T-Connect Web Terminal™
Reference Manual

Version 8.9.0

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INTRODUCTION

T-Connect is Thoroughbred's web terminal emulation product designed specifically to support and enhance Thoroughbred applications for a character interface.

T-Connect is designed specifically for Thoroughbred development environments, providing not only the standard features of an emulator but also functionality specific to Thoroughbred products.

- Support for 24 function keys
- Copy and Paste across applications
- Scrolling
- Slave Printing
- Dictionary-IV color settings
- Mouse aware capabilities for your 3GL applications
- Mouse aware capabilities for your character-based Dictionary-IV and OPENworkshop applications

Emulation uses the standard Thoroughbred terminal table definition: TCONNECT. The TCONNECT terminal table has been designed specifically for T-Connect Web Terminal, please use this table to ensure proper emulation.

INSTALLATION AND SETUP

Prerequisites

Before installing T-Connect, the following packages must be installed on your system:

- nodejs
- sshpass

To install the prerequisites and T-Connect you must be logged in as root. Commands that require root privileges will begin with the root prompt (#).

To install on rpm-based systems (i.e. Red Hat, CentOS, AlmaLinux, Rocky Linux):

```
# dnf install nodejs
# dnf install epel-release
# dnf install sshpass
```

To install on Debian-based systems (i.e. Ubuntu):

```
# apt-get install -y nodejs sshpass
```

After a package is successfully installed, the output from the command will display “Complete!”.

To confirm that node was installed:

```
# node --version
```

Installing and Activating T-Connect

To install T-Connect, first unpack the tar/tgz file:

```
# cd /opt/tbred
# umask 0
# tar xvzf tconnect.tgz
```

After the files have been loaded onto the system, confirm that the version of T-Connect installed was built with the version of node.js running on your system:

```
# cd /opt/tbred/tconnect
# cat .node.version
```

The first 2 numbers of the version must match in order for T-Connect to run correctly. For example:

```
# node --version
v12.22.9
# cd /opt/tbred/tconnect
# cat .node.version
v12.22.12
```

If the first 2 numbers do not match, contact Thoroughbred Support.

The /usr/lib/basic and /usr/lib/basic/tmp directories are required for activating and running T-Connect. The *setup.sh* script will create these directories if they do not exist. The /usr/lib/basic/tmp directory is required for generating PDFS. The *setup.sh* script will also install the tconnect terminfo definition.

```
# cd tconnect/bin
# ./setup.sh
```

To manually create the /usr/lib/basic and the /usr/lib/basic/tmp directories:

```
# mkdir /usr/lib/basic
# chmod 777 basic
# mkdir /usr/lib/basic/tmp
# chmod 777 /usr/lib/basic/tmp
```

After the /usr/lib/basic and /usr/lib/basic/tmp directories have been created, either manually or via the *setup.sh* script, T-Connect must be installed and activated:

```
# cd /opt/tbred/tconnect
# ./install
#./tconnact
```

Terminfo

T-Connect sets the UNIX/Linux TERM variable to ‘tconnect’. This requires a terminfo entry. The tconnect terminfo file is included with the T-Connect install and is located in the terminfo/t directory.

To manually install the T-Connect terminal definition:

```
# cp /opt/tbred/tconnect/terminfo/t/tconnect /usr/share/terminfo/t/tconnect
```

Update the Firewall

Once installed and activated, the T-Connect port must be opened in your firewall. The default port number is 5622. If a different port number is to be used when connecting to T-Connect, use the desired port number when updating the firewall.

If not using a firewall appliance, the T-Connect port number must be added to the system's firewall.

To open the default port via firewall-cmd, do the following:

```
# firewall-cmd --zone=public --add-port=5622/tcp  --permanent
# firewall-cmd --reload
```

To open the default port via ufw, do the following:

```
# ufw allow 5622/tcp
# ufw reload
```

Starting T-Connect

T-Connect can be started via the command line or as a service.

To start T-Connect via the command line, run the *start* script:

```
$ cd /opt/tbred/tconnect
$ ./start
```

The *start* script:

```
# startup script - T-Connect Web Termimal
#

NODE_ENV=production; export NODE_ENV

tchost=$(hostname)
# tchost=$(hostname -I | awk '{print $1}')
# tcport=5622
# sshport=22
# tbssl=/opt/tbred/ssl

tc_exe=/usr/bin/node
# tc_parm1=index.js
tc_parm1=build/main.js
tc_parm2=--sshhost=$tchost
# tc_parm3=--port=$tcport
# tc_parm4=--sshport=$sshport
# tc_parm5="--sslkey $tbssl/key.pem --sslcert $tbssl/cert.pem"
# tc_parm6=--force-ssh

tc_cmd="$tc_exe $tc_parm1 $tc_parm2"

rm -f nohup.out 2>/dev/null
nohup $tc_cmd >/dev/null 2>&1 &
# $tc_cmd
```

Note that when running T-Connect with node.js version 10, change tc_parm1 to use index.js:

```
tc_parm1=index.js
# tc_parm1=build/main.js
```

To check that T-Connect is started and listening, run the following:

```
$ ps –ef | grep -w node
$ netstat –na | grep 5622
```

By default, when the T-Connect server is started by the *start* script, it will allow HTTP connections on port 5622. To connect on a different port number, change tcport to the desired port number and then start with the –port= option:

```
tchost=$(hostname)
tcport=2265

tc_parm3=--port=$tcport
tc_cmd="$tc_exe $tc_parm1 $tc_parm2 $tc_parm3"
```

The default ssh port number is 22. To run with a different ssh port number, change sshport to the desired port number and then start with the –sshport= option:

```
tchost=$(hostname)
sshport=22022

tc_parm4=--sshport=$sshport

tc_cmd="$tc_exe $tc_parm1 $tc_parm2 $tc_parm4"
```

To enable HTTPS connections, start the T-Connect server with the –sslkey and –sslcert options:

```
tchost=$(hostname)
tbssl=/opt/tbred/ssl

tc_parm5="--sslkey $tbssl/key.pem --sslcert $tbssl/cert.pem"

tc_cmd="$tc_exe $tc_parm1 $tc_parm2 $tc_parm5"
```

Installing the T-Connect Service

To install the T-Connect service, the *loadservice.sh* script will copy service files from the bin directory to the appropriate system directories or the service files can be loaded manually.

To install the T-Connect service via the script, run the following:

```
# cd /opt/tbred/tconnect/bin
# ./loadservice.sh
```

By default, when the T-Connect server is started as a service, it will allow HTTP connections on port 5622. Similar to the *start* script, the service files can be modified to use a different port when connecting to T-Connect, to use a different port for ssh connections and to enable HTTPS connections.

systemd

To manually install the T-Connect service:

```
# cp /opt/tbred/tconnect/bin/tconnect.systemd /etc/systemd/system/tconnect.service
# systemctl daemon-reload
```

To start the T-Connect service:

```
# systemctl start tconnect
```

To have the T-Connect service start automatically when the system boots:

```
# systemctl enable tconnect
```

To stop the T-Connect service:

```
# systemctl stop tconnect
```

To prevent the T-Connect service from starting automatically when the system boots:

```
# systemctl disable tconnect
```

System V (init.d)

To manually install the T-Connect service:

```
# cp /opt/tbred/tconnect/bin/tconnect.init.d /etc/init.d/tconnect
# chmod a+x /etc/init.d/tconnect
# chkconfig tconnect on
```

To start the T-Connect service:

```
# service tconnect start
```

To have the T-Connect service start automatically when the system boots:

```
# service tconnect enable
```

To stop the T-Connect service:

```
# service tconnect stop
```

To prevent the T-Connect service from starting automatically when the system boots:

```
# service tconnect disable
```

The tcservice.sh script

To perform all of the above service commands, run the *tcservice.sh* script located in the tconnect/bin directory. This script must be run as root and will start, stop, restart, enable or disable the T-Connect service.

To start the T-Connect service:

```
# cd /opt/tbred/tconnect/bin
# ./tcservice.sh start
```

To stop the T-Connect service:

```
# cd /opt/tbred/tconnect/bin
# ./tcservice.sh stop
```

Stopping T-Connect

If T-Connect was started using the *start* script, search for the running node process and then kill the process:

```
# ps -ef | grep -w node
# kill <node process id>
```

If T-Connect was started as a service, then stop the service.

When T-Connect is stopped, all T-Connect connections will be terminated and display a reconnect page. When T-Connect starts again, these pages in reconnect mode will automatically restart the connection.

