

# DOT

PROGRAMMABLE TACTICAL  
AWARENESS CONTROLLER



## USER MANUAL

8.4", 10.4", 12.1", 15.0" TFT LCD



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## **WELCOME.**

With this acquisition of the Programmable Tactical Awareness Controller, the DOT, we welcome you to iTech LCD's family of harsh-duty smart mobile display products. With 20 programmable buttons, this 'smart' DOT offers ASCII or HEX code protocol for control of external systems and/or internal display features.

Housed in an ultra-thin milled billet aluminum case, the slim-profile DOT is light weight and watertight, with fully sealed IP67 connectors; the chassis also meets IP67/ NEMA 6.

Engineered to operate on low power consumption, the DOT manages multiple incoming signals: DVI, RS-170 and VGA, and is auto-sensing on NTSC/PAL. The Source Select Button allows the user to quickly move between video inputs.

Incorporated into the DOT is the latest in optical engineering to achieve optimal viewability in all lighting conditions. This bright sunlight-readable flat panel LED LCD Display is engineered to thrive wherever it is put to work. Offered as an option, the programmable softkeys can control backlight through communication protocol set-up.

This rugged mobile Display is specifically designed to handle a wide-range of harsh environments (dust, water, cold (integrated heater), vibrations) making it the go-to selection of many industries for their mobile applications.

The DOT offers productivity-oriented options: the Red/Green NVIS Compatible display, and Analog Resistive Touch Screen.

# GENERAL SAFETY

## SAFETY ICONS

Safety icons are displayed throughout the DOT User Manual to draw attention to specific User caution and warning instructions.



**WARNING!**

### WARNING! SHOCK HAZARDS

This icon is intended to tell the User of a potential risk of electrical shock.



**CAUTION!**

### CAUTION! INSTRUCTIONAL

This icon is intended to tell the User of important operating and/or maintenance instructions.

## GENERAL SAFETY INSTRUCTIONS

- Before operating the DOT Display, read this User Manual thoroughly
- Keep this User Manual for future use
- Verify the system capability (see System Setup) to ensure operation of the Display
- For expeditious installation, follow these User Manual instructions in sequence
- Adhere to all Caution and Warnings on system and as stated in this User Manual
- User Manual instructions for installation and operation should be followed precisely
- Adjust only those controls covered by the User Manual's operating instructions; improper adjustment of other controls voids the Display's warranty and may result in Display damage, and
- Adhere to local installation codes.

## GENERAL DISPLAY SAFETY

- Always disconnect Display from power source before cleaning
- Do not operate Display with a damaged cable, and
- Do not operate if Display has been dropped or damaged. Unit should be inspected by qualified iTech Service Personnel.



**WARNING!**

### GENERAL SAFETY PRECAUTIONS

- Power cable must be connected to a properly wired and grounded power source
- Any equipment to which the Display is attached must also be connected to properly wired and grounded power sources
- Do not connect or disconnect Display during an electrical storm
- Do not open Display enclosure – there are no User serviceable parts
- Do not disassemble or modify Display to avoid possibility of electrical shock, damage to electrical components or scratching the Display surface, and
- Disassembly of Display voids warranty.

# LCD AND ELECTRICAL SAFETY

## LCD DISPLAY SAFETY

It is recommended Users adhere to personal safety in the instance the DOT display screen should be shattered. Aside from obvious glass shards, the fluids in the LCD are a known skin irritant.



CAUTION!

### FLUIDS FROM LCD DISPLAY

- If Display should become shattered, do not touch fluids from LCD Screen
- If fluid should get on hands or clothing, immediately wipe off with liquid soap or rubbing alcohol on a clean towel; wash with water; immediately consult with a doctor, and
- If fluid gets in the eyes, flush eyes immediately with water for a minimum of 15 minutes; immediately consult with a doctor.

## ELECTRICAL



CAUTION!

### EMI/RFI

Product has been engineered to meet or exceed international industry standards addressing product design and enclosure protection against EMI/RFI.

## CONNECTING CABLES

- Disconnect power to computer when Display is being installed
- Upon installation, verify power input connector is securely seated on Display
- Position power cable so it is not in contact with hot surfaces
- Do not allow anything to rest on power cable, and
- Protect power cable from extreme heat sources.

## POWER SOURCE

- Always connect to a properly grounded DC (standard) power source
- Any equipment to which Display is attached must also be connected to properly wired and grounded power sources
- Operational voltage is 10 - 36 VDC (Input is 12, 24, 28 VDC nominal), and
- Power Consumption is: 30 Watts maximum.



WARNING!

### POWER CONSUMPTION IS 30 WATTS MAXIMUM



CAUTION!

### DISPOSAL

Should a product be retired, dispose responsibly through a technology electronic (E-waste) recycler.

# PRODUCT CARE

## PRODUCT CARE

This DOT Display has been designed to provide optimum performance and service without any required scheduled maintenance other than occasional cleaning. Prior to use, remove the protective film from the Display screen.



Disconnect Display from power source before cleaning Display, optional Touch Screen or Display's enclosure.



- Do not use abrasive or solvent-based (flammable) cleaners on Display enclosure or any other electrical device (cables, power cable, etc.)
- Do not use paper products as they may scratch Display screen, and
- Do not directly apply cleaning solutions to Display screen.

## DISPLAY SCREEN CLEANING

- A vinegar-based cleaner is preferred: prevents streaking, degradation of coatings
- A nonabrasive glass cleaner may be used, as in professional foam glass cleaner
- Apply cleaning solution to a soft clean cloth, dampening slightly
- Keep a fresh side of cleaning cloth towards screen surface to avoid scratching it with accumulated grit as Display screen is made of glass, and
- To minimize risk of abrasion to glass screen, air drying is recommended.

## DISPLAY ENCLOSURE

- Clean Display enclosure with a soft clean cloth lightly dampened with a general purpose mild detergent solution
- Wipe down with clean water; dry with a soft clean cloth.



*In marine or similar environments, a benefit of a vinegar-based cleaner is its effectiveness in dissolving mineral and salt deposits.*

## LONG-TERM STORAGE

- For long-term storage, it is suggested Display be stored in an ambient indoor environment and Display glass be protected from accidental damage
- For pedestal mount units, disconnect cable(s) and loosen arm adjustment to a point where ball can be removed from arm, or
- For Flush or Panel Mount units, cover product with a protective covering that will not scratch or transfer any dyes to Display screen.



Disassembling Display voids warranty. To avoid risk of electrical shock, do not disassemble enclosure; Users cannot service. User maintenance is restricted to cleaning or power cable replacement, as explained.

# MAINTENANCE

## MAINTENANCE

### OTHER MAINTENANCE

Only iTech Qualified Service Personnel should perform all other maintenance except for cleaning and power cable replacement as described.



#### POWER CABLE

To avoid shock and fire hazards, replaced Display's power cable if:

- Insulation becomes damaged, or
- A loose connection is suspected.

## PROTECTION ON SERVICING

### SERVICING - USER

- User Servicing is limited to cleaning the Display
- Do not disassemble or modify the Display to avoid the possibility of electrical shock, damage to its electrical components or scratching the Display surface, and
- Disassembly voids the warranty.

### SERVICING - iTech

iTech Qualified Service Personnel may be required to service the Display

if: Does not operate normally when installation instructions are followed

- Does not operate normally when operating instructions are followed
- Has been dropped or damaged, or
- Exhibits a distinct change in performance, indicating a need for service.

## SHIPPING

If Display should need to be shipped to the iTech Service Center, the original packing material or similar should be used to ensure safety of Display in shipping. Repack Display as it would have originally been received from manufacturer. Protect the Display

# SYSTEM SETUP

### SYSTEM REQUIREMENTS

The DOT accepts Composite and DVI video signals.

### SHIPPING BOX CONTENTS

The DOT is shipped in a custom box with enhanced packaging. Installer should save box and all packaging materials in the instance Display is returned to the iTech Service Center. Shipping box contents are:

- DOT Display

# INSTALLATION

The DOT can be install with: panel mount (M4); VESA Mount (75mm / M4) or RAM mount (M4). Follow known-good practices during installation.



# DISPLAY CONNECTORS

## CABLES

All cables are supplied by End User; the DOT is not shipped with cables.



Use caution when coupling or uncoupling cables and connectors.

## CONNECTORS

The DOT Connectors are fully sealed, and the chassis meets IP67/NEMA 6. From left to right, see Figure 1, Table 1 for connector assignments.

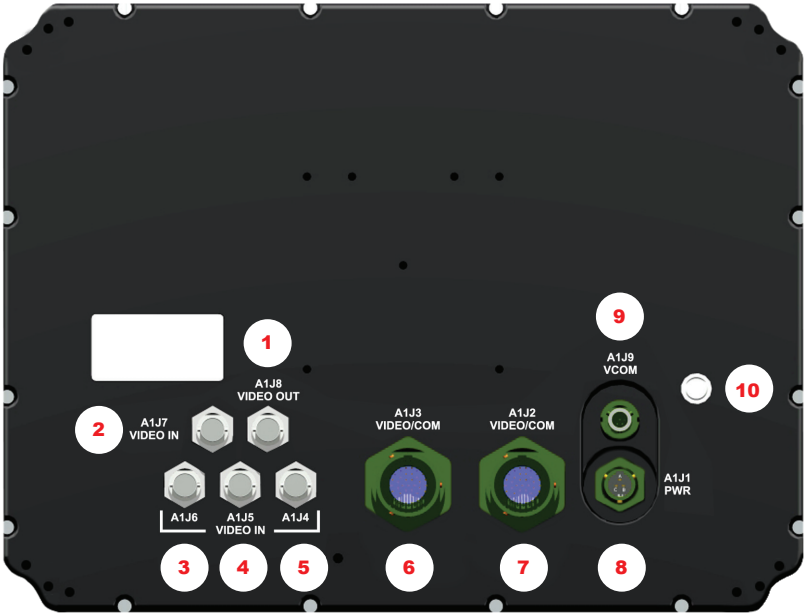


FIGURE 1

POSITION	CONNECTOR	CALL - OUT
1	VIDEO OUT	A1J8
2	VIDEO IN	A1J7
3	VIDEO IN	A1J6
4	VIDEO IN	A1J5
5	VIDEO IN	A1J4
6	DVI	A1J3
7	DVI	A1J2
8	POWER	A1J1
9	VCOM	A1J9
10	PRESSURE EQ.	N/A

TABLE 1

# DISPLAY CONNECTORS (CONTINUED)

## POWER CONNECTOR (A1J1)

The military grade sealed Power Connector is A1J1. See Table 2, right.

- Align up with A1J1 connector; See Figure 1, #8
- Add a twist to lock
- Connector is sealed (IP67)
- End-user supplies cable

*\*PIN C. No Connect, Chassis GND (if applicable)*

## POWER CONNECTOR

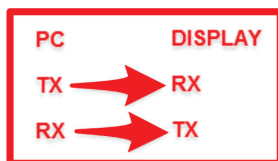
A1J1 PWR	
PIN	SIGNAL
A	28 VOLT DC
B	28 VOLT RTN
C	NO CONNECT*
AMPH	71-533721-33P
MATE	PT06E-833SSR

**TABLE 2**

## DVI RECEPTACLES (A1J2, A1J3)

See Table 3, below.

