies power
Set Dip Switches Bank2, Switches 1 and 2 to ON (Enabled)

CTL101 Contact Closure Input

NOTE: Current through each contact is @ 7mA.

CTL101 Contact Closure Inputs
CTL101 Contact Closure Input

NOTE: Current through each contact is @ 7mA.

CAUTION: Pay close attention NOT to reverse the +5V and GND connections. Pin 1 and 4 are marked on the circuit board next to the connector.

0 to 500ft use 20 AWG min, 500 to 1000ft use 18 AWG min.
APPLICATION DIAGRAM B:  
IR to Serial Command Conversion

SERIALLY CONTROLLED DEVICES

IN1404 Video / RGB Video Scaler
with RS-232 Serial Control Port

IN31608-6 Presentation Switcher
with RS-232 Serial Control Port

RS232 or RS422 or RS485

ctl101 Back View

ctl101 Front View

ctl120 Infrared Remote

A/C Power Source

IR SIGNAL

= IR Signal

= Serial Control

= Power

TECHNICAL SUPPORT:
EXT
INT
SENSOR
MODE
(800) 882-7117
(714) 921-4100
www.inlineinc.com

MADE IN U.S.A
APPLICATION DIAGRAM C: Contact Closure to Serial Command Conversion

**CONTACT CLOSURE SOURCES**

- IN9471 Module With Double Throw Switch
- IN9360 Module With Switch
- IN3590 Wired Remote

**SERIALLY CONTROLLED DEVICES**

- IN1404 Video / RGB Video Scaler with RS-232 Serial Control Port
- IN31608-6 Presentation Switcher with RS-232 Serial Control Port

- CTL101
- Back View

- RS232 or RS422 or RS485

- A/C Power Source

- FUSE: 0.250A; 250V; TIME DELAY 90-260VAC; 0.05A; 47-63Hz

**TECHNICAL SUPPORT:**
- EXT INT SENSOR MODE
- (800) 882-7117
- (714) 921-4100
- www.inlineinc.com

**MADE IN U.S.A**
**CTL101 Connectors and Controls**

**FRONT PANEL INDICATORS**

The Remote and Power LED’s, and the IR receiver sensor are located on the front panel of the **CTL101** (see the diagram on the following page). The Power LED will illuminate as soon as power is applied to the unit (the **CTL101** has no ON/OFF switch). The Remote LED will illuminate whenever the interface receives an infrared signal from any IR remote control.

**REAR PANEL CONNECTORS AND CONTROLS**

All connectors and controls are located on the back of the unit, and the dipswitches are located on the bottom (see the **Dipswitch Bank** Tables on page 14).

- **Sensor Mode** - is located on the left rear of the **CTL101**. This switch allows users to toggle between the unit’s internal IR sensor and the remote sensor. When the switch is in the INT position (down), the unit’s internal IR sensor is active (factory default). In the EXT position (up), the remote sensor (attached to the IR Sensor Input) is active.

- **IR Sensor Input** - is a 4-pin captive screw terminal that connects directly to the **CTL131DB / CTL131DW** IR Remote Sensor (see **Application Diagram D** on page 10).

- **Contact Closure Ports** - allow users to connect up to 16 devices with contact closure capability (see **Application Diagram C** on page 9).

- **RS-232 / RS-422 / RS-485 Serial Ports** - The Output Port connects directly to the **IN1402 / IN1403 / IN1404** Video Scaler, **IN3600** Series Switcher or **IN31608** Matrix or any other device that accepts ASCII command strings. The Input Port connects directly to the computer workstation (see **Application Diagram E** on page 11).

- **IR Out** - connects to the **CTL130** IR Emitter via a 2-pin captive screw terminal (see **Application Diagram D** on page 10).

- **Fuse** - 0.25A, time delay

- **Power** - Universal power: 90 - 260 VAC, 47 - 63 Hz.
DIPSWITCH SETTINGS

On the bottom of the unit are two sets of dipswitches. Dipswitch Bank #1 is used to configure the serial ports to operate as an RS-232, or RS-422 / RS-485 physical interface. Dipswitch Bank #2 is used to isolate the contact closure ports and to configure the CTL101 to the default baud rate (9600). The factory default and specialized dipswitch settings are listed below:

Factory Default Settings:

Dipswitch Bank #1:

