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GFVT03-CAMMO
USAF/CACI Sonic Digitizer User Manual

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1 Revision Control

Version History:

Version	Issued	Author	Changes	Sections
1.0	21-Sep-20	Mike Clery Thruput	Initial Version	

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2 Acronyms

CAMMO	Consolidated Air Force Satellite Control Network Modifications, Maintenance and Operations
ASTRO	Automated Scheduling Tools for Range Operations
LCD	Liquid Crystal Display
CRT	Cathode Ray Tube
ASW	ASTRO Scheduling Workstation
PDU	Power Distribution Unit
FRU	Field Replaceable Unit

2.1 Reference Documents

GFVT03-TS-EA Sony DDM Monitor Replacement Installation Instructions DN 2036-003 V1.1

GF VT 03 HHC User Manual DN 1440-0004 V1.3

3 Brief Description

The GFVT03-CAMMO, USAF Space Command upgrade program, is to replace the Sony DDM2800-CU and its associated GP9W sonic digitizer on the ASTRO Scheduling Workstation (ASW).

The Sony DDM2800-CU CRT display has already been replaced by the Thruput GFVT03-BA LCD monitor. Under this contract the GFVT03-BA is to be upgraded to a GFVT03-TS. This adds a touch screen to current GFVT03-BA monitor.

The GFVT03-TS has a touchscreen controller, GFVT03-TS-CNT, which provides a RS232 touch solution that will operate over the surface area of the 2048x2048 GFVT03-CAMMO monitor. The controller is software compliant with the MIDAS-GP9-CNT. The GVT03-TS-CNT will be placed, and powered, within the GFVT03-TS housing.

To make the GFVT03-TS compliant with the ASTRO Scheduling Workstation, the serial output of the touchscreen controller has been converted into the existing GP9W digitizer protocol. This is done by the MIDAS-GP9-CNT. The MIDAS-GP9-CNT outputs GP9 RS232 control data via a DB9 connector to the ASW.

In addition to this, there is a 31-button keypad, physically outside the area of the touchscreen, that emulates the Command button selection. This is achieved by the placement of a keypad, the MIDAS-GP9-TP40, placed beneath the main monitor on the console desktop. The output of the MIDAS-GP9-TP40 is connected to the MIDAS-GP9-CNT by a RS232 serial interface and cable. The MIDAS-GP9-CNT then converts the key actions into sonic digitizer Command positions.

The GFVT03-TS-EA display has a GFVT03-EA-HHC, handheld controller, to each position. This allow fast and easy alignment of the monitor.

The GFVT03-CAMMO is powered by two power supplies. The GFVT03-EA-PSU is 150W 12V power supply that powers the GFVT03-TS-EA display. There is also a 15W 5V power MIDAS-GP9-PSU supply to power the MIDAS-GP9-CNT controller, and through this via the RS232 connections, also powers the GFVT03-TS-CNT touchscreen controller and MIDAS-GP9-TP40 keypad. The two power supplies will connect to a 110/240v 50/60Hz power source through a 2 port PDU, the GFVT03-EA-PDU.

All the constituent parts that make up the GFVT03-CAMMO are housed within the monitor except for the MIDAS-GP9-TP40 keypad.

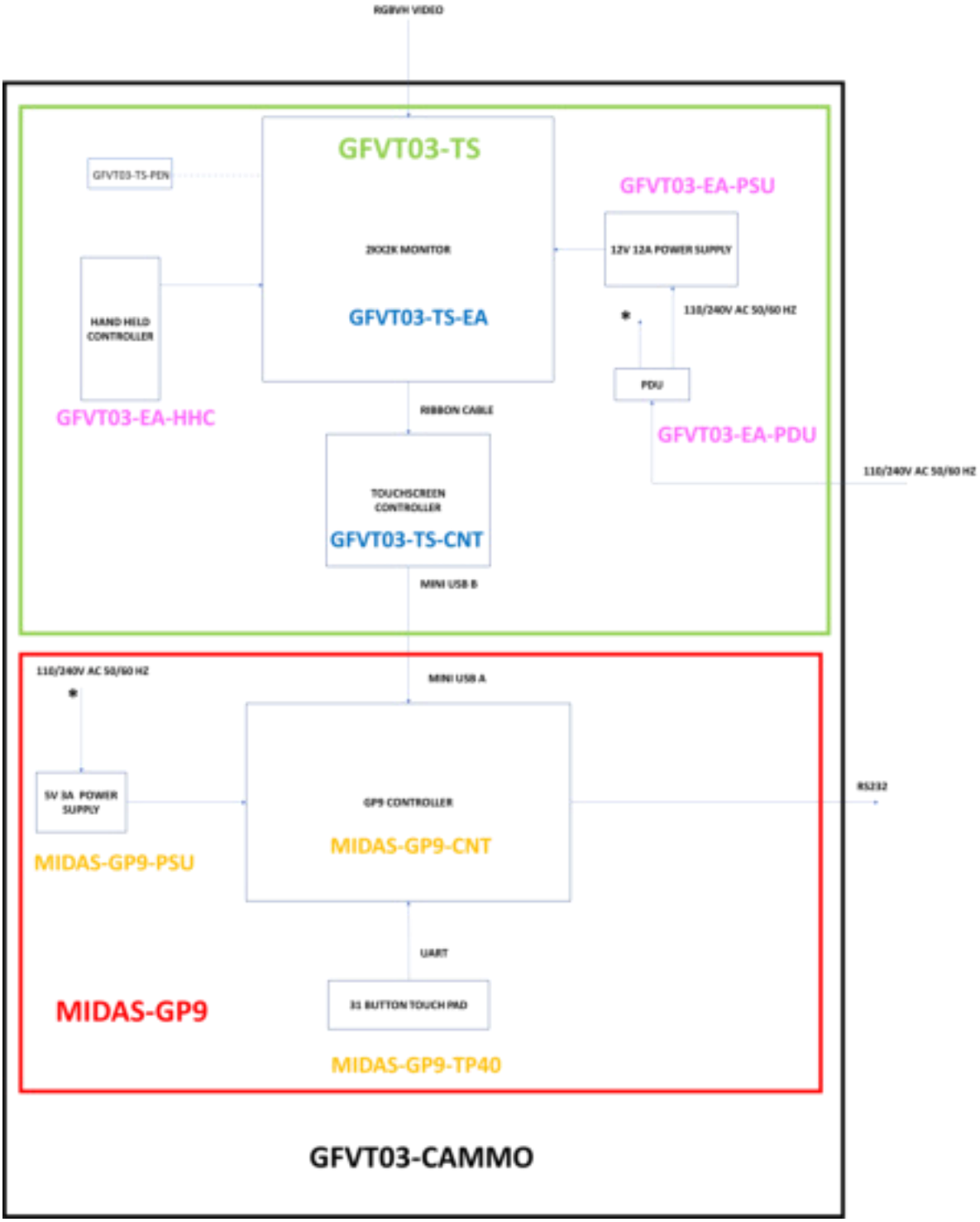


Figure 1 GFVT03-CAMMO Block Diagram

4 GFVT03-CAMMO Detailed Description

The scope of work for the design and manufacture of the GFVT03-CAMMO can be broken down into its constituent parts. The list of parts and their dependency as shown below.

Figure 2 GFVT03-GAMMO Parts Breakdown

The GFVT03-CAMMO is made up of two major sub-assemblies, the GFVT03-TS touchscreen display and the MIDAS-GP9, digitizer replacement.

4.1 GFVT03-TS Monitor with Touchscreen

The GFVT03-TS is made up of four sub-assemblies, the GFVT03-TS-EA display with touchscreen, GFVT03-TS-CNT touchscreen controller, GFVT03-EA-HHC handheld controller and GFVT03-EA-PSU monitor power supply.

The GFVT03-EA is an enhanced GFVT03-BA, which has a 1100:1 contrast ratio and a 225 NIT brightness. This luminance is measured with the touchscreen fitted.

The touchscreen is internally bonded to the monitor and is calibrated in the factory.

4.1.1 GFVT03-TS-EA Display

The GFVT03-TS-EA is Thruput GFVT03-EA monitor with a capacitive touchscreen added. The touchscreen fits between the bezel and the screen face using 1.6mm bonding tape. This is a factory fitted option.

The touchscreen has a touch resolution of 4096x4096, which on a 20”x20” LCD panel gives a sensitivity of .005”. This is the same sensitivity as original GP9W digitizer it replaces.

Twenty of the GFVT03-BA monitors have been returned to Thruput for upgrading to the -EA variant. Modification to these twenty monitors are:

1. Changing the LCD panel from the GFVT03-BA to the GFVT03-TS-EA
2. Modify the LCD casing to allow the exit of the touchscreen ribbon cable

3. Modify the monitor stand top section to accommodate the housing of the GFVT03-TS-CNT
4. Modify the monitor stand bottom section to accommodate the housing of the MIDAS-GP9-CNT controller
5. Modify the monitor stand bottom section to accommodate the housing of the GFVT03-PDU
6. Add the provision of the GFVT03-EA-HHC
7. Design 20”x20” 4K resolution touchscreen
8. Manufacture 23 touchscreens
9. Add removable monitor stands for desktop applications

In addition to this, three more monitors will have to made from new. They will have the same specification and parts as the modified monitors.

10. Manufacture 3 new GFVT03-TS-EA monitors

4.1.1.1 GFVT03-EA-HHC Handheld Controller

The GFVT03-EA-HHC is to be fitted to every monitor to be manufactured. This was an optional extra on the original GFVT03-BA monitor previously shipped. The handheld controller allows for the quick setting up of the monitor in the field. It will be attached to the left-hand vertical inside pillar. It will be permanently connected to the RS232 input of the monitor by a 2M DB9F-DB9M cable.

The firmware of the GFVT03-EA-HHC will need modification to include the setup requirements of the touchscreen monitor.

4.1.1.2 GFVT03-EA-PSU

The GFVT03-EA-PSU is the main 12V DC power supply to the monitor. The twenty returned power supplies will be re-used on the new monitors and three new units will be manufactured for the new build monitors.

The power supplies are to be seated on the monitor stand bottom section.

In the GFVT03-TS monitors, the power supplies are to connect to AC power supply via the new GFVT03-EA-PDU. Therefore, they will require a 0.5M IEC 13 10A extension cable.

4.1.1.3 GFVT03-EA-PDU Power Distribution Unit

The AC power for the GFVT03-CAMMO enters by the existing IEC 13 10A power cable that supplies the GP9 digitizer. The unit is now powers not only the 12v DC 16A power supply for the GFVT03-TS-EA monitor but to also supplies mains voltage for the 5v DC 3A power supply that will power the MIDAS-GP9-CNT and the GFVT-TS-CNT touchscreen controller. This will be achieved by adding a 3-way IEC 13 10A power distribution unit, the GFVT03-EA-PDU. This unit will have a 110V/240V 50/60Hz single IEC 13 10A male socket input and triple IEC 13 10A female output sockets. The input will be switched and fused. The switch will be illuminated when switched on and the fuse holder will be fitted with a 5A fuse.

4.1.2 GFVT03-TS-CNT Touchscreen Controller

All supplied GFVT03-CAMMO monitors will be fitted with GFVT03-TS-CNT touchscreen controllers.

The GFVT03-TS-CNT consists of a housing assembly that attaches by four screw mountings to the top of the monitor casing. It takes the flat ribbon cable from the touchscreen and this will be attached to the internal circuit board of the unit. The circuit board will house the electronics to convert the touchscreen output into a RS232 format. The output of the GFVT03-TS-CNT will be a DB9 female connection. There is a panel mounted cable assembly that will connect to the controller printed circuit board. This connection will output the touchscreen information to the MIDAS-GP9-CNT, where it is translated in to the GP9 digitizer format.

The RS232 connection to the GFVT03-TS-CNT supplies the 5v DC to power the controller and touchscreen sensors.

4.2 MIDAS-GP9 Digitizer Emulator Sub-assembly

The MIDAS-GP9 is the collection of hardware and firmware that enables the GFVT03-TS, touchscreen monitor, to emulate the GP9W sonic digitizer. The emulator firmware has been written so that the new hardware is transparent to the ASTRO Scheduling Workstation during operation.

As well as having to replace the GP9 digitizer outputs from the screen area, it also has to emulate a 40-position keypad located under the screen. This is the MIDAS-GP9-TP40

The MIDAS-GP9 consists of the main controller, the MIDAS-GP9-CNT.

The MIDAS-GP9-CNT receives input data from both the GFVT03-TS-CNT touchscreen controller and the MIDAS-GP9-TP keypad. It processes this data send the resultant GP9 commands to the ASW on the MIDAS-GP9-CNT RS232 COM3 port.

To power the MIDAS-GP9-CNT there is 5v DC 3A power supply, the MIDAS-GP9-PSU.

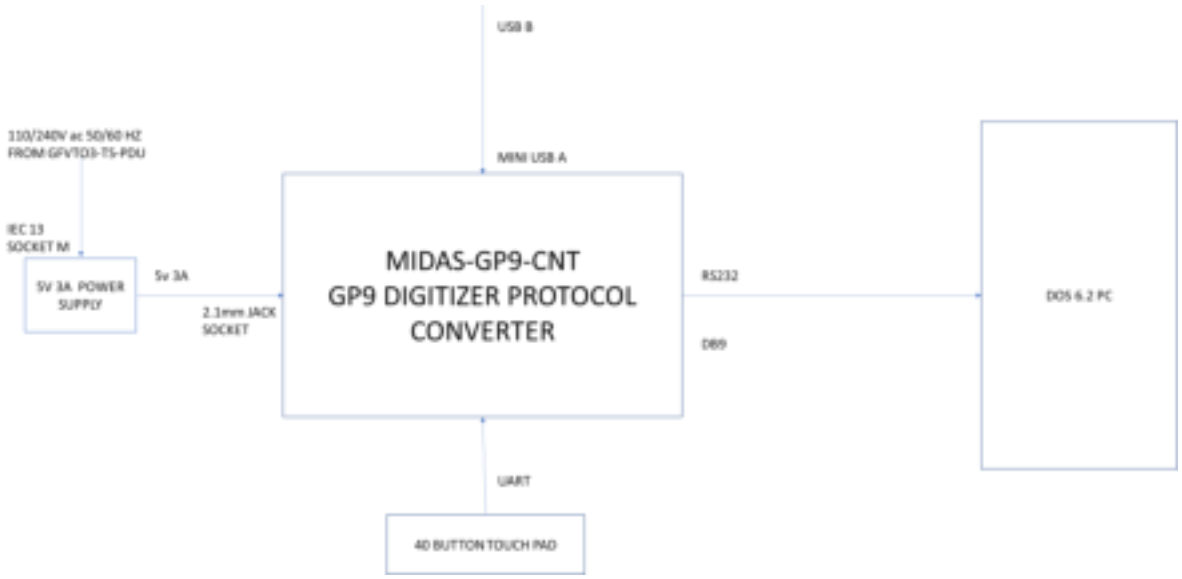


Figure 3 MIDAS-GP9 Block Diagram

4.2.1 MIDAS-GP9-CNT Sonic Digitizer Emulator

The MIDAS-GP9-CNT is a microprocessor based printed circuit board protocol converter. It function is to translate inputs from the touchscreen and touchpad and send them in GP9 digitizer format to the host system.

4.2.2 MIDAS-GP9-TP40 Position Keypad

The MIDAS-GP9-TP40 is to provide the touch inputs that emulate the GP9 sonic digitizer paper Command selection menu that is currently placed under the main 30” display monitor.

The current paper Command selection menu has been replaced with a stand-alone keypad, to be positioned behind the current Operator’s QWERTY keyboard.

The MIDAS-GP9-TP40 will require a small PCB circuit to decode the switch functions into a serial bus to be sent to the MIDAS-GP9-CNT controller. This is contained within the keypad itself.

The MIDAS-GP9-TP40 keypad has a 2m lead from the right hand side of the unit and terminates in a 9 pin female D type connector. This connects to rear of the GFVT03-CAMMO on the rear face of the MIDAS-GP9-CNT housing, marked

5 MIDAS-GP9-CNT Process Controller Operation

The MIDAS-GP9-CNT is a micro-processor that will takes in the positional inputs from the GFVT03-TS-CNT touchscreen controller and RS232 keyboard characters and maps them into Calcomp GTCO GP9-XL protocol to be read by the ASTRO workstation.

The MIDAS-GP9-CNT has a 10/100 network controller interface. This TELNET interface will be used for future diagnostics, monitor control and logging touchscreen and touchpad activities.

The MIDAS-GP9-CNT has a mini-USB port for firmware upgrades.

The MIDAS-GP9-CNT will has 4 RS232 ports. Port 1 communicates with the GFVT03-TS-CNT touchscreen controller. Port 2 communicates with the GFVT03-TS-EA monitor. Port 3 interfaces to the ASTRO workstation. Port 4 interfaces to the MIDAS-GP9-TP32 touchpad.