- Align with A1J2 or A1J3 connector; See Figure 1, #7, #6
- Add a twist to lock
- Connector is sealed (IP67)
- End-user supplies cable



## DVI RECEPTACLE

A1J2, A1J3 DVI			
PIN	SIGNAL	PIN	SIGNAL
1	DVI RX2-	21	DVI AN BLUE
2	DVI RX2+	22	DVI HSYNC
3	DVI RX2 GROUND	23	ANALOG GROUND
4	DVI DDC SCL	24	DIGITAL GROUND
5	DVI DDC SDA	25	USB- TOUCH
6	DVI VSYNC	26	USB+ TOUCH
7	DVI RX1-	27	DIGITAL GROUND
8	DVI RX1+	28	RS232 RXD TOUCH
9	DVI RX1 GROUND	29	RS232 TXD TOUCH
10	DVI +5V	30	DIGITAL GROUND
11	DVI DDC GROUND	31	RS232 TXD COM
12	DVI HPD	32	RS232 RXD COM
13	DVI RX0-	33	DIGITAL GROUND
14	DVI RX0+	34	RS422 TX+ COM
15	DVI RX0 GROUND	35	RS422 TX- COM
16	DVI RXC+	36	RS422 RX+ COM
17	DVI RXC-	37	RS422 RX- COM
18	DVI RXC GROUND	AMPH	MS27468T15B35P
19	DVI AN RED	MATE	MS27467E15B35S
20	DVI AN GREEN	STRAIN	M85049/49-2-14W

**TABLE 3**

# DISPLAY CONNECTORS (CONTINUED)

## COMPOSITE - VIDEO IN (A1J4 - A1J7)

The center pin BNC Connectors - VIDEO IN (A1J4-A1J7) allow input of auxiliary composite video signals. See Table 4.

- Align with A1J4-A1J7 - IN connector; See Figure 1; #5, #4, #3, #2
- Add a twist to lock
- BNC receptacle is sealed (IP67)
- End-user supplies cables

## COMPOSITE - VIDEO OUT (A1J8)

The center pin BNC Connector - VIDEO OUT (A1J8) provides pass-through of composite video signal. See Table 5.

- Align with A1J8 - OUT connector; See Figure 1, #1
- Add a twist to lock
- BNC receptacle is sealed (IP67)
- End-user supplies cable

## VCOM (A1J9)

The VCOM (A1J9) connector allows for camera installation, and communicates only with BNC connector A1J4 (Programmable Buttons). See Table 6.

- Align with A1J9 - VCOM connector; See Figure 1, #9
- Connector is sealed (IP67)
- End-user supplies cable

BNC CONNECTOR - IN	
A1J4 - A1J7	
PIN	SIGNAL
1	VID_IN
2	GROUND


TABLE 4

BNC CONNECTOR - OUT	
A1J8	
PIN	SIGNAL
CENTER	VID_OUT
SHELL	GROUND

TABLE 5

VCOM	
A1J9	
PIN	SIGNAL
1	RS422 TX+ COM
2	RS232 TXD COM
3	RS232 RXD COM
4	DIGITAL GROUND
5	RS422 RX+ COM
6	RS422 TX- COM
7	RS422 RX- COM
AMPH	803-015-07ZN6-7PN
MATE	803-001-06ZN6-7SN

TABLE 6



**CAUTION!**

Do not block or constrain the Pressure Equalizer Valve.

## PRESSURE EQUALIZER VALVE

There is a Pressure Equalizer Valve on the chassis, see Figure 1, #10. See Figure 2 for close-up. In the final installation, do not block or constrain this valve.



FIGURE 2

# MAIN MENU

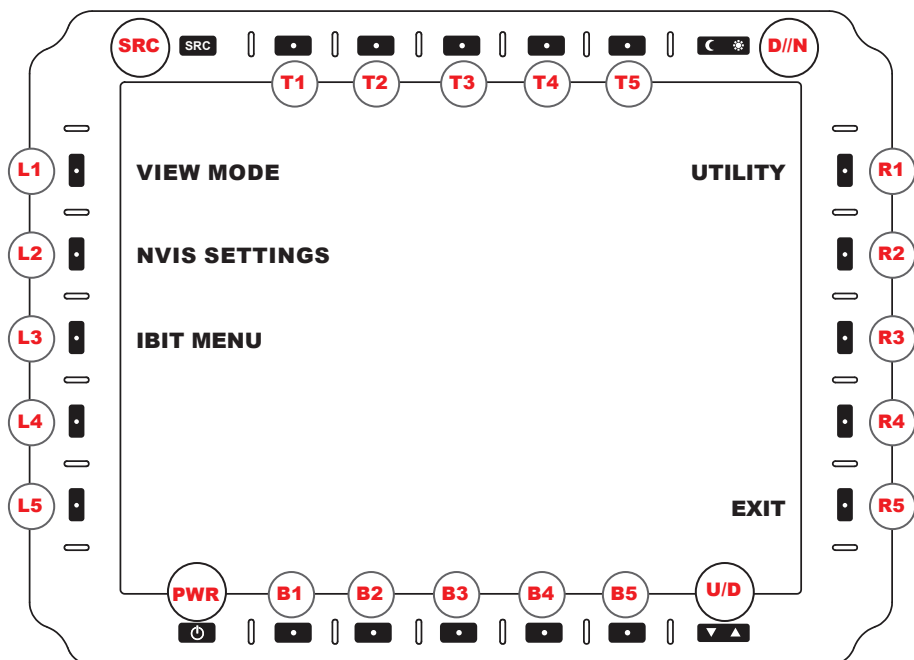


FIGURE 3

## MAIN MENU ACCESS

Power ON the display using the Power button (bottom row, left button). Rapid power cycling (ON/OFF/ON) is not supported. Several User Menus are factory-set in the DOT. To access the Main Menu (Figure 3) which allows access to DOT's submenus, hold down the SOURCE button for three (3) seconds (top row, far left).

**SRC**

The SOURCE Button (SRC) is located on the top row of softkeys, the first button on the left, as indicated in Figure 3. Other softkey are explained in following user manual sections.



USER TIP

*Hold SOURCE (SRC) button for three (3) seconds to enter Main Menu Screen.*

## MAIN MENU

The MAIN MENU is the user's entry portal to submenus. From this top level, the following submenus are accessed, which opens additional tiers of extended submenus. To access the MAIN MENU, hold down the SOURCE BUTTON for three (3) seconds.

- VIEW MODE: Manage VIEW settings for each communication port
- NVIS SETTINGS (OPTIONAL): Set NVIS to Green or Red master color
- IBIT: Initiate Built-In-Test (IBIT) checks system functionality, and
- UTILITY: Start-up Options; Programmable Button Set-up; Factory Reset.

# VIEW MODE MENU

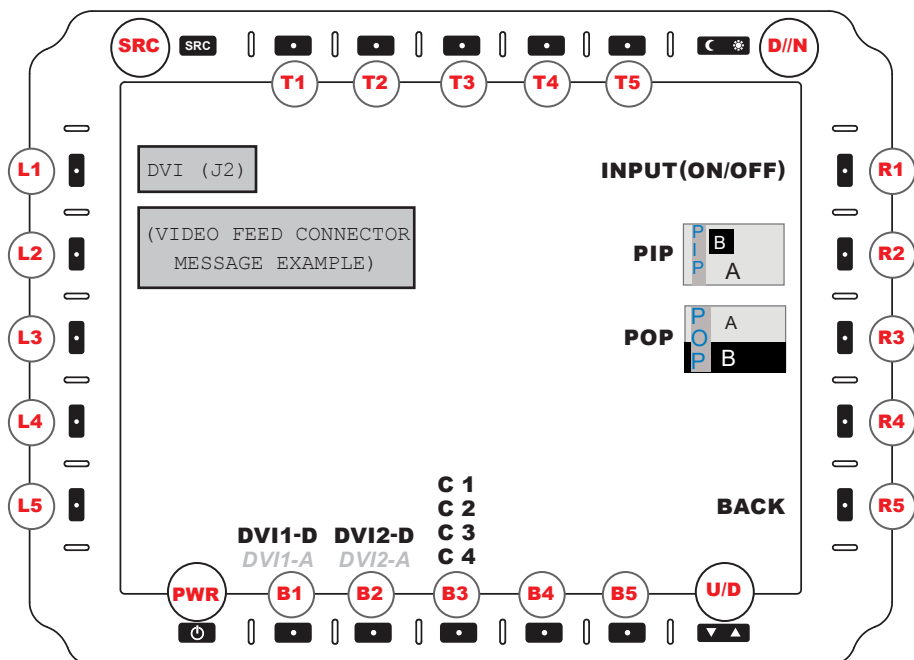


FIGURE 4

## VIDEO STATUS MESSAGE

In the upper left corner of the screen a popup information window indicates the VIDEO STATUS when feed is changed from one input to another. (Figure 4).

This message will list the physical port and resolution detected, or if no feed, physical port and 'no video'. The video detected information will display for approximately five (5) seconds. If there is no video feed, message will state 'no video' until video is detected.

## VIEW MODE MENU

To enter the VIEW MODE MENU (Figure 4), select L1 from the MAIN MENU (Figure 3). VIEW MODE MENU is dedicated to selecting specific video settings for each physical port. Note: View settings of individual video feeds are independent of each other.

Across the lower edge of the front bezel are the 'B' (Bottom) softkeys buttons. Select one of the bottom softkeys to modify that specific physical port: B1: DVI1-D (Digital) and DVI1-A (Analog); B2: DVI2-D; DVI2-A; B3: C1/C2/C3/C4. The button and corresponding port will be highlighted when selected. Any changes made to video mode settings will only affect the highlighted port.

On the right side of the bezel are the 'R' (RIGHT) softkeys. Softkey R1 allows the user to turn ON or OFF specific physical ports. Keys (R2 - R3) are used for selecting dual video feeds, and how they display on the screen.

# VIDEO MODE MENU (CONTINUED)



*Video Feed Settings are configured independently of each other.*

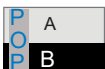
## VIDEO SCALING OPTIONS

There are VIDEO SCALING OPTIONS available to customize the video feed view on the DOT's display screen. These control softkeys are located on the front bezel, right.

**INPUT (ON/OFF) (Source) (R1).** Selects button R1, INPUT, to choose the input source to ENABLE (ON) or DISABLE (OFF) input from the source selection.



**PIP (R2).** Selects PIP (R2) to enter into Picture-In-Picture (PIP) layout menu. This feature is reviewed in a following menu section.



**POP (R3).** Selects POP (R3) to enter into Picture-Over-Picture (POP) layout menu. This feature is reviewed in a following menu section.

**BACK (R5).** Returns to MAIN MENU (Figure 3).

# PICTURE-IN-PICTURE (PIP) OPTIONS MENU

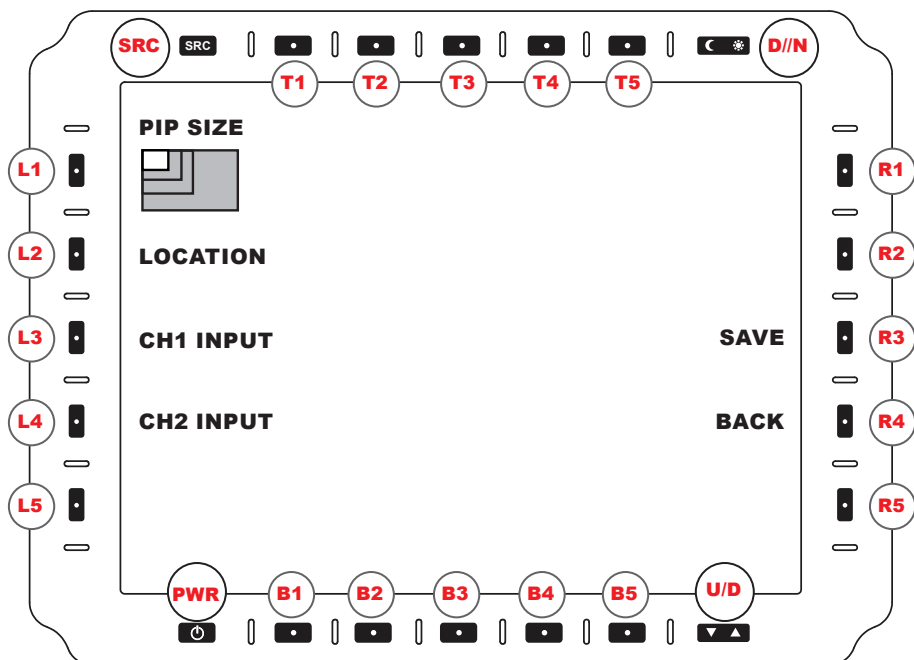


FIGURE 5

## PICTURE-IN-PICTURE (PIP) OPTIONS MENU

To enter the PIP (PICTURE-IN-PICTURE) OPTIONS MENU (Figure 5), select PIP (R2) from VIEW MODE MENU (Figure 4). User determines feed assigned to dual-view PIP setting.