- Dipswitches 1, 2, 3, 4, 5 & 6: All in "0" position
- Input Port Serial Mode: RS-232, no termination
- Output Port Serial Mode: RS-232, no termination
Dipswitch Bank #2:

Dipswitches 1, 2, 3, 4: 1 & 2 in "1" position 3 & 4 in "0" position
Contact Closure Port +5V Enable / Disable: Enabled (CTL101 provides power)
Contact Closure Port Ground Enabled / Disabled: Enabled (CTL101 provides power)
Baud Rate Override (Cycle power off / on to activate new setting): Normal

<table>
<thead>
<tr>
<th>Dipswitch Bank #1</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dipswitch</strong></td>
<td><strong>Function</strong></td>
<td><strong>Setting</strong></td>
</tr>
<tr>
<td>1, 2 &amp; 3</td>
<td>Input Port Serial Mode</td>
<td>1 RS-485 / RS-422</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 RS-232*</td>
</tr>
<tr>
<td>4, 5 &amp; 6</td>
<td>Output Port Serial Mode</td>
<td>1 RS-485 / RS-422</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 RS-232*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dipswitch Bank #2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dipswitch</strong></td>
<td><strong>Function</strong></td>
<td><strong>Setting</strong></td>
</tr>
<tr>
<td>1</td>
<td>Contact Closure Port +5V Enable / Disable</td>
<td>1 Enable*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 Disable</td>
</tr>
<tr>
<td>2</td>
<td>Contact Closure Port Ground Enable / Disable</td>
<td>1 Enable*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 Disable</td>
</tr>
<tr>
<td>3</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Baud Rate Override (Cycle power off / on to activate new setting)</td>
<td>1 9600 Baud Group 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 Normal*</td>
</tr>
</tbody>
</table>

*D Factory Default

DIPSWITCH BANK #1

Dipswitches 1, 2 and 3 control the Input Port, while 4, 5 and 6 control the Output Port. The Input / Output port will operate in RS-232 mode when all six dipswitches are in the "0" position (default), and in the RS-422 / RS-485 mode when all six dipswitches are in the "1" position. Switching pairs 2 & 3 and 5 & 6 will terminate the receive & transmit signals (respectively) at their ports.

DIPSWITCH BANK #2

In most cases, the contact closure ports use internal power from the CTL101 to sense changes (switches 1 & 2 are enabled). Users can completely isolate the remote contacts & wiring from the CTL101 by incorporating an external +5 volt power supply into the system (see the CTL101 Contact Closure Inputs Diagrams on page 6). In such applications, the internal power supply of the CTL101 must be disconnected from the contact closure ports by disabling dipswitches 1 & 2.

When dipswitch #4 is in the "0" position (normal), the CTL101 automatically recalls the last configuration at power-up. Users can override the last settings and power-up the unit at factory default (9600 baud) by setting the switch to the "1" position (override). Note that the factory default also sets the Code End / Menu Call character to an asterisk (*).
Serial Port Set-Up

Preprogrammed command functions can be sent via the RS-232 / RS-422 / RS-485 serial output port. The **CTL101** accepts serial commands from a control system, computer serial port or any other device capable of sending out serial ASCII commands at compatible baud rates, and relays the commands to the video equipment via the output port.

**RS-232, RS-422 & RS-485 FORMATS**

RS-232, RS-422 and RS-485 formats are physical interface standards for serial communication. RS-232 is a full duplex operation that is typically used for short distances (up to 25\*). RS-232 full duplex is the most common format and is limited to point-to-point applications (i.e. one computer, one piece of equipment). It is not designed for the simultaneous usage of several units or for sending serial information over very long cable lengths.

RS-422 and RS-485 formats can operate in both full and half duplex modes. In half duplex mode, only one unit can transmit information at any given time. Therefore, other units in the system will not respond until the initial transmission is concluded, and only one unit can respond at any given time. Half duplex mode is preferred for applications involving multiple devices and/or communication along fewer lines.

*Note: Configuring the **CTL101** for full or half duplex serial port operation is discussed in the Serial Port Control Section on pages 20 - 22.*

Both RS-422 and RS-485 formats are designed for longer cable runs (actual lengths depend on cable grade, capacitance and a number of other variables). RS-485 is recommended when operating multiple units on a single line.