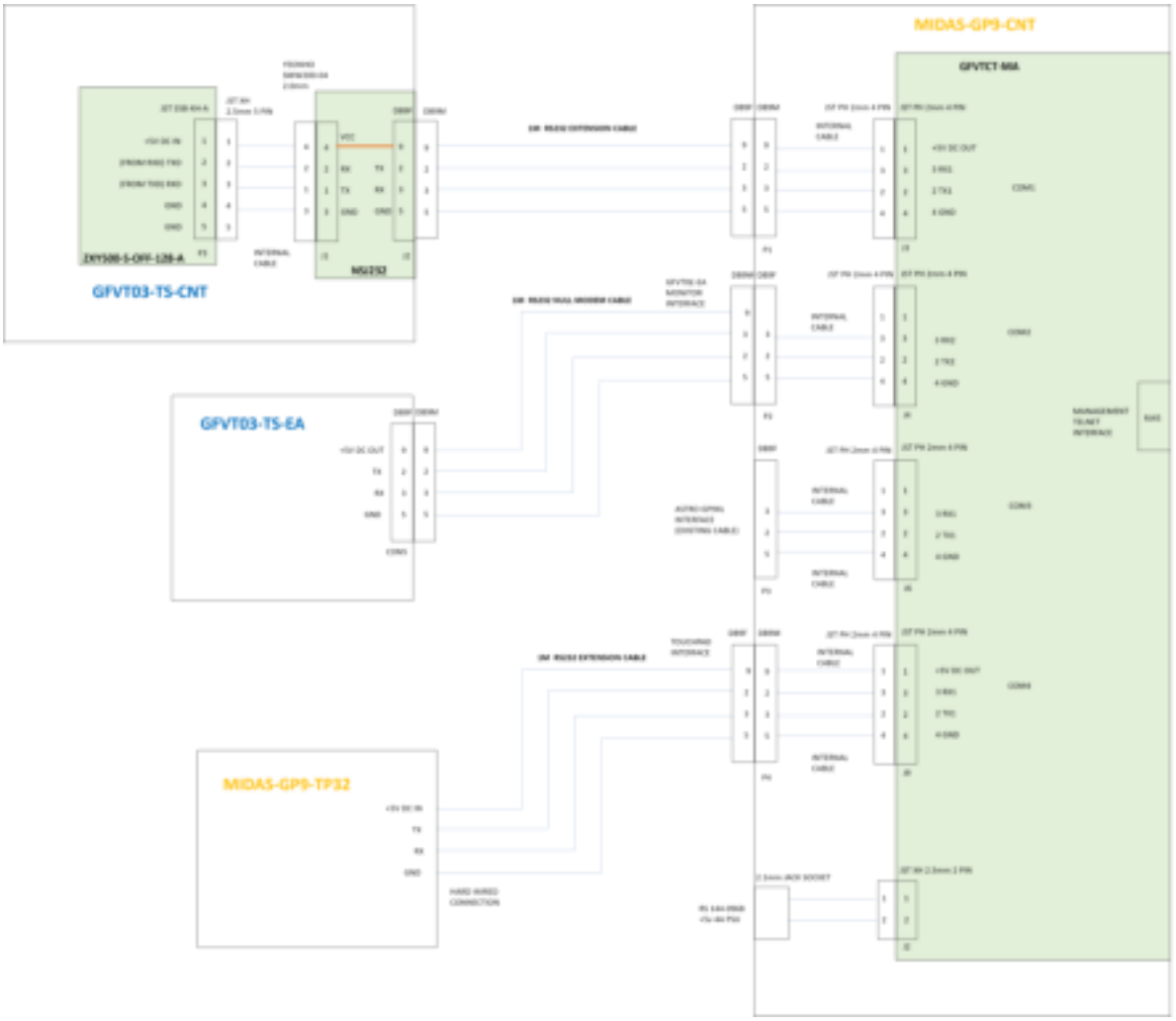


Figure 4 MIDAS-GP9-CNT Connection Diagram

6 Installation

The GFVT03-CAMMO is self-contained with in the monitor chassis. It is factory configured and only requires fitting into the console and connecting to the system.

6.1 Desktop Operation

The monitor is supplied with a temporary base plate that enables the monitor to stand on a flat surface without toppling. This will allow the monitor to be tested before fitting into the console. After testing this base plate should be removed but kept for future use.

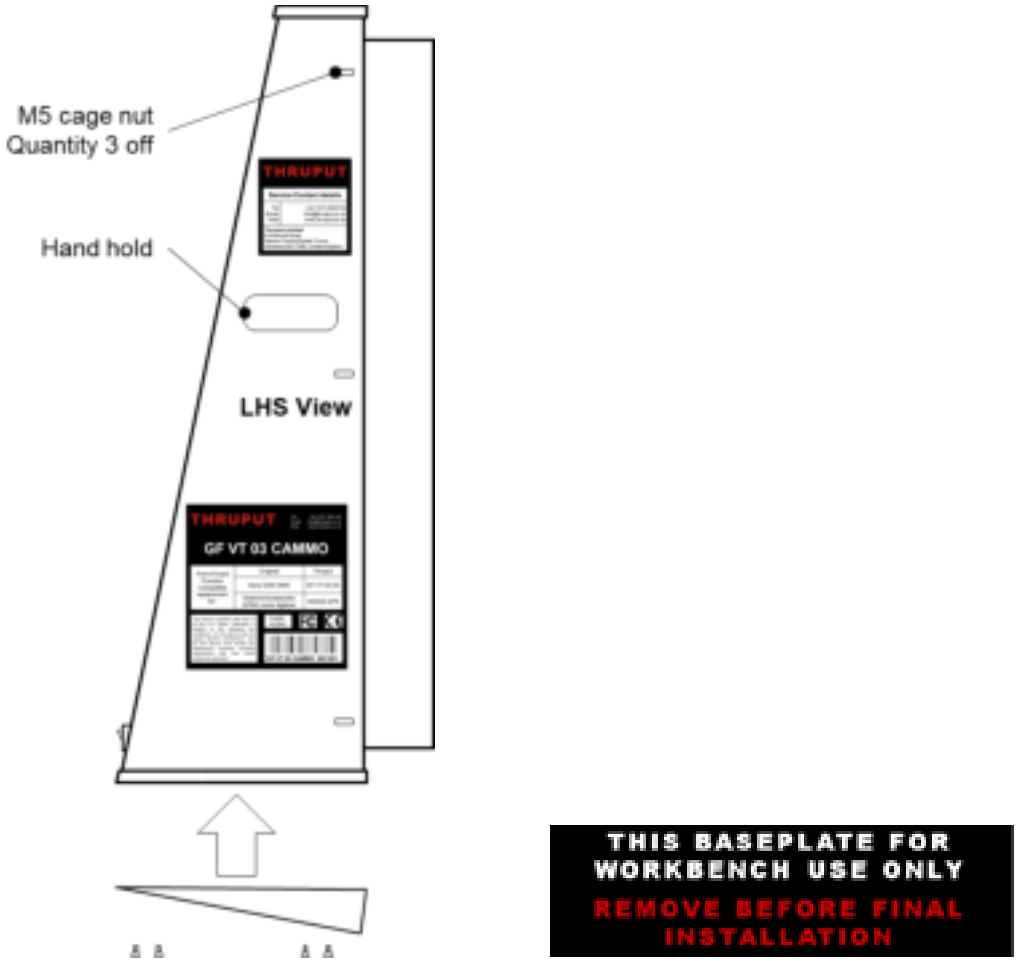


Figure 5 GFVT03-CAMMO Side Elevation Showing Base Plate

6.2 Console fitment

NB The GFVT03-CAMMO will topple with the base plate removed.

The GFVT03-CAMM has been designed to mount into a console that has currently housed a Sony DDM2800 CRT.

It has mounting connections on the bottom, sides, and the top of the monitor chassis.

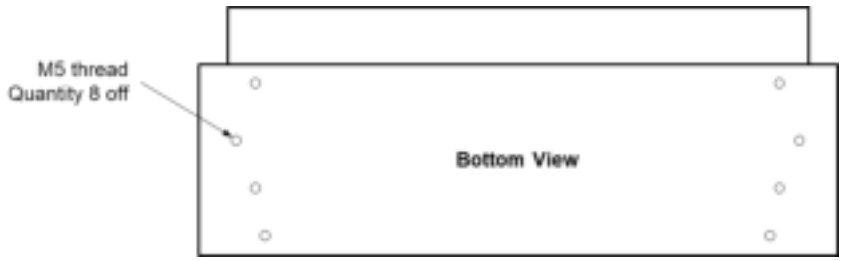


Figure 6 Bottom Mounting Points

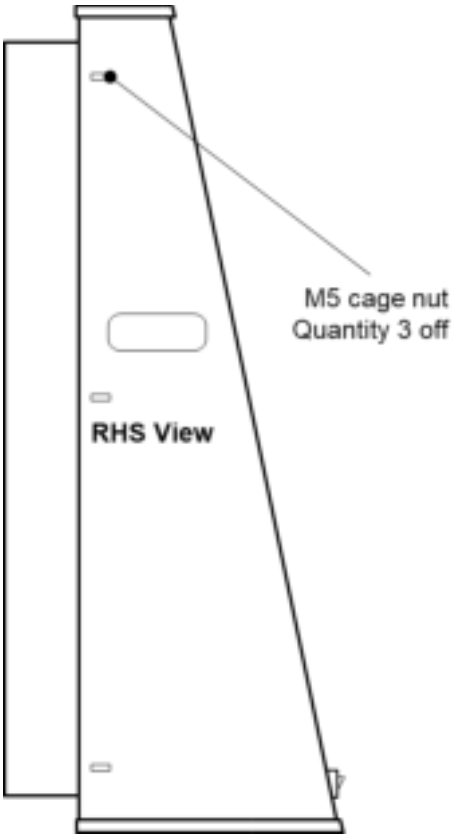


Figure 7 Side Mounting Points

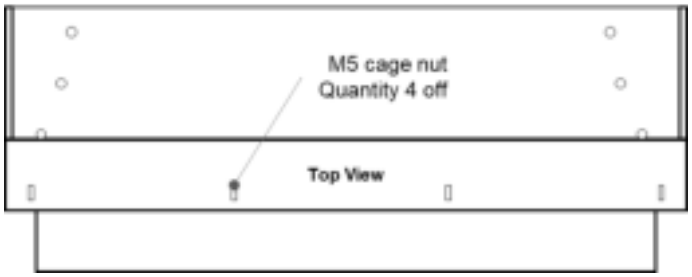


Figure 8 Top Mounting Points

6.3 System Connection

6.3.1 Power Connection

At the rear of the GFVT03-CAMMO is an IEC 14 power connector with an illuminated power switch. The existing power cable that went to the Sonny DDM2800 CRT monitor is used to power up the GFVT03-CAMMO.

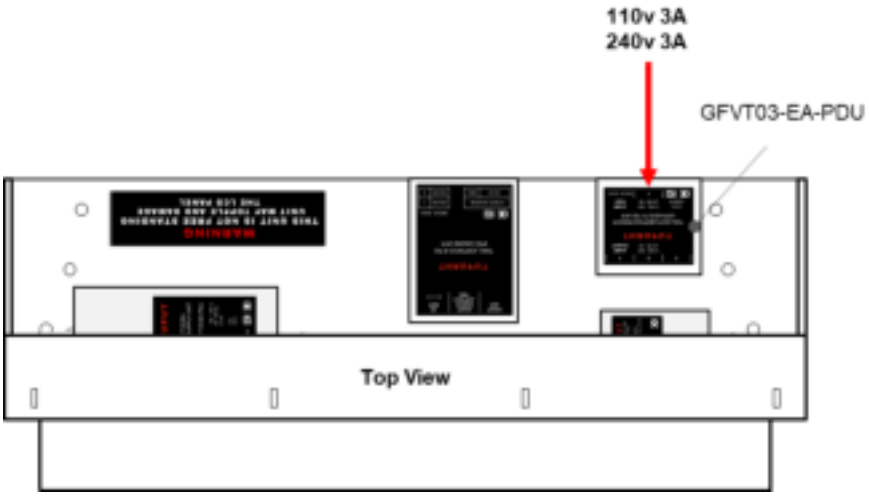


Figure 9 IEC Power Input (Top View)

The GFVT03-CAMMO is fitted with a 5A Slow Blow fuse for use at 110v. If the monitor is to be used at 240V then the fuse should be reduced to 3A Slow Blow.

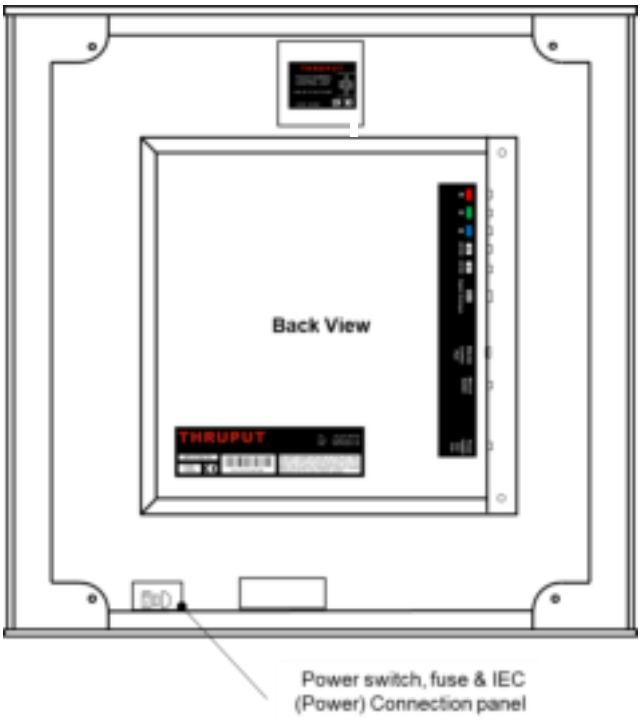


Figure 10 IEC Power Input (Rear)

6.3.2 MIDAS-GP9-TP40 Keypad Connection

The MIDAS-GP9-TP40 connects to the lower 9-way Male connector on the MIDAS-GP9-CNT. The keypad cable should be threaded through console right hand entry before connection.

Figure 11 MIDAS-GP9-TP40 Keypad

The power for the keypad is supplied from the connection to the MIDAS-GP9-CNT.

With monitor power on the left-hand GREEN LED should illuminate.

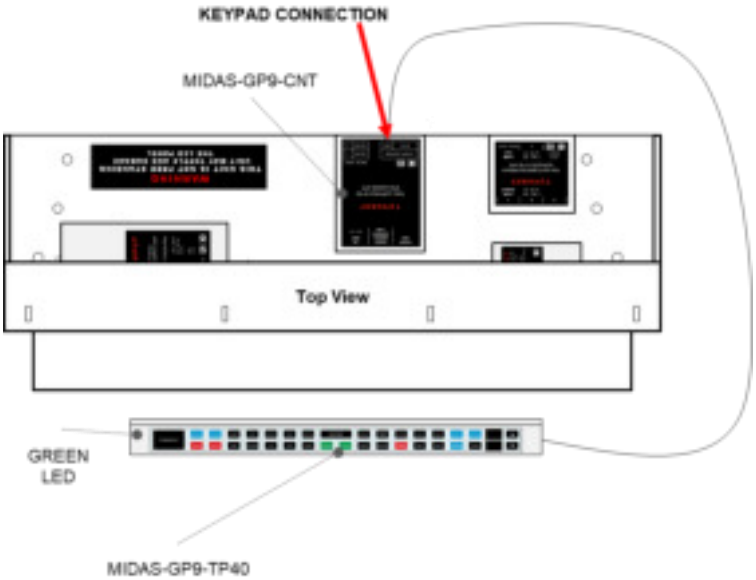


Figure 12 MIDAS-GP9-TP40 Connection (Top)

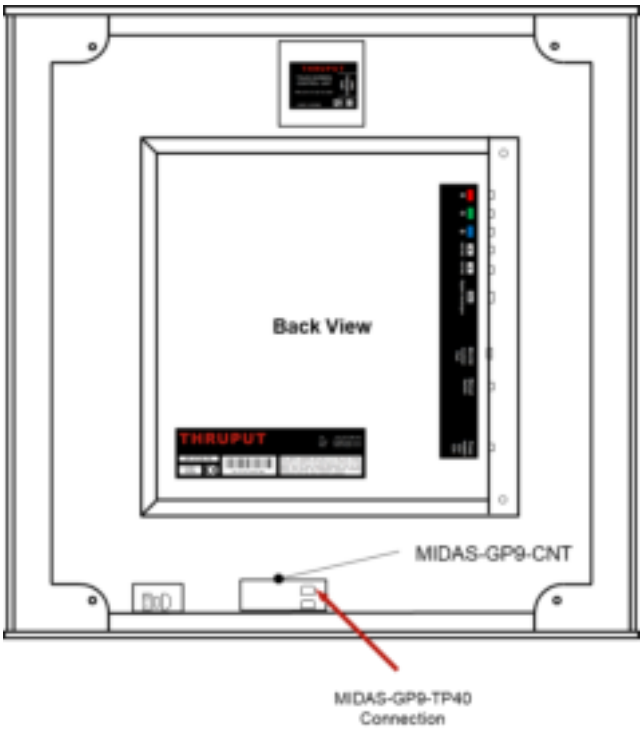


Figure 13 MIDAS-GP9-TP40 Connection (Rear)

6.3.3 ASTRO Workstation Connection

The GFVT03-CAMMO uses the existing 9-pin male serial cable connected to the Science Accessories GP9 sonic digitizer. This cable is fitted into the upper 9-pin female connector at the rear of the MIDAS-GP9-CNT.