**Note:** *Buttons and Touch are active on the input displayed in the larger view.*

**PIP SIZE (L1).** Cycles through three (3) PIP SIZES: Small; Medium; Large. Each press increases the size to next, then returns PIP to default (Small).

**LOCATION (L2).** Cycles through five (5) possible screen locations:

Top Left; Bottom Left; Top Right; Bottom Right; and Center.

**CH1 INPUT (L3).** Cycles CH1 input sources for configuration in PIP view.

**CH2 INPUT (L4).** Cycles CH2 input sources for configuration in PIP view.

**SAVE (R4).** Opens SAVE VIEW MENU (See Section Save View Menu, Figure 7).

**BACK (R5).** Returns to VIEW MODE MENU (Figure 4).



USER TIP

*Buttons and Touch are active on the input displayed in the larger view.*

# PICTURE-OVER-PICTURE (POP) OPTIONS MENU

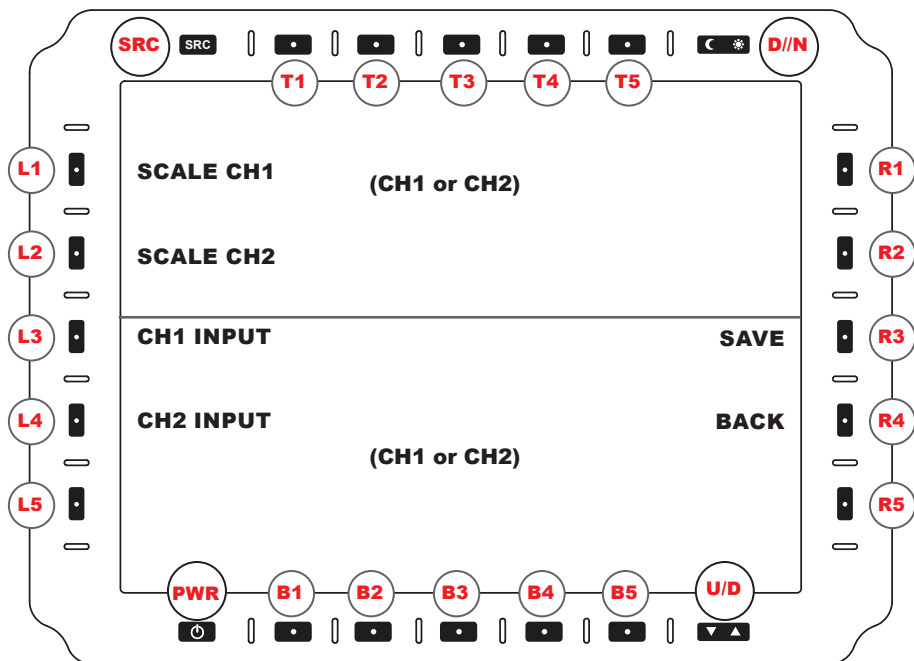


FIGURE 6

## PICTURE-OVER-PICTURE (POP) OPTIONS MENU

To enter the POP (PICTURE-OVER-PICTURE) OPTIONS MENU (Figure 6), select POP (R3) from VIEW MODE MENU (Figure 4). User determines input feed assigned to dual-view POP setting.

POP settings are Stretched or Cropped. Cropped scaling displays the middle 50% of video and crops the top and bottom by 25%.

**SCALE CH1 (L1).** Cycles Top Window options: Stretched; Cropped

**Note: Buttons and touch are active on this displayed top view.**

**SCALE CH2 (L2).** Cycles Bottom Window options: Stretched; Cropped

**CH1 INPUT (L3).** Cycles through CH1 input sources.

**CH2 INPUT (L4).** Cycles through CH2 input sources.

**SAVE (R4).** Opens SAVE VIEW MENU (See Section Save View Menu, Figure 7).

**BACK (R5).** Returns to VIEW MODE MENU (Figure 4).



*Buttons and touch are active on the TOP WINDOW displayed view.*



# SAVE VIEW MENU

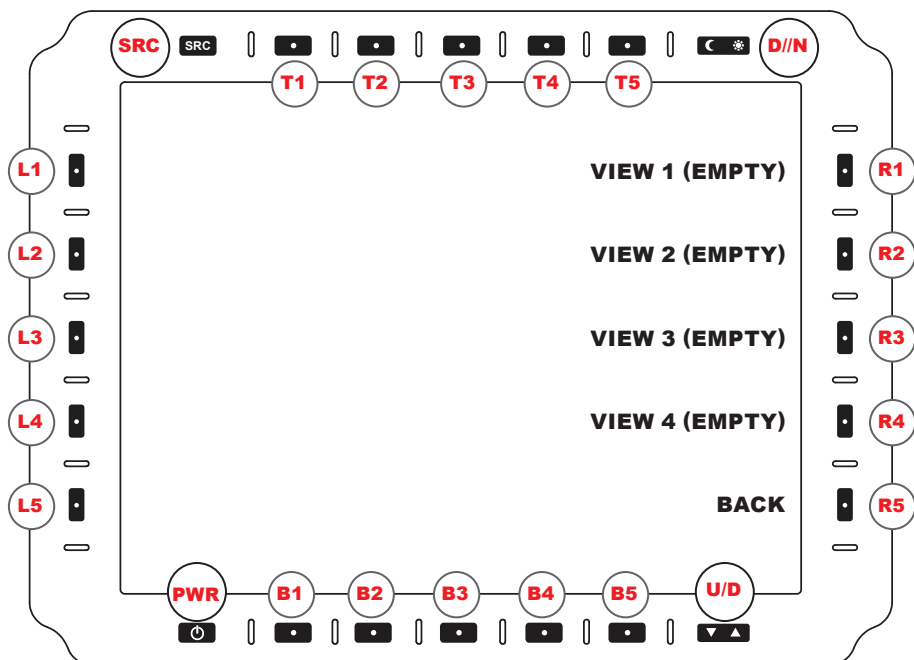


FIGURE 7

## SAVE VIEW MENU

Use the SAVE VIEW MENU to save PIP (Figure 5) or POP (Figure 6) configurations. Select entry using R (Right) softkey buttons. Go to section NAME ENTRY MENU (Figure 8) to name views.

**VIEW 1 (R1).** Saves to PIP/POP VIEW 1 entry. NAME ENTRY MENU (Figure 8) opens.

**VIEW 2 (R2).** Saves to PIP/POP VIEW 2 entry. NAME ENTRY MENU opens.

**VIEW 3 (R3).** Saves to PIP/POP VIEW 3 entry. NAME ENTRY MENU opens.

**VIEW 4 (R4).** Saves to PIP/POP VIEW 4 entry. NAME ENTRY MENU opens.

**BACK (R5).** Returns to PIP or POP MENU (Figure 5 or 6).

# NAME ENTRY MENU

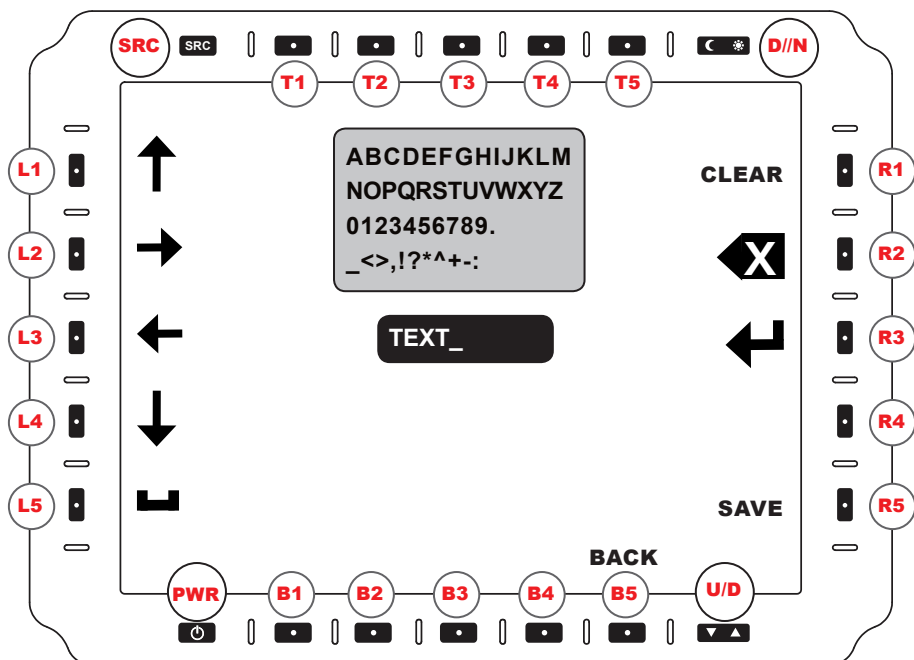


FIGURE 8

## NAME ENTRY MENU

The NAME ENTRY MENU (Figure 8) is where the user can name the SAVE VIEW previously created. (Figure 7). Use the Left and Right softkeys to navigate. Text assigned will appear in the TEXT field on the screen.

**LEFT (L3).** Navigates Selection Cursor LEFT.

**RIGHT (L2).** Navigates Selection Cursor RIGHT.

**UP (L1).** Navigates Selection Cursor UP.

**DOWN (L4).** Navigates Selection Cursor DOWN.

**SPACE (L5).** Adds an empty SPACE (as in a spacebar press).

**CLEAR (R1).** Clears Current Characters.

**BACKSPACE (R2).** Deletes Last Character.

**SELECT (R3).** Enters Character.

**SAVE (R5).** Exits Menu while saving changes.

**BACK (B5).** Returns to SAVE VIEW MENU (Figure 7).

# OPTIONAL NVIS SETTINGS MENU

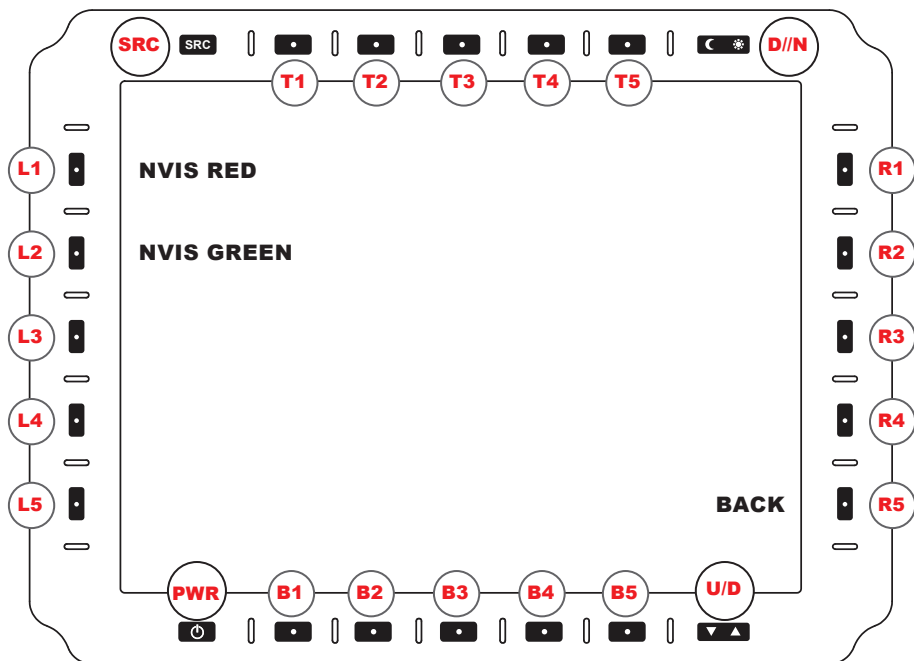


FIGURE 9

## NVIS SETTINGS MENU (OPTIONAL)

THE OPTIONAL NVIS RED / GREEN OPTION ALLOWS INTERFACING WITH NIGHT VISION DEVICES WITHOUT ADVERSE EFFECTS. The NVIS SETTINGS MENU (Figure 9) is accessed through L2 from the MAIN MENU (Figure 3), and allows the user to make NVIS viewing color selections.