**Reflections**

Reflections will sometimes occur when signals are sent over long cable runs (in the RS-422 / RS-485 mode). If a system incorporates several units and/or long control cable runs (while operating in full duplex mode), users can minimize reflections by setting dipswitches 2 & 3 and/or 5 & 6 to the "1" position (on the **CTL101**) and/or by engaging the termination resistors on the units located at opposite ends of the control cable (see diagram on page 5). For half duplex applications, engage switch 2 and/or 5 only.

**COMMUNICATION PROTOCOL**

<table>
<thead>
<tr>
<th>Start Bit</th>
<th>Stop Bit</th>
<th>Data Bits</th>
<th>Parity Check</th>
<th>Baud Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>8</td>
<td>none</td>
<td>9600 (default)</td>
</tr>
</tbody>
</table>

**BAUD RATE SELECTION**

The **CTL101** has a factory default baud rate of 9600 bps and can communicate at baud rates from 1200 up to 115,200.

*Note: The baud rate of the computer / A/V equipment must match the baud rate selected on the **CTL101** (both the input and output port are set to the same baud rate).*

**KEY CONCEPT**

*If communication is lost, use the default switch on the bottom of the **CTL101** to reset the unit to factory default (9600 baud).*
**TERMINAL EMULATION PARAMETERS***

In order for the workstation to communicate with the **CTL101**, the terminal emulation program parameters must be set as follows:

**Enabled:**
- VT100 Terminal Emulation
- Echo Typed Characters Locally (sending)
- Wrap Lines that Exceed the Terminal Width (receiving)

**Disabled:**
- XON / XOFF Control
- Hardware Flow Control
- Echo Received Characters

* Software comes standard with the Windows™ Package.

By default, the **CTL101** is set up to accommodate most common terminal emulation programs. If the unit is not communicating properly (i.e. unwanted text / messages appear on the screen, double spacing occurs between menu choices, menu selections are followed by "error" responses, etc.), set the parameters to full duplex, no delimiter pause and no flow control, then check the emulation program set-up. Refer to the **Serial Port Control** Section on pages 20 - 22 for more details.

## CTL101 Set-Up Menu

Power-up the **CTL101** and open the systems terminal emulation program. Type in an asterisk (*) to bring up the setup menu. With Firmware Revisions 1.2, you may change the asterisk to any character you choose.

*Note:* Whatever character you select, you may not use it in *any* command string.

The Main Setup Menu will look like this:

```
*CTL101 Main Menu - please enter selection.
1. Switch codes.
2. Infrared codes.
3. Serial Port.
4. Delimiter pause.
5. Set Code End character.
```

### CONTROL CODES FOR CONTACT CLOSURE

If the application involves control codes for contact closure, type "1" in the main menu followed by **ENTER**.

A new feature includes Hexadecimal code entry (HEX format). HEX format codes must be entered in pairs (even number of entries). Also, in ASCII format, Carriage Return (Ctrl M) and Line Feed (Ctrl J) may now be entered as part of the code string (they were previously ignored). HEX format code entry must be in capital letters "0-F" (Version 1.1 or later in self test).
The next series of menus will look like this:

Switch Codes - enter selection.
1. Clear All switch codes.
2. Switch closure code. (ASCII format)
3. Switch open code. (ASCII format)
4. Switch closure code. (HEX format)
5. Switch open code. (HEX format)

Select 2, 3, 4, or 5.

Enter Switch # (1 - 16).
Select the switch #.

**New:**

Enter selection.
1. Enter code.
2. Delete code.
3. Display current.
4. Exit.

Select "1".

Begin entering Command codes
- End with a Code End character (Default = asterisk *)
- Backspaces will be ignored.

**1. Clear All Switch Codes** allows users to delete all pre-existing contact closure codes simultaneously.

**2 & 4. Switch Closure Code** - will prompt users to select a switch number (1-16). Upon selection of the appropriate switch number, a message will appear indicating whether the switch code "Exists" or is "New". Users can now establish command strings for contact closure states, delete commands or display the current command string.

**3 & 5. Switch Open Code** - same as Switch Closure Code but for contact opening.

**6. Exit** - will always return users to the previous menu.

**KEY CONCEPT**

Contact closure command code strings can consist of (up to) 120 characters. A "Code Area is Full" message will appear after 120 characters have been entered.

