

**Lucas Control Systems  
Deeco™ Systems  
ST-C730  
10.4" SUNLIGHT READABLE  
COMPUTER  
USER MANUAL**

**Manual P/N: 15066  
Manual Revision: 1.0  
Manual Revision Date: November 1997**



**How to contact Deeco Systems for sales or technical support:**

North America and Asia/Pacific:

**LUCAS CONTROL SYSTEMS, DEECO SYSTEMS**

**31047 Genstar Road**

**Hayward, California USA 94544-7831**

**Phone: 510-471-4700**

**Applications Engineering Phone: 510-476-2551**

**FAX: 510-489-3500**

**General E-mail: sales@deeco.com**

**Technical Support CompuServe: ldtechsupport@compuserve.com**

**Internet Home Page: <http://www.deeco.com>**

**Technical Support BBS: 510-471-5402**

Baud Rate:	up to 14400 Baud
Data Bits:	8
Parity:	None
Stop Bits:	1
Flow Control:	XON/OFF or hardware
Emulation:	ANSI

Europe:

**Lucas Control Systems, Deeco Systems**

**Wertstrasse 8 D-73240**

**Wendlingen, Germany**

**Phone: 49-7024-9712-14**

**FAX: 49-7024-9712-40**

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Printed in the U.S.A.



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# Warning!!

**Grounding circuit continuity is vital for safe operation of machine. Never operate the machine with grounding conductor disconnected. See installation instructions before connecting to the supply.**

**The Computer System described in this manual uses an AC power supply capable of producing a dangerous electrical shock. Only properly trained and authorized personnel should attempt to open the enclosure of the computer.**

**CAUTION: DISCONNECT POWER BEFORE OPENING.**

**WARNING: USE PROPER ESD PROCEDURES WHEN OPENING THE ENCLOSURE AND SERVICING THE COMPUTER.**

**Static electricity introduced into the electronics is often not immediately fatal, but can cause future reliability problems - like frequent and troublesome failures.**

## 1.0 Configuration and Specifications

Lucas Control Systems, Deeco™ Systems offers a complete line of sealed and unsealed standalone computers, panel mount computers, monitors, and serial terminals. All computers and modules are available with touch systems, for a rugged and intuitive user interface. Deeco Systems has manufactured flat panel display based products for harsh and industrial applications for more than a decade.

The ST-C730 is a sunlight readable (750 cd/m<sup>2</sup> with 30:1 dimming) flat panel display based industrial computer. The system is housed in a compact, lightweight, non-sealed metal enclosure. The computer uses a 10.4" full color Active Matrix TFT (AMTFT) display.



The computer comes standard with Guided Acoustic Wave (GAW) touch input. An optional solid state disk is available.

The computer includes an integrated EMI shield. Certain configurations are already CE certified.

### Features:

- Sunlight readable with a 30:1 front panel external dimming control knob for nighttime or daytime viewing (from 750 cd/m<sup>2</sup> to 26 cd/m<sup>2</sup>).
- GAW touch system with sensitive tactile feeling and high transparency. Touch allows your finger to work like a mouse.
- Optional semiconductor disk for application programs (no hard drive is necessary).
- Quiet & Low Power 486DX4 100 MHz Processor - No fans needed to cool the system.

## 1.1 ORDERING INFORMATION

### Ordering Example: ST-C730-1022-803

#### Base System Configuration

- ST-C730

#### Upgrades and Options

##### **Semiconductor Flash IDE Disk Drive**

- 1020 4 Megabytes
- 1021 10 Megabytes
- 1022 20 Megabytes
- 1023 40 Megabytes
- 1024 80 Megabytes

##### **Software - Operating Systems**

- 803 DOS

## 1.2 SPECIFICATIONS

<b>CPU</b>	486DX4 100 MHz Processor										
<b>Memory</b>	4 MB EDO RAM, standard. Consult the factory for upgrades up to 64 MB										
<b>L1 Cache</b>	Consult the factory for L1 Cache installation, up to 512 KB										
<b>SBC Bus Architecture</b>	1 slot PC/104 bus										
<b>SBC Battery</b>	3.6V @ 600 mA lithium battery, up to 10 years										
<b>Display</b> 640 x 480 VGA	10.4" AM Color TFT LCD, Sunlight Readable, 750+ cd/m <sup>2</sup> typ., 30:1 dimming										
<b>Video Controller</b>	Chips and Technology 65XXX										
<b>External Connectors</b>	<table> <tr> <td>Serial:</td> <td>9-pin DSUB (COM2)</td> </tr> <tr> <td>Parallel:</td> <td>25-pin DSUB</td> </tr> <tr> <td>Keyboard:</td> <td>5-pin DIN</td> </tr> <tr> <td>Floppy Disk Drive:</td> <td>37-pin DSUB</td> </tr> <tr> <td>Power Connector:</td> <td>AC—standard IEC</td> </tr> </table>	Serial:	9-pin DSUB (COM2)	Parallel:	25-pin DSUB	Keyboard:	5-pin DIN	Floppy Disk Drive:	37-pin DSUB	Power Connector:	AC—standard IEC
Serial:	9-pin DSUB (COM2)										
Parallel:	25-pin DSUB										
Keyboard:	5-pin DIN										
Floppy Disk Drive:	37-pin DSUB										
Power Connector:	AC—standard IEC										
<b>COM Port</b>	Supports up to 115 Kbaud data rates										
<b>Touch Mouse</b>	GAW Touch Mouse for DOS programs										
<b>Enclosure Material</b>	Non-Sealed Aluminum										