**NVIS RED (L1).** Selects the NVIS RED view color.

**NVIS GREEN (L2).** Selects the NVIS GREEN view color. Default is GREEN.

**BACK (R5).** Returns to MAIN MENU (Figure 3).

# IBIT SYSTEM TESTS

## BIT SYSTEM TESTS

---

Utilized to improve the reliability, safety, and security of mission-critical applications, Built-in-test (BIT) applications offer the ability to quickly and easily identify a specific component when a fault is detected. This is the fundamental promise of an effective Built-in-tests (BIT) system. BITs are self-test processes supporting display maintenance in that they monitor the display, as well as detect and isolate faults of the display.

BIT applications also offer tools to identify operational readiness, or where necessary, identify specific degraded or failed conditions relative to the display. The DOT supports three (3) Built-In-Test (BIT) components: Power-UP BIT (P-BIT) Initiated BIT (I-BIT), and Continuous BIT (C-BIT). P-BIT runs at Power ON; I-BIT confirms all systems are functioning, and C-BIT runs in the background.

All BIT results are stored in memory with time and date stamping, and failures are listed in the Test Log Box as shown on the display screen.

## DOT SYSTEM TESTS

---

BIT system tests present the ability to know that a fault exists. Table 10 provides the DOT BIT System Test Summary with brief definitions of the BIT available for the DOT. Tests are designed to assess the health of the display and to improve diagnostics, minimize maintenance, and reduced debugging time.

Running Initiated BIT (I-BIT) allows the user to confirm specific monitor systems are functioning. I-BIT results are shown in the test log box in the center of the display screen. Table 10 explains System Tests Error Codes, and Table 11 lists System Tests.

Power-UP BIT (P-BIT), is a series of BITs the display initiates at Power ON. P-BIT searches for errors, and provides confirmation that specific systems are functioning at Power ON. Systems tested are: RAM, ROM, EEP, and Device (1 - 2).

For the purpose of detecting an external communications error from an incoming signal, Continuous BIT (C-BIT) runs in the background. C-BIT verifies the input connector is operative by verifying data integrity through the external communications port.

All BIT results are stored in memory with time and date stamping, and failures are listed in the Test Log Box as shown on the display screen.

# IBIT MENU

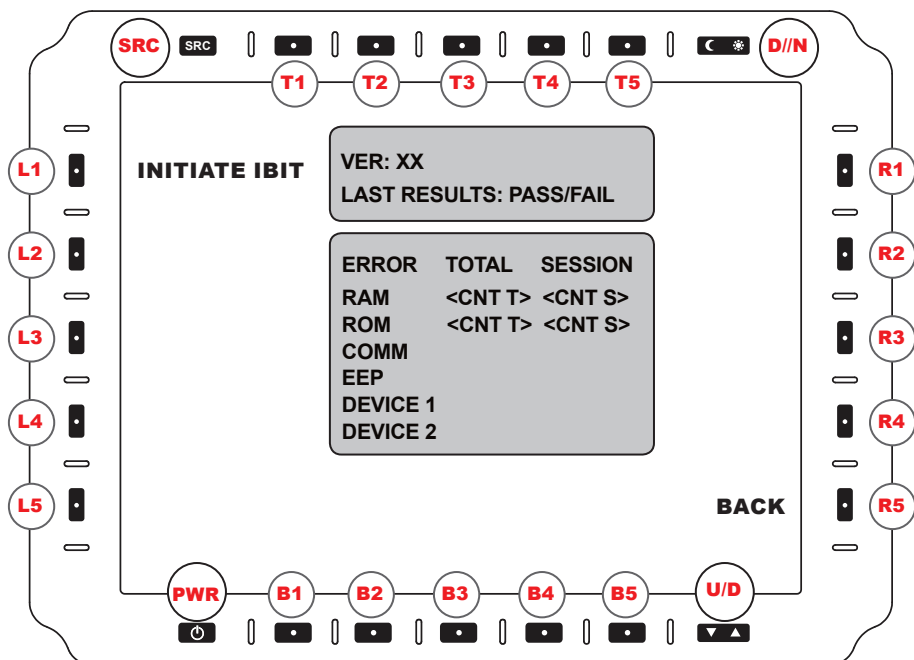


FIGURE 10

## IBIT (INITIATE BIT) MENU

The DOT supports a Built-In-Test (BIT) component, Initiate BIT. This process detects and isolates faults to help the user identify the operational readiness, or where necessary, identify degraded or failed system conditions. Results of BIT failures are stored in memory.

**INITIATE IBIT (L1).** Running the INITIATE BIT (IBIT) allows the user to confirm all systems are functioning. Results are shown as counts per category in the test log box in the center of the display screen. Select INITIATE IBIT to start the process (Figure 10).

**TEST LOG BOX FIELDS.** See Figure 10 for example. The Test Log Box Fields indicate the following:

- Version of the IBIT test run
- Lists the overall result of last IBIT test: PASS or FAIL
- TOTAL: Lists the total ERROR count from unit's initial power ON (manufacture date)
- SESSION: Lists the ERROR count from unit's current power ON session, and
- Lists an Error Code (See ERROR CODES, Table 10, following page).

## IBIT MENU (CONTINUED)

**ERROR CODES.** If there are conflicts within the DOT, they may be indicated by the following ERROR CODES (Table 10). The Error Code is displayed in the on-screen Error Log Message. Example: "ERROR 1 (IF ANY)".

**BACK (R5).** Returns to MAIN MENU (Figure 3).

ERROR CODES	ERROR CODE EXPLANATION
RAM ERROR	A series of bit patterns are written across the RAM. The test fails if the pattern read back at an address does not match the written pattern.
ROM ERROR	Bootloader firmware or application firmware validation failed. This could be due to a bad checksum, file length or incorrect meta-data.
COMM ERROR	The microcontroller detected a framing, parity or overrun error when receiving data from the external communication port.
EEP ERROR	EEP file header was incorrect or communication with the device failed.
DEVICE (1) ERR	Failed communication with Video Decoder.
DEVICE (2) ERR	Failed communication with Bezel Key Circuit.

**TABLE 10**

*This section is intentionally left blank.*

## EVENTS PERFORMED AT BUILT-IN-TEST (BIT)

The System Test can be run at Power ON, when initiated by a BIT serial command, when initiated by the user from the I-BIT menu, or System Test can run continuously. Table 11 shows when each test is run, in various BITs: Power-up (P-BIT); Initiated Serial and Initiated Menu (I-BIT), and Continuous (C-BIT).

**Events Performed at P-BIT, I-BIT and C-BIT**

SYSTEM TEST NAME	POWER UP	INITIATED SERIAL	INITIATED MENU	CONTINUOUS
RAM ERROR	YES	YES	YES	NO
ROM ERROR	YES	YES	YES	NO
COMM ERROR	YES	NO	NO	YES
EEP ERROR	YES	YES	YES	NO
DEVICE (1) ERROR	YES	YES	YES	NO
DEVICE (2) ERROR	YES	YES	YES	NO

**TABLE 11**

*This section is intentionally left blank.*

# UTILITY MENU

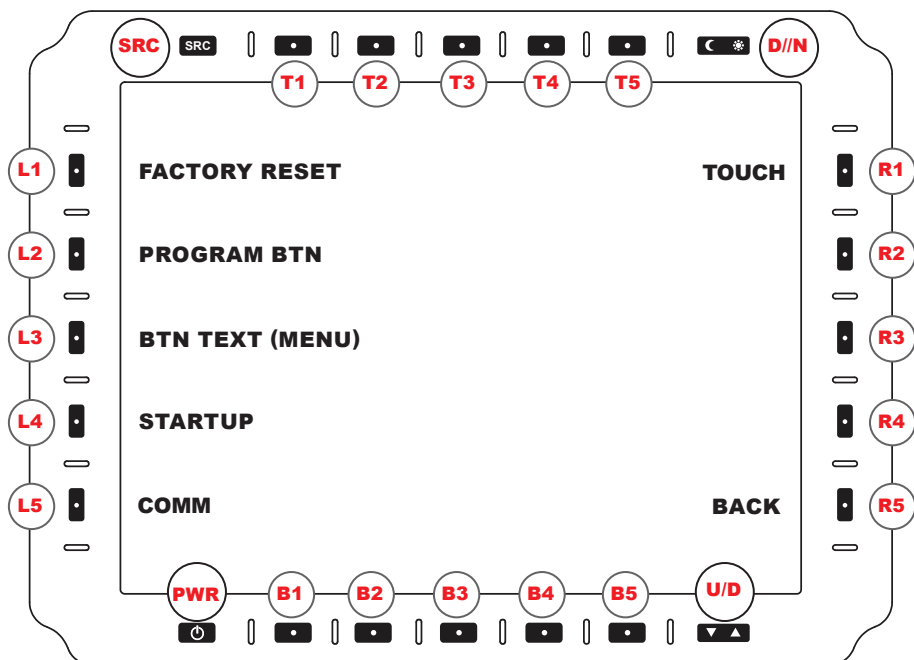


FIGURE 11

## UTILITY MENU

From the MAIN MENU (Figure 3), the UTILITY MENU (Figure 11) is accessed through R1.

**FACTORY RESET (L1).** Select FACTORY RESET to reset monitor to factory defaults:

- VIDEO SOURCES: All ENABLED; DVI (1 and 2), Digital, Analog, and Composites (4)
- SERIAL COMMUNICATIONS PORTS: Sets to RS232
- NVIS COLOR (If Applicable): Sets to GREEN
- CONTRAST: Resets to a predetermined factory setting, and
- KEY DOWN/KEY UP: Restores to Text List (See Section Communication Protocol > Factory Default Key Down and Key Up Transmit Text).
- BUTTON TEXT: restores to Always ON.

**PROGRAM BTN (L2).** Initiates PROGRAMMABLE BUTTON MENU (Figure 16).

**BTN TEXT (MENU) (L3).** Supports OSD timeout options of Button Label Text after opening a menu or following a button press. Cycle through the options of **1: Always ON (default)**. **2: Hide**. **3: Timeout 3 sec**. **4: Timeout 5 sec**. **5: Timeout 7 secs**.

**STARTUP (L4).** Opens STARTUP MENU (Figure 12).

**COMM (L5).** Opens SERIAL COMMUNICATIONS OPTIONS Menu.

**TOUCH (R1).** Opens TOUCHSCREEN OPTIONS Menu.

**BACK (R5).** Returns to MAIN MENU (Figure 3).



# STARTUP MENU

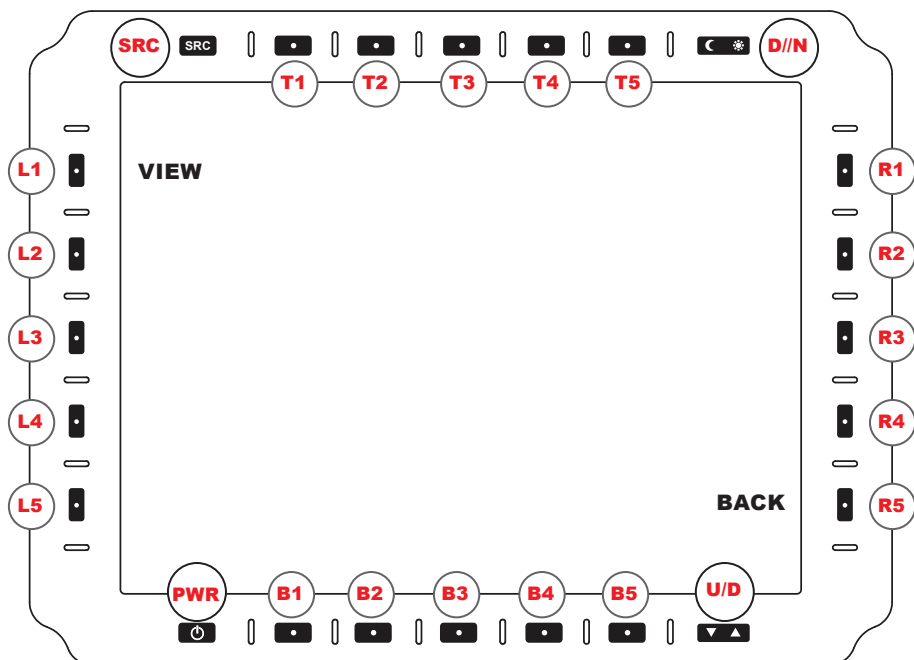


FIGURE 12

## STARTUP MENU

From the UTILITY MENU (Figure 11), the STARTUP MENU (Figure 12) is accessed through softkey button L4.

