Terminal Control Workstation (TCW) Controller

User Reference Guide

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TABLE OF CONTENTS

1. Introduction 4

1.1. What is Terminal Control Workstation (TCW) Controller? 4
1.2. What is Terminal Control Workstation (TCW) Client? 4
1.3. What is Terminal Control Workstation (TCW) Server? 4

2. Basics 5

2.1. Configuration 5
2.2. Starting TCW Server 5
2.2.1. Parameters for TCW Server 5
2.3. Starting TCW Client 6
2.3.1. Parameters 7

3. Using the TCW Client - Display 9

3.1. Display 9
3.2. Buttons 9
3.2.1. FS/ES 10
3.2.2. Map Uncor/Uncor 10
3.2.3. Maps 10
3.3. Dials 10
3.3.1. Panel Illum/SW Illum 10
3.3.2. Hist/Hist Lnth 10
3.3.3. FDB/List 10
3.3.4. LDB/WX 11
3.3.5. POS/Primary 11
3.3.6. Other/RR 11
3.3.7. Map A/Map B 11
3.3.8. Spare 1/Spare 2 11
3.3.9. LDR Length/LDR Dir 11
3.3.10. S-N/E-W 11
3.3.11. Char Size/Pos Size 12
3.3.12. Range/RR Int 12
3.4. Additional Controls 12

4. Using TCW Client - Input 13

4.1. Keyboard 13
4.1.1. QWERTY Keyboard 14
4.1.2. Keyboard Shortcuts 14
4.2. Trackball 16
4.3. TCW Client Shortcuts 17
4.4. Injecting Trackball Slews 17

5. TCW Client Add-Ons – Pilot 18

5.1. Add Pop-up Target 18
5.2. Manipulate Target 19
5.3. Pilot Target 19
5.4. Macros 20

6. TCW Server Log File 21

Appendix A. Acronyms 22

TABLE OF FIGURES

Figure 1. TCW Client Display 9
Figure 2. TCW Client Keyboard and Trackball Where Keyboard is Selected 13

1. Introduction

1.1. What is Terminal Control Workstation (TCW) Controller?

The TCW Controller is a software package that includes the TCW Client and TCW Server. This is installed on a chassis which is connected directly to a physical TCW or TDW. Capabilities of this package include:

- Full Service Level (FSL)/Emergency Full Service Level (EFSL) Switchover Video and Buttons
- Audio In and Video In
- Connection via Simulation Driver Radar Recorder (SDRR) or Direct Secure-Operational Support Environment (S-OSE) (Preferred Method)
- Improved TCW Image
- Providing Real-Time Standard Terminal Automation Replacement System (STARS) Audio Alerts
- Simultaneous remote and on-site usage

1.2. What is Terminal Control Workstation (TCW) Client?

The TCW Client provides an interactive display of a STARS TCW as well as any keyboards and trackballs connected.

All inputs within the program are sent to the TCW as if they were input with the physical keyboard onsite. When TCW Server runs in the background, it allows for a seamless use of a TCW both remotely and in-person.

1.3. What is Terminal Control Workstation (TCW) Server?

TCW Server is a daemon that runs in the background of a TCW Controller-equipped machine that allows for the physical TCW keyboard and trackball feed to be active even when TCW Client is not running.

2. Basics

2.1. Configuration

One TCW Controller-equipped machine can support one TCW.

The TCW Controller requires the install and setup of a chassis which is connected directly to the TCW itself, using audio, video, and DB9 splitters.

Available on request is a Guacamole server through which remote access to the TCW Controller is provided.

NOTE: *Note: If the Guacamole session is unresponsive, SHIFT+CTRL+ALT may be pressed to access settings to restart the session.*

2.2. Starting TCW Server

The TCW Server can be started from right clicking the monitor icon on the TCW Controller tool bar or from the command line.