<b>Weight</b>	11.4 lbs (5.2 kg)
<b>Dimensions</b>	10.3" H x 12.0" W x 4.9" D (262 mm x 305 mm x 124 mm)
<b>Temperature</b>	
Operating	0°C to +45°C
Non-operating	-20°C to +60°C
<b>Humidity</b>	0%-85% RH
<b>Power Input</b>	100-240 VAC input, 100 Watts
<b>MTBF (nominal) (@25°C)</b>	SBC > 80,000 hours*

\*AMTFT display backlight are considered field replaceable items and are not included in MTBF figures.

## 2.0 Installation

### 2.1 UNPACKING

The shipping configuration of the ST-C730 varies with the options ordered. Here is a typical shipping configuration:

- Touch Mouse Driver Diskette
- Solid State Disk Drive Formatting Diskette and manual (SSD Option only)
- 6 ft. (1.8 m) AC Power Cable
- This ST-C730 User Manual
- A Separate Single Board Computer Manual

Your actual shipping configuration is documented on the packing list, located on the outside of the shipping carton. Lucas Deeco customer service maintains a record of customer shipping configurations.

### 2.2 INSTALLATION

It is wise to test your new computer before performing any upgrades.

#### 2.2.1 Mounting Requirements

The ST-C730 is designed to be mounted in enclosures, racks, walls, and integrated into systems. The ST-C730 is not a sealed computer. Consult the factory for information about other products if sealing is required.

**Note:** *To avoid risk of injury, the computer must be firmly secured. Any mounting arrangement must be able to support at least five times the weight of the basic computer, and able to withstand aggressive touch inputs.*

- The mounting surface should not be a hot wall.
- The unit should be mounted for optimum visibility of the display. Typically, this is close to eye level. Avoid looking down on AMTFT displays from directly above, as the viewing angle is not as good as in other planes.
- The unit is not intended to be opened under normal operating conditions. However, the unit may need to be opened by authorized service personnel in order to perform necessary maintenance. Mount the unit so that the electronics can be serviced.

- Mount the ST-C730 against a flat surface. It is possible to crack the glass in the display if the mounting surface is not flat.

Refer to the mechanical drawing in the Appendix for mounting hole locations.

### 2.3 POWER REQUIREMENTS

Power Supply	Voltage	Max Current	Frequency	Max Watts
13248	100-240 VAC	1.3 - 0.6 A	47-63 Hz	100

Actual power dissipation will vary with the options ordered.

The computer is fused with a 2A slow blow fuse, Little Fuse # 215002 or equivalent, located next to the on/off switch.

### 2.4 CONNECTING

<b>Caution: Do Not Wire A Standard External Floppy Drive Directly to the 37 Pin DSUB Connector.</b>
---

See section 6.3 for the 37 pin DSUB floppy drive connector pin-out. The floppy drive connector requires a special floppy drive and cable. Consult the factory for more information.

Prior to applying power to the system, and connect any peripheral equipment. Once all associated equipment has been properly connected, the user is ready to apply power to the computer.

Plug the female end of the power cord into to the three prong IEC power connector located at the rear of the computer just below the I/O ports

Plug the male end of the power cord into a power outlet that conforms to the above power specifications. Once power is applied, the computer will run a series of self tests. After completing these tests the computer will open the operating system.

## **3.0 Single Board Computer Operation**

The separate Single Board Computer (SBC) user manual contains setup, and operational documentation for the SBC. The SBC is factory configured by Deeco Systems, and modifications are usually unnecessary.



## **4.0 Mass Storage**

The ST-C730 is supplied with an optional solid state disk. Refer to the accompanying Semiconductor Flash IDE Disk Drive manual for documentation.



## 5.0 GAW Touch System

The ST-C730 includes a GAW (Guided Acoustic Wave) touch screen. The hardware consists of a touch bezel and a touch controller. The touch bezel reads all touch inputs. The touch controller processes this information, then communicates with the computer over a RS-232 link, internally connected to COM1. The GAW touch system senses x axis, y axis, and z (pressure) axis input.

A software touch driver runs on the computer, which processes the RS-232 touch point data, and formats the information as if it were coming from a mouse.

Touch drivers are pre-installed at the factory and reside on the mass storage device. The touch screen is factory calibrated, and normally requires no field adjustment. Touch drivers and documentation are sent on a 3 ½" floppy.

Documentation is also available on the Internet at <http://www.carrolltouch.com>.