Terminal Table

T-Connect uses the TCONNECT terminal table, modify your TERM.MAP file accordingly. For more information on TERM.MAP please see the Basic Customization and Tuning Guide System Files manual.

```
tconnect:TCONNECT
```

T-CONNECT WEB TERMINAL SESSION

Connect to the T-Connect Host System

Start a browser of your choice. T-Connect has been tested with the following browsers:

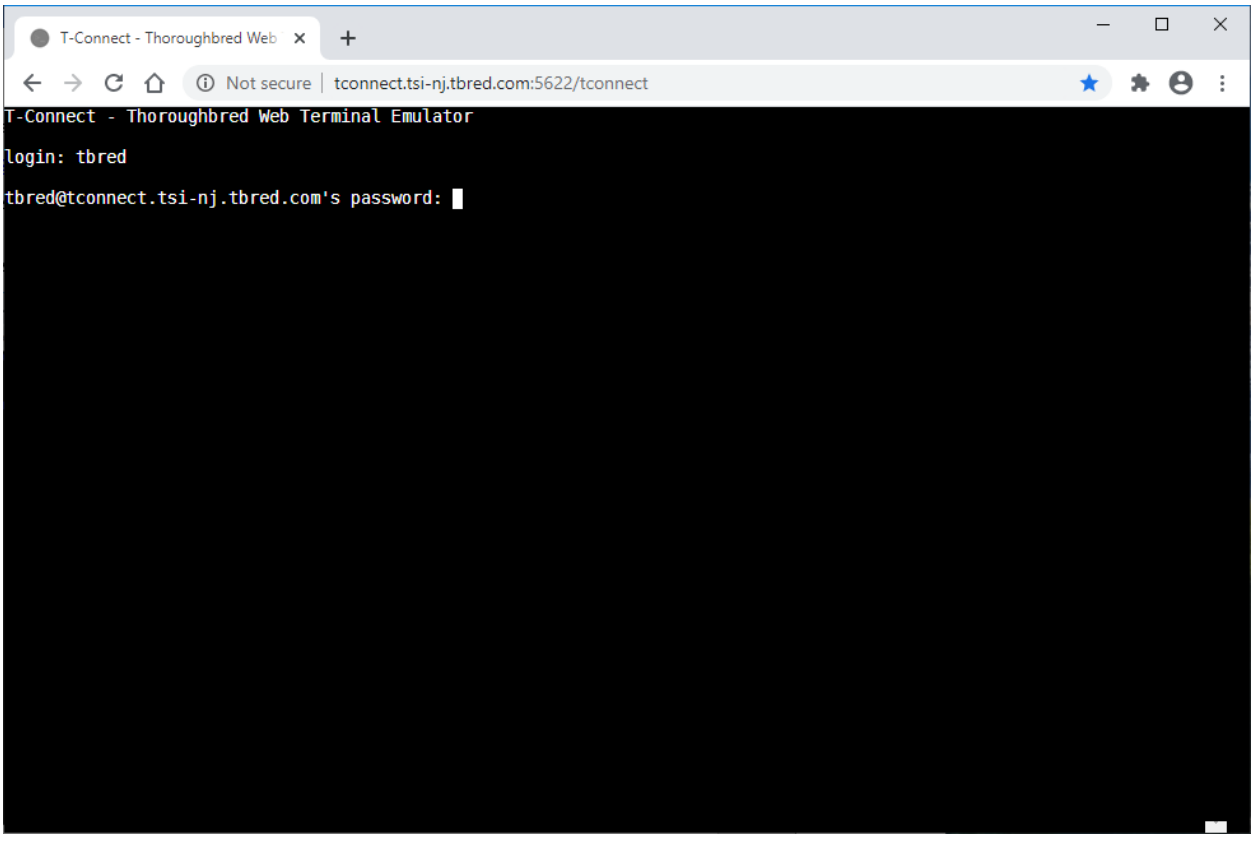
- Brave
- Google Chrome
- Microsoft Edge
- Mozilla Firefox
- Opera

To start a web terminal session, enter the following into the address bar of the browser:

http://<system-name>:5622/tconnect

If the T-Connect server was started with the SSL options, replace the http with https. If the T-Connect server was started with a different port number, replace the 5622 with the alternate port number.

When connected to the system, you will be presented with login and password prompts.

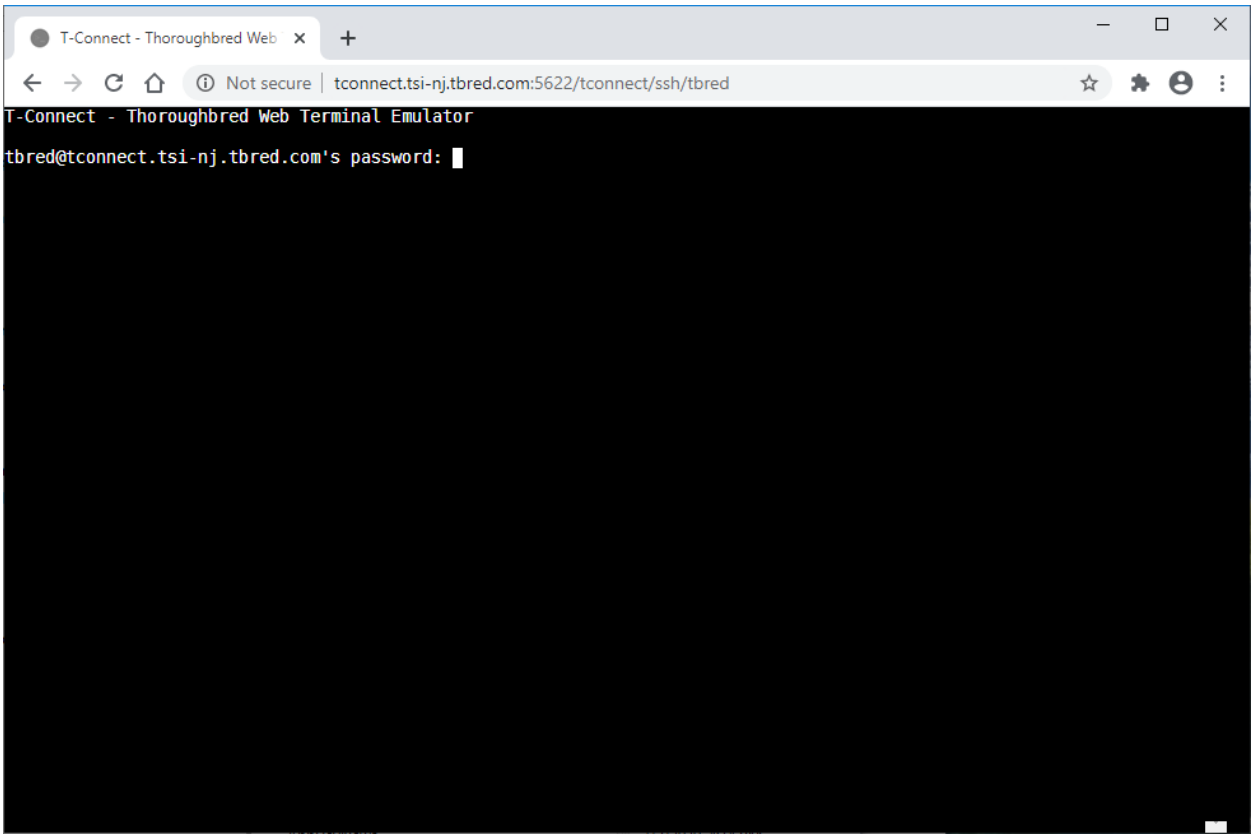


Similar to AutoLogons in TbredComm, you can specify your user id and password when starting a web terminal session.

To specify your user name when starting a web terminal session, enter the following into the address bar of the browser and replace <username> with your user id.

http://<system-name>:5622/tconnect/ssh/<username>

When connected to the system, you will be presented with just a password prompt.



To start a web terminal session without having to enter your user id or password, enter the following into the address bar of the browser, replace <username> with your user id and <password> with your password:

http://<system-name>:5622/tconnect/ssh/<username>?pass=<password>

The security implications of specifying the password in the URL must be considered by the user. It is recommended that this type of connection is only done on a secure network.

If T-Connect is started as root with the *start* script or as a service, the *--force-ssh* option will need to be added to the node command line arguments in order to specify your user id or your user id and password in the URL. For example, in the *start* script, change tc_cmd to the following:

```
tc_cmd="$tc_exe $tc_parm1 $tc_parm2 $tc_parm6"
```

In the *tconnect.systemd* service file, change ExecStart to the following:

```
ExecStart=/usr/bin/node build/main.js --sshhost=%H --force-ssh
```

In the *tconnect.init.d* service file, change TC_RUN to the following:

```
TC_RUN="$TC_EXE $TC_PARM1 $TC_PARM2 $TC_PARM6"
```