To start the TCW Server from the command line, enter:

```
> tcwServer --fslDEC=device --fsl=device --eslDEC=device --esl=device --kb1Port=port
```

2.2.1. Parameters for TCW Server

Parameter	Description
`--fslDEC=device`	Required parameter for the FSL keyboard input
`--fsl=device`	Required parameter for the FSL keyboard output
`--eslDEC=device`	Required parameter for the ESL keyboard input

Parameter	Description
`--esl=device`	Required parameter for the ESL keyboard output
`--kbPort1=port`	Required parameter for keyboard port
`--logDev=file`	Parameter to set a log file
`--dysimPort=port`	(Pilot Add-On) Parameter to specify port to connect Dysim machine to TCW Controller
`--abcTgtgenMacroFile=file`	(Pilot Add-On) Parameter to set TGTGEN Macros
`--fast`	Optional parameter to indicate tcwServer will be communicating with a system whose adapted cursor speed is set to FAST. Default is set to standard.
`--solaris`	Optional parameter for use when communicating with a Solaris-based system. Default is Linux.
`--cursorSpeed`	Optional parameter to set cursor speed to values 1-10. Default is set to 3.
`--origin`	Parameter to override the coordinates of where the [CORE] key sets the cursor, when using non-default adaptation.

2.3. Starting TCW Client

The TCW Client can either be started by the icon on the TCW Controller or from the command line. The TCW Client Graphical User Interface (GUI) prompts the user to select a keyboard and keyboard style (ABC or QWERTY). If multiple keyboards are desired, the user can click on the icon once more to open another keyboard without affecting the display.

To start TCW Client from the command line, enter:

```
> tcwClient tcpDevice --kb --fslVideo=device --eslVideo=device
```

To launch a TCW Client version that is not the default version, enter:

```
> /usr/local/jvn.x.x.x/bin/tcwClient tcpDevice --kb --fslVideo=device
--eslVideo=device
```

NOTE: *TCW Client requires device names to be specified to run.*

2.3.1. Parameters

TCW Client can be started with various options which control its operation.

Table 1. Parameters for TCW Client

Parameter	Description
`tcpDevice`	Required parameter for the TCP device.
`--kb`	Parameter for keyboard and trackball.
`--fslVideo=device`	Required parameter for the FSL video device.
`--eslVideo=device`	Required parameter for the EFSL video device.
`--audioInput=n`	Adds an audio input device.
`--title=TITLE`	Adds a title to the top of the TCW Controller window.
`--qwerty`	Displays a QWERTY keyboard.
`--listAudioInputs`	Lists the available audio inputs.
`--listAudioOutputs`	Lists the available audio outputs.

Parameter	Description
`--enableZoom`	Allows user to use mouse wheel to zoom in and out of the TCW display.
`--testMode`	Brings up the TCW in test mode.
`--kbButtonSize`	Adjusts the size of the keyboard buttons.
`--tbButtonSize`	Adjusts the size of the trackball buttons.
`--sdrrCmdPort=port`	Sets SDRR connection port.

Example starting the TCW Client with optional parameters:

```
>/usr/local/jvn.12.8.5.1/bin/tcwClient tcp:3100 --fslVideo=/dev/video0
--eslVideo=/dev/video1 --title=TCW-1 --kb --kbButtonSize=5 --tbButtonSize=5
```