**Note:** If Delimiter Pause is selected, the **CTL101** will pause for a response end delimiter or a one second timeout between commands in a string, allowing the controlled equipment time to process each command. See the **Delimiter Pause** Section on pages 21-22 for more details.
INFRARED CODES
If the application involves infrared codes, type "2" in the main menu followed by ENTER. The next series of menus will look like this:

- IR Codes - enter selection.
- 1. Clear All codes in user programmable group.
- 2. Set/Change/Clear/Display a code. (ASCII format)
- 3. Set/Change/Clear/Display a code. (HEX format)
- 4. Select current code group.
- 5. Exit.

Select 2, or 3.

**Press remote button.
**Press again - Verify.

**New:
Enter selection.
1. Enter code.
2. Delete code.
3. Display current.
4. Exit.

Select "1".

Enter selection.
2. Remote delay OFF - for Continuous push.

Begin entering Command codes
- End with a Code End character (Default = asterisk *)
- Backspaces will be ignored.

1. Clear All Codes in User Programmable Group - allows users to erase all group #3 command codes (provided that group #3 is enabled).

The CTL101 features three groups of command codes associated with IR signals. The first two groups are programmed at the factory with the serial command codes for INLINE video scalers, switchers and matrices, and cannot be changed. The third group allows users to program their own set of command strings. Once established, the unit will always power up in the last group selected.

Group #1 Command Codes - allow users to run a single INLINE unit by using the same delimiters (the same beginning and end [ ] brackets).

Group #2 Command Codes - have different delimiters allowing the simultaneous usage of several pieces of INLINE equipment (i.e. switcher { }, matrix ( ), scaler [ ]).

Group #3 Command Codes - are completely user programmable and are capable of directing several pieces of equipment simultaneously.

Note: When programming Group 3 for the first time or reprogramming the entire group, Group 3 must be enabled, and all codes must be cleared before you begin.
2 & 3. **Set / Change / Clear / Display a Code** - will prompt users to push an IR remote control button to be associated with the operations. Another prompt will be displayed to verify the selection. If the IR signal is acceptable, the unit will indicate if it is a "New" or "Existing" command code.

A new feature includes Hexadecimal code entry (HEX format). HEX format codes must be entered in pairs (even number of entries). Also, in ASCII format, Carriage Return (Ctrl M) and Line Feed (Ctrl J) may now be entered as part of the code string (they were previously ignored). HEX format code entry must be in capital letters "0-F" (Version 1.01 or later in self test).

Select one of the following:

1. **Enter Code** - If selected, two menus will be displayed:
   
   **First Menu:**
   
   Enter Selection.
   1. Remote Delay ON - for Single push
   2. Remote Delay OFF - for Continuous push

   Users are now prompted to program the **CTL101** for either single push operation (which repeats the code no faster than 2 times per second), or for continuous operation (to repeat the code 20 times per second while the button is pushed). Single push modes are utilized for most operations, while continuous push modes are primarily used for such functions as volume regulation.

   **Second Menu:**
   
   Begin entering Command codes
   - End with a Code End character (Default = asterisk *)
   - Backspaces will be ignored.

   After the remote has been configured, the unit will automatically begin the code entry mode (which is the same as contact closure entry). The group has the capacity to store up to 72 individual remote command strings.

2. **Delete Code** - deletes the previously programmed command.

3. **Display Current** - shows the current command status.

4. **Select Current Code Group** - allows users to enable one of the three groups.
REPROGRAMMING OR USING A DIFFERENT IR REMOTE CONTROL

The **CTL120** IR Remote is pre-programmed at the factory and will readily support most applications. However, if operators wish to use their own remote, or if the **CTL120** commands interfere with components in the system, the existing command codes may have to be changed. Recommended manufacturer’s command codes include Sony (default), JVC, Panasonic, Pioneer and RCA/Proscan. A complete list of manufacturers, components and code numbers is provided in the **CTL120** Operation Manual.

*Note: Reprogramming of the **CTL120** Remote should only be done by qualified technicians.*

When first setting up IR commands with a new manufacturer / component remote control code format, a "Signal Error" may result. If this happens, try again. If the "Signal Error" message occurs three times, then the manufacturer / component code is incompatible with the **CTL101**. Try another manufacturer’s code format (a list of available codes is provided in the back of the **CTL120** Operations Manual).

SERIAL PORT CONTROL

If SERIAL PORT is selected in the main menu, type "3" followed by ENTER. The next series of menus will look like this:

Select Input Port option.
1. Baud Rate.
2. Flow Control.
3. Full or Half Duplex ports.
4. Exit.

Select "1".