Technical Manuals and Diagnostics Software are located at:

<http://www.carrolltouch.com/CTgraph/library.htm#Product Data Sheets>

### **Technical Manuals:**

The **Guided Wave Diagnostics User's Guide** contains information about testing and troubleshooting the guided wave touch systems (82 pages). This manual explains the use of the GWDIAG21.exe program described below.

The **Touch System Programmer's Guide** documents the hardware and software requirements necessary for programmers. Included is information on the simple Touch Application Program Interface (TAPI) driver, the CTKERN interface for customized applications, and information on Windows dynamic link libraries (DLLs) (274 pages).

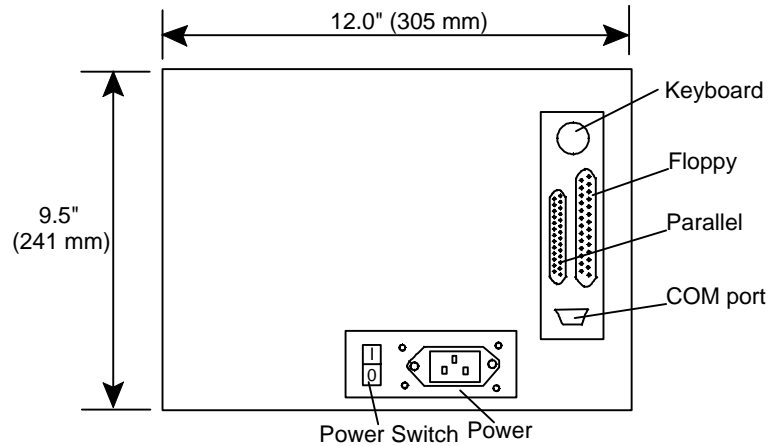
### **Diagnostics Software:**

**GWDIAG21.EXE** is a diagnostics program that includes a "Touch Coordinates" section at the main menu. "Touch Coordinated" performs a test of the touch system. This software is available at <http://www.carrolltouch.com/CTgraph/swdown.htm>. Programming examples are available at the same location.

Refer to the touchscreen literature for more information.



## 6.0 Input/Output Interface Ports



*Rear View of the ST-C730*

### 6.1 SERIAL COMMUNICATIONS PORT

The computer includes two serial ports, configured as COM1 and COM2. COM1 is internal, and used in the touch system. The default interface on the external COM2 is RS232. RS422 and RS485 are available. Refer to the SBC manual for configuration information.

The 9 pin DSUB serial connector has the standard PC pin-out:

Pin #	Signal
1	DCD
2	RX
3	TX
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

## 6.2 PARALLEL COMMUNICATIONS PORT

The ST-C730 includes a fully compatible IBM AT bi-directional printer port.

The 25 pin DSUB parallel connector has the standard PC pin-out:

Signal	Pin		Pin	Signal
STRB - Strobe	1	<input type="checkbox"/> <input type="checkbox"/>	14	-AFX - Autofeed
D0	2	<input type="checkbox"/> <input type="checkbox"/>	15	-ERR - Error
D1	3	<input type="checkbox"/> <input type="checkbox"/>	16	-INIT - Initialization
D2	4	<input type="checkbox"/> <input type="checkbox"/>	17	-SLIN - Select In
D3	5	<input type="checkbox"/> <input type="checkbox"/>	18	GND
D4	6	<input type="checkbox"/> <input type="checkbox"/>	19	GND
D5	7	<input type="checkbox"/> <input type="checkbox"/>	20	GND
D6	8	<input type="checkbox"/> <input type="checkbox"/>	21	GND
D7	9	<input type="checkbox"/> <input type="checkbox"/>	22	GND
-ACK - Acknowledge	10	<input type="checkbox"/> <input type="checkbox"/>	23	GND
BUSY - Busy	11	<input type="checkbox"/> <input type="checkbox"/>	24	GND
PE - Paper Empty	12	<input type="checkbox"/> <input type="checkbox"/>	25	GND
SLCT - Select	13	<input type="checkbox"/>		

### 6.3 EXTERNAL FLOPPY DRIVE CONNECTOR

The computer system has a 37 pin port for an external floppy drive option. The pin-out is as follows:

Signal	37- Pin DSUB		37- Pin DSUB	Signal
GND	1	□ □	20	RPM
GND	2	□ □	21	NC
GND	3	□ □	22	RATE0
GND	4	□ □	23	INDEX
GND	5	□ □	24	MTR0
GND	6	□ □	25	DRV1
GND	7	□ □	26	DRV0
GND	8	□ □	27	MTR1
GND	9	□ □	28	DIR
GND	10	□ □	29	STEP
GND	11	□ □	30	WDATA
GND	12	□ □	31	WGATE
GND	13	□ □	32	TRK0
GND	14	□ □	33	WRPRT
GND	15	□ □	34	RDATA
GND	16	□ □	35	+5 V DC
GND	17	□ □	36	+5 V DC
NC	18	□ □	37	+5 V DC
NC	19	□		

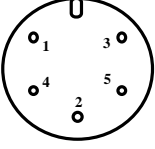
**Note that the connector is NOT designed to be wired directly to a 34 pin floppy drive connector.** Pins 35, 36, and 37 are +5V outputs. **Consult the factory for cabling and floppy drive options.**

Caution: Pins 35, 36, 37 Are +5 V DC Outputs.  
Do Not Supply +5 V DC to these Outputs!  
Damage to the ST-C730 Will Result!