**VIEW (L1).** Enters VIEW STARTUP MENU (Figure 13).

**BACK (R5).** Returns to UTILITY MENU (Figure 11).

*This section is intentionally left blank.*

# VIEW STARTUP MENU

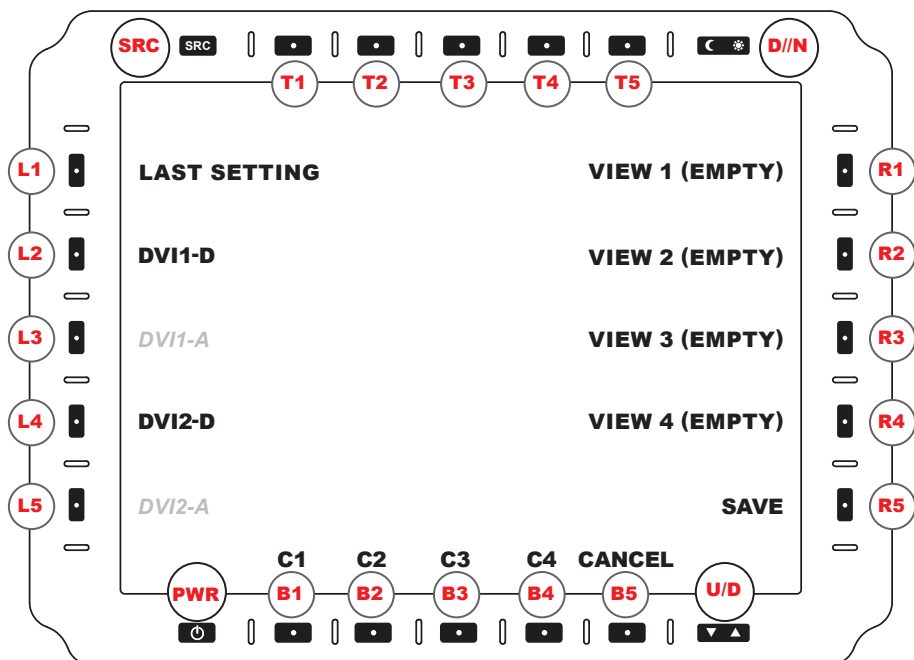


FIGURE 13

## VIEW STARTUP MENU

From STARTUP MENU (Figure 12), VIEW STARTUP MENU (Figure 13) is accessed through softkey button L2.

**LAST SETTING (L1).** Starts with last used view.

**DVI1-D (L2).** Starts with DVI1-D (Digital) fullscreen.

**DVI1-A (L3).** Starts with DVI1-A (Analog) fullscreen.

**DVI2-D (L4).** Starts with DVI2-D (Digital) fullscreen.

**DVI2-A (L5).** Starts with DVI2-A (Analog) fullscreen.

**C1 (B1).** Starts with Composite 1 fullscreen.

**C2 (B2).** Starts with Composite 2 fullscreen.

**C3 (B3).** Starts with Composite 3 fullscreen.

**C4 (B4).** Starts with Composite 4 fullscreen.

**VIEW 1 (R1).** Starts with PIP/POP View 1.

**VIEW 2 (R2).** Starts with PIP/POP View 2.

**VIEW 3 (R3).** Starts with PIP/POP View 3.

**VIEW 4 (R4).** Starts with PIP/POP View 4.

**SAVE (R5).** Saves Selection for Power ON view. Auto-returns to STARTUP MENU.

**CANCEL (B5).** Cancels entry. Returns to STARTUP MENU (Figure 12).

# SERIAL COMMUNICATIONS OPTIONS MENU

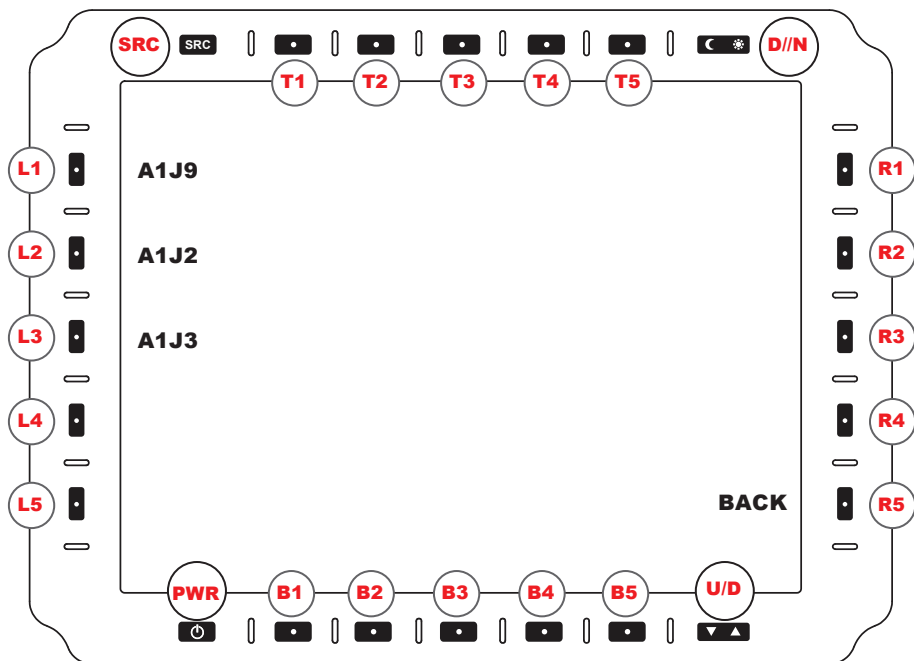


FIGURE 14

## SERIAL COMMUNICATIONS OPTIONS MENU

From the STARTUP MENU (Figure 12), the SERIAL COMMUNICATIONS OPTIONS MENU (Figure 14) is accessed through softkey button L5, COMM.

**A1J9 (L1).** Select RS232 or RS422 for A1J9 port (for use with A1J4; RS-170).

**A1J2 (L2).** Select RS232 or RS422 for A1J2 port (DVI1).

**A1J3 (L3).** Select RS232 or RS422 for A1J3 port (DVI2).

**BACK (R5).** Returns to STARTUP MENU (Figure 12).

*This section is intentionally left blank.*

# OPTION TOUCH SCREEN OPTIONS MENU

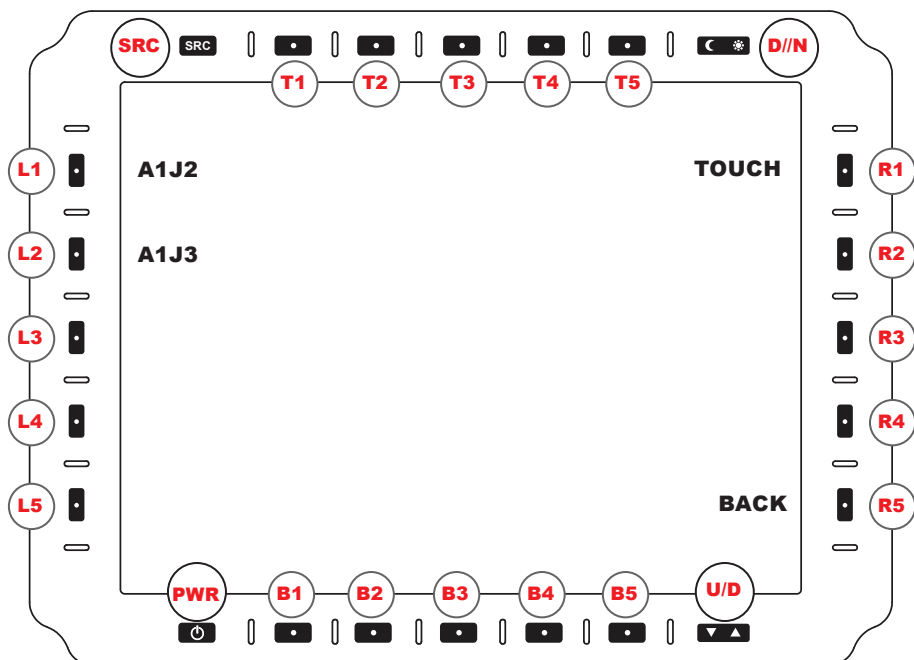


FIGURE 15

## OPTION TOUCH SCREEN OPTIONS MENU

If Touch Screen was ordered at time of production, the unit has the touch feature. From the STARTUP MENU (Figure 12), the TOUCH SCREEN OPTIONS MENU (Figure 15) is accessed through softkey button R1, TOUCH.

**A1J2 (L1).** Select USB (default) or RS232 Touch Interface for A1J2 port.

**A1J3 (L2).** Select USB (default) or RS232 Touch Interface for A1J3 port.

**BACK (R5).** Returns to STARTUP MENU (Figure 12).

*This section is intentionally left blank.*

# PROGRAMMABLE BUTTON MENU (SELECT BUTTON)

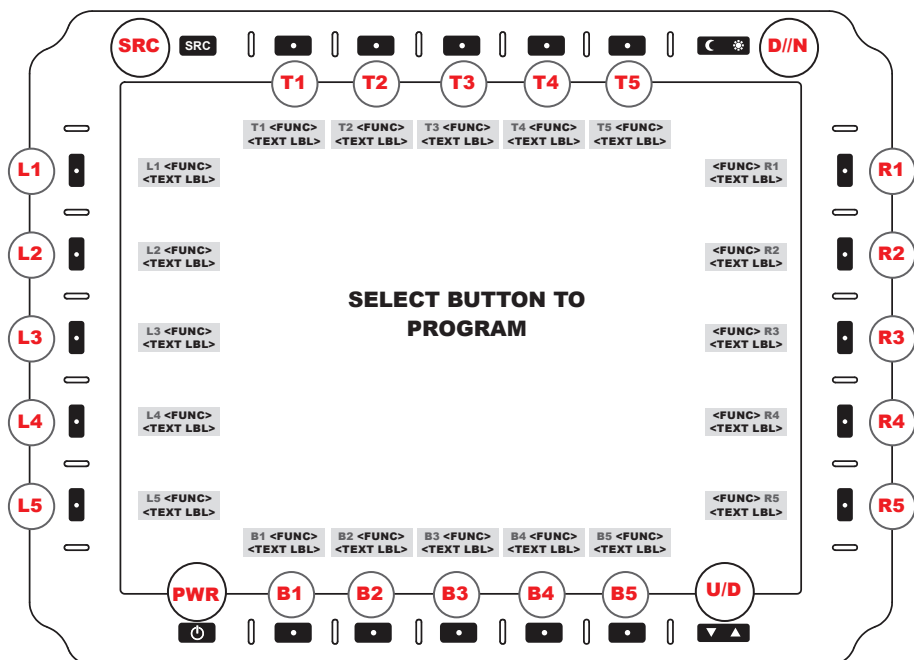


FIGURE 16

## PROGRAMMABLE BUTTON ASSIGNMENT MENU (SELECT BUTTON)

The front bezel twenty (20) softkeys are in a layout of five keys on the left (L1-5), right (R1-5), bottom (B1-5) and top, (T1-5) (Figure 29). Use these keys to select on-screen menu options. The keys are illuminated in Day or Night mode and off in Off mode. Night luminance is subdued to match existing platform lighting.

Identification of the assigned function should be visible next to the key selected.

**Additional softkey information is communicated over the serial communication link as provided by the Host device.**

### KEY DOWN/KEY UP

When Keys are programmed with the COMM CMD function, they will transmit a Key Down message and Key Up message. Simultaneous Key presses can be detected when multiple Key Down messages are transmitted before Key Up messages are transmitted.