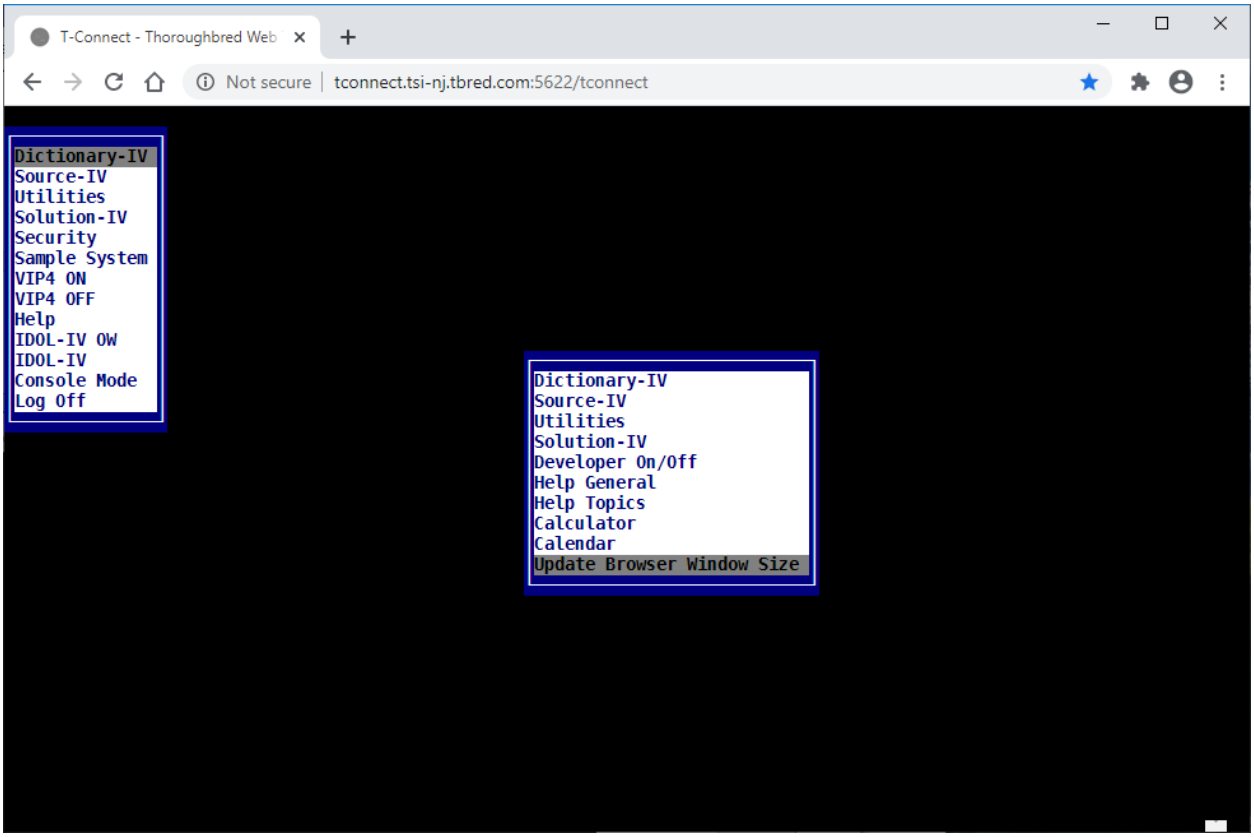
If T-Connect is being run as a service, make sure that T-Connect is not running before loading the new service file.

Using T-Connect

Resizing the Terminal Window

When not running the browser as a maximized window, the size of the terminal window will be determined by the browser window size. If the browser window is resized, the terminal window size will also be resized.

The terminal window can also be resized manually in Basic. One method to manually resize the terminal window is to open the **control-p** menu and select **Update Browser Window Size**:



Another method to manually resize the terminal window is to print the Resize Window mnemonic, ‘RW’, in Basic console mode:

basic> PRINT ‘RW’

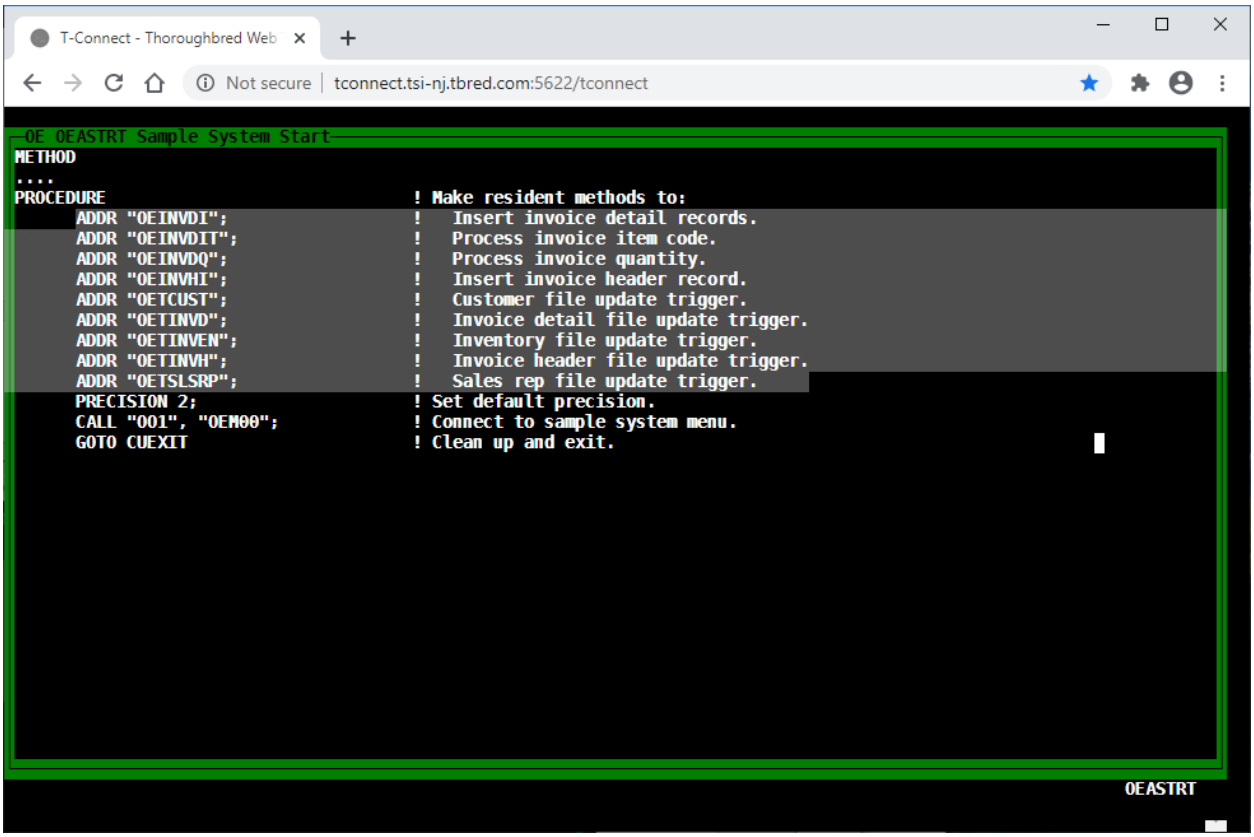
Changing the Font Size

The font size of the terminal window can be changed by using the Zoom feature of the browser. From the browser's menu, click on the + next to Zoom to increase the font size or click on – to decrease the font size.

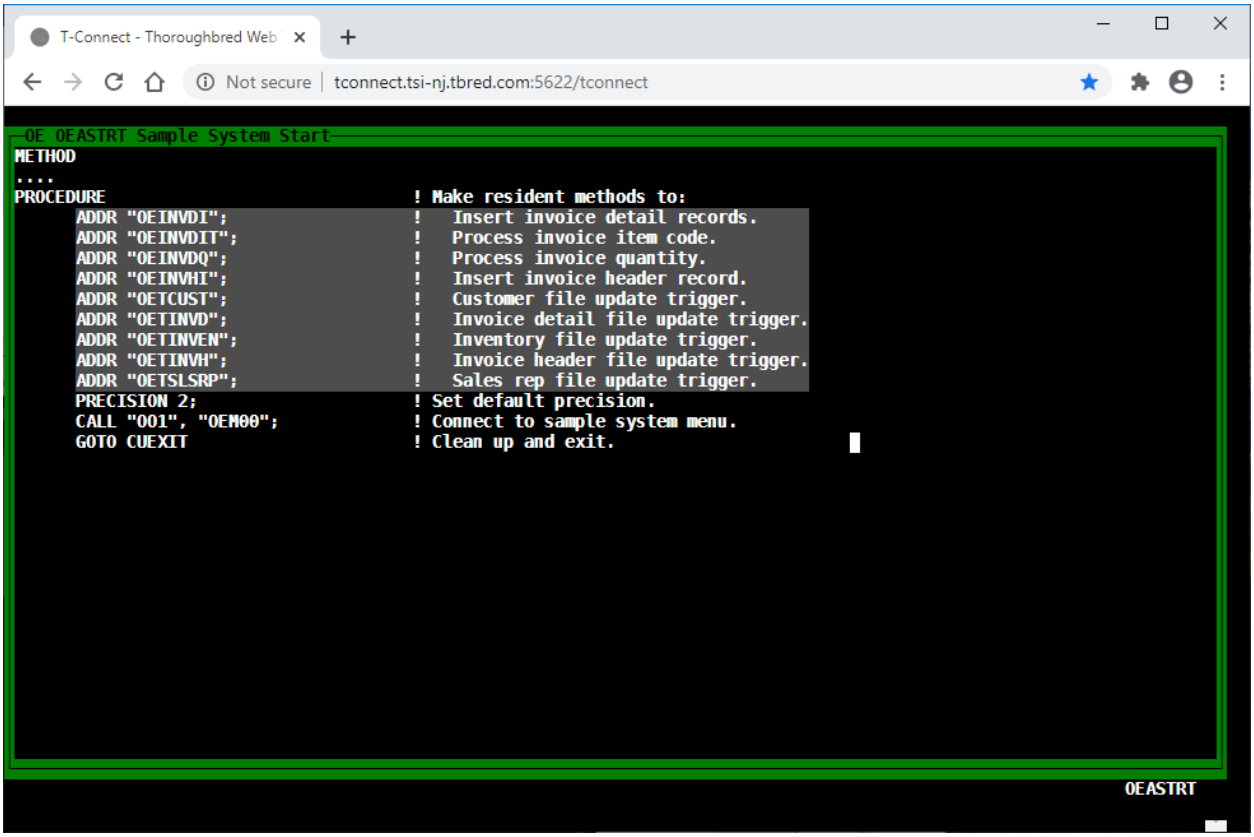
The font size can also be changed by using keyboard shortcuts to Zoom in or out. To increase the font size, enter **control +**. To decrease the font size, enter **control -**.