After attaching an external floppy drive inform the computer's BIOS of the floppy drive's existence. See the accompanying Single Board Computer manual for BIOS Setup details.

## 6.4 KEYBOARD PORT

The computer supports a standard AT style 101 Keyboard.

<p><b>Keyboard Connector</b>  (Rear View)</p>	<table border="1"> <thead> <tr> <th><b>Pin</b></th> <th><b>Signal</b></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>KeyClk</td> </tr> <tr> <td>2</td> <td>KeyData</td> </tr> <tr> <td>3</td> <td>NC</td> </tr> <tr> <td>4</td> <td>GND</td> </tr> <tr> <td>5</td> <td>VCC</td> </tr> </tbody> </table>	<b>Pin</b>	<b>Signal</b>	1	KeyClk	2	KeyData	3	NC	4	GND	5	VCC	
<b>Pin</b>	<b>Signal</b>													
1	KeyClk													
2	KeyData													
3	NC													
4	GND													
5	VCC													

## **7.0 General Maintenance**

The ST-C730 computer is a ruggedized system, so no special maintenance procedures are required.

Strong solvents should not be used for cleaning purposes. A soft, lint-free cloth, along with a non-abrasive, general purpose cleaner can be used to clean the touch screen.



## 8.0 Troubleshooting and Repair

We believe it is most economical to use the factory's repair service, but we do recognize some customer may prefer to attempt field repairs. These are the basic requirements for field repair:

- 1) A qualified and experienced electronic technician. People without the proper training are likely to make a problem worse!
- 2) An ESD controlled work area. Static electricity introduced into the electronics is often not immediately fatal, but can cause future reliability problems.
- 3) Access to replacement parts.
- 4) A method of driving the computer, monitor, or terminal during diagnostics and repair. Can the same fixture be used for an extended time to assure the repair is complete?

### **Observe Static Precautions Whenever Opening the ST-C730 !**

ESD damage is not often immediately fatal, but can result in unreliable operation and troublesome repeated failures later in the life of the computer.

### **Disconnect Power Before Servicing the ST-C730!**

#### **Fuse Replacement:**

The computer is fused with a 2A slow blow fuse, Little Fuse # 215002 or Wickman 19181 2 AMP or equivalent, located near the on/off switch.

There is a fuse on the power supply. It can be removed and checked with an ohmmeter. Replace it only with the exact type, to avoid a fire hazard.

Oftentimes unreliable operation results if replacement fuse values are not matched exactly. If the fuse is a slow blow type, replace only with a slow blow type fuse. If the fuse is a fast blow type, replace only with a fast blow type fuse, etc.

#### **BIOS System:**

If the BIOS system is incorrectly configured, the computer may not operate. Refer to the separate SBC manual for BIOS configuration information.

**Cabling and EMI:**

If you are experiencing erratic and unreliable operation, consider whether external cables could be picking up electrical noise. If possible, use a shorter external cable as a temporary diagnostic tool. Or, perhaps a shielded cable will help.

Consider routing cables away from sources of electrical noise. Although for mechanical reasons it is tempting to bundle cables together in long parallel runs, this will cause cross-talk between the cables. If you are experiencing glitches, lay out your wiring harness so cables cross at right angles, and avoid parallel runs.

**Grounding:**

Ground noise can be a troublesome source of unreliable operation in some systems. Pay attention to grounding your systems as well as you can! Usually a star ground topology is preferred - where all the grounds in a system come together at a common point.

The differential mode on an oscilloscope will show ground noise between different parts of the system, and aid in diagnostics.

**Virus Detection:**

Erratic and troublesome failures can be caused by a virus infection. Run a virus detection software program if you are having problems. It is essential that virus detection software be current to be effective.

**Connectors:**

If a breakdown occurs after long service in a corrosive environment, it is sometimes worthwhile to check the connectors in the system. Simply removing and re-seating the connectors is sometimes effective. Use extreme care to assure all connectors are replaced exactly as originally installed. More harm comes from misplaced connectors than most other failures!

**Display Dimming:**

The ST-C730 does have a dimming knob located on the front of the enclosure.

**Contacting the Factory:**

Contact information is located inside the cover, at the front of this manual. Also, read the Limited Warranty located near the end of this manual for shipping information.

Lucas Deeco maintains a complete repair facility, stocked with all the replacement parts necessary to fully repair failed products. Special testing and burn-in equipment assure repaired units are fully functional before they are returned to customers.

In most circumstances customers prefer to return failed units to the factory for service.