3. Using the TCW Client - Display

3.1. Display

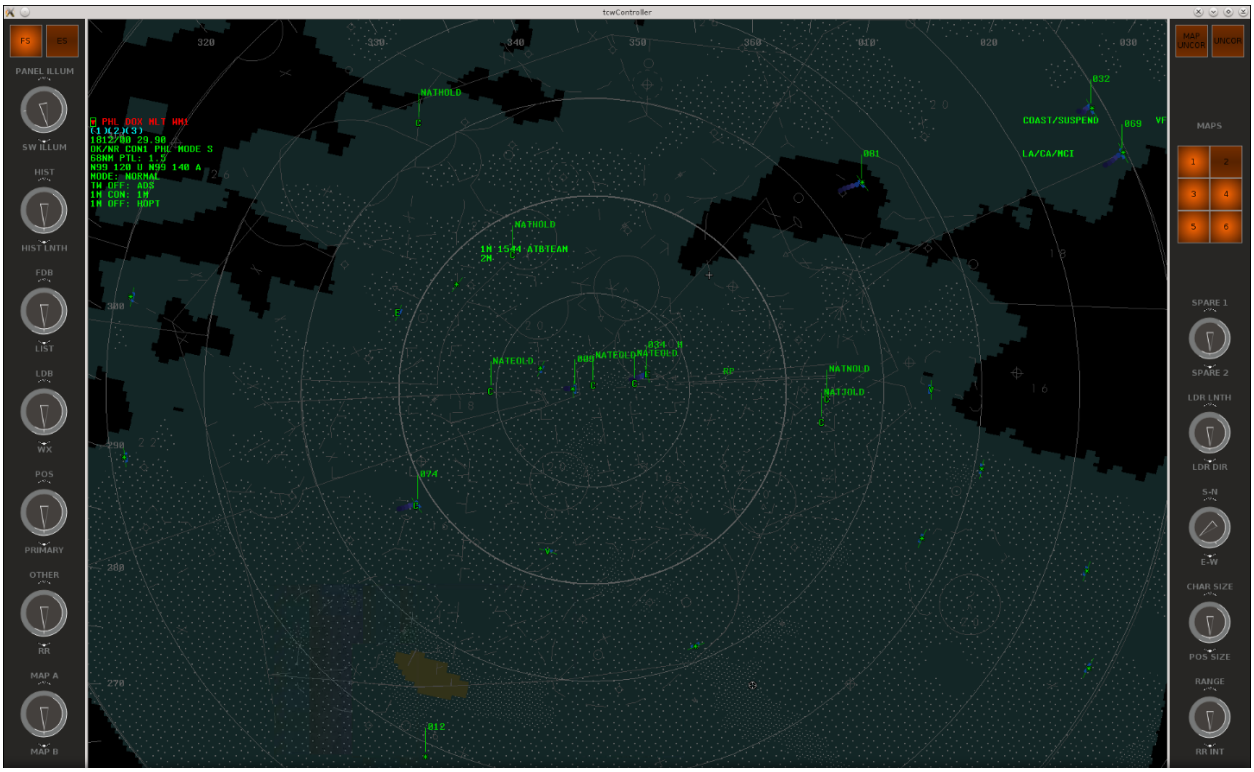

Figure 1. TCW Client Display

When TCW Client is opened, the TCW display will appear. This display is an exact replica of the front of the TCW, complete with viewer, dials, and buttons.

3.2. Buttons

The buttons function exactly as they would on the physical TCW. They will light up when clicked to activate and will return to unlit when clicked again to deactivate.

3.2.1. FS/ES

The service level of the TCW can be changed with the FS and ES buttons. The button of the active service level will be lit up. Click the other service level button to change between them.

3.2.2. Map Uncor/Uncor

The Map Uncor/Uncor buttons can be clicked to display search-only plots.

3.2.3. Maps

The Map buttons can be clicked to display various maps. When lit, the designated map will be visible. Click the button again to remove the map.

3.3. Dials

The dials are controlled by either left- or right-clicking on the dial and dragging to the desired setting which is identical to their physical counterpart.

3.3.1. Panel Illum/SW Illum

When left-clicked, this dial controls the brightness of the control panel text. When right-clicked, it adjusts the brightness of the control panel switches.

3.3.2. Hist/Hist Lnth

When left-clicked, this adjusts the brightness of the history trail. When right-clicked, it changes the amount of history tracks displayed.

3.3.3. FDB/List

When left-clicked, this dial adjusts the brightness of the data blocks of owned targets, cursor, and preview area. When right-clicked, it controls the brightness of list text.

3.3.4. LDB/WX

When left-clicked this dial adjusts the brightness of limited and partial data blocks and their position symbols. When right-clicked, it changes the weather brightness.

3.3.5. POS/Primary

When left-clicked, this dial controls the brightness for position symbols of Owned Full Data Blocks. When right-clicked, it adjusts the brightness of primary tracks, primary symbols, and fused symbols.

3.3.6. Other/RR

When left-clicked, this adjusts the brightness of unowned targets and their position symbols. When right-clicked, this dial sets the brightness of range rings.

3.3.7. Map A/Map B

When left-clicked, this adjusts the brightness of group A maps, and adjusts group B when right-clicked.

3.3.8. Spare 1/Spare 2

This is not typically used by the TCW.

3.3.9. LDR Length/LDR Dir

When left-clicked, this sets the track leader line length. When right-clicked, this adjusts the position of the leader line for owned tracks.

3.3.10. S-N/E-W

When left-clicked, the map position can be adjusted in the directions of north and south, and adjusts east and west when right-clicked.