For example, L1-down (hold) followed by L2-down.

### DSE'S ALTERNATE PROGRAMMING SOFTWARE

DSE's Alternate Programming Software allows for customizing the OSD labels, button functions, and Key Down/Up messages. See iTech's website for the instructions document or e-mail: [info@itechlcd.com](mailto:info@itechlcd.com) for assistance.

# PROGRAMMABLE BUTTON MENU (SET FUNCTION)

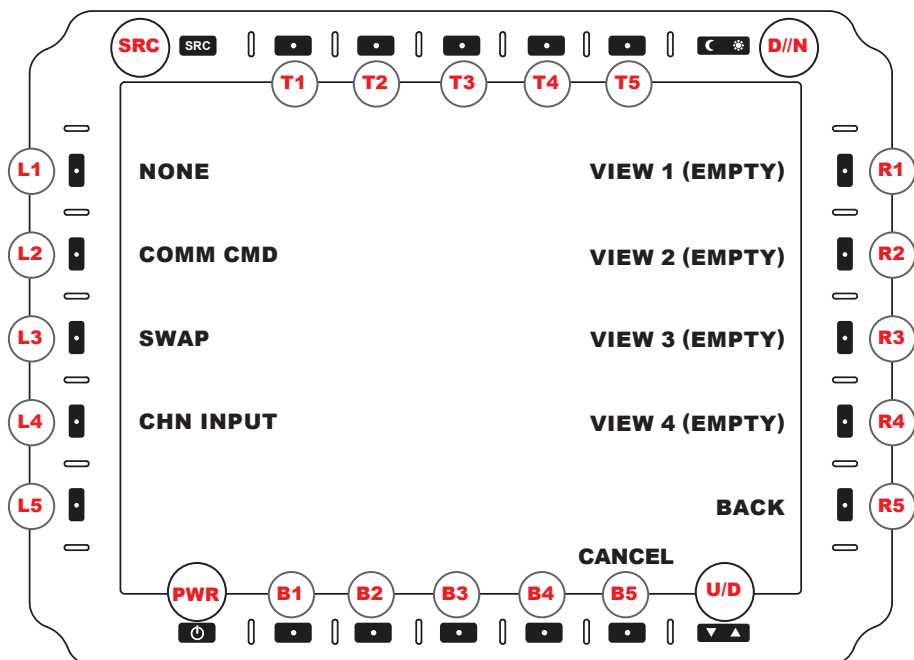


FIGURE 17

## PROGRAMMABLE BUTTON MENU (SET FUNCTION)

User selects a button (Figure 17) to set a specific function into the button.

**NONE (L1).** No action takes place when button is pressed.

**COMM CMD (L2).** Programmed text command transmits when button is pressed.

**SWAP (L3).** CH1 and CH2 swap inputs.

**CHN INPUT (L5).** Opens Input Function Menu.

**VIEW 1 (R1).** User-configured layout entry 1 toggles ON and OFF. 'Empty' displays or the saved PIP/POP view name.

**VIEW 2 (R2).** User-configured layout entry 2 toggles ON and OFF. 'Empty' displays or the saved PIP/POP view name.

**VIEW 3 (R3).** User-configured layout entry 3 toggles ON and OFF. 'Empty' displays or the saved PIP/POP view name.

**VIEW 4 (R4).** User-configured layout entry 4 toggles ON and OFF. 'Empty' displays or the saved PIP/POP view name.

**BACK (R5).** Returns to SELECT BUTTON MENU, (Figure 16).

**CANCEL (B5).** Cancels entry. Returns to UTILITY MENU (Figure 11).

# PROGRAMMABLE BUTTON (SET INPUT FUNCTION)

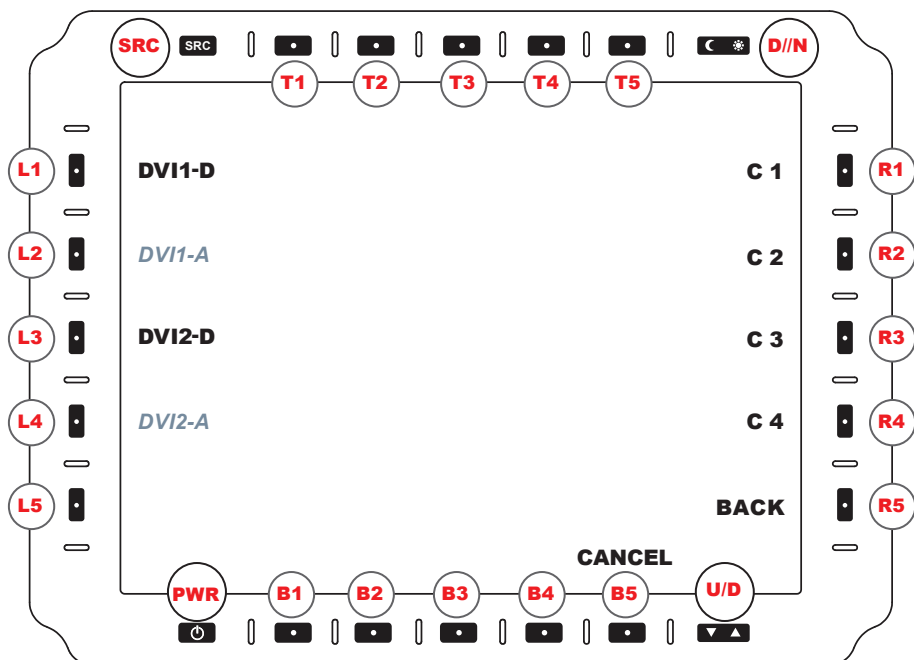


FIGURE 18

## PROGRAMMABLE BUTTON MENU (SET INPUT FUNCTION)

User selects a button (Figure 18) to set video feed input.

**DVI1-D (L1).** CH1 displays the DVI1-D (Digital) Input.

**DVI1-A (L2).** CH1 displays the DVI1-A (Analog) Input.

**DVI2-D (L3).** CH1 displays the DVI2-D (Digital) Input.

**DVI2-A (L4).** CH2 displays the DVI1-A (Analog) Input.

**C1 (R1).** CH1 displays the Composite 1 Input.

**C2 (R2).** CH1 displays the Composite 2 Input.

**C3 (R3).** CH1 displays the Composite 3 Input.

**C4 (R4).** CH1 displays the Composite 4 Input.

**BACK (R5).** Returns to SET FUNCTION (Figure 17).

**CANCEL (B5).** Cancels entry; returns to UTILITY MENU (Figure 11).

# PROGRAMMABLE BUTTON MENU (ENTER NAME)

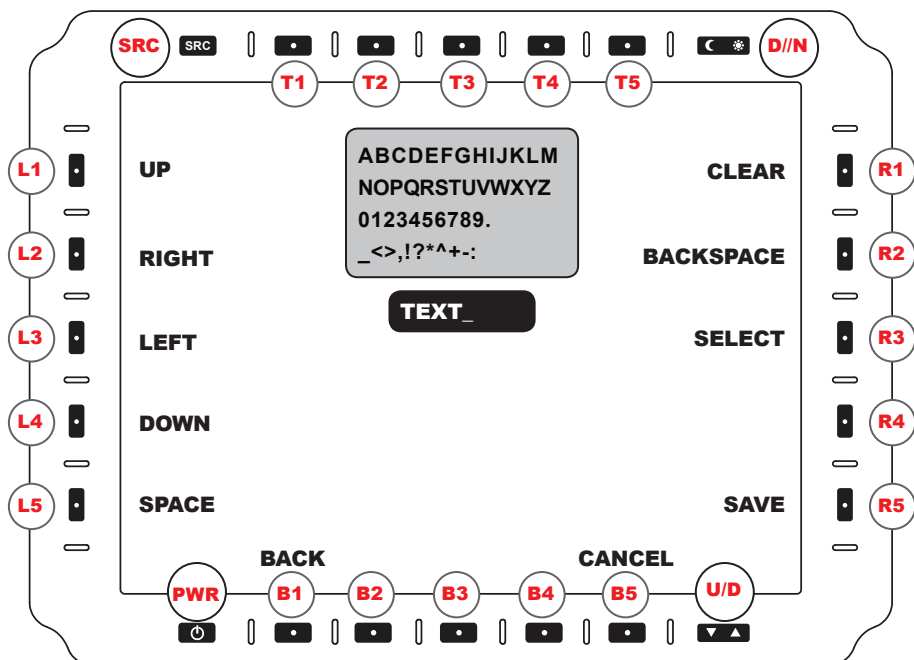


FIGURE 19

## PROGRAMMABLE BUTTON MENU (ENTER NAME)

User can enter custom text (Figure 19) for default screen button names. Select button; back-space to clear default test; customize.

**UP (L1).** Navigates Selection Cursor UP.

**RIGHT (L2).** Navigates Selection Cursor RIGHT.

**LEFT (L3).** Navigates Selection Cursor LEFT.

**DOWN (L4).** Navigates Selection Cursor DOWN.

**CLEAR (R1).** Clears the Text Entry.

**BACKSPACE (R2).** Deletes Last Character.

**SELECT (R3).** Enters Character.

**SAVE (R5).** Exits Menu and Saves Changes.

**BACK (B1).** Returns to SET FUNCTION MENU (Figure 17).

**CANCEL (B5).** Cancels entry; returns to UTILITY MENU (Figure 11).



# COMMUNICATION PROTOCOL

## COMMUNICATION PROTOCOL

The DOT protocol uses packets based on the NMEA message format. This consists of an ID, comma delimited fields, a checksum field and a two-character checksum. A response message is transmitted from the DOT upon receiving a message. It will either be the specific response for the command, a general DSACK response, or a DSNACK response if the command is not recognized or the packet is invalid.

The System Test can be run at Power ON, when initiated by a BIT serial command, when initiated by the user from the I-BIT menu, or System Test can run continuously. Table 11 shows when each test is run, in various BITs: Power-up (P-BIT); Initiated Serial and Initiated Menu (I-BIT), and Continuous (C-BIT). This Table is a repeat of page 24, Events Performed at Built-In-Test (BIT).

Events Performed at P-BIT, I-BIT and C-BIT

SYSTEM TEST NAME	POWER UP	INITIATED SERIAL	INITIATED MENU	CONTINUOUS
RAM ERROR	YES	YES	YES	NO
ROM ERROR	YES	YES	YES	NO
COMM ERROR	YES	NO	NO	YES
EEP ERROR	YES	YES	YES	NO
DEVICE (1) ERROR	YES	YES	YES	NO
DEVICE (2) ERROR	YES	YES	YES	NO

TABLE 11

## PHYSICAL AND DATA LINK LAYER

The DOT communicates via RS232 or RS422 interface using the following port settings (Table 12).

BAUD RATE	19200 bps
DATA BITS	8
PARITY	NONE
START BITS	1
STOP BITS	1
FLOW CONTROL	NONE

TABLE 12

# COMMUNICATION PROTOCOL (CONTINUED)

## PACKAGE MESSAGE FORMAT

The NMEA (standard protocol) message format is an ASCII string consisting of a message ID, comma delimited data fields and a checksum field. Message format is described in Table 13.

LENGTH	VALUE	DESCRIPTION
1	'\$'	Packet Message Start Byte
5	MSGID	Message Identifier; first two characters represents the manufacturer (DS); last three are Command Code
n	Comma De-limited Fields	Field 0, Field 1, Field n
1	'**'	Checksum Delimiter Byte
2	Checksum	Checksum is two ASCII characters representing a hexadecimal byte 00 to FF. Value is the exclusive OR (XOR) of all bytes between, but not including characters '\$' and '**'
2	[CR][LF]	Carriage Return Character (0xD) and Line Feed (0xA) combination terminates the message

TABLE 13

## CHECKSUM CALCULATION

```
unsigned char ComputeChecksum(string text)
{
    unsigned char startIdx, endIdx, result;

    startIdx = Pos('$', text) + 1; //start at character after '$' in string
    endIdx = Pos('**', text) - 1; //end at character before '**' in string
    result = 0;

    for(int n = startIdx; n <= endIdx; n++)
    {
        result = result ^ text[n];
    }

    return result;
}
```

# COMMUNICATION PROTOCOL (CONTINUED)

## COMMANDS

The following table references the commands the DOT supports (Table 14).