Select Baud Rate.
1. 1,200
2. 2,400
3. 4,800
4. 9,600
5. 19,200
6. 38,400
7. 57,600
8. 115,200
10. Exit.

1. **Baud Rate** - allows users to change the baud rate. The new setting will become the default baud rate. The terminal computer baud rate must now be changed to communicate with (match) the **CTL101**.

   *Note: Change the A/V equipment baud rates first, the **CTL101** baud rate second, and the computer baud rate last.*

Select "2".

Select Input Port flow control.
1. Enable XON/XOFF.
2. Disable XON/XOFF.
3. Display current.
4. Exit.
2. Flow Control - The Input Serial Port (host computer) can receive XON / XOFF flow control from the CTL101. This is beneficial when the host computer is controlling the video equipment simultaneously with a contact closure and / or IR signal.

If a contact change or an IR signal is sensed, the CTL101 will send an XOFF command to the computer (once a delimiter is received from the computer going to the equipment, or a one second timeout). This allows the computer to stop transmitting command messages without overflowing the 32 byte FIFO in the CTL101 receive buffer. The CTL101 will trap the response message from the video equipment in response to the last command from the host computer. At this time the CTL101 will start sending its programmed command string to the video equipment. After the CTL101 has sent its command string, an XON will be sent to the host computer indicating it can resume communication with the video equipment. At this time, the trapped response from the last host command will be sent to the host computer to verify that the last command was processed.

Note: This feature must be used with the delimiter pause established, otherwise the CTL101 has no way of knowing when the host computer has ended a command and the video equipment has ended its response.

Select "3".

Select Full or Half duplex ports.
1. Both ports Full Duplex (Default).
2. Input port Full Duplex & Output port Half Duplex.
3. Input port Half Duplex & Output port Full Duplex.
5. Display current.

3. Full or Half Duplex Ports - For RS-232 operation, full duplex communication is selected. In RS-422 / RS-485, either full or half duplex communication can be selected.

In half duplex mode and computer control, the driver turns on as each character is transmitted, and the character is sent without any flow control provided by the CTL101. To prevent contention, the controlled equipment and the host computer system must provide some means of flow control. Typically, the host computer would send a command, shut its driver off, and wait for a response from the controlled equipment before sending the next command. The CTL101 acts as a relay unit between the computer and controlled equipment.

When the CTL101 sends commands in half duplex mode for IR remote control or contact switches, it automatically activates its driver for each command character transmitted. The CTL101 uses the end delimiter responses to determine when it can send the next command in a string. If no end delimiters are detected within one second, it will automatically send the next command.

DELMITER PAUSE

If DELIMITER PAUSE is selected, type "4" followed by ENTER. The next series of menus will look like this.

Select Delimiter Pause.
1. Don’t wait for response.
2. Wait for response between commands.
3. Display current.
4. Exit.
1. Don’t Wait For Response - allows the CTL101 to deliver a command without receiving an end delimiter from the controlled equipment. In most instances this mode is used because it decreases the CTL101 response time (it does not have to wait for a response before the next command [button push] can be issued).

All commands sent to INLINE units must contain a leading code, the command code, and an ending code. Each unit can be set to recognize several sets of leading and end codes (delimiters): brackets [ ], parentheses ( ), braces{ }, slashes \\, a less and greater than sign < > and signs !#. The factory default serial delimiters are [ ].

A complete command consists of:

[ The leading code
CH3 The command code.
] The ending code

Example: [CH3] sets the unit to select channel 3.

2. Wait For Response Between Commands (ASCII format only) - allows the CTL101 to wait for equipment responses while executing a command string. The CTL101 looks for an end delimiter from the host computer commands (or 100 millisecond timeout) and a response from the controlled equipment commands (or 1 second timeout) before initiating a contact or IR command string.

For example, users could program the following commands to be issued with one IR remote button push: [CH1][CH2][CH3][CH4]. With the pause engaged, the CTL101 would send out the initial command [CH1], wait for a response (with an end delimiter) from the controlled equipment, send the next command [CH2], wait again, etc. In each case, the CTL101 would wait for a response before issuing the next command.

**KEY CONCEPT**

Avoid setting the delimiter pause unless a string of commands is involved. Doing so will extend the time between infrared remote button responses.

3. Display Current - shows the current delimiter pause status.

**SET CODE END CHARACTER**

If an asterisk (*) is required in the command code, then you may choose another character to evoke the Main Menu and to terminate the command code entry. Enter "5" at the Main Menu, followed by Enter.