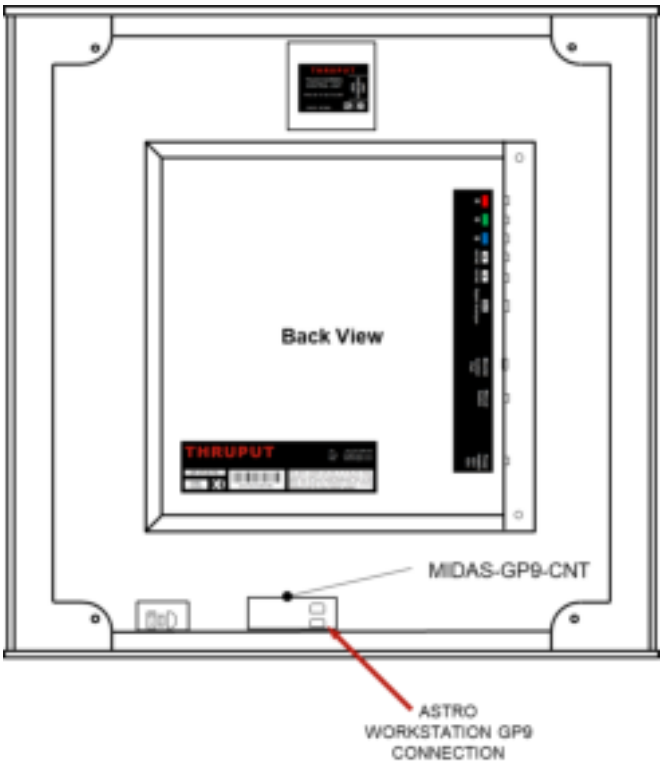


Figure 14 ASTRO Workstation Connection

6.4 GFVT03-PPTS Touch Pen

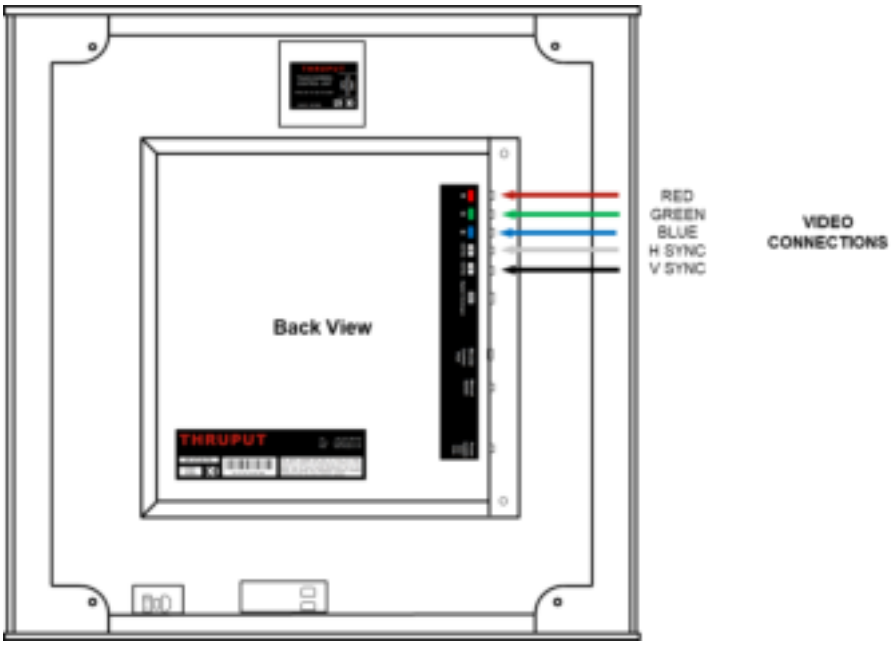
Packed separately in with the GFVT03-CAMM monitor is the GFVT03-PPTS touch pen.

The GFVT03-PPTS has two touch ends. The first is 6mm domed mesh that is to be used in normal operation. The other end it has a 2.5mm touch point set in a 7mm transparent disk. This end is for use during calibration.

Figure 15 GFVT03-PPTS Touch Pen

6.4.1 Video Connection

The video connections from the ASTRO workstation are the 5 BNC cables taken from the rear of the Sony DDM2800 CRT monitor. The video connections for the GFVT03-CAMMO are situated at the rear of the monitor



The connections to the GFVT03-CAMMO are the 3 colours, red, green & blue followed by the h Sync and then the V Sync.

This now completes the physical installation of the GFVT03-CAMMO monitor.

6.4.2 Monitor Adjustments

The GFVT03-CAMMO is pre-set with factory video timings. The monitor should be powered on for at least 1 hour before adjustments are considered. If adjustment is required please refer to the maintenance section.

7 System Alignment

Before the GFVT03-CAMMO can be used in the ASTRO workstation position it has to be aligned.

The following alignments must be conducted using the Align.Exe program

The MIDAS-GP9-CNT is factory configured to the following values.

MODE	POINT	; sets the GP9 into single touch mode
MENU ZONE	NONE	; disables the option menu functions
ORIGIN	UL	; position 0,0” to the upper left of the active area
REP RATE	75	; number of touches per second
COMMAND SET	NONE	; no optional commands
ACTIVE AREA	36x48	; active area is 36”H x 48”W
TERMINATOR	CR	; carriage return terminates the command
SIGN	SPACE	; space bar starts a new command
FLAG TYPE	NONE	; cursor button status
FLAG MODE	STREAM	; cursor button character format
OUTPUT FORMAT	GP8	; SPACEXXXX-YYYYCR data format
RESOLUTION	100 LPI	; position resolution in lines per inch
OVERFLOW STATUS	GP8	; returns all 9’s on overflow
BAUD RATE	9600	; serial interface set 9600 Baud
DATA BITS	7	; 7-bit data field
PARITY	NONE	; no parity calculated
HAND SHAKE	NONE	; no data control
DATA FILTER	ON	; line/stream mode smoothing
DATA VALIDATION	OFF	; noise filter disabled

There are no adjustments required in the field.

The GFVT03-TS-EA monitor has preset

7.1 Align.exe

Align.exe is a standalone calibration program designed to supply the ASTRO application with sufficient measurements that enable an accurate, and consistent, landing of the GP9 sonic pen to the 2048x2080 screen graphics and command buttons. At the end of the calibration sequence the Align.exe produces a binary file, Sony.cal, and places it in the directory C:/data/CSF.

The replacement, GFVT03-CAMMO, for the GP9 is a bonded touchscreen onto the front of the LCD monitor and a 40-position keyboard to replace the lower command function paper strip. Both devices are calibrated at manufacture and do not require calibration in the field.

The new device does require calibration for use with the ASTRO application, and still requires generating a valid Sony.cal file to be placed into the C:/data/CSF directory.

To use this calibration procedure a current Sony.cal file must reside in the c:/data/CSF directory. The Sony.cal file generated during this procedure will overwrite the existing file.

There are 21 steps in completing the calibration process. They are listed below.

Screen	Range	Instruction	Active Axis
1	1350-1750	Pen along vertical line	X
2	0100-0400	Pen along horizontal line	Y
3	3050-3450	Pen the target “+”	X
4	2000-2300	Pen the target “+”	Y
5	1350-1550	Pen the left edge of REVERSE command	X
6	3250-3450	Pen the right edge of ADVANCE command	X
7	2300-2500	Pen the division between Upper/Lower commands	Y
8	0050-0350	Pen the first USER name >>>>>>	Y
9	3550-3750	Pen the middle of the [**] between the USER & FUNCTION >>>>>>	X
10	0050-0350	Pen the first FUNCTION name >>>>>>	Y
11	1200-1500	Pen the first EQUIP name >>>>>>	Y
12	3550-3750	Pen the middle of the [**] between the EQUIP & COMMENT >>>>>>	X
13	1200-1500	Pen the first COMMENT text >>>>>>	Y
14	3800-4000	Pen the extreme edge of the Large Display cabinet >>>>>>	X
15	0050-0350	<<<<<< Pen the first USER name	Y
16	1050-1250	<<<<<< Pen the middle of the [**] between the USER & FUNCTION	X
17	0050-0350	<<<<<< Pen the first FUNCTION name	Y
18	1200-1500	<<<<<< Pen the first EQUIP name	Y
19	1050-1250	<<<<<< Pen the middle of the [**] between the EQUIP & COMMENT	X
20	1200-1500	<<<<<< Pen the first COMMENT text	Y
21	0825-1025	<<<<<< Pen the extreme edge of the Large Display cabinet	X

7.1.1 GFVT03-CAMMO Calibrate GP-9 X-Coordinate Origin Screen

From the DOD prompt, in the directory in which it resides, run Align.exe. On the GFVT03-CAMMO monitor the following screen will appear.

Figure 16 GFVT03-CAMMO X-Coordinate Origin Screen

On the support screen there will be displayed the instructions

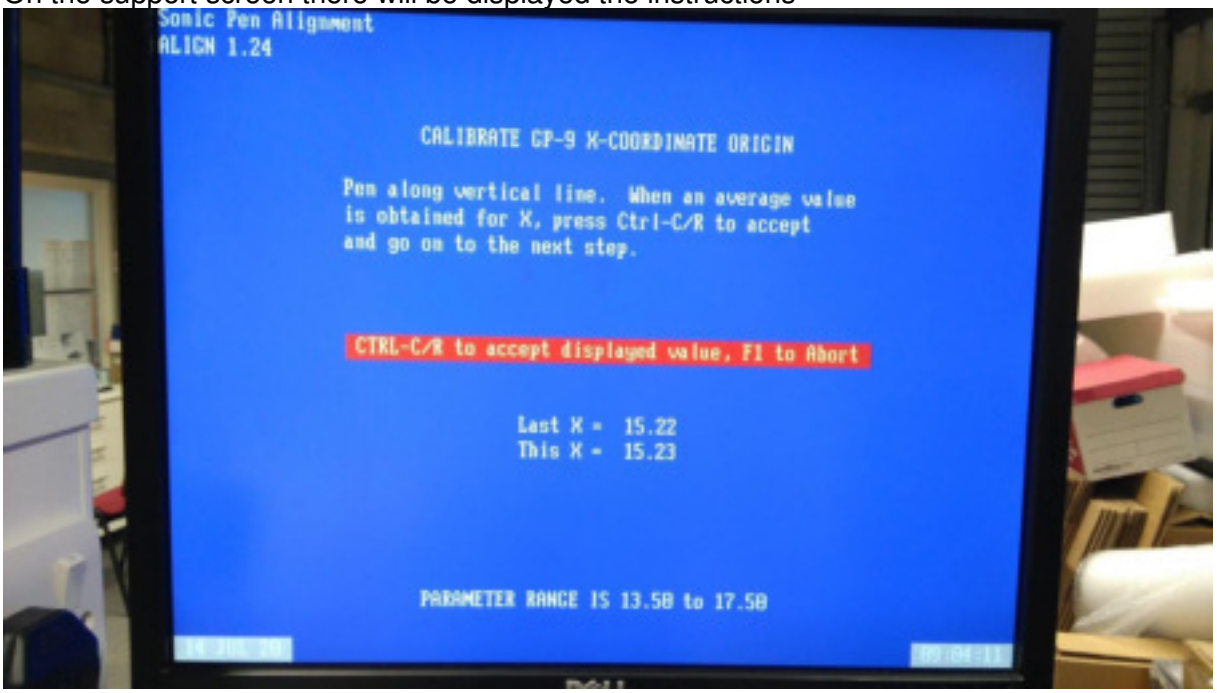


Figure 17 Calibrate GP-9 X-Coordinate Origin Support Screen

Using the calibration tip of the GFVT03-PPTS touch pen follow the instructions on the screen. When satisfied accept the value by entering the Control/Return key

7.1.2 Calibrate Horizontal Microphone

After accepting the previous alignment, the following image will appear on the GFVT03-CAMMO screen.

Figure 18 GFVT03-CAMMO Calibrate Horizontal Microphone Screen

On the support screen there will be displayed the instructions.

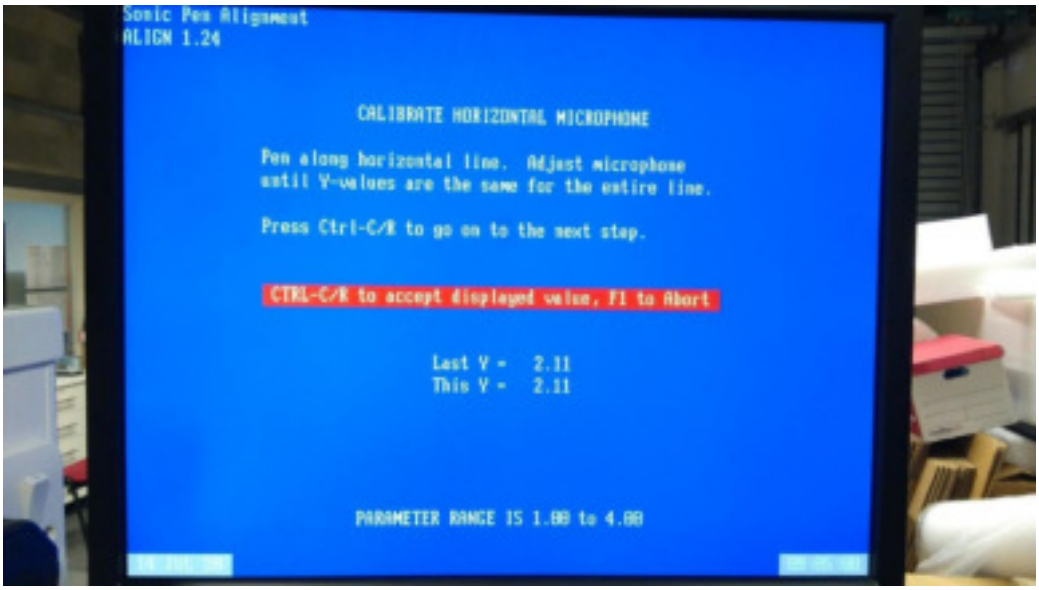


Figure 19 Calibrate Horizontal Microphone Support Screen

As the sonic digitizer microphones no longer exist, using the calibration tip of the GFVT03-PPTS touch pen, pen along the horizontal line. When satisfied that the values are consistent along the line, accept the value by entering the Control/Return keys,

7.1.3 Calculate Graph Area Fudge Factors

After accepting the previous alignment, the following image will appear on the GFVT03-CAMMO screen.

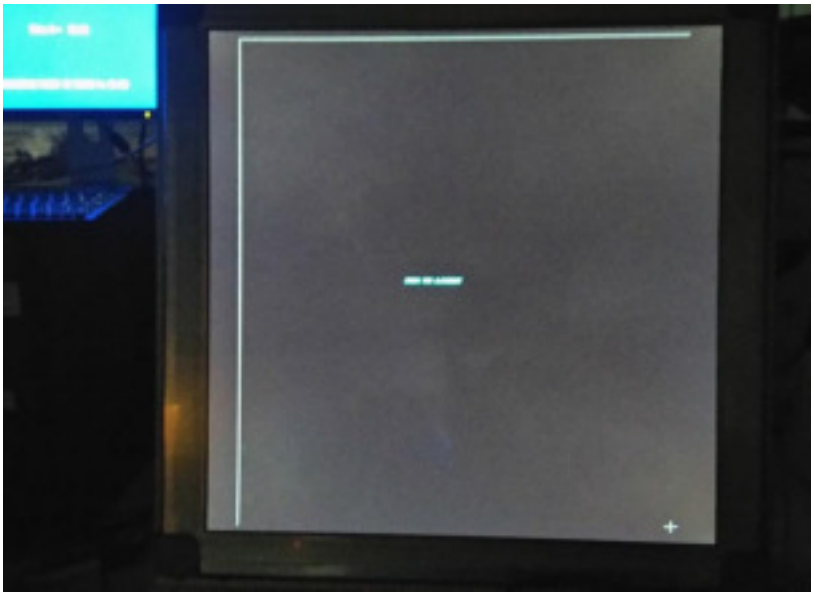


Figure 20 GFVT03-CAMMO Calculate Graph Area Fudge Factors Screen

7.1.3.1 Calculate Graph Area Fudge Factors (X)

On the support screen there will be displayed the instructions.