Selecting Text

There are 2 modes for selecting text in T-Connect. In the default mode, line mode, click the **left mouse button** and drag the mouse to select text. Selecting multiple lines of text will wrap around the end of each line.



In column mode, click the **alt key** and the **left mouse button** to select a rectangle of text. When in column mode, the cursor will be changed to a cross. Selecting multiple lines will not wrap around the end of each line. This is similar to the Smart Copy option in TbredComm.



Copy/Paste

Copying and pasting of text can be performed via the keyboard or the mouse.

To copy selected text via the keyboard, enter **control-shift-c** or **control-c**. If no text is selected, **control-c** will send an interrupt.

To paste text via the keyboard, enter **control-shift-v** or **control-v**.

Mouse Aware

T-Connect is mouse aware, but this feature is disabled when you first connect to a system. Once you start up a Basic session, mouse aware will be enabled. When you release out of Basic, mouse aware will be disabled.

Mouse aware can also be enabled or disabled manually printing the Mouse Begin or Mouse End mnemonics, ‘MB’ or “ME’, in Basic console mode. To manually enable mouse aware:

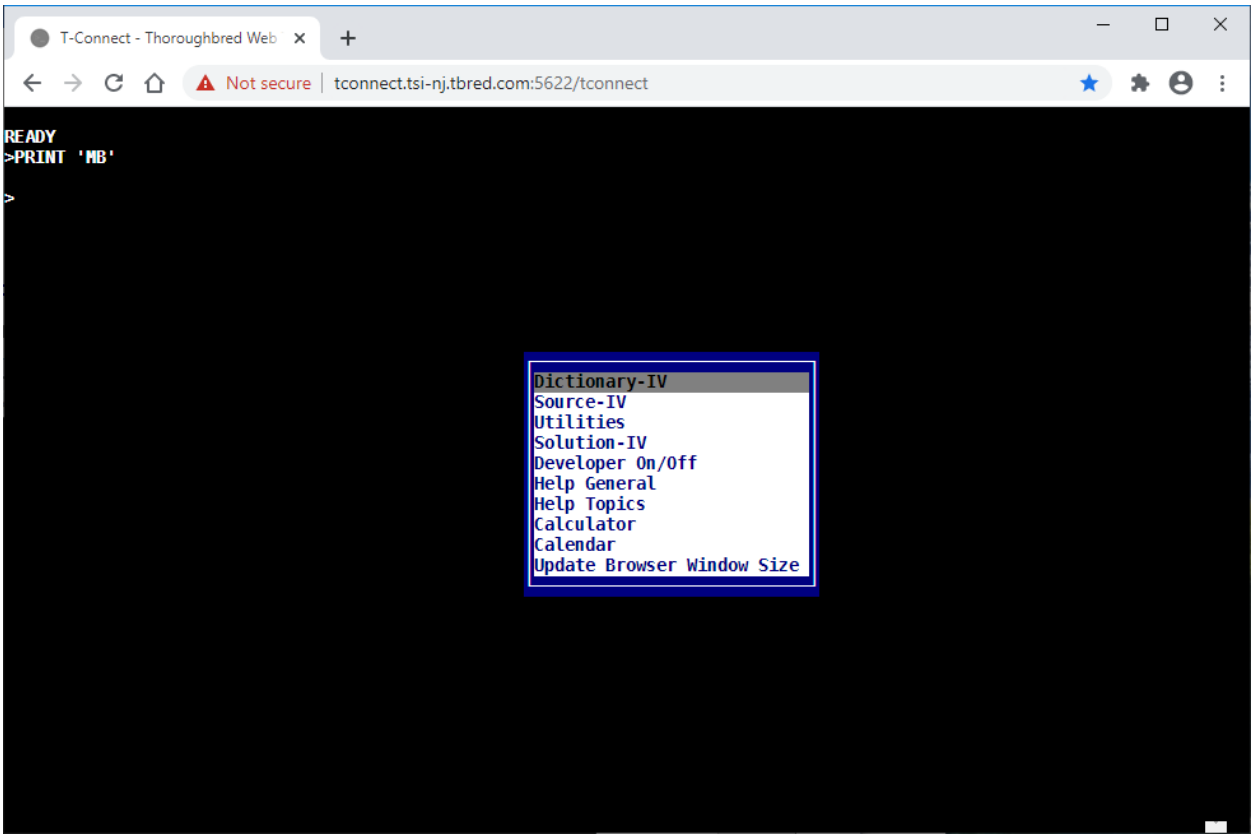
basic> PRINT ‘MB’

To manually disable mouse aware:

basic> PRINT ‘ME’

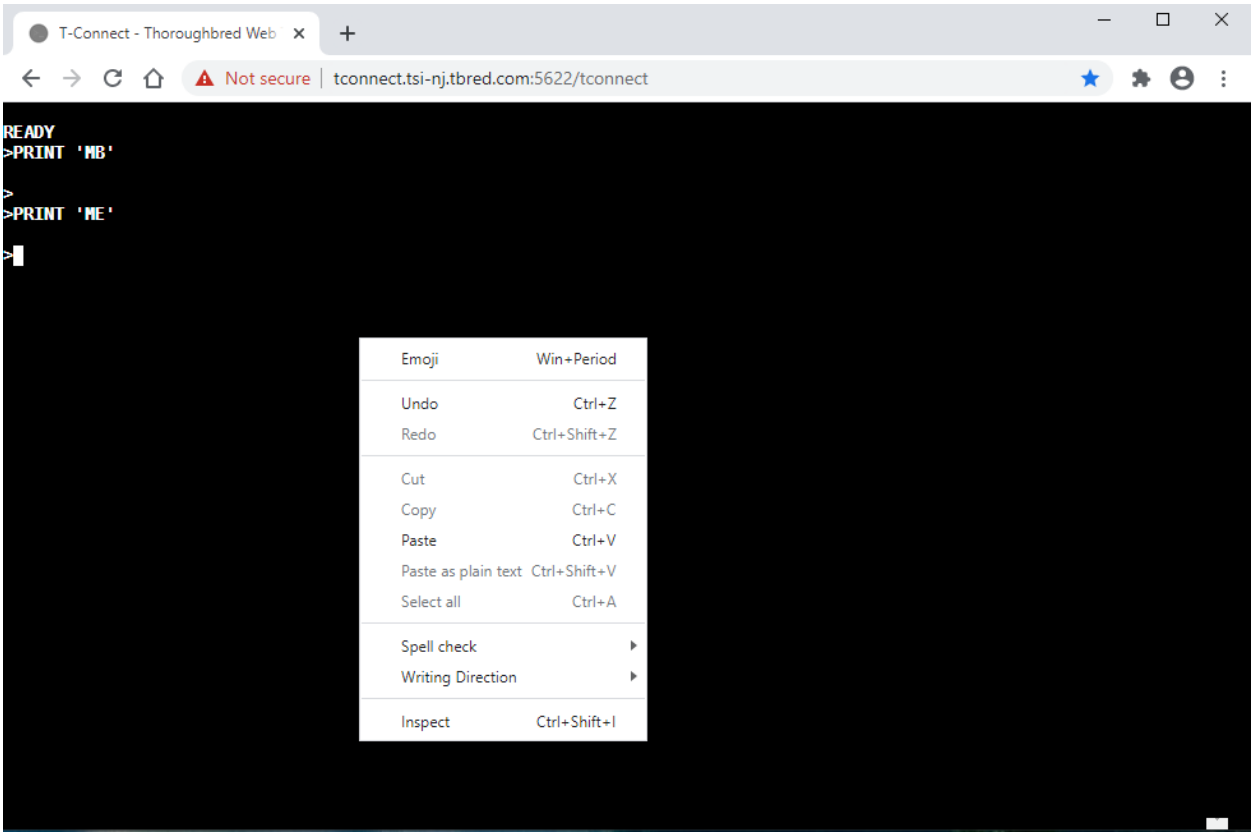
Context Menu/Control-p Menu

When mouse aware is enabled, a **right-click** will generate a **control-p**, displaying the **control-p** menu:



When mouse aware is disabled, a **right-click** will display the browser's context menu.