Type in a Code End / Menu Call character (Default = * asterisk). - Note: This character will be Case Sensitive.

**Note:** If you forget this Code End / Menu Call character, reset the unit to default (Switch Bank #2, Switch #4) to set the Code End / Menu Call character to an asterisk (*). You may then set up another character in place of the asterisk (*). Remember to turn off the default switch when you are finished.
SELF-TEST

If SELF-TEST is selected, the next series of menus will look like this.

Test Results - Rev. 1.2
SRAM............(PASS)
Flash............(PASS)
RHost Serial....(PASS)
Inline Serial..(PASS)
Press button on remote.
**Press again - Verify.
IR Signal.......(PASS)
Switch 1 to 8..(PASS)
Switch 9 to 16.(PASS)

Remove test cable from switches (10 second timeout).
Switch 1 to 8..(PASS)
Switch 9 to 16.(PASS)

As the name implies, the unit conducts a quick series of tests to make sure that the major functions / circuits are working properly. The test is primarily designed for factory use, however, in the event that major problems should occur, the customer can use it to determine if a problem is associated with the CTL101 operation. The menu indicates the status of the unit as the system runs a self-check. All functions (SRAM, static memory, Flash, etc.) are tested and the CTL101 indicates whether or not the unit passed or failed. The serial output port must be disconnected and both dipswitch banks must be set to default.

If problems occur, running the self-test before calling INLINE Technical Services will allow technicians to better assist users with problems.

Note: The contact closure test requires a test connector. The first part of the switch test verifies that all contacts are connected to ground (closed). The second part verifies that all contacts are open.
# Specifications

## CTL101 Control Interface

<table>
<thead>
<tr>
<th>Control Ports:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IR Remote Sensor Port</td>
<td>4-Pin Captive Screw Terminal</td>
</tr>
<tr>
<td>IR Emitter Port</td>
<td>2-Pin Captive Screw Terminal</td>
</tr>
<tr>
<td>Contact Closure Port</td>
<td>(2) 10-Pin Captive Screw Terminals (16) Control Ports / (2) Power / (2) Ground</td>
</tr>
<tr>
<td>Contact Closure Signals</td>
<td>Latching or Momentary (100 mSec minimum pulse time)</td>
</tr>
<tr>
<td>Contact Closure Power</td>
<td>+5 VDC / 7 mA per contact</td>
</tr>
<tr>
<td>Serial Input Port</td>
<td>5-Pin Captive Screw Terminal</td>
</tr>
<tr>
<td>Serial Output Port</td>
<td>5-Pin Captive Screw Terminal</td>
</tr>
<tr>
<td>Serial Interface Formats</td>
<td>RS-232 (default) / RS-422 / RS-485</td>
</tr>
<tr>
<td>Default Serial Protocol</td>
<td>9600 bps, 1 start bit, 8 data bits, no parity, 1 stop bit, no flow control</td>
</tr>
<tr>
<td>Flow Control</td>
<td>XON / XOFF or None</td>
</tr>
<tr>
<td>Serial Port Baud Rates</td>
<td>1200 bps to 115,200 bps</td>
</tr>
</tbody>
</table>

## General

| Command Capacity | 72 IR Commands  
16 Contact Closures  
120 Characters per Command String |
| IR Sensor | Operational Distance: 30 feet / 10 meters  
Angle: 30 degrees  
(operational distance may be sacrificed at this angle) |
| Remote Sensor | Distance from **CTL101**: 1,000 feet |
| Power Supply | 90-260 VAC; 47-63 Hz; 0.05 Amps (Internal Universal) |
| Product Weight | 1 lb. / 0.45 kg |
| Shipping Weight | 3 lbs. / 1.5 kg |
| Dimensions | 1.65" x 8.5" x 6" / 4.2cm x 21.6cm x 15.2cm |

## Regulatory Compliance

| EMI & Safety | UL 1950, CAN/CSA-22.2 No. 950 3rd Ed.  