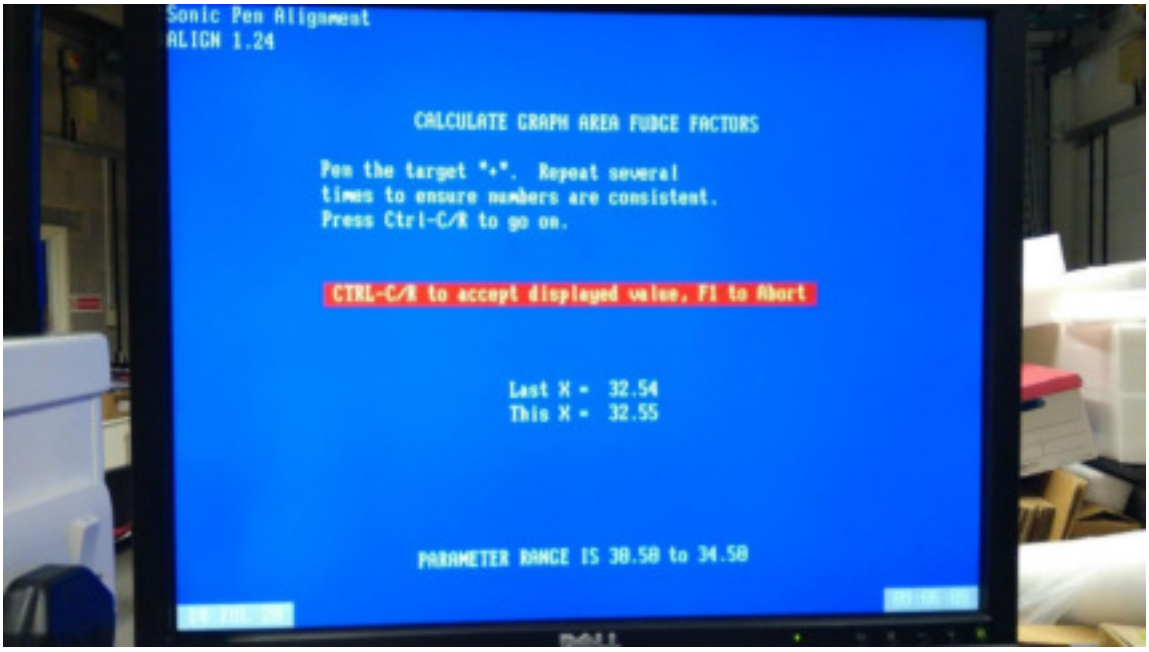


Figure 21 Calculate Graph Area Fudge Factors Screen (X) Support Screen

Using the calibration tip of the GFVT03-PPTS touch pen follow the instructions on the screen. When satisfied accept the value by entering the Control/Return keys.

7.1.3.2 Calculate Graph Area Fudge Factors (Y)

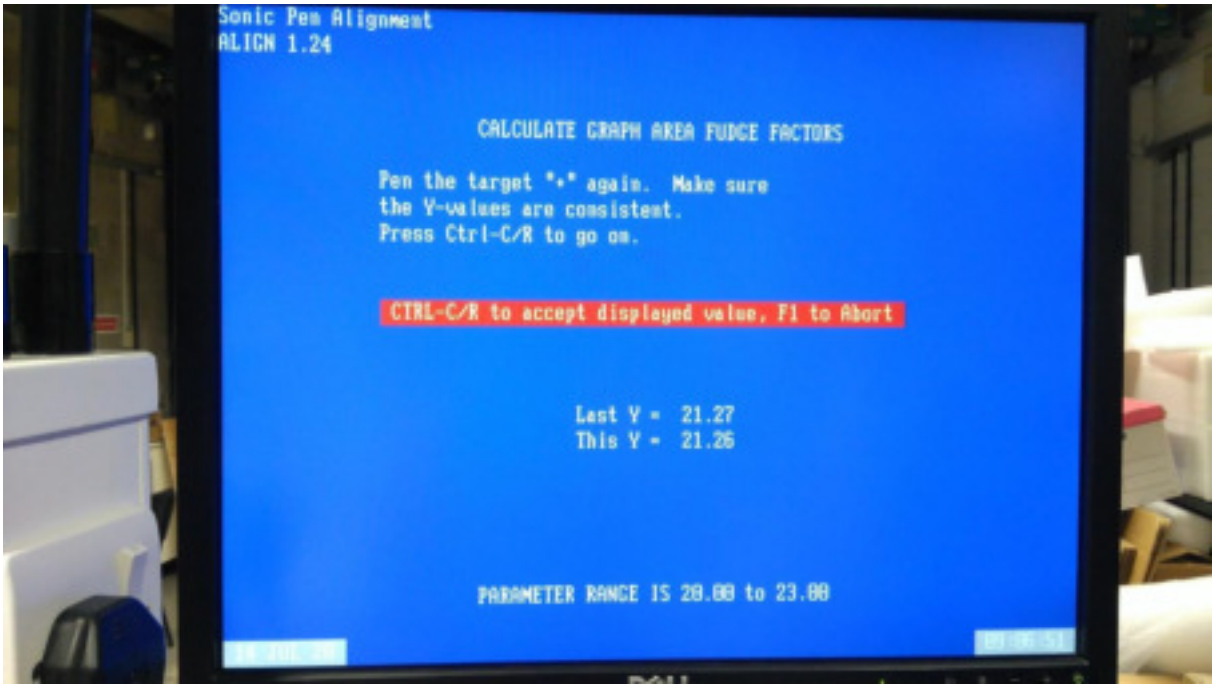


Figure 22 Calculate Graph Area Fudge Factors Screen (Y) Support Screen

Using the calibration tip of the GFVT03-PPTS touch pen follow the instructions on the screen. When satisfied accept the value by entering the Control/Return keys.

7.1.4 Calculate Command Area Fudge Factors

There are three alignments that are used to calibrate the position of the Command Area situated under the GFVT03-CAMMO screen. This has now been replaced with MIDAS-GP9-TP40 keypad. The MIDAS-GP9-TP40 has special key sequence to enter the required value.

7.1.4.1 Pen Left Edge of the REVERSE Command

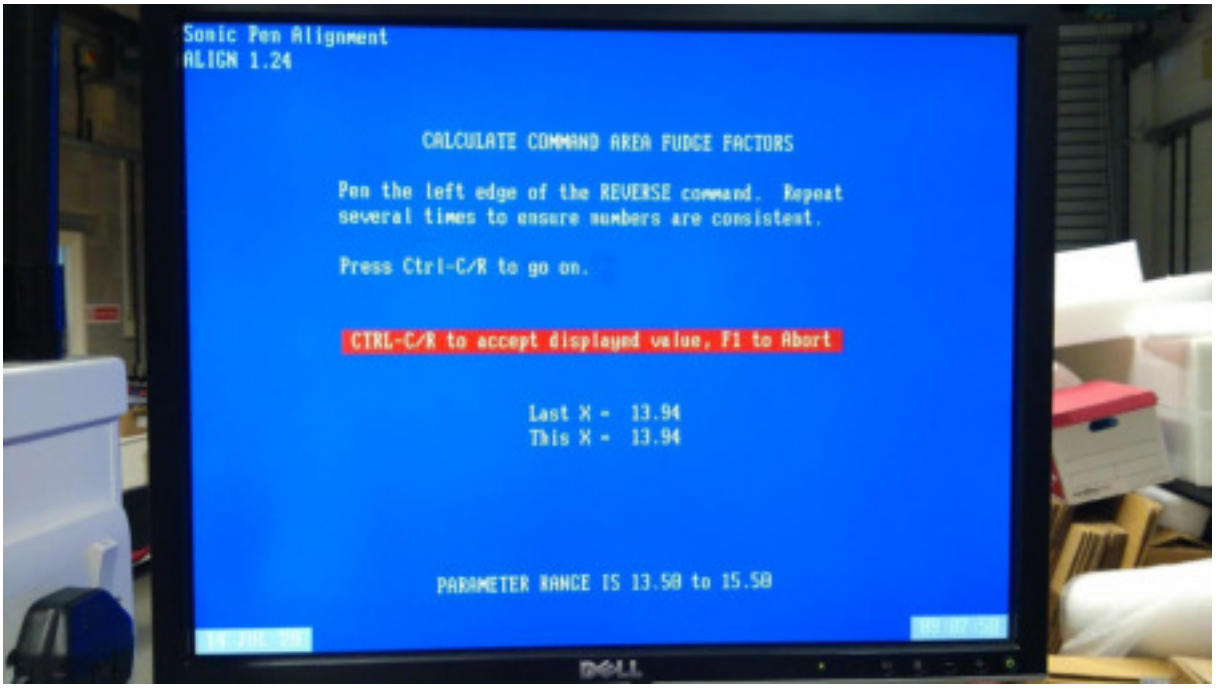


Figure 23 Calculate Command Area Fudge Factor, Left Edge of REVERSE Command

When requested for the Pen Left Edge of the REVERSE command, hold down the THRUPUT key on the MIDAS-GP9-TP40 keypad, the left-hand keypad LED indicator will turn red, then simultaneously press the REVERSE key. The REVERSE key will illuminate red when pressed.

The This X = 14.50 should be displayed on the support monitor.

Press Control/Return keys to accept this value.

7.1.4.2 Pen Right Edge of the ADVANCE Command

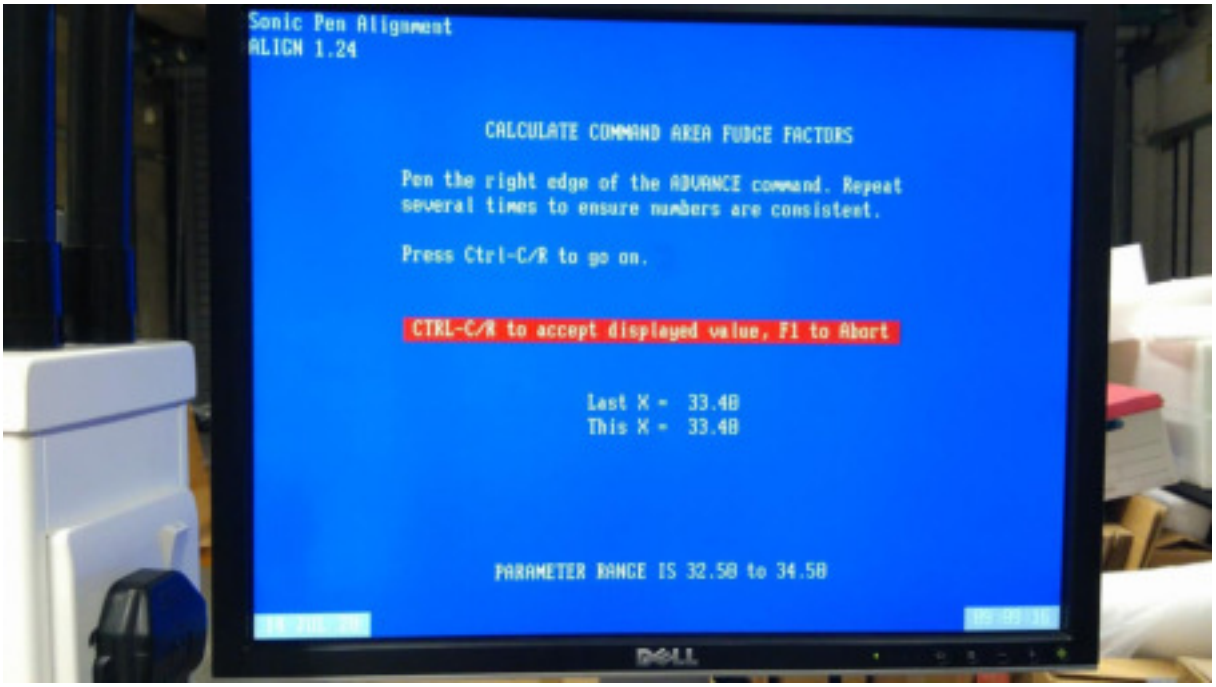


Figure 24 Screen 6 Right Hand Boundary of Command Buttons

When requested for the Pen Right Edge of the ADVANCE command, hold down the THRUPUT key on the MIDAS-GP9-TP40 keypad, the left-hand keypad LED indicator will turn red, then simultaneously press the ADVANCE key. The ADVANCE key will illuminate red when pressed.

The This Y = 33.38 should be displayed on the support monitor.

Press Control/Return keys to accept this value.

7.1.4.3 Pen the division between Upper/Lower commands

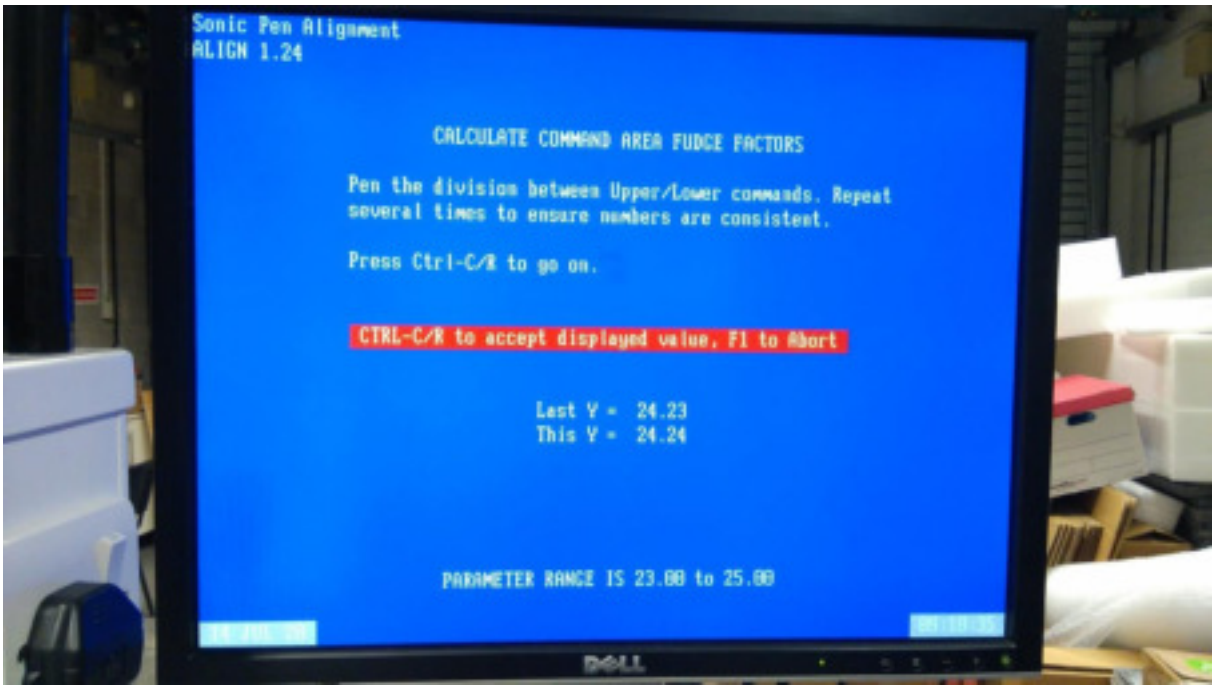


Figure 25 Screen 7 Vertical Boundary Between Upper and Lower Command Buttons

When requested for the Penthe division between Upper/Lower commands, hold down the THRUPUT key on the MIDAS-GP9-TP40 keypad, the left-hand keypad LED indicator will turn red, then simultaneously press the ENTER key. The ENTER key will illuminate red when pressed.

The This Y = 24.00 should be displayed on the support monitor.

Press Control/Return keys to accept this value.

7.1.5 Non-supported Calibration Points

There are several Command Area calibration points that not required to be supported. These sonic pen alignments refer to off screen command areas. To complete the alignment procedure, and to produce the Sony.cal calibration, file these values must be entered.

For each value displayed, accept the value by pressing Control Return key on the system QUERTY keyboard.