It is essential customers contact the factory before returning any unit, and obtain a RMA (return unit authorization) number. Freight to the factory is prepaid by the customer. Freight return to the customer is paid by Deeco Systems. **Ship the product in its original packaging or equivalent to prevent transit damage!**

## Repair Information Request

RMA # \_\_\_\_\_ Model # \_\_\_\_\_ Serial # \_\_\_\_\_ Date \_\_\_\_\_

- 1) When did you discover the problem, and how was the problem found?
  
- 2) How long was the unit in service before the failure occurred?
  
- 3) What failure indications are visible on the display?
  
- 4) Are there any mechanical problems associated with the failure?
  
- 5) Has the unit received any upgrades since the original date of manufacture?
  
- 6) Who should we contact if we have technical questions during the repair cycle?

Name: \_\_\_\_\_

Telephone: \_\_\_\_\_

*Primary Customer Contact:* Lois Powers  
510-476-2526 (Direct Telephone)  
510-471-4700 (Factory Telephone)  
510-489-3500 (Fax)  
powersl@lihaywa1.li.co.uk

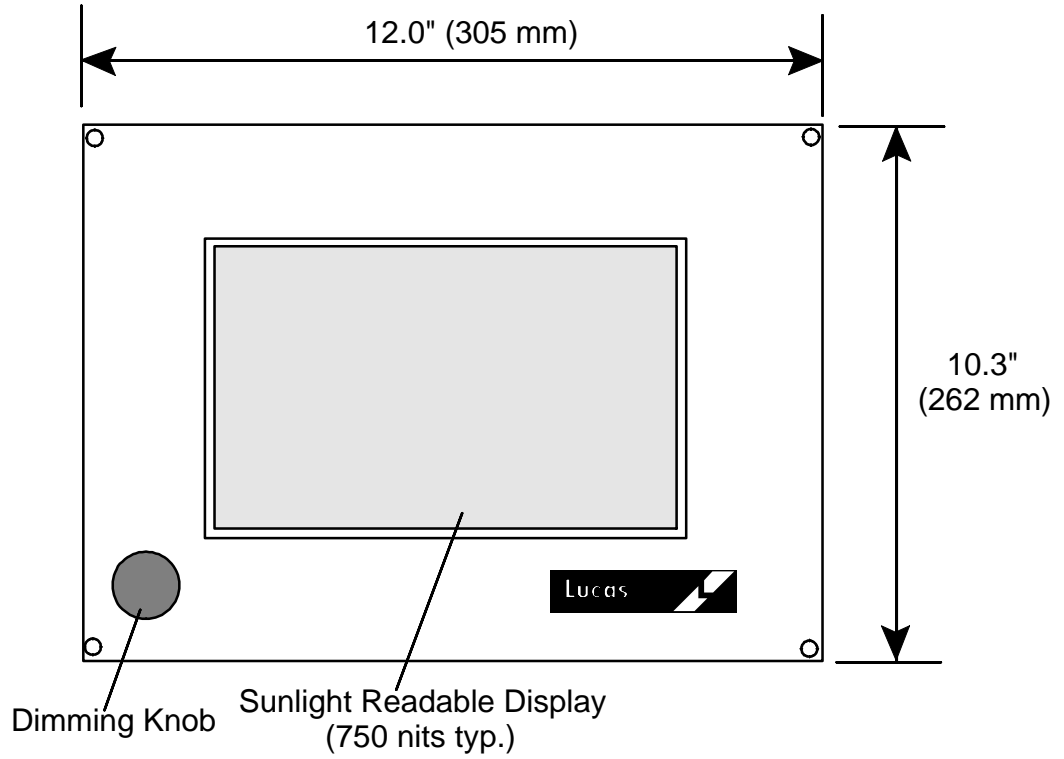
Pin-pointing failures to the Deeco component often seems obvious, yet "No-Problem-Found" is one of our largest failure categories. In some cases an Application Engineer may be able to suggest field tests that could shorten (or even eliminate) the repair cycle. Application Engineering Hotline: 510-476-2551. The email address is ldtechsupport@compuserve.com.

It is now possible for customers to send "Not to Exceed" purchase orders with out-of-warranty repairs. Products are repaired more quickly than otherwise possible, because the waiting period for a purchase order is eliminated.