## Parts Included

1. **CTL101**: Control Interface  
2. **IN9230**: IEC Power Cable, 6’ long (USA only)  
3. **IN9339**: Adjustment Tool with Technician’s Blade  
4. 4-Pin Remote IR Sensor Connector with Screw Terminals  
5. 5-Pin Serial Port Connectors with Screw Terminals  
6. 10-Pin Contact Closure Connectors with Screw Terminals  
7. Operation Manual
**Optional Accessories**

<table>
<thead>
<tr>
<th>IR Accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CTL120-1</strong>: IR Remote Control</td>
</tr>
<tr>
<td><strong>CTL120-2</strong>: IR Remote Control with Overlay for IN1402 / IN1403 / IN1404 Video Scalers, IN3600 Series Switchers and the IN31608 Matrix Switcher</td>
</tr>
<tr>
<td><strong>CTL130</strong>: IR Emitter</td>
</tr>
<tr>
<td><strong>CTL131DB</strong>: Remote IR Sensor - Double Size A/V Connector Module - Black</td>
</tr>
<tr>
<td><strong>CTL131DW</strong>: Remote IR Sensor - Double Size A/V Connector Module - White</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mounting Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IN9080</strong>: Rack Shelf - For mounting the CTL101 in a standard 19” equipment rack</td>
</tr>
<tr>
<td><strong>IN9088B</strong>: Half-Rack Blank Plate - Fills space when rack mounting one CTL101</td>
</tr>
</tbody>
</table>

**Troubleshooting**

**Problem:** The power cord is plugged in, but the front panel POWER LED is dark.

- **Solution 1:** Make sure that the IN9230 IEC power cable is securely plugged into the unit and the A/C source.
- **Solution 2:** Make sure the A/C source is live.
- **Solution 3:** The CTL101 contains a 0.25A time delay fuse. To change the fuse, first, disconnect the power cord. Slide out the fuse holder (located on the rear panel to the left of the IEC cable receptacle) using the IN9339 alignment tool (included).

**Problem:** There is no response from the CTL120 Remote and the remote LED on the front of the CTL101 does not illuminate.

- **Solution 1:** Make sure that the CTL120 is positioned at an angle that is no more that 30 degrees from the CTL130 IR Sensor.
- **Solution 2:** Make sure that the CTL120 is no farther than 30 feet from the IR Sensor.
- **Solution 3:** Make sure that the IR sensor mode switch is in the correct position.
- **Solution 4:** The batteries in the CTL120 may be old / weak. Replace them if necessary.

For best results, position the emitters and sensors in direct line with each other whenever possible. The exception to the rule is when the CTL130 IR emitter is involved in the application. Do not place the CTL101 in a location where the unit’s sensor window will detect the emitter signal, or in an area in which the signal could feed back into the unit. This condition is evident whenever a remote control command is issued and the remote LED on the CTL101 remains "ON" even after the remote control button is released.

**Problem:** While setting up the IR remote control for a new manufacturer / component for the first time, a "Signal Error" message appears on the screen.

- **Solution 1:** The "Signal Error" may result from the CTL101 adjusting to a new code format. Try again.
- **Solution 2:** If the "Signal Error" message occurs three times, then the manufacturer / component is incompatible with the CTL101. Try another manufacturer’s code format on your remote control.
Problem: While entering a command code, a "Code Area is Full" message appears on the screen.

- **Solution:** Command code strings can only consist of (up to) 120 characters. When the message appears, back up one command and terminate the string by using an asterisk (*).

Problem: Infrared remote commands are responding very slowly.

- **Solution:** Unless a string of commands is involved, avoid setting the DELIMITER PAUSE.

Problem: There is no response from serial commands.

- **Solution 1:** Make sure that the baud rates of the controller and the unit match.
- **Solution 2:** Make sure the controller is configured as eight data bits, one stop bit and no parity.
- **Solution 3:** Make sure that the correct command codes and delimiters are being used.
- **Solution 4:** Make sure that the connector cable is properly inserted into both / all units.

If problems persist, call INLINE Technical Services at (714) 450-1800 for further assistance.

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**Contact Switch Technical Information**

1. Contact current is controlled via a 560-ohm resistor to less than 10 milliamps.

2. A debounce time of 50 milliseconds is built into the software.

3. Optical output isolation is 2,500 VRM’s.

4. The contact closure bank 1 (switches 8 thru 1) are checked first, if no changes are sensed then bank 2 (switches 16 thru 9) is sampled. If a change is sensed in bank 1 the order of service is first switch 8 on down to switch 1. If a change is sensed in bank 2 the order of service is first switch 16 on down to switch 9. Thus the priority of service is always switch 8 down to switch 1 and then switch 16 down to switch 9.