This requires a current Sony.cal file to be installed on the system in the location C:/data/CSF

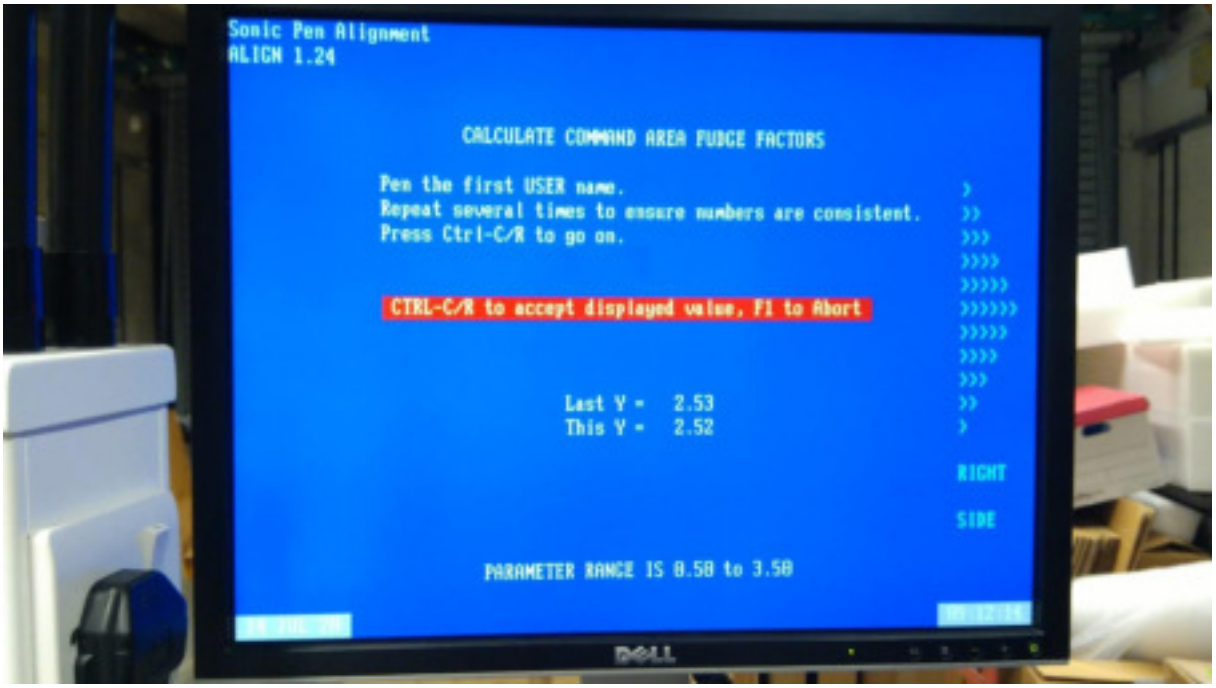


Figure 26 Screen 8 Right Hand Off Screen User Name Vertical Calibration

Press Control/Return to accept current value

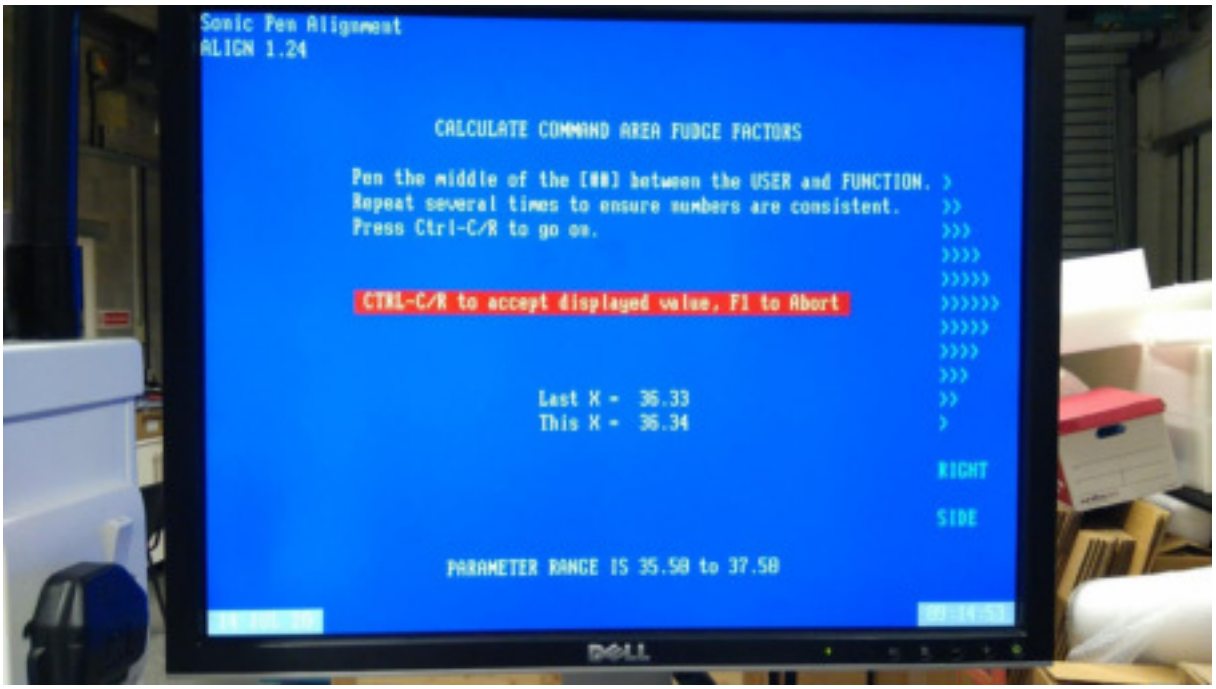


Figure 27 Screen 9 Right Hand Off Screen Between User and Function Horizontal Calibration