COMMAND	DIRECTION	RESPONSE	DESCRIPTION
DSKDN	From DOT	N/A	Key pressed
DSKUP	From DOT	N/A	Key released (from press)
DSCDV	To DOT	DSACK/DSNAK	Change Display Video
DSIBT	To DOT	DSBTR/DSNAK	Initiates IBIT System Test (DOT)
DSBTQ	To DOT	DSBTR/DSNAK	Requests last IBIT System Test results
DSBTR	From DOT	N/A	BIT System Test Response
DSFWQ	To DOT	DSFWR/DSNAK	Request Firmware Version
DSFWR	From DOT	N/A	Firmware Version Response
DSPKM	To DOT	DSACK/DSNAK	Program Key Mode
DSPKD	To DOT	DSACK/DSNAK	Program Key Down Text Message
DSPKU	To DOT	DSACK/DSNAK	Program Key Up Text Message
DSPKF	To DOT	DSACK/DSNAK	Program Key Function
DSPKT	To DOT	DSACK/DSNAK	Program Key OSD Label Text
DSKDQ	To DOT	DSKDR/DSNAK	Request Program Key Down TX Message
DSKUQ	To DOT	DSKUR/DSNAK	Request Program Key Up TX Message
DSKFQ	To DOT	DSKFR/DSNAK	Request Program Key Function
DSKTQ	To DOT	DSKTR/DSNAK	Request Program Key OSD Label Text
DSKDR	From DOT	N/A	Key Down Transmit Message Response
DSKUR	From DOT	N/A	Key Up Transmit Message Response
DSKFR	From DOT	N/A	Key Function Response
DSKTR	From DOT	N/A	OSD Key Text Response
DSBLS	To DOT	DSACK/DSNAK	(Optional) Set Backlight
DSBLQ	To DOT	DSBLR/DSNAK	(Optional) Request Backlight
DSBLR	From DOT	N/A	(Optional) Backlight Response
DSACK	From DOT	N/A	Acknowledge Response; Used if DOT acknowledges command.
DSNAK	From DOT	N/A	Not Acknowledged Response; Used if command was not recognized by DOT or the command contained errors.

**TABLE 14**

# COMMUNICATION PROTOCOL (CONTINUED)

## PROTOCOL MESSAGE COMMANDS

### DSKDN “KEY DOWN” COMMAND

The DSKDN Key Down command will transmit a message after a key has been pressed. The message transmitted can be programmed using the DSPKD (Program Key Down) command. Each key can transmit up to 20 bytes. If a custom message has not been programmed, a factory default message for the key will transmit.

FIELD	NAME	DATA (DSKDN)
0	BTNID	L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5

Example: \$DSKDN,L1\*07[CR][LF]

**Factory default** transmit message for top left button (L1) on Press Down.

L1D[CR][LF]

Message “\$DSPKD,L1,4C31440D0C\*47[CR][LF]” used to program key L1 to transmit “L1D” on Press Down. (Custom message)

0x01 0x02 0x03

Message “\$DSPKD,L1,010203\*32[CR][LF]” used to program key L1 to transmit the three bytes 0x01, 0x02, and 0x03 on Press Down. (Custom message)

Response: N/A

**Warning:** A factory reset will revert the key down message to factory default (see “Factory Default Key Down and Key Up Transmit Text” section).

### DSKUP “KEY UP” COMMAND

The DSKUP Key Up command transmits a message after a key has been released from Key (press) Down. The message transmitted can be programmed using DSPKU (Program Key Up) command. Each key can transmit up to 20 bytes. If a custom message has not been programmed, a factory default message for the key will transmit.

FIELD	NAME	DATA (DSKUP)
0	BTNID	L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5

Example: \$DSKUP,L1\*08[CR][LF]

**Factory default** transmit message for top left button (L1) when released (from Press Down).

Response: N/A

**Warning:** A factory reset will revert the key down message to factory default (see “Factory Default Key Down and Key Up Transmit Text” section).

# COMMUNICATION PROTOCOL (CONTINUED)

## DSCDV “CHANGE DISPLAYED VIDEO” COMMAND

The DSCDV Change Displayed Video command is used to change the input video source.

FIELD	NAME	DATA (DSCDV)
0	Source	DVI1-D, <i>DVI1-A</i> , DVI2-D, <i>DVI2-A</i> , C1, C2, C3, C4

Example: \$DSCDV,DVI1D\*44[CR][LF]

Video changed to DVI1-D input.

Response: DSACK or DSNACK

## DSIBT “INITIATE IBIT” COMMAND

The DSIBT Initiate IBIT command starts the IBIT System Test. Immediately upon receiving DSIBT, the DOT responds with DSBTR (Request IBIT Results), indicating the IBIT test set is incomplete. When IBIT completes, the DSBTR is transmitted with IBIT results. The DOT is unable to process any commands until the IBIT test has completed.

FIELD	NAME	DATA (DSIBT)
0	Placeholder	00

Example: \$DSIBT,00\*64[CR][LF] (Command runs.)

Response: HDMR-CRH immediately responds with DSBTR with BIT status flag set to incomplete upon receiving a DSIBT command, runs IBIT and transmits a DSBTR with results.

## DSBTQ “REQUEST IBIT RESULTS” COMMAND

The DSBTQ Request IBIT Results command requests the DOT to transmit the last IBIT System Test results. Use DSIBT (Initiate IBIT) command if a test needs to be run.

FIELD	NAME	DATA (DSBTQ)
0	Placeholder	00

Example: \$DSBTQ,00\*7C[CR][LF]

Requests an IBIT response from DOT

Response: DSBTR or DSNACK

## DSBTR “IBIT RESPONSE” COMMAND

The DSBTR IBIT Response command contains status information and results from running IBIT System Test. When DSIBT (initiate IBIT) is received, the DOT immediately transmits an IBIT response with status flags bit 7 set low. Upon completion, the DOT transmits a second response message with status flags bit 7 set high, with test results.

# COMMUNICATION PROTOCOL (CONTINUED)

FIELD	NAME	DATA (DSBTR)
0	BIT Status Flags	bit 7: 1 IBIT complete / 0 IBIT incomplete bit 6: 1 IBIT success / 0 IBIT fail bit 5: reserved bit 4: reserved bit 3: reserved bit 2: reserved bit 1: reserved bit 0: reserved
1	BIT Status Flags	Byte order follows big endian format 1 = pass / 0 = fail  bit 15: reserved bit 14: Device (2) bit 13: reserved bit 12: reserved bit 11: Device (1) bit 10: reserved bit 9: reserved bit 8: reserved bit 7: reserved bit 6: reserved bit 5: reserved bit 4: COMM bit 3: EEP bit 2: ROM bit 1: reserved bit 0: RAM

Example: \$DSBTR,00,0000\*53[CR][LF]

IBIT incomplete response message

Example: \$DSBTR,80,0000\*5B[CR][LF]

IBIT complete and failed response message

Example: \$DSBTR,C0,0000\*20[CR][LF]

IBIT complete and successful response message

Response: N/A

## DSFWQ “REQUEST FIRMWARE VERSION” COMMAND

The DSFWQ Request Firmware Version command requests DSFWR (Firmware Version Response) from the DOT.

FIELD	NAME	DATA (DSFWQ)
0	Placeholder	00

# COMMUNICATION PROTOCOL (CONTINUED)

Example: \$DSFWQ,00\*7B[CR][LF] (*Command runs.*)

Response: DSFWR or DSNACK

## DSFWR “REQUEST FIRMWARE RESPONSE” COMMAND

The DSFWR Request Firmware Response command answers the DSFWA (Request Firmware Version) command. The data contains the year, month, and day of month the firmware was compiled.

FIELD	NAME	DATA (DSFWR)
0	Year 20xx	00-99
1	Month	01-12
2	Day of Month	01-31

Example: \$DSFWR,13,07,08\*75[CR][LF] *DOT*

*reported Firmware version is July 08 2013*

Response: N/A

## DSPKM “PROGRAM KEY MODE” COMMAND

The DSPKM command can be used to set the DSPKD, DSPKU, DSPKF and DSPKT operating mode. This is useful for disabling drawing until all keys are programmed and for disabling saving key setting to non-volatile storage.

FIELD	NAME	DATA (DSPKM)
0	Mode	00 – Resume Normal Operation (Enable Drawing and Save Values). OSD is redrawn if mode was suspending drawing. 01 – Suspend Drawing 02 – Suspend Drawing and do not save

Example: \$DSPKM,01\*6C[CR][LF]

//Suspend drawing

... program key info

\$DSPKM,00\*6D[CR][LF]

//Resume drawing and force scene to repaint

Response: DSACK or DSNACK

## DSPKD “PROGRAM KEY DOWN TRANSMIT MESSAGE” COMMAND

The DSPKD Program Key Down Transmit Message command is used to program the message a key will transmit when pressed. The data in Field 1 is encoded in a series of ASCII character pairs representing hex bytes. For example, the ASCII characters “0102” represent the two hex bytes 0x01 and 0x02; these two hex bytes transmit (not ASCII) when the button is pressed.

# COMMUNICATION PROTOCOL (CONTINUED)

FIELD	NAME	DATA (DSPKD)
0	BTNID	L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5
1	Key Down Message	Hex bytes encoded as an ASCII Hex Character Sequence. Maximum data length is 40 bytes, which will represent up to the 20 hex bytes a key can transmit.

Example: \$DSPKD,L1,4C31440D0A\*45[CR][LF]

*Top left button (L1) set to transmit "L1D\r\n" when pressed. '\r' and '\n' are escape sequences for carriage return and newline characters.*

Response: DSACK or DSNACK

## DSPKU "PROGRAM KEY UP TRANSMIT MESSAGE" COMMAND

The DSPKU Program Key Up Transmit Message command is used to program the message a key will transmit when released (from Press). The data in Field 1 is encoded in a series of ASCII character pairs representing hex bytes. For example, the ASCII characters "0102" represent the two hex bytes 0x01 and 0x02; these two hex bytes transmit when the button is released.

FIELD	NAME	DATA (DSPKU)
0	BTNID	L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5
1	Key Up Message	Hex bytes encoded as an ASCII Hex Character Sequence. Maximum data length is 40 bytes, which will represent up to the 20 hex bytes a key can transmit.

Example: \$DSPKU,L1,4C31550D0A\*54[CR][LF]

*Top left button (L1) set to transmit "L1U\r\n" when pressed. '\r' and '\n' are escape sequences for carriage return and newline characters.*

**Note: Maximum key up transmit text is 20 bytes.**

Response: DSACK or DSNACK

## DSPKF "PROGRAM KEY FUNCTION" COMMAND

The DSPKF Program Key Function command is used to program key functions.

FIELD	NAME	DATA (DSPKF)
0	BTNID	L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5
1	Function	NONE, COMM, SWAP, VIEW1, VIEW2, VIEW3, VIEW4, DVI1D, <i>DVI1A</i> , DVI2D, <i>DVI2A</i> , C1, C2, C3, C4



# COMMUNICATION PROTOCOL (CONTINUED)

Example: \$DSPKF, L1, COMM\*3B[CR][LF]

*Top left button (L1) set to cycle the video input*

Response: DSACK or DSNACK

## DSPKT “PROGRAM OSD KEY TEXT” COMMAND

The DSPKT Program OSD Key Text command is used to program OSD key text.

FIELD	NAME	DATA (DSPKT)
0	BTNID	L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5
1	Hex ACII Text	Hex bytes encoded as an ASCII Hex character Sequence. The hex string must be less than or equal to 12 bytes representing up to 6 characters.

Example: \$DSPKT,L1,535243\*23[CR][LF]

*Top left button (L1) set to display the text “SRC”*

Response: DSACK or DSNACK

## DSKDQ “REQUEST KEY DOWN TRANSMIT MESSAGE” COMMAND

Requests a DSKDR response message.