**Please Include a Copy of this Form With the Returned Unit**

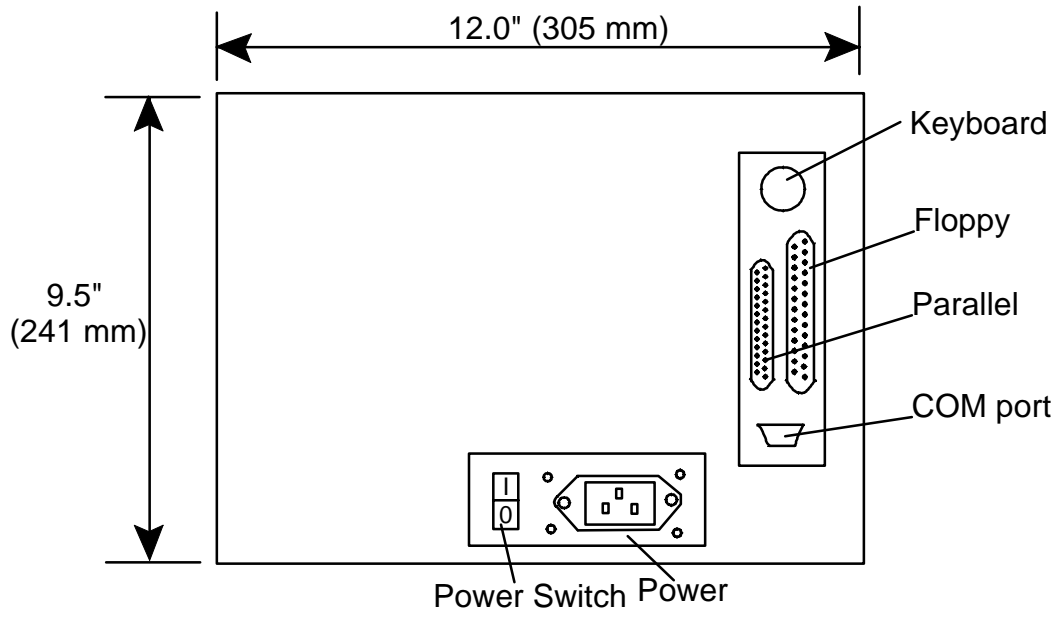
## Appendix A: Mechanical Drawings

### ST-C730 Computer Front View



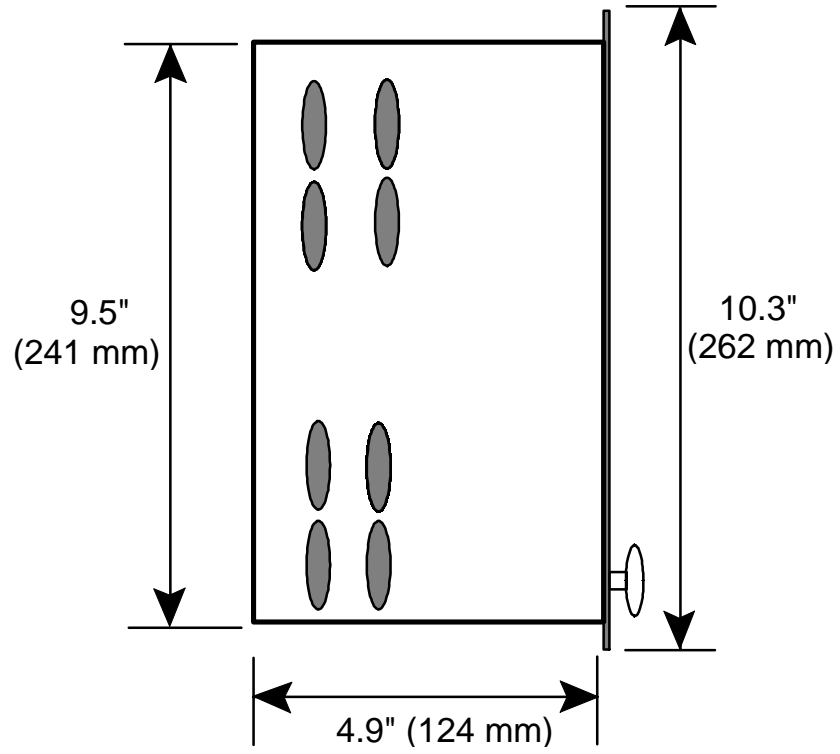
Drawing not to scale -- Dimensions are in inches (mm).

## ST-C730 Computer Rear View



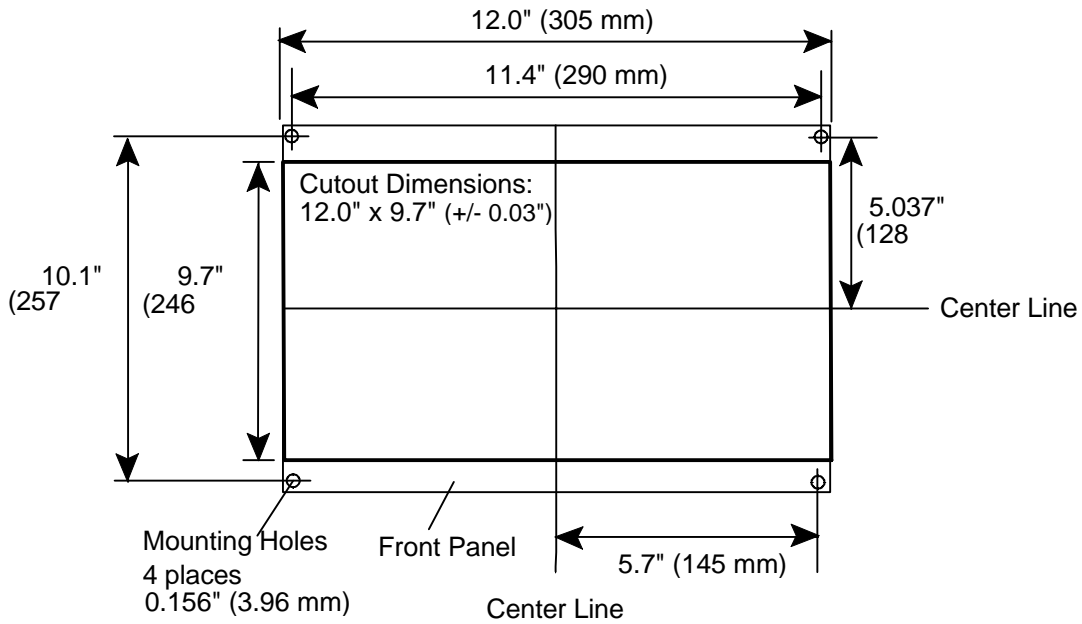
Drawing not to scale -- Dimensions are in inches (mm).