Press Control/Return to accept current value

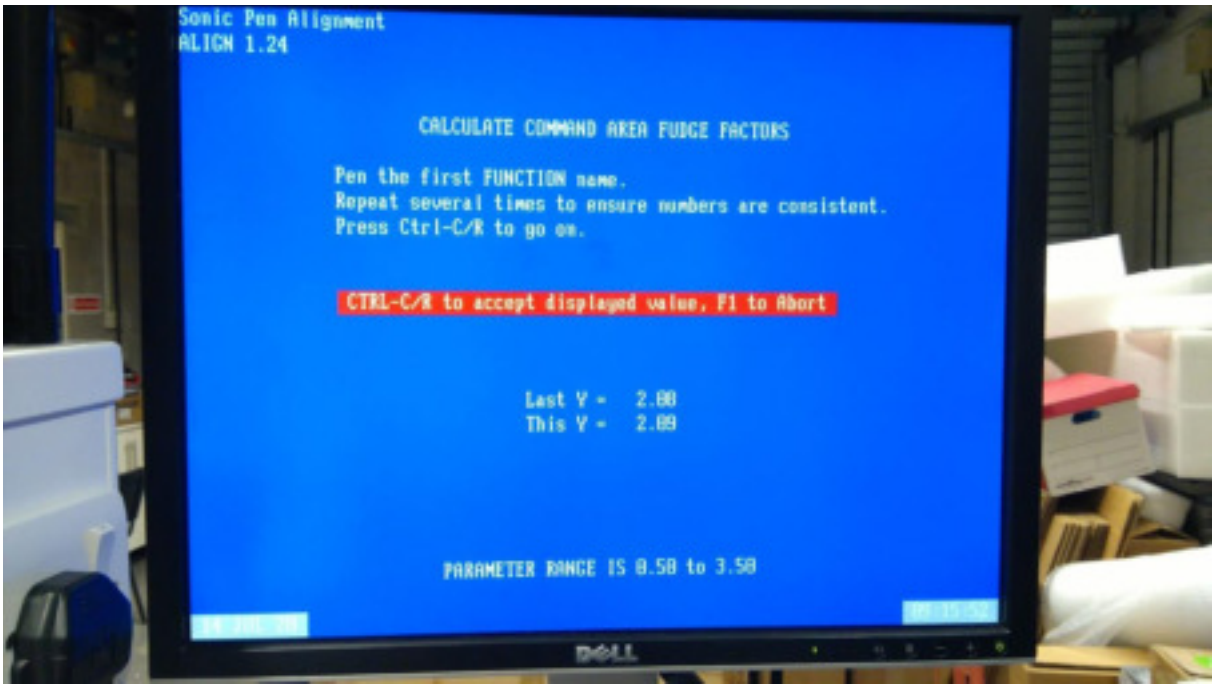


Figure 28 Screen 10 Right Hand Function Name Vertical Calibration

Press Control/Return to accept current value

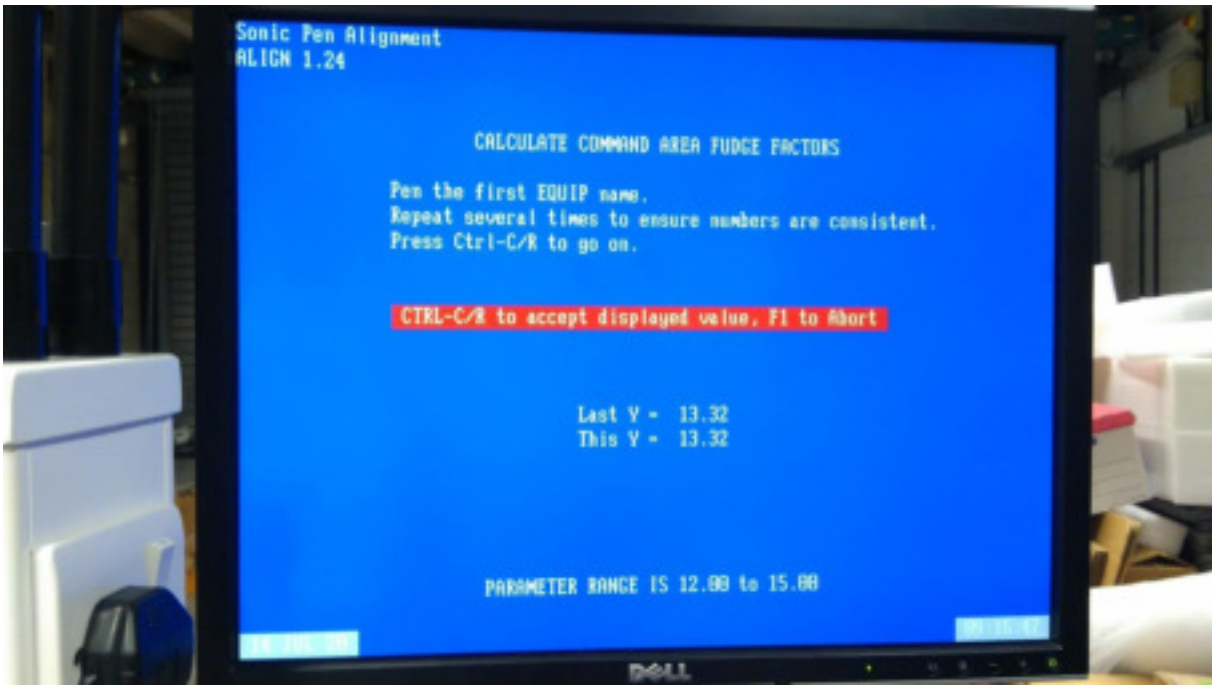


Figure 29 Screen 11 Right Hand Equipment Name Vertical Calibration

Press Control/Return to accept current value

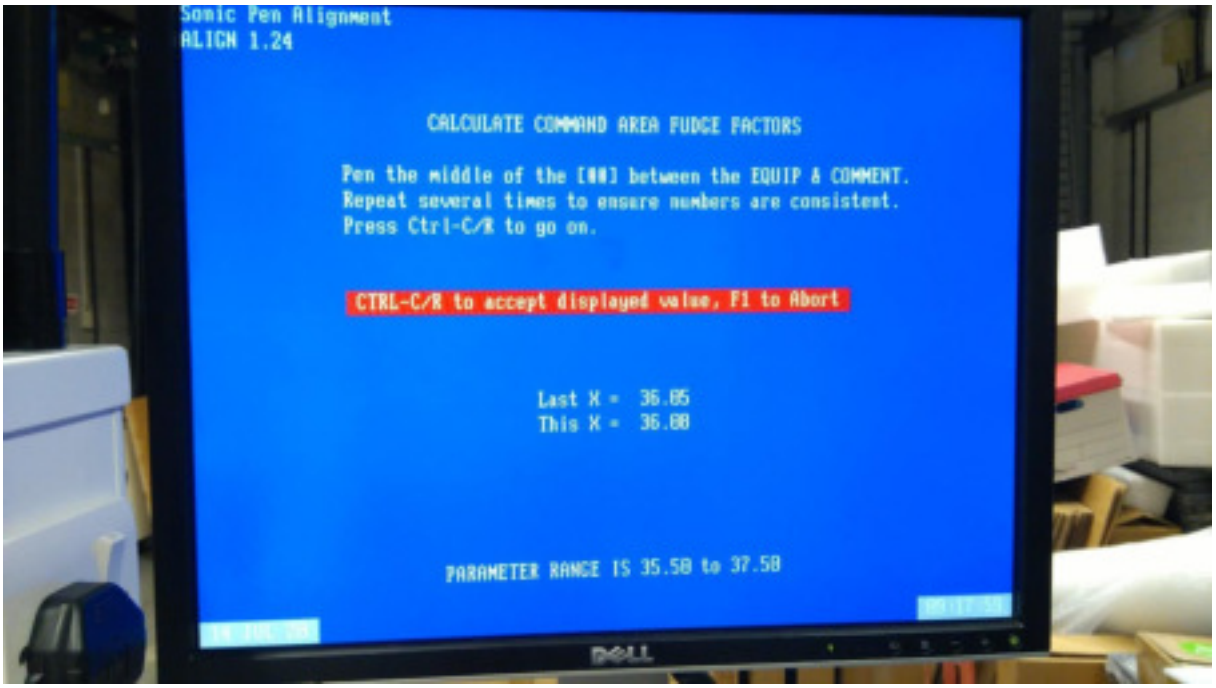


Figure 30 Screen 12 Right Hand Calibration Between Equipment & Comment

Press Control/Return to accept current value

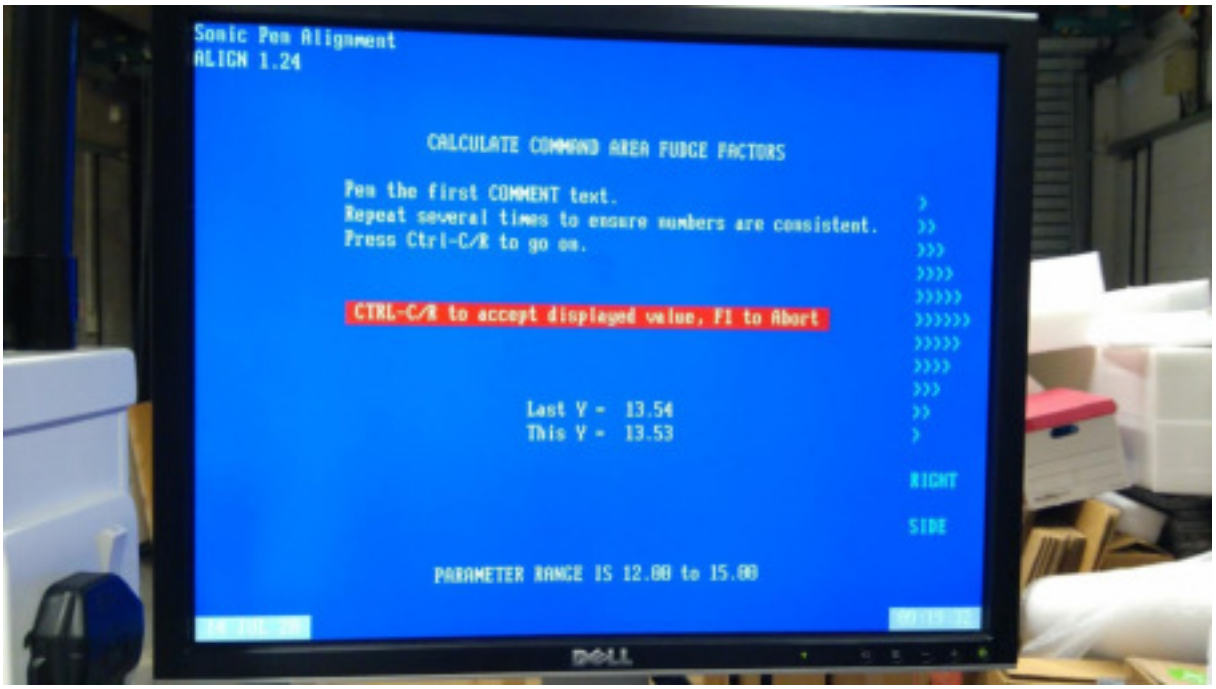


Figure 31 Screen 13 Vertical Alignment of First Comment Text

Press Control/Return to accept current value

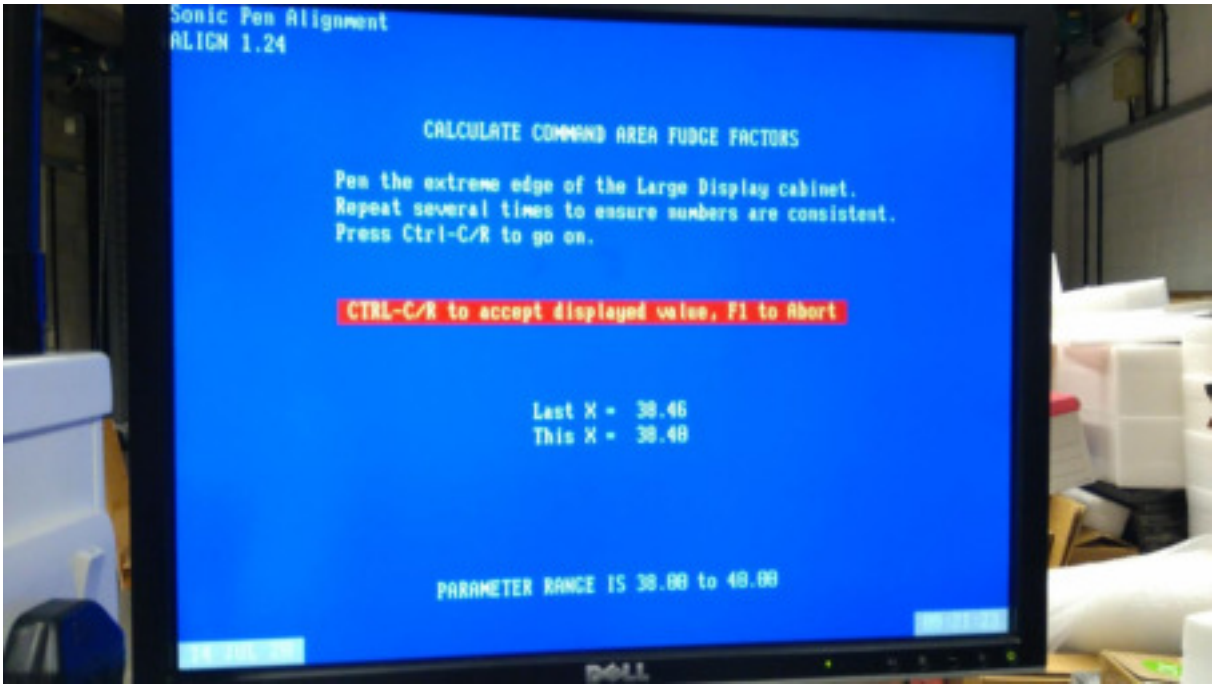


Figure 32 Screen 14 Right Hand Horizontal Cabinet Edge

Press Control/Return to accept current value

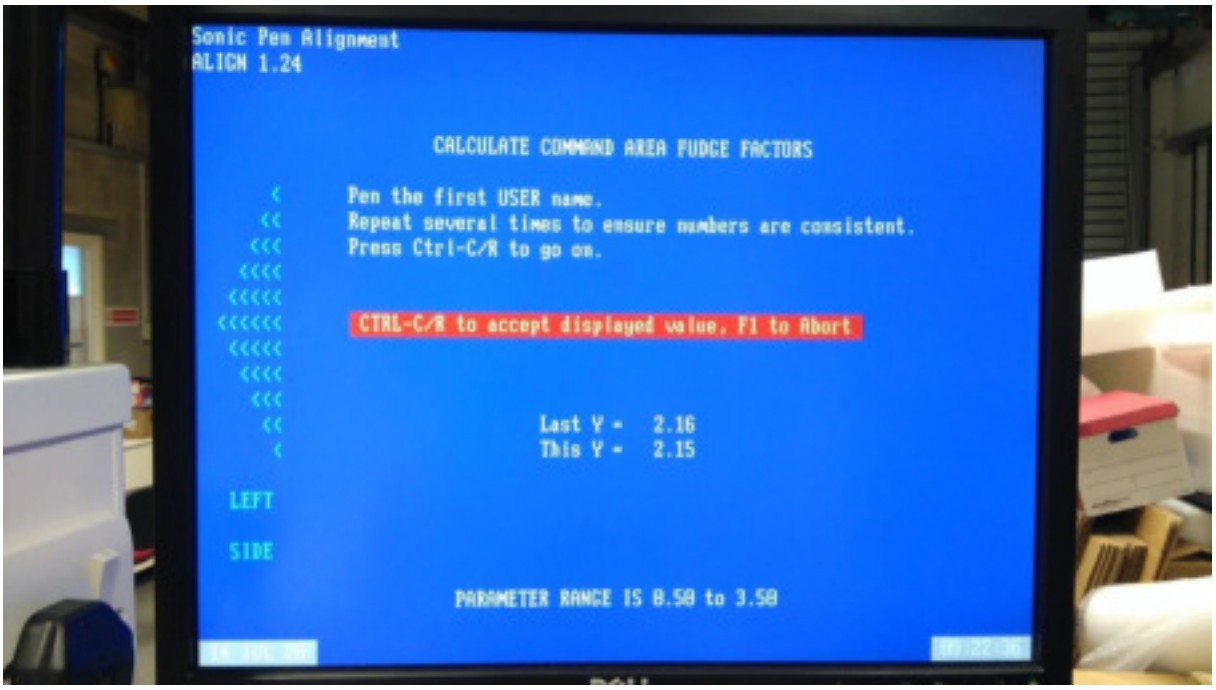


Figure 33 Screen 15 Left Hand Vertical User Name Calibration

Press Control/Return to accept current value

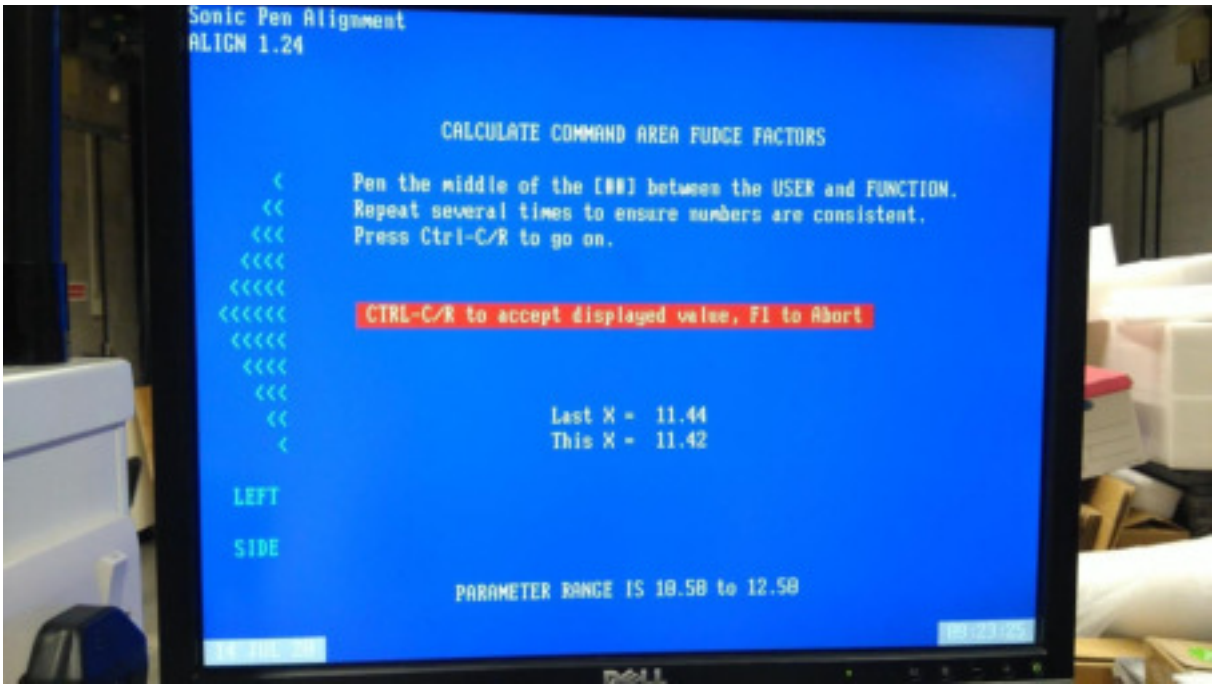


Figure 34 Screen 16 Left Hand Between User and Function Horizontal Calibration

Press Control/Return to accept current value

Figure 35 Screen 17 Left Hand Function Name Vertical Calibration

Press Control/Return to accept current value

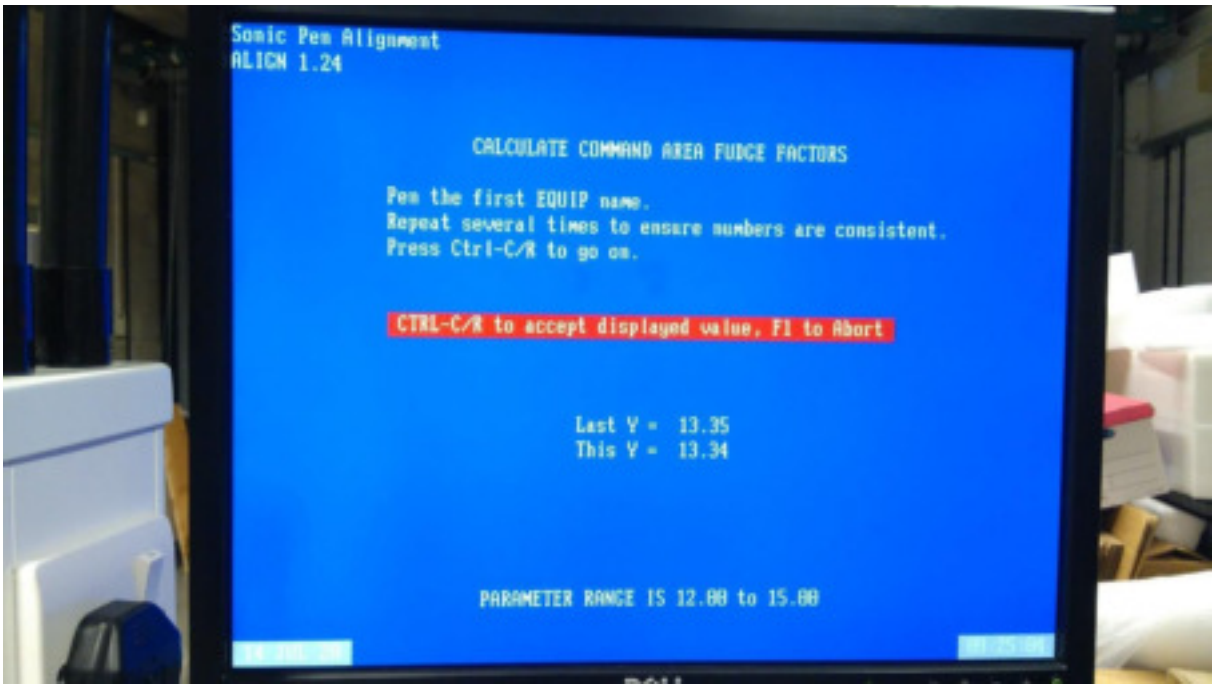


Figure 36 Screen 18 Left Hand Equipment Name Vertical Calibration

Press Control/Return to accept current value

Figure 37 Screen 19 Left Hand Between Equip and Comment Horizontal Calibration

Press Control/Return to accept current value

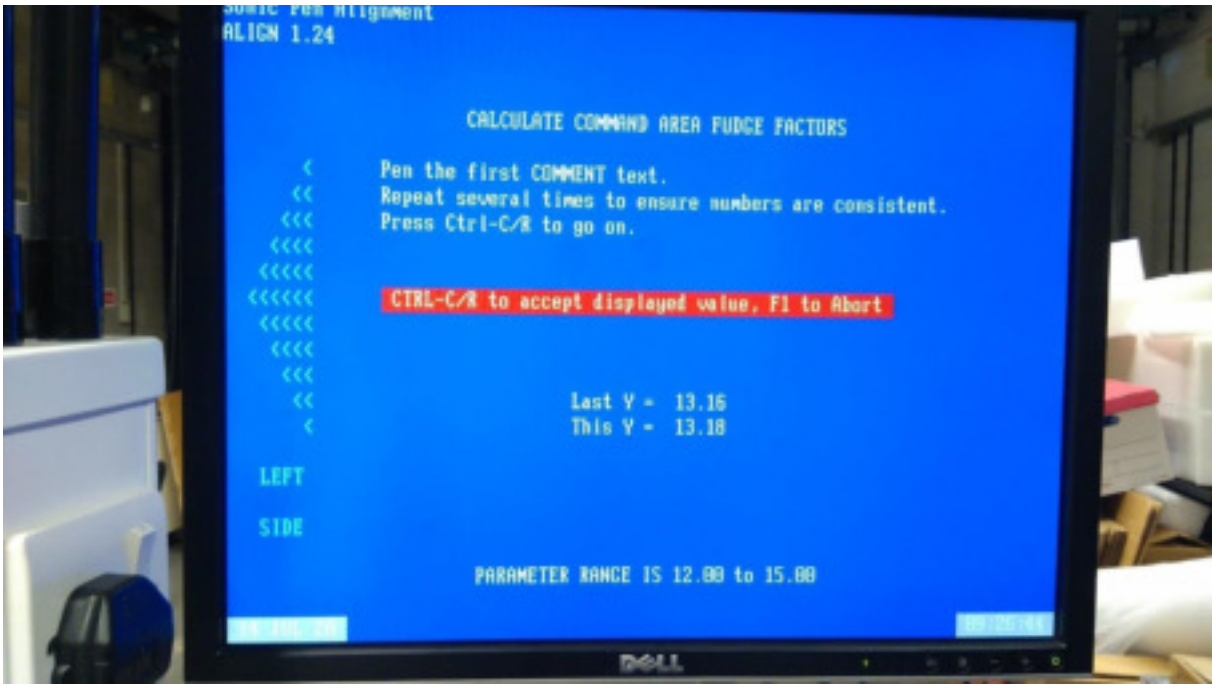


Figure 38 Screen 20 Left Hand Comment Vertical Calibration

Press Control/Return to accept current value

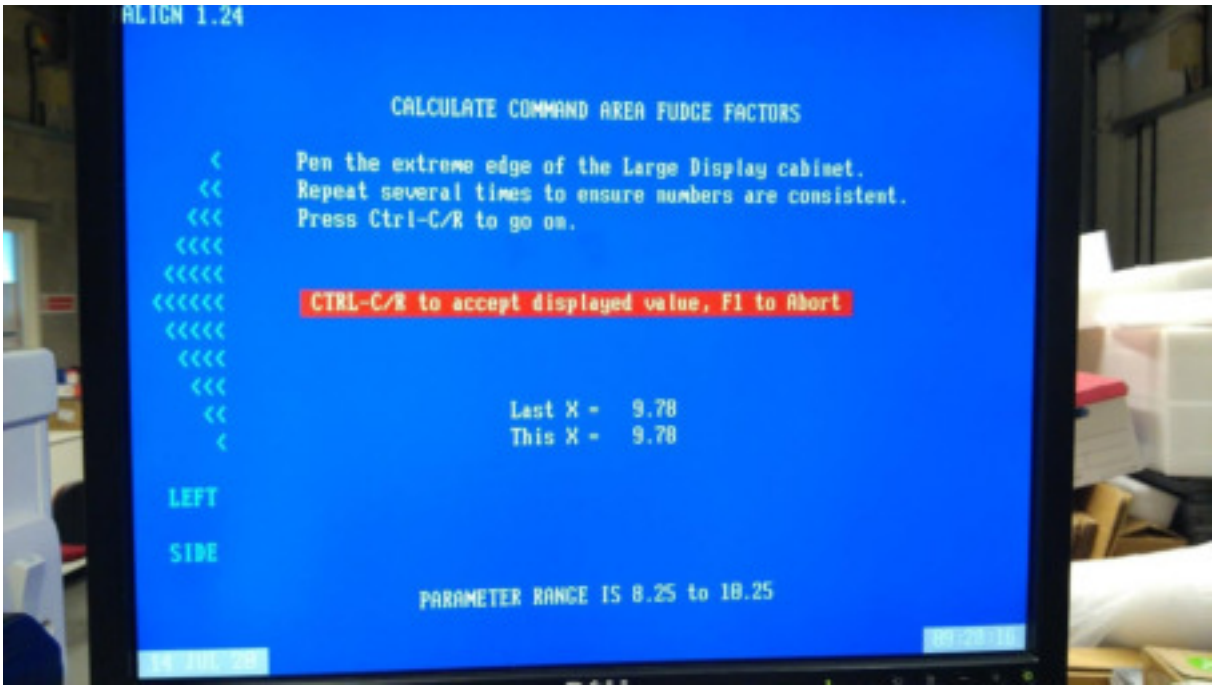


Figure 39 Screen 21 Left Hand Horizontal Cabinet Edge

Press Control/Return to accept current value

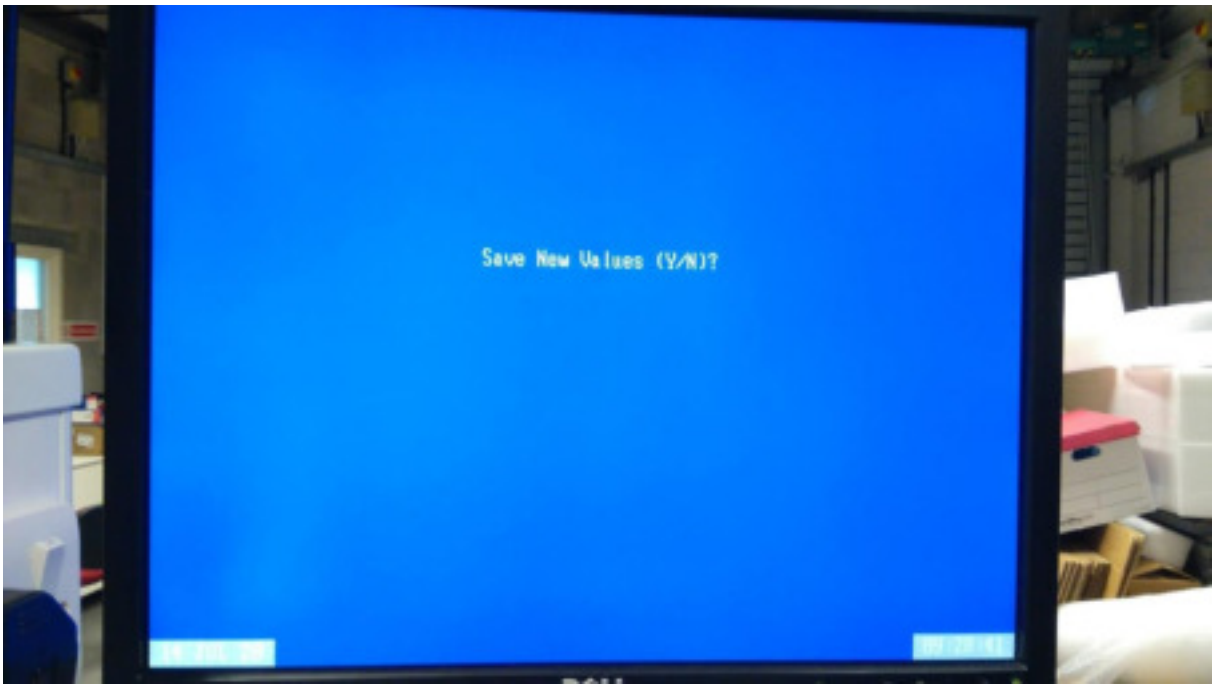


Figure 40 Screen 22 Confirm and Produce Sony.Cal

This value will be entered as Y

This will now generate a new Sony.cal file in the location C:/data/CSF

8 MIDAS-GP9-CNT Software

The heart of the GP9 control emulator is the MIDAS-GP9-CNT controller.