3.3.11. Char Size/Pos Size

When left-clicked, this sets the font size for data blocks and previous area. When right-clicked, the font size of position symbols is changed.

3.3.12. Range/RR Int

When left-clicked, the display range is adjusted. When right-clicked, this dial sets the interval for range rings.

3.4. Additional Controls

The position of the map can be changed by clicking and dragging the display. The range of the display can be controlled by the scroll button on the mouse. Slews can be issued by holding shift and clicking on the TCW window. The side panels containing the dials can also collapse by dragging the border.

NOTE: *Slew with mouse is not compatible with DCB.*

4. Using TCW Client - Input

When opened up, tcwClient also brings up a window for both the Keyboard and the Trackball. The actions taken in these windows affect the TCW Display both on the physical location and the TCW Client display. Multiple keyboards can be accessed by clicking the tcwClient icon. All keyboards and trackballs are dimmed by default and will undim when selected.

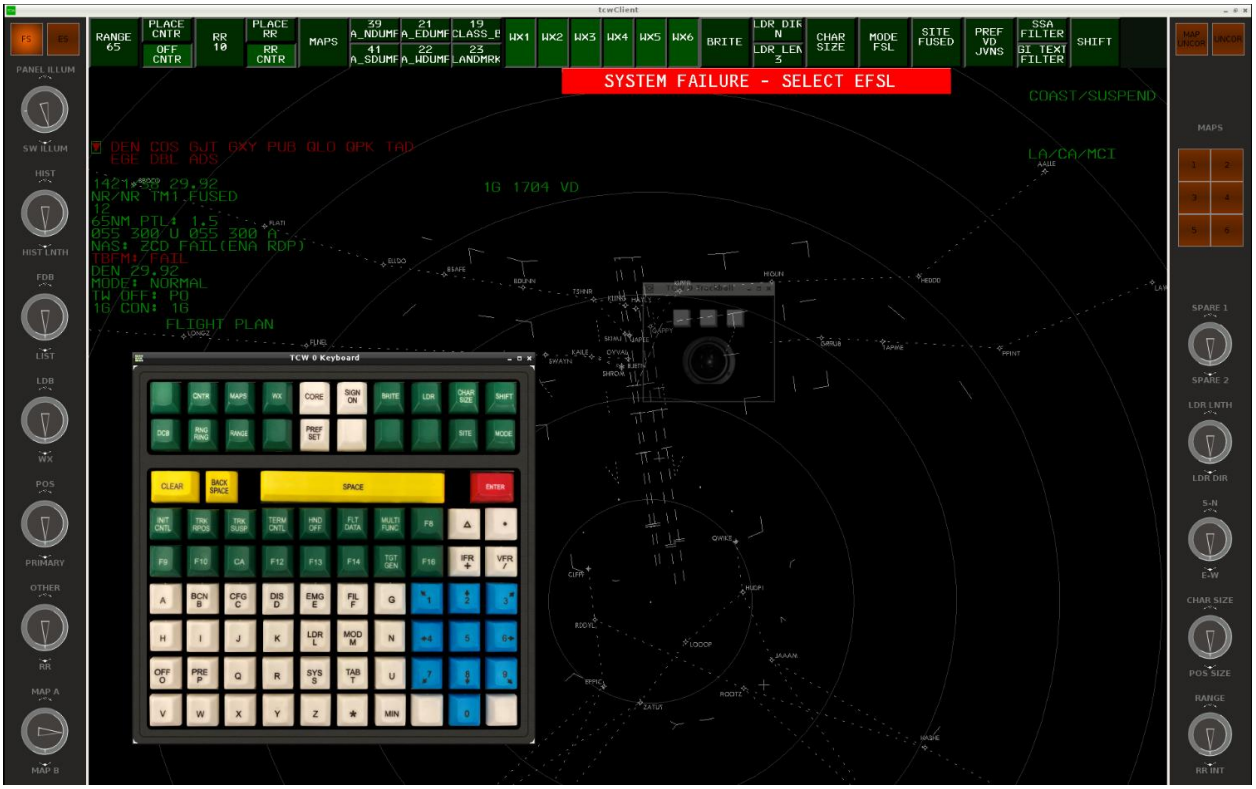

Figure 2. TCW Client Keyboard and Trackball Where Keyboard is Selected

4.1. Keyboard

The tcwClient keyboard has identical usage to the physical TCW keyboard. The buttons are activated by either clicking on them or typing them in with the keyboard in focus. Up to three keyboard positions can be active at once and will display accordingly. The tcwClient keyboard does not need to be active to accept keyboard input.