## ST-C730 Computer Side View



Drawing not to scale -- Dimensions are in inches (mm).

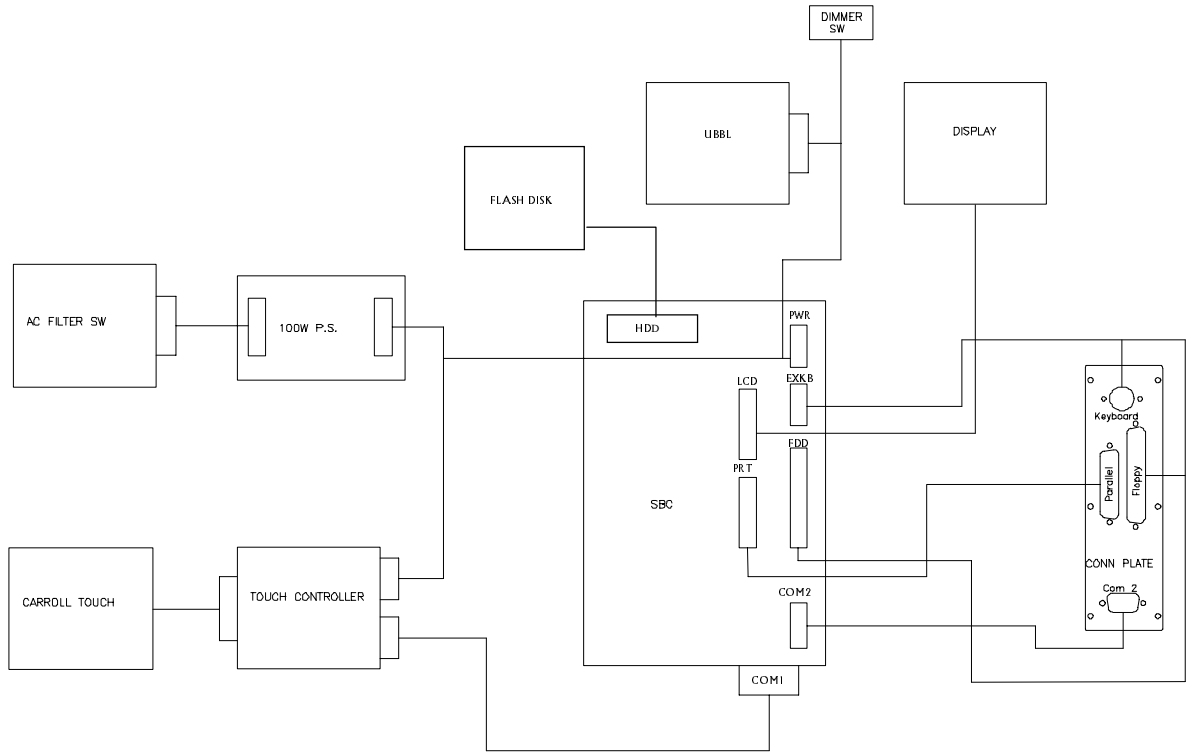
## ST-C730 Panel Mount Cutout



**Note:** Use 07 milled edge screws with retainers (4 places). Size = M2.5 x 11.3. ELMA #63-157 or ELMA #63-443.

**Drawing not to scale -- Dimensions are in inches (mm).**

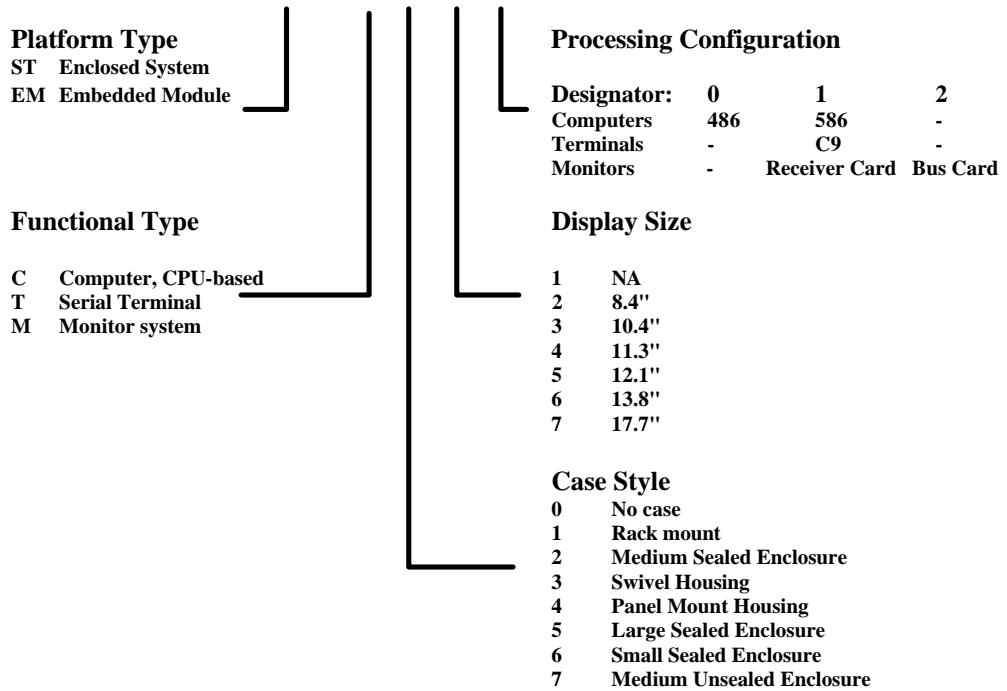
## Appendix B: Internal Cabling Diagrams





## Appendix C: Product Naming Convention

ST - C 4 6 1



### Examples

ST-C461      Sealed Computer, Medium case, 13.8" display, Pentium SBC  
EM-C031      Embedded computer, 10.4" display, Pentium SBC

## Limited Warranty

Lucas Control Systems, Deeco Systems warrants this product against defects in materials and workmanship for a period of one year from the date of original shipment from the factory.

During this warranty period, Lucas Control Systems will, at no cost to the buyer, promptly repair or replace defective equipment returned to the factory, or other authorized warranty repair center, transportation charges pre-paid by the buyer, and will return such equipment, transportation charges prepaid. Lucas Control Systems 's sole obligation shall be, at its option, to repair or replace any goods which have been determined to be defective by Lucas Control System.

Equipment returned to the factory must be accompanied by the following information:

- Returned Material Authorization (RMA) number, obtained from Lucas Control Systems;
- Reason for return, with a comprehensive description of the malfunction;
- The name and telephone number of the person to contact in the event of questions or problems; and,
- Shipping instructions