When mouse aware is enabled, a **control right-click** will display the browser's context menu:



Line-Insert and Line-Delete

Similar to other Thoroughbred products, a line insert is generated by entering **shift-insert** and a line delete is generated by entering **shift-delete**. A line insert can also be generated by entering **control-a,** and a line delete by entering **control-d**.

Printing Overview

T-Connect printing will generate a PDF file that is made available through the browser. Depending upon the browser settings, the PDF file will be downloaded and opened in a new tab, downloaded by the browser with an option to save the file, or the user will be prompted for an action. To accomplish this T-Connect utilizes both Thoroughbred Report-IV to PDF (with 3GL wrapper) product and the Gateway for Windows product. Both of these products are now bundled with Dictionary-IV.

Before you can print using T-Connect, you must first install them. To install and configure Report-IV to PDF with 3GL Wrapper please refer to the Report-IV to PDF manual. To install Gateway for Windows simply include that GWW product when doing the Dictionary-IV installation (merge), please refer to the Dictionary-IV installation manual for details.

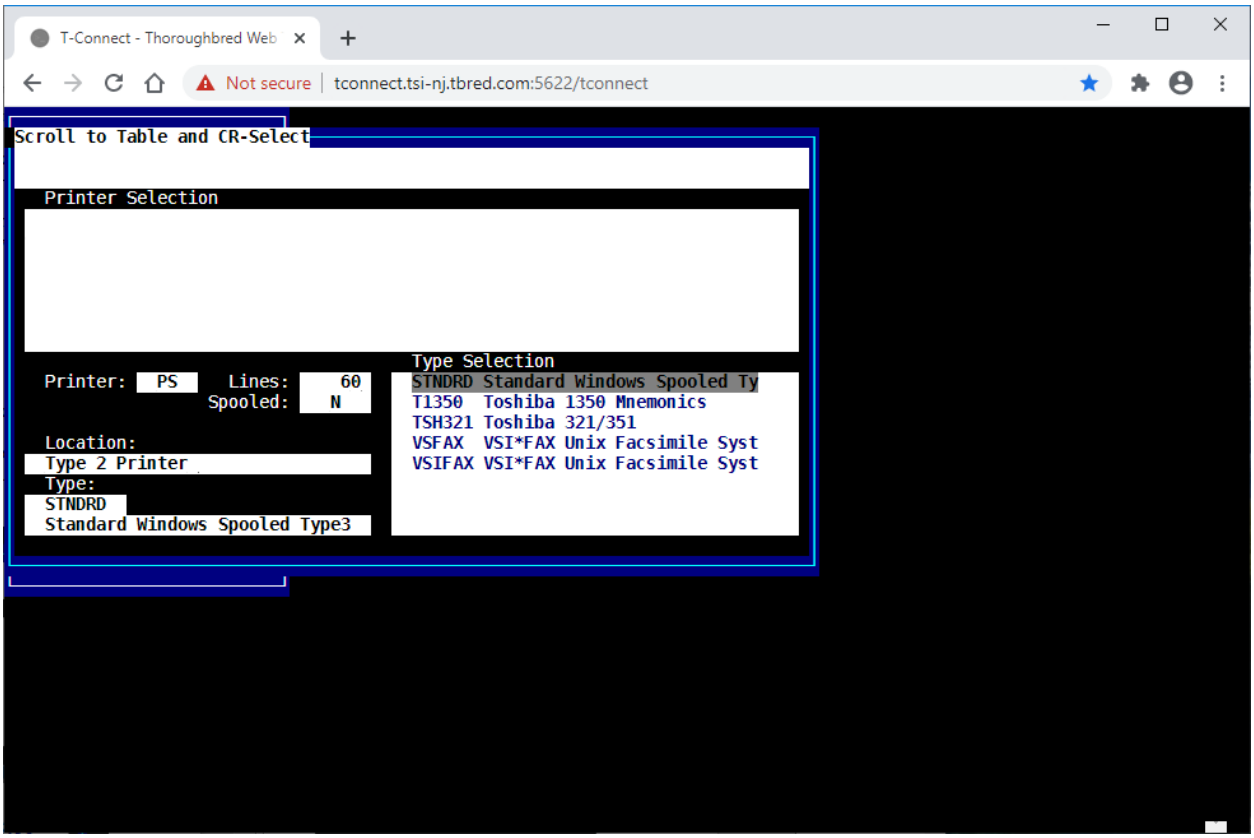
Printing to a Type 2 Printer

A standard slave printer must be defined in the IPLINPUT file.

DEV PS,4,,,,2,,tty

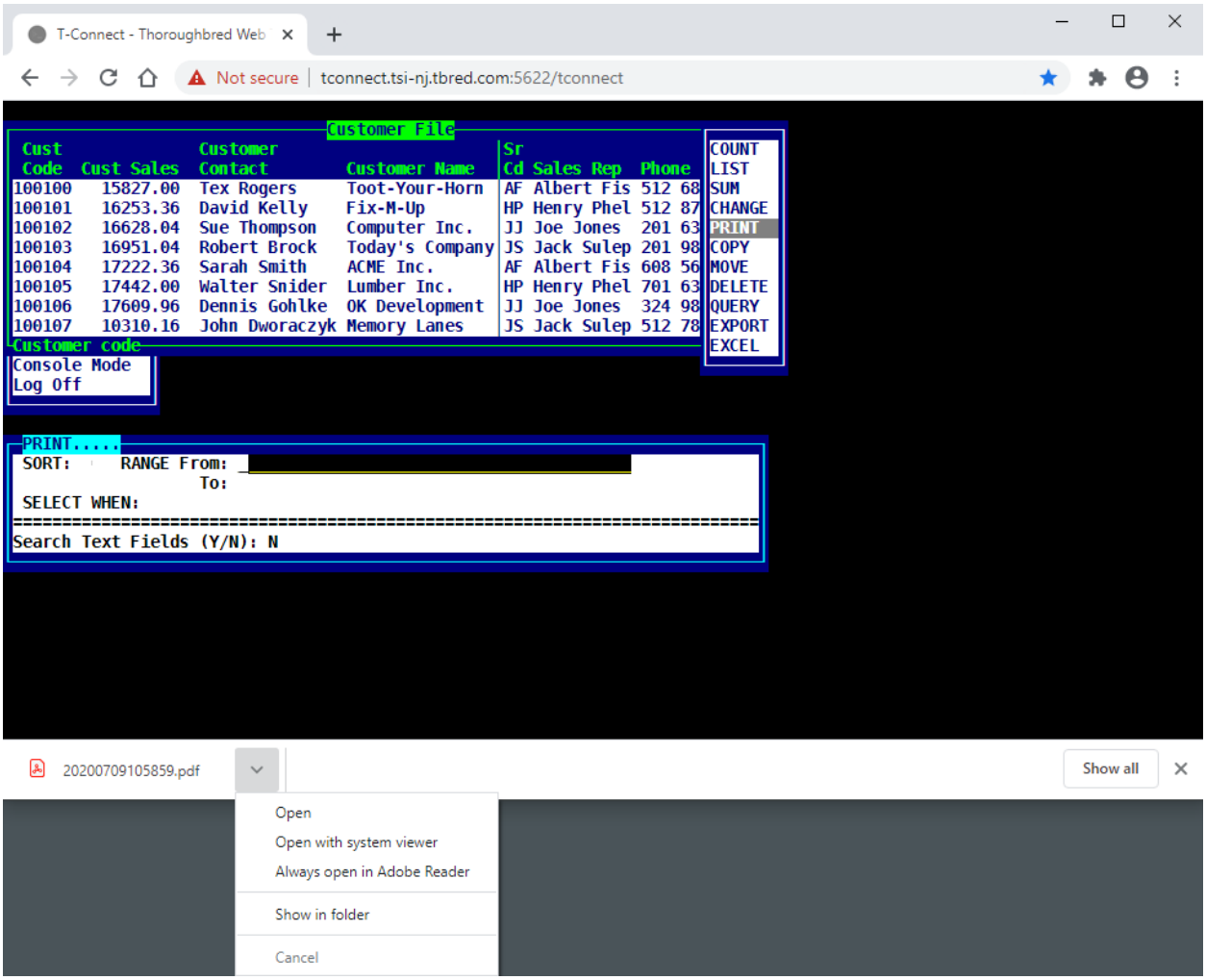
For more information on defining this printer type in the IPL file please refer to the Basic manuals.