4.1.1. QWERTY Keyboard

The tcwClient can alternatively show a QWERTY keyboard, identical to those used with the physical TCW. The parameter `--qwerty` must be used on startup to enable this mode.

4.1.2. Keyboard Shortcuts

Some buttons on the tcwClient keyboard are not available on a typical keyboard, so some keyboard shortcuts were put into place.

Table 2. Keyboard Shortcuts for TCW Client Keyboard

TCW Client Keyboard Button	Keyboard Shortcut
CNTR	Ctrl+Shift+F1
MAPS	Ctrl+Shift+F2
WX	Ctrl+Shift+F3
BRITE	Ctrl+Shift+F4
LDR	Ctrl+Shift+F5
CHAR SIZE	Ctrl+Shift+F6
SHIFT	Ctrl+Shift+F7
DCB	Ctrl+Shift+F8
RNG RING	Ctrl+Shift+F9
RANGE	Ctrl+Shift+F10
SITE	Ctrl+Shift+F11
MODE	Ctrl+Shift+F12
CORE	Insert
SIGN ON	Home

TCW Client Keyboard Button	Keyboard Shortcut
PREF SET	End
CLEAR	Delete
BACK SPACE	Backspace
SPACE	Space
ENTER	Enter
INIT CTRL	F1
TRK RPOS	F2
TRK SUSP	F3
TERM CNTL	F4
HND OFF	F5
FLT DATA	F6
MULTIFUNC	F7
F8	F8
F9	F9
F10	F10
CA	F11
F12	F12
F13	Shift+F1
F14	Shift+F2
TGT GEN	Shift+F3
F16	Shift+F4

TCW Client Keyboard Button	Keyboard Shortcut
Δ	Comma (,)
•	Period (.)
IFR +	Plus (+)
VFR /	Forward Slash (/)
A through Z	Mapped to A through Z
0 through 9	Mapped to 0 through 9
*	Asterix (*)
MIN	Question Mark (?)

4.2. Trackball

The tcwClient trackball has identical usage to the physical trackball. To slew, click the trackball and drag in the desired direction for the cursor. The buttons, when clicked, have the same functionality as the physical buttons.

The trackball cursor is centered on start. If the user wishes recenter the trackball cursor, Cursor Home on the Display Control Bar (DCB) tab may be selected. Then when either of the two right buttons on the tcwClient trackball are clicked, the cursor will be sent to “home/center”.

4.3. TCW Client Shortcuts

The TCW Client has some keyboard shortcuts in place to enhance the user experience.

Table 3. Keyboard Shortcuts for TCW Client

TCW Client Action	Keyboard Shortcut
Show/Hide Keyboard(s)	Alt+K (when neither trackball or keyboard are selected)
Show/Hide Trackball(s)	Alt+T (when neither trackball or keyboard are selected)

4.4. Injecting Trackball Slews

The TCW Controller is capable of injecting trackball slews and keystroke injections to a STARS's TCW. Keystroke injections are read from the optional keys.xml that can be created from CDR data. Users can also create scripted keystrokes by hand with an XML file. Users must take note of the following settings to playback CDR: Operating system when the CDR was extracted, cursor settings from the adaptation, and cursor speed from the STARS's TCW.

NOTE: *Keystroke XML is generated from the starscdr utility.*

Example starting the TCW Server to playback CDR with optional parameters:

```
> tcwServer --fslDEC=device --fsl=device --eslDEC=device --esl=device --kb1Port=port --
solaris --fast --cursorSpeed=7
```

NOTE: *The example above is playing back CDR that was collected in a Solaris OS TCW with a FAST cursor setting that is defined in the adaptation, and the cursor speed on the TCW was set as 7.*

5. TCW Client Add-Ons – Pilot

5.1. Add Pop-up Target

If the pilot add-on license is purchased, pop-up targets can be added to the TCW display while a scenario is running on either SDRR or SimDriver.