The controller uses a Microchip MC24FJ256 micro controller. The controller supports four RS232 ports, 1 USB device port and a 10/100 Telnet network port.

It has a +5v DC 2.1mm jack socket to supply its power requirements.

The microcontroller sits in a box inside the base of the GFVT03-CAMMO monitor with its 5v DC 4A power supply unit.

The function of the controller is to receive data from the touchscreen and 40 button keypad and convert them into GP9 compatible commands.

It also has a secondary function of connecting to LCD monitor controller to collect status and control the backlight brightness and contrast. It will also have the default values for the monitor setup in the CAMMO environment.

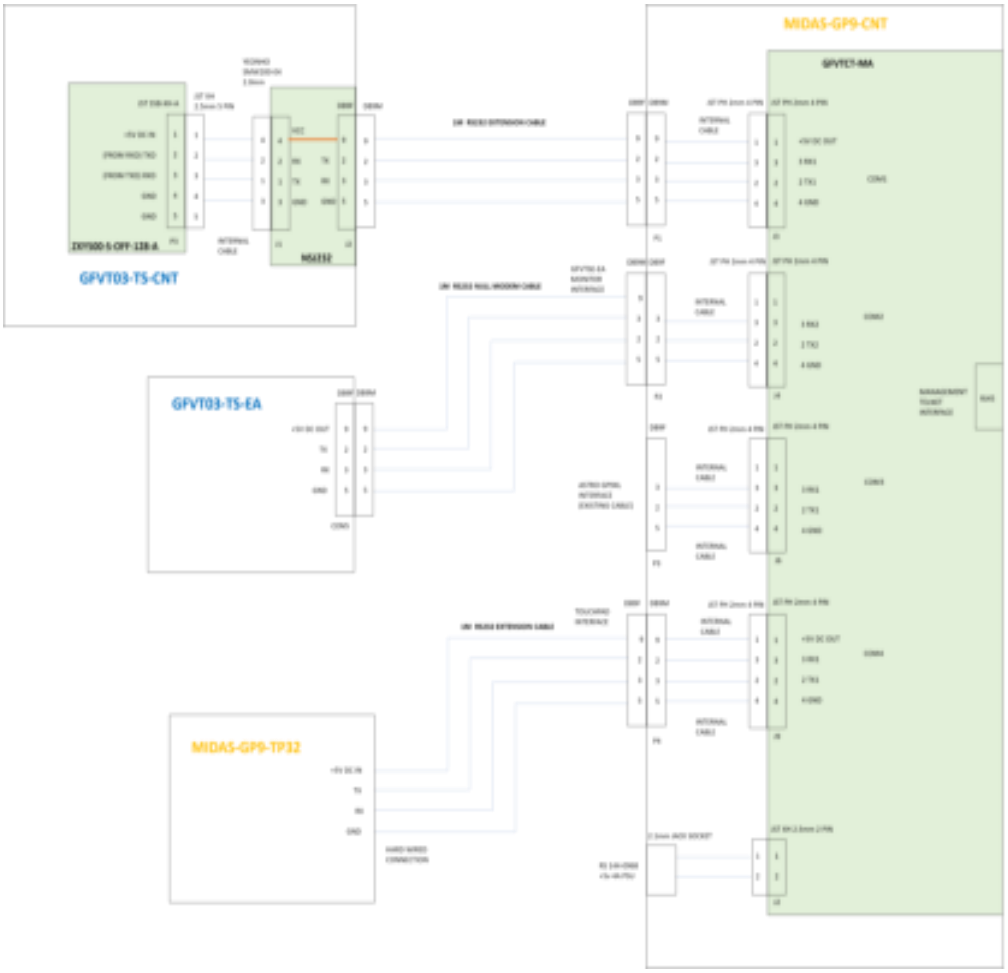


Figure 41 MIDASGP9-CNT Block Diagram

8.1 GFVT03-CAMMO CLI Commands

The rear of the GFVT03-CAMMO monitor, situated on the MIDAS-GP9-CNT, is the maintenance USB port. This port is a plug and play communication port for Windows 7/10 operating systems.

The communications port that Windows has designated to the USB port will be displayed in Device Manager.

Use Hyper-Terminal to connect to the correct COM port assigned by Windows and set the session to:

Baud Rate	115200
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

Once connected to the USB maintenance port, the Command Line Interface is running and the > prompt should appear in your Hyper-Terminal screen.

This is the Command Line Interface that enables the parameters of the GFVT03-CAMMO monitor to be changed. The CLI only requires the first 3 characters for each command to be entered to be valid.

8.1.1 Save/Restore

All commands entered are volatile until saved. If you wish to make your values permanent use the Save command. If you wish to revert to the saved values, use the Restore command

>save

Writes all current settings into flash

>restore

Reads flash saved values into current settings

8.1.2 Point Mode

Point #

Sets the controller into single touch mode. Only one position is reported per touch. The # is a numerical value between 1 and 20.

This command puts the monitor into the GP9 Point mode. The number is the #th packet

>point 1

The 1st touch packet from the touchscreen controller will be used to extract the touchpoint position. Default is 1.

8.1.3 Line Mode

Line #

Sets the controller into Line mode. Streams all points at a fixed rate. Output stream rate will be between 1-100

>line 75

Default is 75.

8.1.4 CRC Mode

CRC XX

>crc on

Turns CRC on. If a CRC error is detected a 9999-9999 is reported in the GP9 output.

>crc off

The CRC is no longer processed.

Default OFF

8.1.5 Break Detection

Break nnnn

The touchscreen continuously streams position data if the screen is touched. This is the time, in milliseconds that will determine that a touch has finished. The numerical value will be between 1 and 1000 milliseconds. Not used in Line mode. Default is 10ms.

>Break 10

8.1.6 Touchscreen Horizontal Offset

Hoffset nnnn

It is the horizontal offset to be added to the GP9 0000 output. The number is input in GP numerical format

>hoff 1368

Will offset the horizontal touchscreen position to 13.68”

8.1.7 Touchscreen Vertical Offset

Voffset nnnn

It is the vertical offset to be added to the GP9 0000 output. The number to input in GP numerical format

>voff 0168

Will offset the vertical GP9 output by 1.68”

8.1.8 Touchscreen Horizontal Active Size

Hactive nnnn

The physical active size of the touchscreen in inches. The number input to in GP9 format to 2 decimal places.

>hact 2047

The active horizontal size of the touchscreen is 20.47” to 2 decimal places.

Default is 2047

8.1.9 Touchscreen Vertical Active Size

Vactive nnnn

The physical active size of the touchscreen in inches. The number input to in GP9 format to 2 decimal places.

>vact 2047

The active vertical size of the touchscreen is 20.47” to 2 decimal places.

Default is 2047

8.1.10 Horizontal Touchscreen Resolution

Hresolution xxxx

This is the horizontal resolution of the touchscreen

>hres 4096

The horizontal touch resolution is 0-9999. Default is 4096

8.1.11 Vertical Touchscreen Resolution

Vresolution xxxx

This is the vertical resolution of the touchscreen

>Vres 4096

The vertical touch resolution is 0-9999. Default is 4096

8.1.12 Version

Read the current PIC version. Read only command

Read Version

>read ver

MIDAS-GP9-CNT V0.9

8.1.13 Serial Number

Read SerialNumber

Read the unit serial number. Read only command

>read ser

MIDAS-GP9-CTN 012001

Where the first 2 numbers are the batch code. The next 2 numbers are year code. The last 2 numbers are the serial number

8.2 Keypad CLI Commands

The keys are laid out in 2 rows of 20 keys. The top left-hand key is Key 1 and the bottom left hand key is 40.

Keys 1&2 and 21&22 are combined as a single SHIFT key.

Keys 3- 18 on the top row and Keys 23-38 on the bottom row will be programmed as the GP9 command keys. Key 10 & 11 on the top row will be a single key.

Key positions 19 & 39 are blank

Key positions 20 & 40 are used for monitor brightness and contrast

A horizontal datum point and key size, also a vertical datum point and key size will be programmable.

They will be held in GP9 format, 2400 = 24”
0501

8.2.1 Keypad Horizontal Offset

Khdatum nnnn

This will be the keypad left hand offset from the GP9 digitizer left zero datum. The format is in inches

>khd 1450

Will set the keyboard horizontal left-hand offest at 14.5”. Default is 1450

8.2.2 Keypad Vertical Offset

Kvdatum nnnn

This will be the keypad top offset from the GP9 digitizer top zero datum. The format is in inches

>kvd 2325

This will set the keyboard horizontal top datum to 23.25”

8.2.3 Keypad Horizontal Key Size

Khsize nnnn

This will set the horizontal size of the emulated command buttons

>khs 0118

Will set the key width to 1.18” (3cm). default is 0118.

8.2.4 Keypad Vertical Key Size

Kvsize nnnn

This will set the vertical size of the emulated command button

>kvs 0075 (1.9cm)

Will set the key height to 0.75” (1.9cm)

All commands will have a corresponding read command.

Example

>read kvd
2325

The keyboard horizontal offset is 23.25”

8.2.5 Monitor Backlight (brightness) Resolution

BLStep nn

The GFVT03-CAMMO can adjust the brightness of the picture by the up and down arrows on the COMMAND keypad. The monitor can go from minimum to maximum brightness in 32 steps. The number of steps may be altered by this command.

>bls 4

This set the number of backlight steps per key press to 4. This will reduce the number of key presses needed to go from minimum to maximum to 8. Default is 1.

CTStep nn

The GFVT03-CAMMO can adjust the contrast of the picture by the SHIFT up and SHIFT down arrows on the COMMAND keypad. The monitor can go from minimum to maximum contrast in 256 steps. The number of steps may be altered by this command.

>CTS 8

This set the number of contrast steps per key press to 8. This will reduce the number of key presses needed to go from minimum to maximum to 32. Default is 1 .

8.3 Keypad Internal Programming

The purpose of the MIDAS-GP9-TP40 is to replace the paper Command buttons under the Sony DDM 2800 monitor.

The MIDAS-GP9-TP40 keypad can programmed so each key has two unique character strings. The first string is the normal output of the key pressed and the second string is the key pressed with the shift key.

Keys are numbered 1-20 on the top row and 21-40 on the second row.

Keys can be joined so that they act as a single key. They can be programmed to illuminate in two different colours, red and blue. The keyboard has been set that the keys normally illuminate blue when pressed and red when the SHIFT key is held down.

Keys 1-2 and 21-22 have been unified as one key. This has the Thruput logo and is the SHIFT key. When the shift key is held down the status light on the left-hand side if the shift key goes from green to red. When the SHIFT key is released the status light will go green. The SHIFT key does not illuminate and does not send a code to the output when pressed. It is a keypad internal function.

Keys 3-18 and 23-38 are the COMMAND keys and the numbers stored in their memory relate to position that pertain to that command. The operation is explained in Chapter 8.5.

Keys 3 (REVERSE), double key 10/11 (ENTER) and key 18 (ADVANCE) have a separate number stored in them when the SHIFT key is in operation. These key values are used in the initial alignment. This is described in Chapter 7.14.

Key 27 (T-A-F) and key 34 (TOGGLE STATUS) have separate numbers stored that enable the GP9 to change between POINT and LINE mode. This is explained in Chapter 8.5.

Key 20 and key 40 have values stored in their memory for local monitor brightness and contrast adjustment. This is explained in Chapter 8.5.

8.4 Command Key Operation

The objective of the MIDAS-GP9-CNT is to report to the ASTRO workstation the centre of each command button as it was penned by the GP9 digitizer.

Keys 3-18 on the top line and keys 23-38 on the bottom line, are reserved for the ASTRO command functions, unless SHIFT is held down.

Each key hold a 4 digit number. The first two numbers are number half key widths (KHsize/2) the horizontal centre of the key is from the left hand datum point (KHdatum). The second 2 numbers are the number of half key heights (KVsize/2) the vertical centre is from the top vertical datum (KVdatum).

From this number the MIDAS-GP9-CNT can calculate the GP9 output relating to every COMMAND.

8.4.1 Example 1

Key 8 pressed (START)

1101	;received by TouchRS232 interface
MIDAS-GP9-CNT calculation	
(11*Khsize/2)+Khdatum = (11*0118/2)+1450 = 2099	; Calculated XXXX GP9 position for command START
(01*Kvsize/2)+Kvdatum = (1*0075/2)+2325 = 2363	; Calculated YYYY GP9 position for command START
2099,2363CR	; Output to GP9 RS232 interface

8.4.2 Example 2

Key 10/11 (Double Key) pressed (ENTER)

1601[CRLF]	;received by Touch RS232 interface
MIDAS-GP9-CNT calculation	
(16*Khsize/2)+Khdatum = (16*0118/2)+1450 = 2394	; Calculated XXXX GP9 position for command ENTER
(1*Kvsize/2)+Kvdatum = = (1*0075/2)+0.2363	; Calculated YYYY GP9 position for command ENTER
2394,2363CR	; Output to GP9 RS232 interface

8.4.3 Example 3

Key 34 pressed (TOGGLE STATUS)

2303[CRLF]	;received by Touch RS232 interface
MIDAS-GP9-CNT calculation	
(23*Khsize/2)+Khdatum = (23*0118/2)+14.5 = 2807	; Calculated XXXX GP9 position for command TOGGLE STATUS
(3*Kvsize/2)+Kvdatum = (3*0075/2)+2325 = 2438	; Calculated YYYY GP9 position for command TOGGLE STATUS
2807-2438CR	; Output to GP9 RS232 interface

Each of the 40 Command keys are programmed as below and the next diagram lists the expected outputs to the ASTRO workstation from these values.