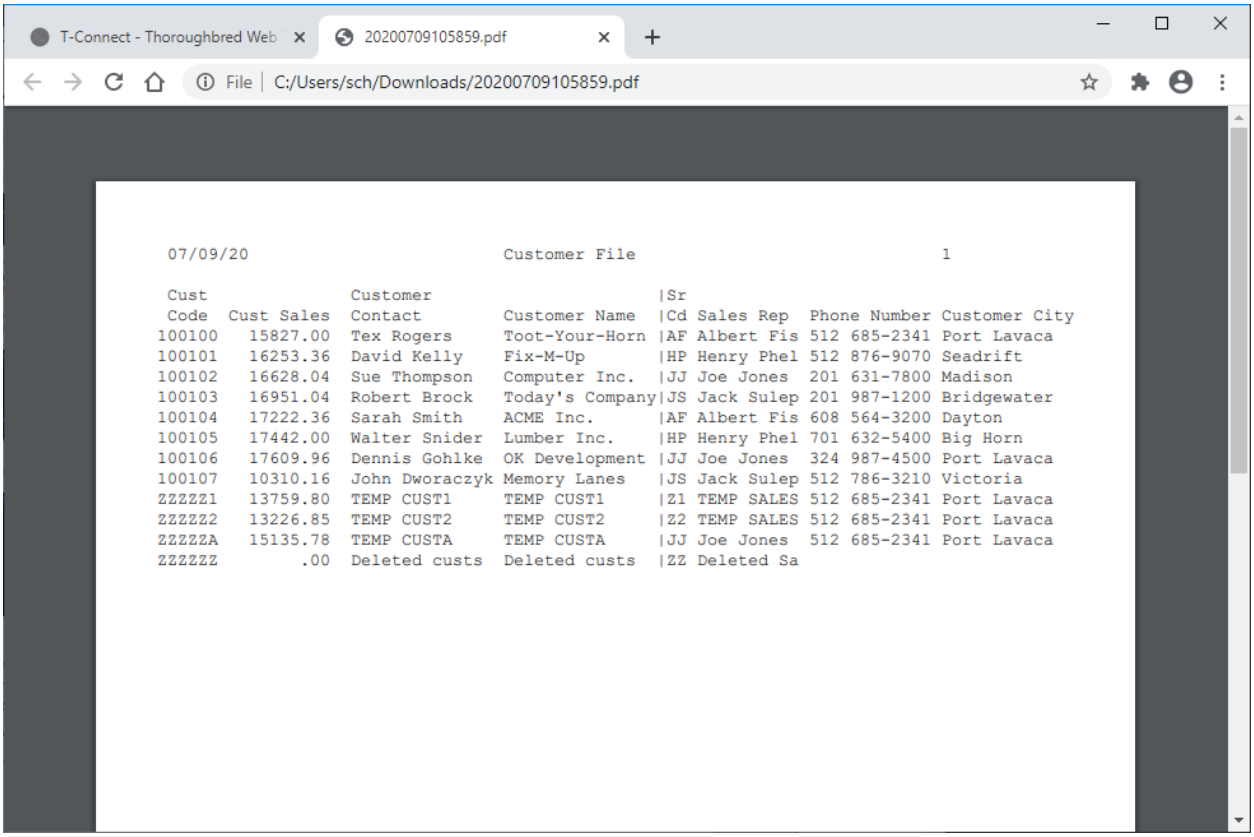
The printer must have a Dictionary-IV printer assignment using the STNDRD printer table distributed with Dictionary-IV. From the Dictionary-IV System Administration menu select **Printer Assignment** and assign the STNDRD printer table to the device defined in the IPLINPUT file:



When a type 2 printer is selected as the output device, T-Connect will automatically generate the output in PDF format. Depending upon the browser settings, the PDF file will be downloaded and opened in a new tab, downloaded by the browser with an option to save the file, or the user will be prompted for an action. To change this behavior please refer to your browser settings.

In the following example the **F8** Print option from an OPENworkshop View was selected and a type 2 printer was chosen for output. The PDF file was generated and downloaded by the browser. The PDF file is saved in the browser download directory. The file name is YYYYMMDDhhmmss.pdf.



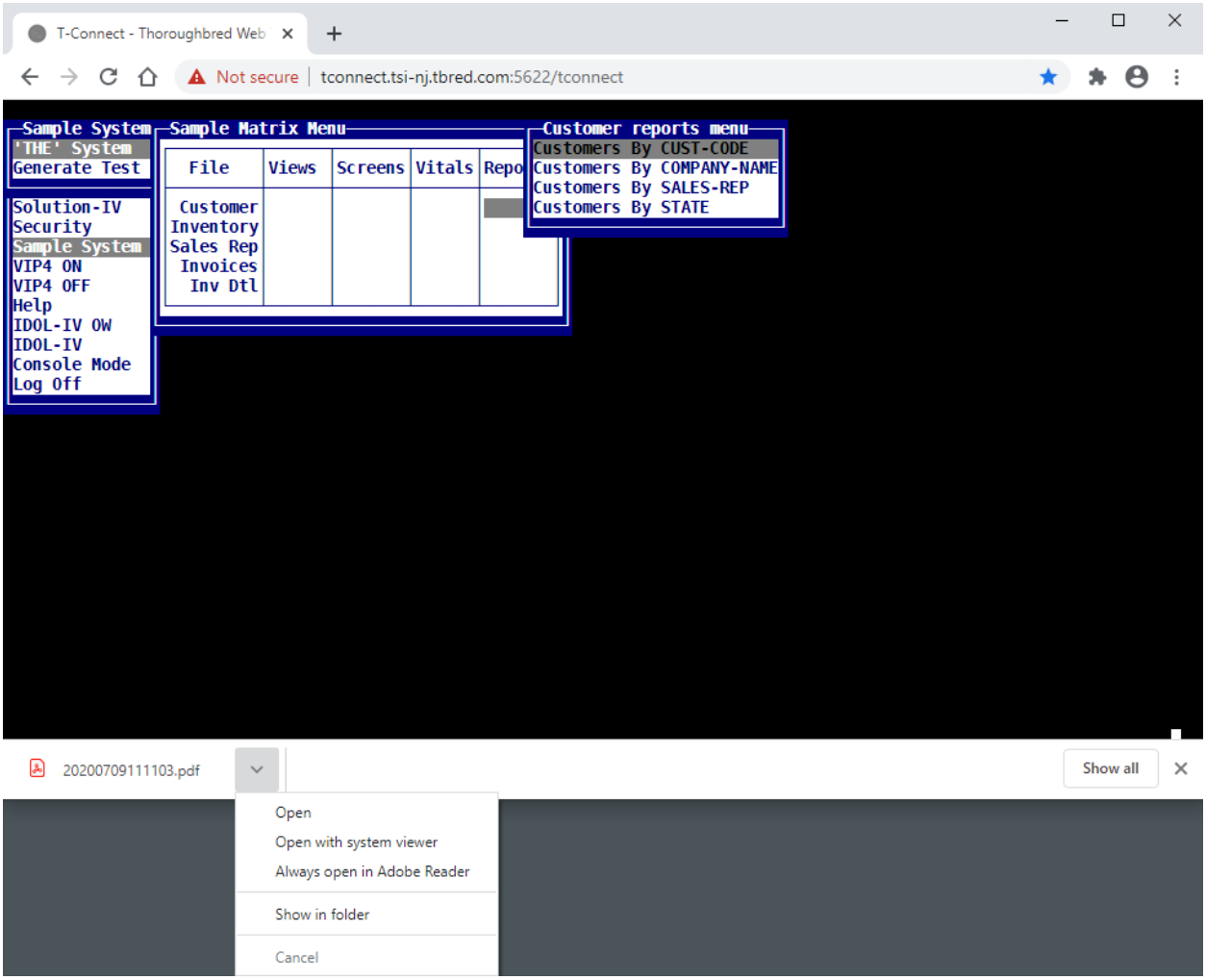


07/09/20 Customer File 1

Cust Code	Cust Sales	Customer Contact	Customer Name	Sr Cd	Sales Rep	Phone Number	Customer City
100100	15827.00	Tex Rogers	Toot-Your-Horn	AF	Albert Fis	512 685-2341	Port Lavaca
100101	16253.36	David Kelly	Fix-M-Up	HP	Henry Phel	512 876-9070	Seadrift
100102	16628.04	Sue Thompson	Computer Inc.	JJ	Joe Jones	201 631-7800	Madison
100103	16951.04	Robert Brock	Today's Company	JS	Jack Sulep	201 987-1200	Bridgewater
100104	17222.36	Sarah Smith	ACME Inc.	AF	Albert Fis	608 564-3200	Dayton
100105	17442.00	Walter Snider	Lumber Inc.	HP	Henry Phel	701 632-5400	Big Horn
100106	17609.96	Dennis Gohlke	OK Development	JJ	Joe Jones	324 987-4500	Port Lavaca
100107	10310.16	John Dworaczyk	Memory Lanes	JS	Jack Sulep	512 786-3210	Victoria
ZZZZZ1	13759.80	TEMP CUST1	TEMP CUST1	Z1	TEMP SALES	512 685-2341	Port Lavaca
ZZZZZ2	13226.85	TEMP CUST2	TEMP CUST2	Z2	TEMP SALES	512 685-2341	Port Lavaca
ZZZZZA	15135.78	TEMP CUSTA	TEMP CUSTA	JJ	Joe Jones	512 685-2341	Port Lavaca
ZZZZZZ	.00	Deleted custs	Deleted custs	ZZ	Deleted Sa		

Printing to Report-IV to PDF and 3GL Wrapper

Both the Report-IV to PDF and the 3GL wrapper are supported by T-Connect. Viewing and saving a PDF file is seamless when using T-Connect. It does not require a network share (e.g. Samba) or an http server to download and view the PDF documents. Depending upon the browser settings the PDF file will be downloaded and opened in a new tab, downloaded by the browser with an option to save the file, or the user will be prompted for an action. To change this behavior please refer to your browser settings.