To create a pop-up target, enter one of the following commands into the TCW Keyboard (physical or TCW Client):

Using Range and Azimuth:

```
[TGTGEN] CNP <ACID> <ACType> HdddAdddVddd[Boooo]ZdddRddd
ex: CNP TEST1 B737 H270A100V100B1234Z000R000
```

Using X/Y Coordinates:

```
[TGTGEN] CNP <ACID> <ACType> HdddAdddVddd[Boooo]X[+/-]ddddY[+/-]dddd
ex: CNP TEST1 B737 H270A100V100B1234X-0100Y0100
```

Using Latitude/Longitude:

```
[TGTGEN] CNP <ACID> <ACType> HdddAdddVddd[Boooo]<N||S>ddmmss<E||W>dddmmss
ex: CNP TEST1 B737 H270A100V100B1234N395227W0751432
```

NOTE: *TCW Client must be ran with --facName="facility name" to use Range/Azimuth and X/Y Coordinates for target generation. If multiple facilities are in use, use format CENTER:FAC. (ex. --facName="phl"; --facName="ZNY:PPP")*

5.2. Manipulate Target

Any target on the scope in a simDriver-driven scenario can be manipulated by using any ATCOACH command on the TCW Keyboard (physical or TCW Client).

Table 4. Example Target Commands

TCW Keyboard Command	Action
`<ACID> Hddd`	Change Heading
`<ACID> Boooo`	Change Beacon
`<ACID> Vddd`	Change Velocity
`<ACID> Addd`	Change Altitude

5.3. Pilot Target

Targets can be piloted using the arrow keys of the TCW Keyboard (physical or TCW Client) by inputting the following command on the TCW Keyboard:

```
[TGTGEN] PILOT <ACID>
```

Heading is adjusted by hitting the left and right arrow keys. Altitude is adjusted by hitting the up and down arrow keys. Speed can be adjusted by using 0 for speed down and 5 for speed up. Hit [CLEAR] to exit navigation.

5.4. Macros

Keyboard macros can be set in a separate macro file and ran in tcwServer with the parameter --abcTgtgenMacroFile=”file”. When running TCWClient, these macros can be accessed by hitting the TGTGEN key followed by the macro key.

Example Keyboard Macro File:

```
#firstrow
[BLANK0_0] CNP TEST1 B737 A080V100H000R050Z000
[CNTR] A111 B4444
[MAPS] A111 V100
[WX] A111 H270
[CORE]
[SIGN_ON]
[BRITE]
[LDR]
[CHAR_SIZE]
[SHIFT]

#secondrow
[DCB] A111 B4444
[RNG_RING] CNP TEST1 B737 A080V100H000X150Y010
[RANGE] CNP TEST1 B737 A080V100H000N395227W0751432
[BLANK1_3]
[PREF_SET]
[BLANK1_5]
[BLANK1_6]
[BLANK1_7]
[SITE]
[MODE]
```

6. TCW Server Log File

The TCW Server records all inputted functions to a log file in the /usr/local/log/ directory. A new TCW Server log is written for each day, recording all inputs received from midnight until 11:59 pm. The date is included in the name of log file; for example:

```
tcwserverlog.10112023.0000
```

Appendix A. Acronyms

ADS-B	Automatic Dependent Surveillance – Broadcast
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
AViD	Airspace Visualization Display
CAS	Commercially Available Software
CD2	Common Digitizer
DASR	Digital Surveillance Radar
DCB	Display Control Bar
DYSIM	Dynamic Simulation
ECGP	External Communications Gateway Protocol
EFSL	Emergency Full Service Level
ERAM	En Route Automation Modernization
FAA	Federal Aviation Administration
FSL	Full Service Level
GSGT	Graphic Simulation Generation Tool
GUI	Graphical User Interface
IFDT	Interfacility Data Transfer
MLAT	Multilateration
NAS	National Air Space
RAPPI	Random Access Plan Position Indicator
RSI	Record Select Indicator
SDRR	Simulation Driver Radar Recorder
SSRV	Simulation Services
STARS	Standard Terminal Automation Replacement System
SWIM	System-Wide Information Management
TCW	Terminal Control Workstation
TRACON	Terminal Radar Approach Control

WAM	Wide Area Multilateration
WJHTC	William J. Hughes Technical Center