NAME	SHIFT	SHIFT	REVERSE	REDRAW	COMMIT	DUPE	HANDOFF	START	SHOW-VIZ	ENTER	ENTER	HILIGHT	UNDO LAST	STATION	SIDE A	SIDE B	SUBSET	ADVANCE	BLANK	^
KEY #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
NORMAL			101	301	501	701	901	1101	1301	1601	1601	1901	2101	2301	2501	2701	2901	3101		9901
SHIFT			1							1602	1602							3201		9903
GP9 OUTPUT			1509-2363	1627-2363	1745-2363	1863-2363	1981-2363	2099-2363	2217-2363	2394-2363	2394-2363	2571-2363	2689-2363	2807-2363	2925-2363	3043-2363	3161-2363	3279-2363		
GP9 OUTPUT			1450-2363							2394-2400	2394-2400							3338-2363		

NAME	SHIFT	SHIFT	FORCE	DELETE	SAVE	NOTATION	T-A-F	STOP	OFFSET	SCHEDULE	Q-CHECK	CANCEL	RELEASE	TOGGLE STATUS	SIDE C	SIDE D	AUTO SKED ZOOM	MINIMIZE	BLANK	˅
KEY #	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
NORMAL			103	303	503	703	903	1103	1303	1503	1703	1903	2103	2303	2503	2703	2903	3103		9902
SHIFT							9905							9906						9904
GP9 OUTPUT			1509-2438	1627-2438	1745-2438	1863-2438	1981-2438	2099-2438	2217-2438	2394-2438	2394-2438	2571-2438	2689-2438	2807-2438	2925-2438	3043-2438	3161-2438	3279-2438		

Figure 42 Key Values for Command Outputs

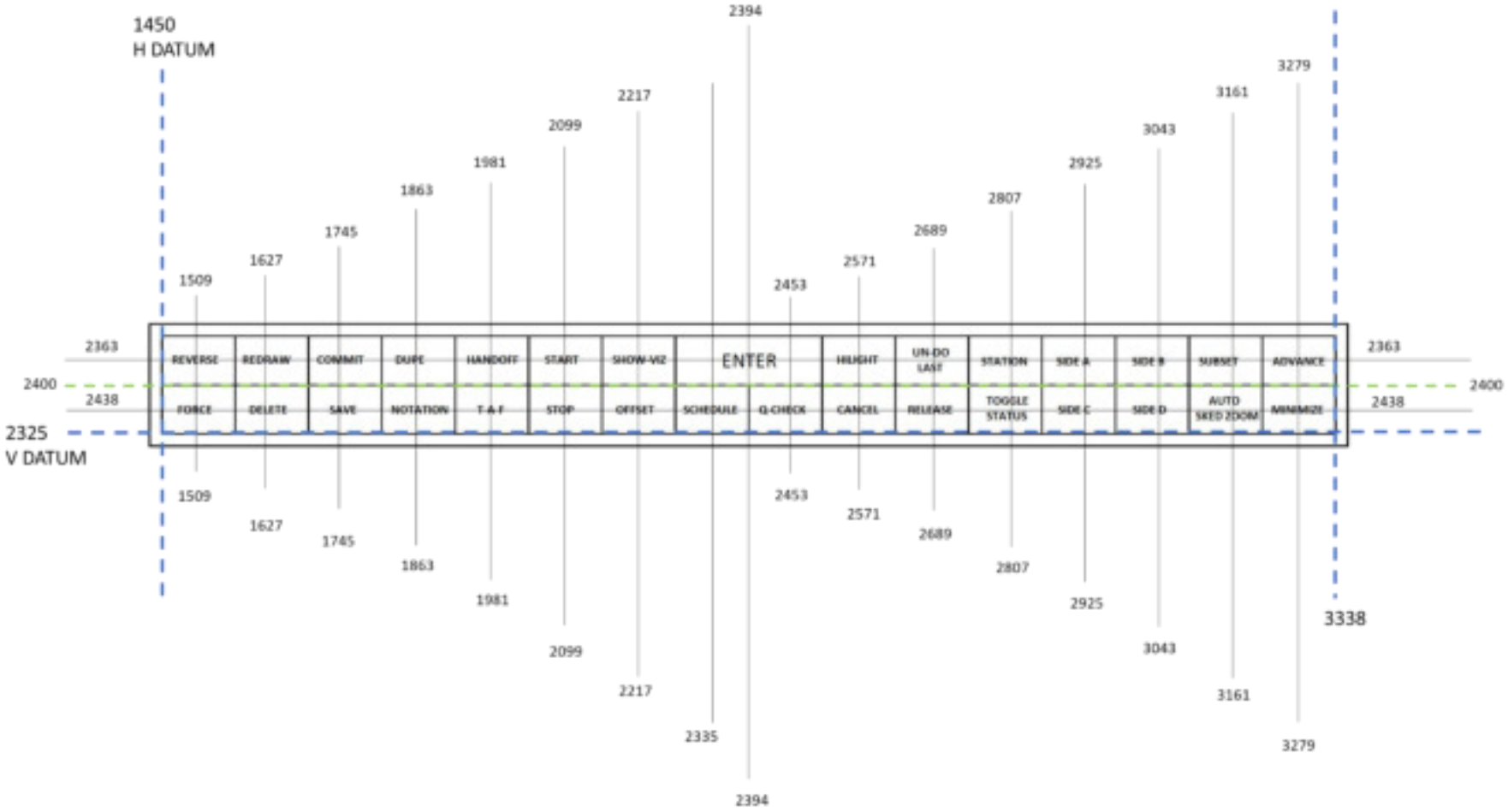


Figure 43 Calculated Values for CAMMO Keypad to the ASTRO Workstation

8.5 Non-Command Keypad Functions

There is a requirement to have the keypad perform some ancillary functions. To simplify the design, and follow the current convention, the same 4-digit code, followed by CRLF, will be used. The convention will be if the first 2 digits are 99 then the next will be the operation.

8.5.1.1 Received TP Backlight Adjustment

9901 Monitor Backlight Function UP

Action. Read current backlight value from the GFVT03 monitor which is attached to the MIDAS-GP9-CNT on COM2 port. Add the number stored in the CLI BLSTEP register and write it back to the monitor.

The monitor backlight read command is #R7000 CRLF. This will return a number between 0 to 31. Add the content of BLSTEP, default 4, and write the result back to the monitor. The monitor will go from minimum to maximum in 8 steps.

Changing the value in BLSTEP will alter the number of steps between maximum and minimum.

9902 Monitor Backlight Function DOWN

Action. Read current backlight value from the GFVT03 monitor which is attached to the MIDAS-GP9-CNT on COM2 port. Subtract the number stored in the CLI BLSTEP register and write it back to the monitor. The monitor will become dimmer.

The monitor backlight read command is #R7000 CRLF. This will return a number between 0 to 31. Subtract the content of BLSTEP, default 4, and write the result back to the monitor. The monitor will go from minimum to maximum in 8 steps.

Changing the value in BLSTEP will alter the number of steps between maximum and minimum backlight.

8.5.1.2 Received TP Contrast Adjustment

NB To high a contrast setting can saturate the colors leading to blurring. To low a value could lead to a loss of color definition.

9903 Monitor Contrast Function UP

Action. Read current contrast value from the GFVT03 monitor which is attached to the MIDAS-GP9-CNT on COM2 port. Add the number stored in the CLI CTSTEP register and write it back to the monitor. The monitor colours will become brighter.

The monitor contrast read command is #R1000 CRLF. This will return a number between 0 to 255. Subtract the content of CTSTEP, default 16, and write the result back to the monitor. The monitor will go from minimum to maximum contrast in 16 steps.

Changing the value in CTSTEP will alter the number of steps between maximum and minimum contrast.

9904 Monitor Contrast Function DOWN

Action. Read current contrast value from the GFVT03 monitor which is attached to the MIDAS-GP9-CNT on COM2 port. Subtract the number stored in the CLI CTSTEP register and write it back to the monitor. The monitor colours will become dimmer.

The monitor contrast read command is #R1000 CRLF. This will return a number between 0 to 255. Subtract the content of CTSTEP, default 16, and write the result back to the monitor. The monitor will go from maximum to minimum contrast in 16 steps.

Changing the value in CTSTEP will alter the number of steps between maximum and minimum contrast.

8.5.1.3 Changing from POINT to LINE Mode, and back, from the Keypad

9905 Point Mode

The Shift/T-A-F key, key 27, is programmed with the value 9905. When the MIDAS-GP9-CNT receives the character sequence 9905 it puts the controller into POINT mode. Only a single output is sent to the ASTRO workstation for every touch. The parameters that have been set in the CLI POINT command apply.

When the SHIFT/T-A-F is pressed the T-A-F key will illuminate red until released, and the keyboard will issue the 9905 code and the MIDAS-GP9-CNT will enter point mode. If the system is currently in POINT mode it will remain in POINT mode.

If the system is in LINE mode from the keypad then the flashing red TOGGLE STATUS key will extinguish.

9906 Line Mode

The Shifty/TOGGLE_STATUS key, key 34 is programmed with the value 9906. When the MIDAS-GP9-CNT receives the character sequence 9905 it puts the controller into POINT mode. When the touch pen is against the screen a continuous output is sent to the ASTRO workstation for every touch. The parameters that have been set in the CLI LINE command apply.

When the SHIFT/TOGGLE_STATUS is pressed the TOGGLE_STATUS key will flash red and the keyboard will issue the 9905 code and the MIDAS-GP9-CNT will enter point mode. If the system is currently in LINE mode it will remain in LINE mode. The TOGGLE_STATUS key will remain flashing to show the operator they are in LINE Mode. Pressing the SHIFT/T-A-F key, key 27, with put the MIDAS-GP9-CNT into POINT Mode and will extinguish the flashing TOGGLE_STATUS key.

9 Maintenance

The GFVT03-CAMMO is monitor with a touch screen and keypad.

Locating the problem to the FRU level is logical and does not require test equipment.

It is always a good start to check the operation of the power supplies. There are two power supplies

The monitor sho

9.1 Field replaceable Parts

FRU	DESCRIPTION	NSN
GFVT03-CAMMO	COMPLETE ASSEMBLY	TBA
GFVT03-TS-EA	TOUCHSCREEN MONITOR	TBA
GFVT03-TS-CNT	TOUCHSCREEN CONTROLLER	TBA
GFVT03-TS-PEN	TOUCHSCREEN STYLUS	TBA
GFVTO3-EA-PDU	MONITOR POWER DISTIBUTION UNIT	TBA
GFVT03-HHC	MONITOR HAND HELD CONTROLLER	TBA
GFVT03-EA-PSU	MONITOR POWER SUPPLY	TBA
MIDAS-GP9-CNT	GP9 CONTROLLER	TBA
MIDAS-GP9-TP40	GP9 TOUCHPAD	TBA
MIDAS-GP9-PSU	GP9 POWER SUPPLY	TBA

Figure 44 Field Replaceable Parts

9.1.1 Locating the Field Replaceable Parts

Image of monitor

9.2 Monitor Alignment

The monitor is factory set for the CAMMO system. The only adjustment that should be required is the Phase adjustment.

The monitor alignment instructions can be found in the *GFVT03-TS-EA Sony DDM Monitor Replacement Installation Instructions DN 2036-003 V1.1* and the *GF VT 03 HHC User Manual DN 1440-0004 V 1.3.docx*

The monitor must be set, using the GFVT03-HHC to the following values. Remember to save any changes you have made in the GFVT03-HHC menu for the values to take affect after power up.

9.2.1 GFVT03-CAMMO Factory Settings

Using the GFVT03-HHC

Backlight	15	
Brightness	103	(Inverted)
Contrast	191	(Inverted)
Vposition	63	
HWidth	2816	(Calculated)
Hposition	117	(Inverted)
Hfine	138	(Inverted)
Phase	18	

Using HyperTerm (9600,8,NP,1 stop bit, no flow) directly into the monitor serial port.

Backlight	15	; #R7000
Brightness	152	; #R0000
Contrast	64	; #R1000
Vposition	63	; #R6000
HClock(Width)	107	; #R4000
Hposition	138	; #R5000
Hfine	117	; #R9000
Phase	18	; #R2000

If the monitor is faulty, use the list of FRU units to determine which part to replace.

9.3 Troubleshooting the Touchscreen

9.3.1 Misalignment.

The touchscreen is mechanically bonded in the factory and cannot be fixed in the field. To check the alignment of touchscreen with a working monitor conduct the following tests.

Connect the monitor DVI connector to a DVI graphics source
Change the input of the monitor from Analogue 1 to DVI, as the primary source.
Run the monitor in Windows 7/10. It will be a GFVT03 with a resolution of 2048x2048.
Open the MIDAS-GP9-CNT Calibration Image with Paint (full screen)

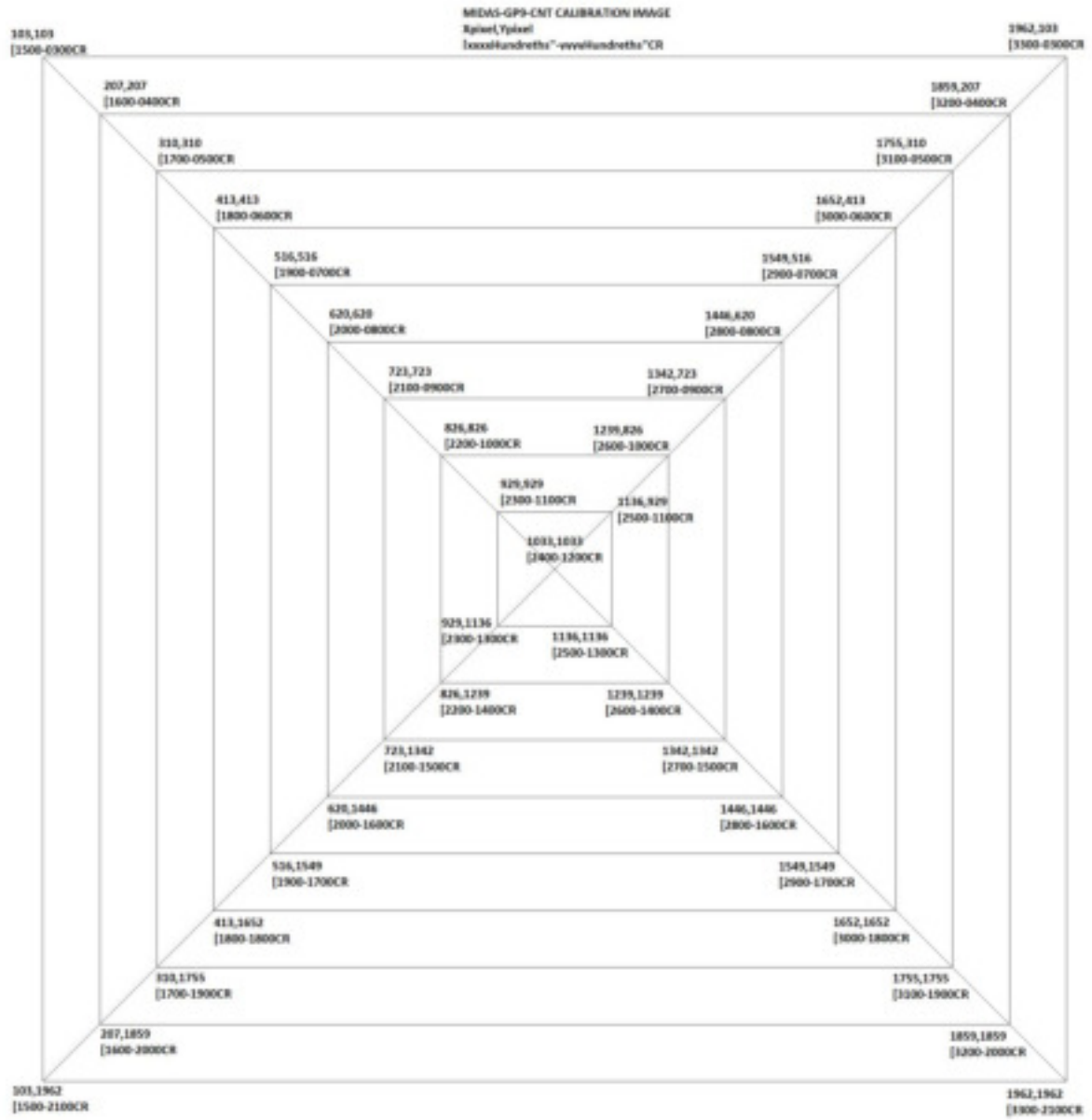


Figure 45 MIDAS-GP9-CNT Calibration Image

The figures in the image are the pixel positions and under them is the expected GP9 output.

Unplug the ASTRO workstation from the rear of the monitor. Connect a RS232 cable into the ASTRO output of the MIDAS-GP9-CNT and connect it to a terminal emulator such as HyperTerm. Set the port to 9600,7,NP,2 stop bits, no flow. Touch the face of the monitor and check that a GP9 position is reported.

Using the fine point end of the GFVT03-TS-PEN stylus, pen the points on the image and check that the output of the MIDAS-GP9-CNT correspond to the values penned.

If a consistent output can not be obtained or if errors of more than +/- 0.05”, the monitor should be exchanged.

If the error is consistent (offset) in either X or Y planes, then check that the H and V datums are set correctly.

9.3.2 No Touchscreen Output

If there is a suspected lack of output from the MIDAS-GP9-CNT controller, unplug the ASTRO workstation from the rear of the monitor. Connect a RS232 cable into the ASTRO output of the MIDAS-GP9-CNT and connect it to a terminal emulator such as HyperTerm. Set the port to 9600,7,NP,2 stop bits, no flow. Touch the face of the monitor and check that no GP9 position is reported.

At the MIDAS-GP9-TP40 keypad press the ADVANCE key and the terminal window should display “3279-2363”. This validates the MIDAS-GP-CNT is working. The problem is with touchscreen or its controller.