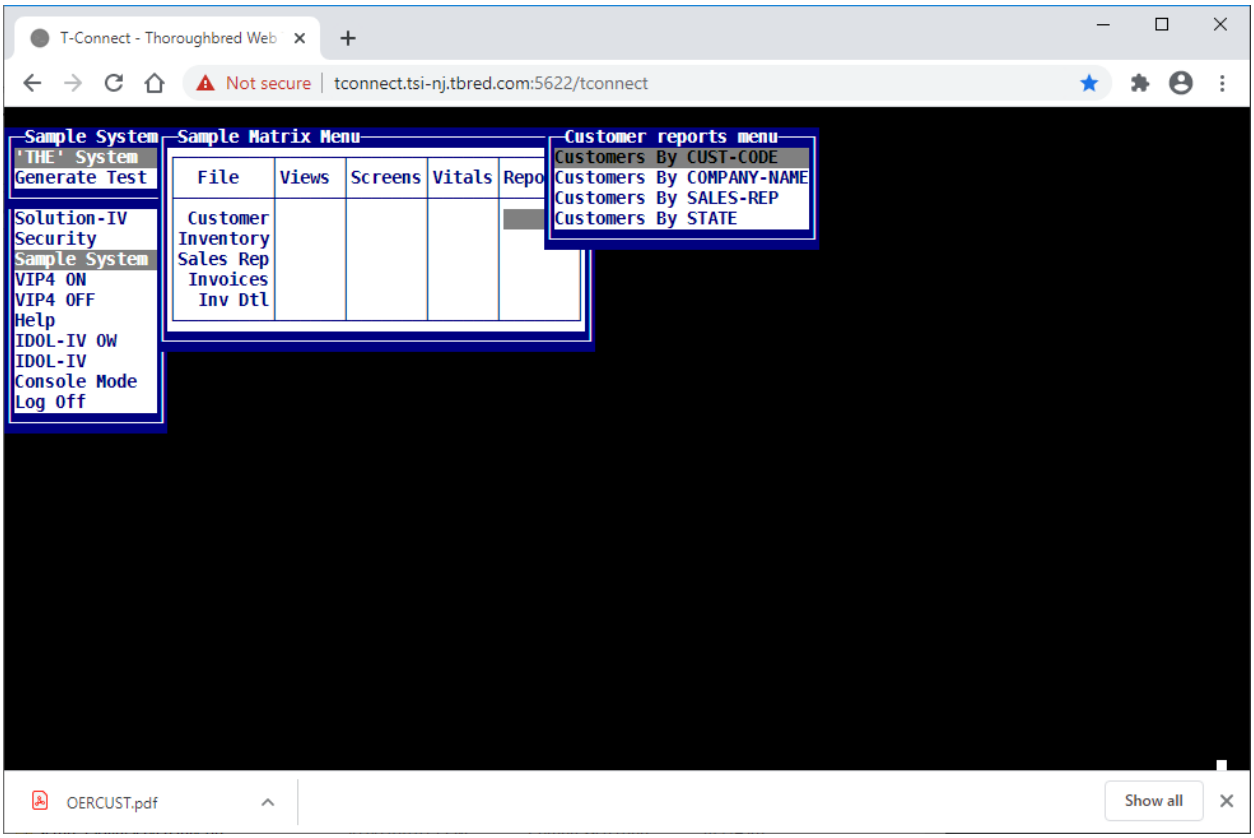
This feature is controlled by a new option in Report-IV to PDF maintained in the logical format #OOFPDF1.TC-AUTO-LOAD. When set to **Y** the PDF file will automatically be processed through the browser. This is the default setting, any other value will disable this feature and the Report-IV to PDF product will behave as it did in previous releases using TbredComm.

To change the value, use Dictionary-IV Format Maintenance to edit OOFPDF1 and clear the PreSet value. For the change to take effect the global settings stored in #OOFPDF1 must be reloaded. From the Report-IV to PDF Utilities menu select the option to **Reset Global Settings**. The value can be manipulated dynamically by changing the value of #OOFPDF1.TC-AUTO-LOAD prior to executing a CONNECT Report or in the 3GL program that calls the 3GL wrapper OORPDFX.

For more information, please see the Report-IV to PDF manual.

Printing to TS ReportServer

The TS ReportServer product supports printing in T-Connect. It does not open the ReportServer window on the workstation, instead it will generate a PDF file. Depending upon the browser settings, the PDF file will be downloaded and opened in a new tab, downloaded by the browser with an option to save the file, or the user will be prompted for an action. To change this behavior please refer to your browser settings.



T-Connect with Dictionary-IV and OPENworkshop

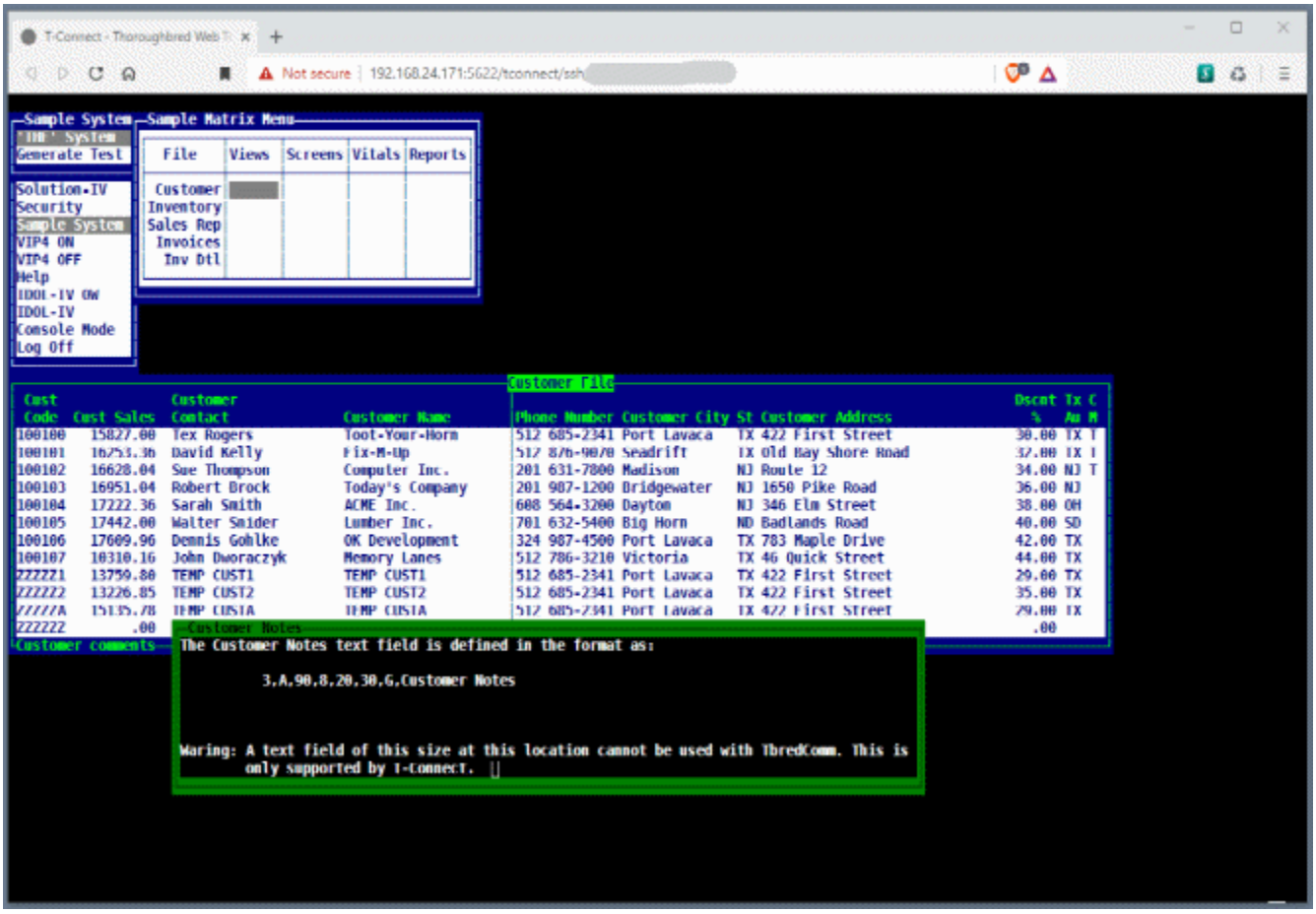
Dictionary-IV Overview

T-Connect supports creating large Dictionary-IV objects: Views, Screens, Pop Up Menus, Help, Reports displayed to the screen, Text Fields, and Source-IV source. All editors including EDITF support editing large objects. Objects that have been saved with a size greater than 80x24 can no longer be edited using TbredComm, the contents are not scaled down to fit an 80x24 window and text will be truncated.