FIELD	NAME	DATA (DSKDQ)
0	BTNID	L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5

Example: \$DSKDQ,L1\*18[CR][LF]

Response: DSKDR or DSNACK

## DSKUQ “REQUEST PROGRAM KEY UP TRANSMIT MESSAGE” COMMAND

Requests a DSKUR response message

FIELD	NAME	DATA (DSKUQ)
0	BTNID	L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5

Example: \$DSKUQ,L1\*09[CR][LF]

Response: DSKUR or DSNACK

## DSKFQ “REQUEST PROGRAM KEY FUNCTION TRANSMIT MESSAGE” COMMAND

Requests a DSKFR response message.

# COMMUNICATION PROTOCOL (CONTINUED)

FIELD	NAME	DATA (DSKFQ)
0	BTNID	L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5

Example: \$DSKFQ,L1\*1A[CR][LF]

Response: DSKFR or DSNACK

## DSKTQ “REQUEST PROGRAM KEY TEXT TRANSMIT MESSAGE” COMMAND

Requests a DSKTR response message.

FIELD	NAME	DATA (DSKTQ)
0	BTNID	L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5

Example: \$DSKTQ,L1\*08[CR][LF]

Response: DSKTR or DSNACK

## DSKDR “KEY DOWN TRANSMIT MESSAGE RESPONSE” COMMAND

The DSKDR is a response message to a DSKDQ and contains the transmit message used when the key is pressed.

FIELD	NAME	DATA (DSKDR)
0	BTNID	L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5

Example: \$DSKDR,L1,4C31440D0A\*47[CR][LF]

*Top left button (L1) set to transmit “L1D\r\n” when pressed. ‘\r’ and ‘\n’ are escape sequences for carriage return and newline characters.*

Response: N/A

## DSKUR “KEY UP TRANSMIT MESSAGE RESPONSE” COMMAND

The DSKUR is a response message to a DSKDQ and contains the transmit message used when the key is released (from being pressed).

FIELD	NAME	DATA (DSKUR)
0	BTNID	L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5
1	Key Up Message	Hex bytes encoded as an ASCII Hex character Sequence. Maximum data length is 40 bytes, which will represent up to 20 hex bytes a key can transmit.

# COMMUNICATION PROTOCOL (CONTINUED)

Example: \$DSKUR,L1,4C31550D0A\*56[CR][LF]

Top left button (L1) set to transmit "L1U\r\n" when pressed. '\r' and '\n' are escape sequences for carriage return and newline characters.

**Note:** Maximum key up transmit text is 20 bytes (not ASCII).

Response: N/A

## DSKFR "KEY FUNCTION RESPONSE" COMMAND

The DSKFR is a response message to the DSKFQ command. The response message contains the function assigned to the key.

FIELD	NAME	DATA (DSKFR)
0	BTNID	L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5
1	Function	NONE, COMM, SWAP, VIEW1, VIEW2, VIEW3, VIEW4, DVI1D, <i>DVI1A</i> , DVI2D, <i>DVI2A</i> , C1, C2, C3, C4

Example: \$DSKFR, L1, COMM\*39 [CR][LF]

Top left button (L1) is set to cycle the video input

Response: N/A

## DSKTR "OSD KEY TEXT RESPONSE" COMMAND

The DSKTR is the response message to a DSKTQ command. The message contains the OSD text assigned to the key.

FIELD	NAME	DATA (DSKTR)
0	BTNID	L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5
1	Hex ACII Text	Hex bytes encoded as an ASCII Hex character Sequence. The hex string must be less than or equal to 12 bytes representing up to 6 characters.

Example: \$DSKTR, L1, 535243\*21[CR][LF]

Top left button (L1) text is "SRC"

Response: N/A

## DSBLS "BACKLIGHT SET" COMMAND (OPTIONAL)

The DSBLS is the command to set Backlight Intensity.

# COMMUNICATION PROTOCOL (CONTINUED)

FIELD	NAME	DATA (DSBLS)
0	Intensity PCT	0 ... 100  Note: 0 is lowest brightness 100 is max brightness

Example: \$DSBLS, 100\*57 [CR][LF]  
*Set the Backlight Intensity to Full Brightness*

Response: DSACK or DSNACK

## DSBLQ “BACKLIGHT QUERY” COMMAND (OPTIONAL)

The DSBLQ command requests a DSBLR from the display, which provides the current Backlight Intensity.

FIELD	NAME	DATA (DSBLQ)
0	N/A	00

Example: \$DSBLQ, 00\*64 [CR][LF]  
*Request Backlight response*

Response: DSBLR or DSNACK

## DSBLR “BACKLIGHT RESPONSE” COMMAND (OPTIONAL)

The DSBLR command is a response to the DSBLQ Backlight Query command.

FIELD	NAME	DATA (DSBLR)
0	Intensity PCT	0 ... 100  Note: 0 is lowest brightness 100 is max brightness

Example: \$DSBLR, 50\*62 [CR][LF]  
*Backlight Intensity is 50%*

Response: N/A

## DSACK “ACKNOWLEDGE RESPONSE” COMMAND

The DSACK Acknowledge Response command is DOT’s response to valid commands.

FIELD	NAME	DATA (DSACK)
0	Placeholder	00

# COMMUNICATION PROTOCOL (CONTINUED)

Example: \$DSACK,00\*72[CR][LF] (Command runs.)

Response: N/A

## DSNAK “NOT ACKNOWLEDGED RESPONSE” COMMAND

---

The DSNAK Not Acknowledged Response command is the DOT’s response when it receives a command it does not recognize or the received command has errors such as the checksum failed.

FIELD	NAME	DATA (DSNAK)
0	Placeholder	00

Example:\$DSNAK,00\*7F[CR][LF] (Command runs.)

Response: N/A

*This section is intentionally left blank.*

# COMMUNICATION PROTOCOL (CONTINUED)

## FACTORY DEFAULT KEY DOWN AND KEY UP TRANSMIT TEXT

These Factory Default Key Down and Key Up softkeys (below) are factory-programmed to transmit the following text messages.

**Note: They will be reset to these values if a Factory Reset is performed from the Main Menu > Utility Menu > Factory Reset (Figure 13).**

BTN	Event	Text	BTN	Event	Text
<b>L1</b>	Down	\$DSKDN,L1*07[CR][LF]	<b>R1</b>	Down	\$DSKDN,R1*19[CR][LF]
	Up	\$DSKUP,L1*08[CR][LF]		Up	\$DSKUP,R1*16[CR][LF]
<b>L2</b>	Down	\$DSKDN,L2*04[CR][LF]	<b>R2</b>	Down	\$DSKDN,R2*1A[CR][LF]
	Up	\$DSKUP,L2*0B[CR][LF]		Up	\$DSKUP,R2*15[CR][LF]
<b>L3</b>	Down	\$DSKDN,L3*05[CR][LF]	<b>R3</b>	Down	\$DSKDN,R3*1B[CR][LF]
	Up	\$DSKUP,L3*0A[CR][LF]		Up	\$DSKUP,R3*14[CR][LF]
<b>L4</b>	Down	\$DSKDN,L4*02[CR][LF]	<b>R4</b>	Down	\$DSKDN,R4*1C[CR][LF]
	Up	\$DSKUP,L4*0D[CR][LF]		Up	\$DSKUP,R4*13[CR][LF]
<b>L5</b>	Down	\$DSKDN,L5*03[CR][LF]	<b>R5</b>	Down	\$DSKDN,R5*1D[CR][LF]
	Up	\$DSKUP,L5*0C[CR][LF]		Up	\$DSKUP,R5*12[CR][LF]
<b>B1</b>	Down	\$DSKDN,B1*09[CR][LF]	<b>T1</b>	Down	\$DSKDN,T1*1F[CR][LF]
	Up	\$DSKUP,B1*06[CR][LF]		Up	\$DSKUP,T1*10[CR][LF]
<b>B2</b>	Down	\$DSKDN,B2*0A[CR][LF]	<b>T2</b>	Down	\$DSKDN,T2*1C[CR][LF]
	Up	\$DSKUP,B2*05[CR][LF]		Up	\$DSKUP,T2*13[CR][LF]
<b>B3</b>	Down	\$DSKDN,B3*0B[CR][LF]	<b>T3</b>	Down	\$DSKDN,T3*1D[CR][LF]
	Up	\$DSKUP,B3*04[CR][LF]		Up	\$DSKUP,T3*12[CR][LF]
<b>B4</b>	Down	\$DSKDN,B4*0C[CR][LF]	<b>T4</b>	Down	\$DSKDN,T4*1A[CR][LF]
	Up	\$DSKUP,B4*03[CR][LF]		Up	\$DSKUP,T4*15[CR][LF]
<b>B5</b>	Down	\$DSKDN,B5*0D[CR][LF]	<b>T5</b>	Down	\$DSKDN,T5*1B[CR][LF]
	Up	\$DSKUP,B5*02[CR][LF]		Up	\$DSKUP,T5*14[CR][LF]

*This section is intentionally left blank.*

# OPTION TOUCH SCREEN DISPLAY

## TOUCH SCREEN INSTALLATION

### TSHARC TOUCH CONTROLLER DRIVER/WINDOWS OPERATING SYSTEMS

The monitor's touch screen function requires the download of a TSHARC Touch Controller Driver application installed on the device where the monitor is connected. To download the latest compatible drivers, go to [www.itechlcd.com](http://www.itechlcd.com).

Operating Systems compatible with TSHARC Touch Controller Driver are: Microsoft's® XP, 7, 8 and 10 (32 and 64-bit); with RS232 and USB options. If other MS O/S are installed, contact [info@itechlcd.com](mailto:info@itechlcd.com) for assistance. **Note: TSHARC Touch Controller Driver is not compatible with Microsoft® Vista.**



TSHARC Touch Screen Controller Driver is not compatible with Vista.

### PREVIOUS VERSIONS OF TOUCH SCREEN CONTROLLER DRIVERS

Previous versions of ANY Touch Screen Controller Driver must be removed before installing the latest version of the TSHARC™ Touch Screen Controller Driver.

If a different T/S Controller Driver (not TSHARC) is on the device it must be removed before installing the TSHARC drivers. Note: A typical driver uninstall program utility of Microsoft's® does not remove all traces of a T/S Driver installation. *Contact manufacturer of previously installed driver program to learn how to uninstall their product. These instructions may be available from the manufacturer's web site.*

### NEW MONITOR INSTALLATION WITH EXISTING DEVICE

Whenever a new monitor is installed to an existing device (equipped with TSHARC driver), *Touch Screen calibration is always required.* The Touch Screen driver resides on the system device, not the monitor.



**CALIBRATE!**

**ALWAYS CALIBRATE!** When adding a monitor to a new or different device, always calibrate to that device; Calibration settings reside on the device, **NOT** the monitor.

### NEW OPERATING SYSTEM INSTALLATION

If installing a new operating system (O/S), do not install Touch Screen Controller Driver until O/S is installed and system's video display settings have been verified. Touch Screen Controller Driver uses system's O/S display driver settings to accurately configure T/S Controller Driver files.

# OPTION BACKLIGHT CONTROL

## OPTION BACKLIGHT CONTROL

Offered as an option, the remote brightness control feature allows for external systems to command the display to set the brightness level to a given value. Using the command protocol described in section Command Protocol, the user can choose to control using a computer rather than the bezel keys on the front bezel of the DOT product.

# INTERNAL HEATER

## INTERNAL HEATER

The Internal Heater automatically brings the Display up to standard operating temperature if the Display is below that temperature when powered on.

## OPERATIONS

- The flashing amber orange LED light behind the Power Button indicates the Display is in heating mode, which is bringing the Display up to internal operational temperature
- Once the Display is up to operational temperature, the flashing LED becomes a constant blue illumination and the Display automatically powers on
- Maximum time for the Display to reach operational temperature is approximately 12 minutes (15 minutes for 15"), and
- There are no user adjustments for the Internal Heater function.

# APPENDIX A

## MECHANICAL DRAWINGS

Mount diagrams and dimensions may be of assistance in installation. Overview drawings may be found on the corresponding product page on the iTech website. When on the product page, scroll down and select the Download tab and follow instructions.



# NOTES