5. The Contact closure port is interleaved with service of the serial input, serial output, and infrared ports. Thus only one contact change is serviced between services of the other ports. This prevents one very active port from locking out service to the other ports.
**CTL120-2 COMMAND EXAMPLES FOR MATRIX SWITCHERS**

**IMPORTANT:** You must press the MATRIX button ( ) once to set the CTL120 remote to control INLINE matrix switchers. Before using the remote control, determine whether your matrix switcher has been set to operate in either Direct mode or Matrix mode by checking the Switching Mode status lights on the front panel. This will determine whether you use the input button or the recall button on the remote control to change input / output configurations.

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>STEPS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Select Input #3 (Direct Mode only).</strong></td>
<td><strong>Press the INPUT button, then press numeric buttons 0 and 3. Press ENTER to execute the command.</strong></td>
</tr>
<tr>
<td><strong>Blank the current output or outputs (Direct mode only).</strong></td>
<td><strong>Press the INPUT button, then press numeric buttons 0 and 0. Press ENTER to execute the command.</strong></td>
</tr>
<tr>
<td><strong>Recall memory configuration #5 (Matrix mode only).</strong></td>
<td><strong>Press the RECALL button, then press numeric buttons 0 and 5. Press ENTER to execute the command.</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>STEPS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Increase the audio level.</strong></td>
<td><strong>Press the VOL + button once to increase the volume slightly. Press and hold VOL + to continuously increase the volume.</strong></td>
</tr>
<tr>
<td><strong>Mute the audio signal.</strong></td>
<td><strong>Press the MUTE button to engage mute. Press MUTE again to return to previous volume.</strong></td>
</tr>
</tbody>
</table>
**VIDEO SCALER**
Press this button first to set the CTL120 to control IN1400 Series video scalers.

**Numeric Buttons**
Select desired input

**Arrow Buttons**
Press the UP ARROW / DOWN ARROW buttons to navigate through on-screen menus.
Press LEFT ARROW / RIGHT ARROW buttons to decrease / increase a setting.

**Enter Button**
Press to make a menu selection or to execute a new setting when using on-screen menus

**Vol + Button**
Increases audio level

**Vol – Button**
Decreases audio level

**Mute Button**
Mutes audio signals

**Blank Button**
Blanks the video image (black)

**CH + Button**
Selects the next higher input

**CH – Button**
Selects the next lower input

**Menu Button**
Activates or removes on-screen menus

**Freeze Button**
Enable / Disable digital still frame

**Vol + Button**
Increases audio level

**Vol – Button**
Decreases audio level

**Mute Button**
Mutes audio signals

**Blank Button**
Blanks the video image (black)

**CH + Button**
Selects the next higher input

**CH – Button**
Selects the next lower input

**Menu Button**
Activates or removes on-screen menus

**Freeze Button**
Enable / Disable digital still frame

**Vol + Button**
Increases audio level

**Vol – Button**
Decreases audio level

**Mute Button**
Mutes audio signals

**Blank Button**
Blanks the video image (black)

**CH + Button**
Selects the next higher input

**CH – Button**
Selects the next lower input

**Menu Button**
Activates or removes on-screen menus

**Freeze Button**
Enable / Disable digital still frame

**Vol + Button**
Increases audio level

**Vol – Button**
Decreases audio level

**Mute Button**
Mutes audio signals

**Blank Button**
Blanks the video image (black)
**Important:** You must press the SWITCHER button ( ) once to set the CTL120 remote to control IN3600 Series switches.

**Command Examples**

<table>
<thead>
<tr>
<th>Function</th>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select Input #3</td>
<td>Press numeric button 3.</td>
</tr>
<tr>
<td>Blank the video image</td>
<td>Press numeric button 0.</td>
</tr>
</tbody>
</table>
Warranty

♦ INLINE warrants the equipment it manufactures to be free from defects in materials and workmanship.

♦ If equipment fails because of such defects and INLINE is notified within three (3) years from the date of shipment, INLINE will, at its option, repair or replace the equipment at its plant, provided that the equipment has not been subjected to mechanical, electrical, or other abuse or modifications.

♦ Equipment that fails under conditions other than those covered will be repaired at the current price of parts and labor in effect at the time of repair. Such repairs are warranted for ninety (90) days from the day of re-shipment to the Buyer.

♦ This warranty is in lieu of all other warranties expressed or implied, including without limitation, any implied warranty or merchantability or fitness for any particular purpose, all of which are expressly disclaimed.

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