This warranty shall not apply to damage resulting from improper handling, accident, negligence, loss or damage in transit, or abuse (such as applying the wrong polarity or voltage power). This warranty shall be voided should the buyer attempt any repairs or alterations without prior written permission of Lucas Control Systems.

Lucas Control Systems makes no other warranty, either expressed or implied, and disclaims any warranty or merchantability or fitness for a particular purpose. Any action by buyer for any alleged breach of this warranty shall be brought to the attention of Lucas Control Systems by the buyer within the warranty period.

Repairs and/or replacement under the terms of this warranty SHALL NOT EXTEND THE WARRANTY LIFE OF THE ORIGINAL EQUIPMENT SUPPLIED.

**LIMITATIONS OF LIABILITY**

THE BUYER AND LUCAS CONTROL SYSTEMS AGREE THAT THE SOLE AND EXCLUSIVE REMEDIES FOR BREACH OF ANY WARRANTY SHALL BE REPAIR OR REPLACEMENT OF DEFECTIVE PARTS ACCORDING TO THE TERMS DESCRIBED ABOVE. LUCAS CONTROL SYSTEMS SHALL NOT BE LIABLE FOR CONTINGENT OR CONSEQUENTIAL DAMAGES TO PERSONS OR PROPERTY, AND LUCAS CONTROL SYSTEMS PRODUCTS' SOLE LIABILITY IS AS SET FORTH ABOVE. THIS STATEMENT OF WARRANTY AND LIMITATION OF LIABILITY IS A COMPLETE AND EXCLUSIVE STATEMENT OF ALL WARRANTY AND LIABILITY REPRESENTATIONS OF LUCAS CONTROL SYSTEMS.

IT MAY NOT BE VARIED, SUPPLEMENTED, QUALIFIED OR INTERPRETED BY ANY PRIOR DEALINGS BETWEEN THE PARTIES OR BY ANY USAGE OF THE TRADE OR UPON THE FACE OR REVERSE OF ANY FORM TO WHICH THIS IS ATTACHED OR PART OF, NOR MAY IT BE MODIFIED BY ANY AGENT, EMPLOYEE, OR REPRESENTATIVE OF LUCAS CONTROL SYSTEMS.



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