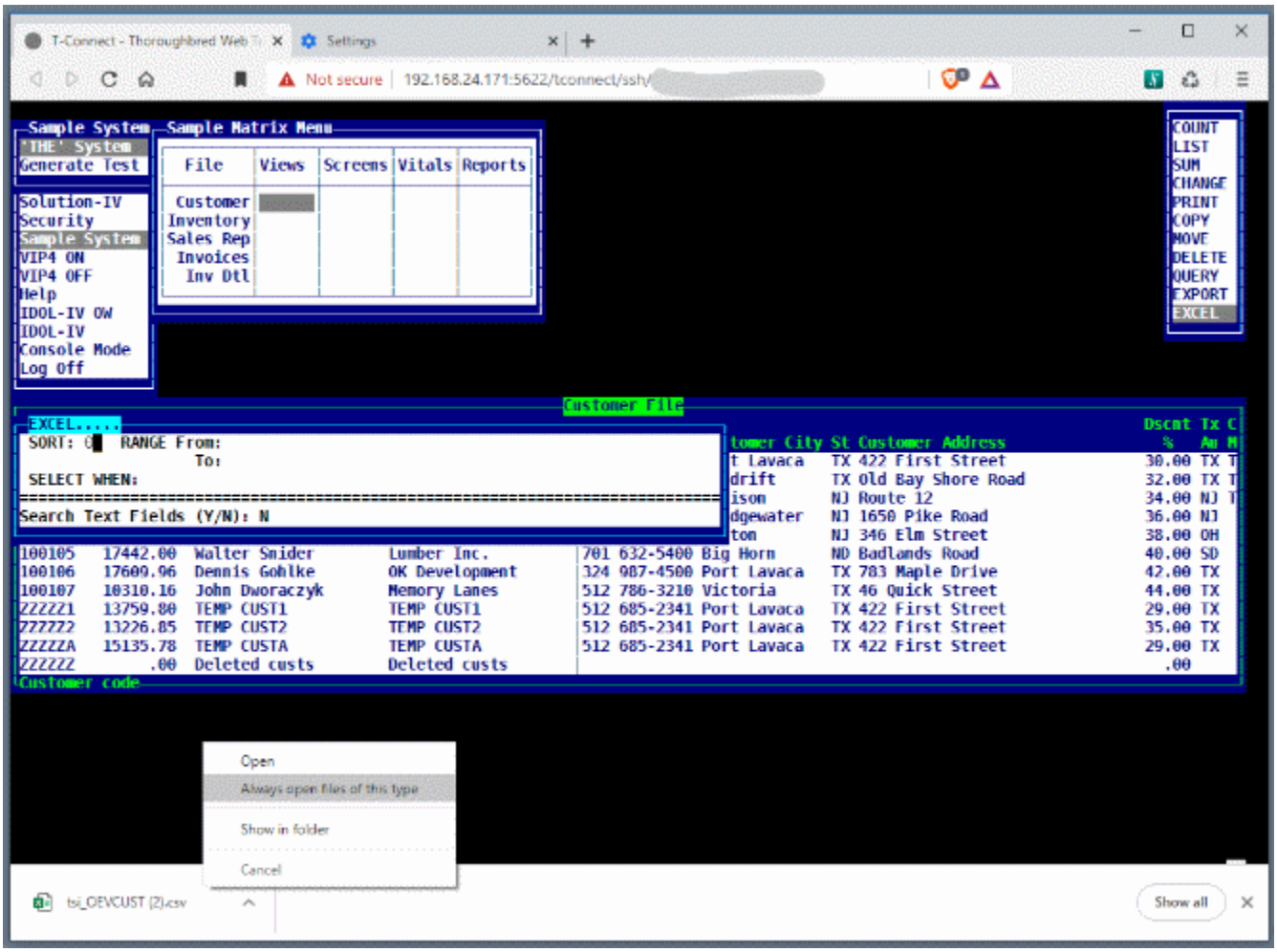
When using the mouse to resize the browser window it may be necessary to 'refresh' the contents. The OPENworkshop hot key menu has been updated to include an option **Update Browser Window Size** to refresh with browser.

Views

OPENworkshop will detect T-Connect and will allow view objects and positions beyond the 80x24 matrix. This example also shows a text field defined for 90 cols 8 rows at column 20 and row 30.



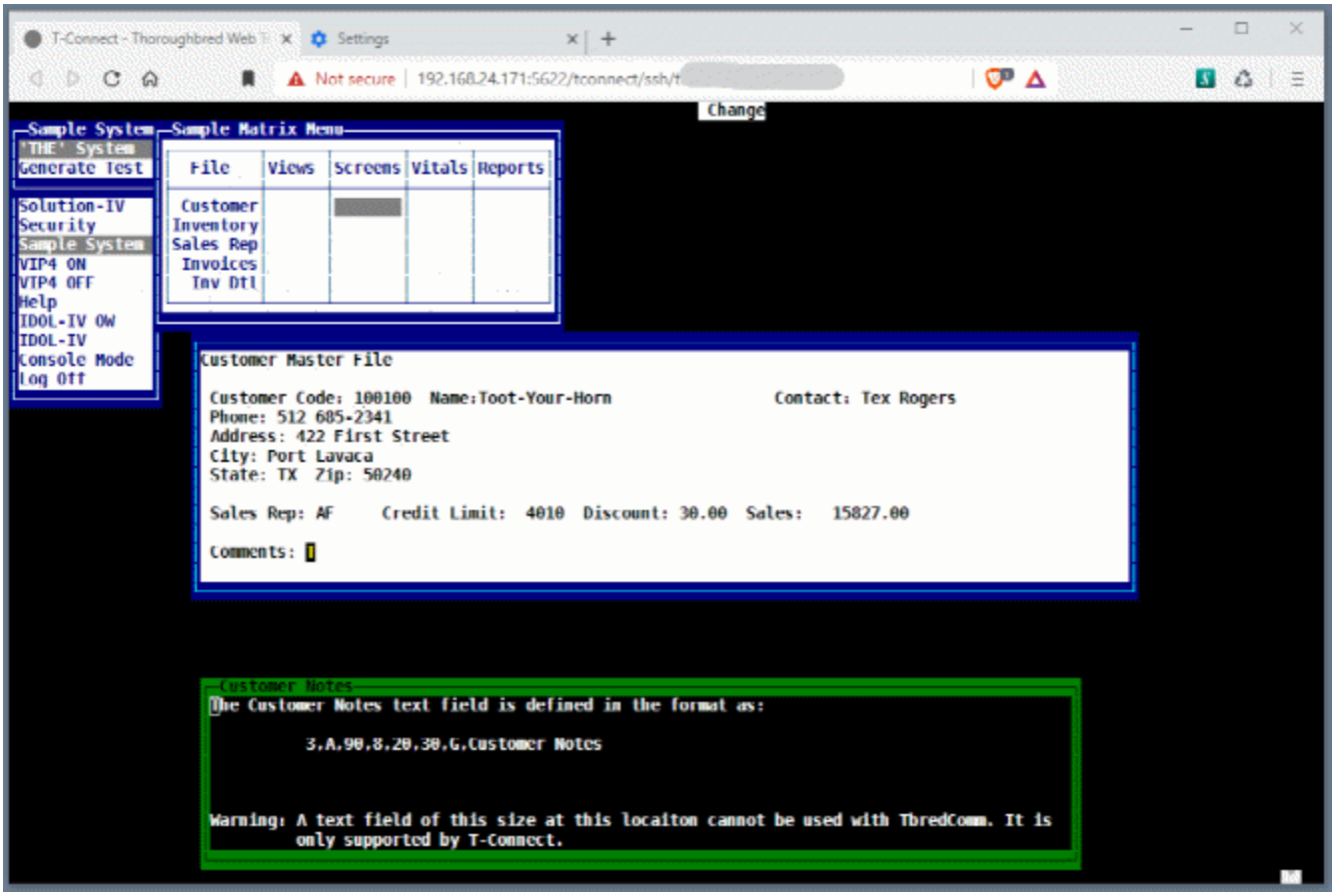
The View **F8** Excel option will create the .csv file and the browser will download it. The .csv file can be opened with Excel or any application that supports .csv file types. Depending upon the browser settings the .csv file will be downloaded or opened automatically using the application associated with .csv files. To change this behavior please refer to your browser settings.



When using the View **F8** Print option, select a **type 2** printer for output and a PDF file will be generated and downloaded by the browser. For more information, please refer to the section on Printing.

Screens

OPENworkshop will detect T-Connect and will allow screen objects and positions beyond the 80x24 matrix. This example also shows a text field defined for 90 cols 8 rows at column 20 and row 30.



Pop Up Menus and Help

OPENworkshop will detect T-Connect and will allow PopUp Menus, Help objects and positions beyond the 80x24 matrix. Help definitions that contain the Help type, window size and location in line 0 can specify a 'Docking' flag. Valid help types are:

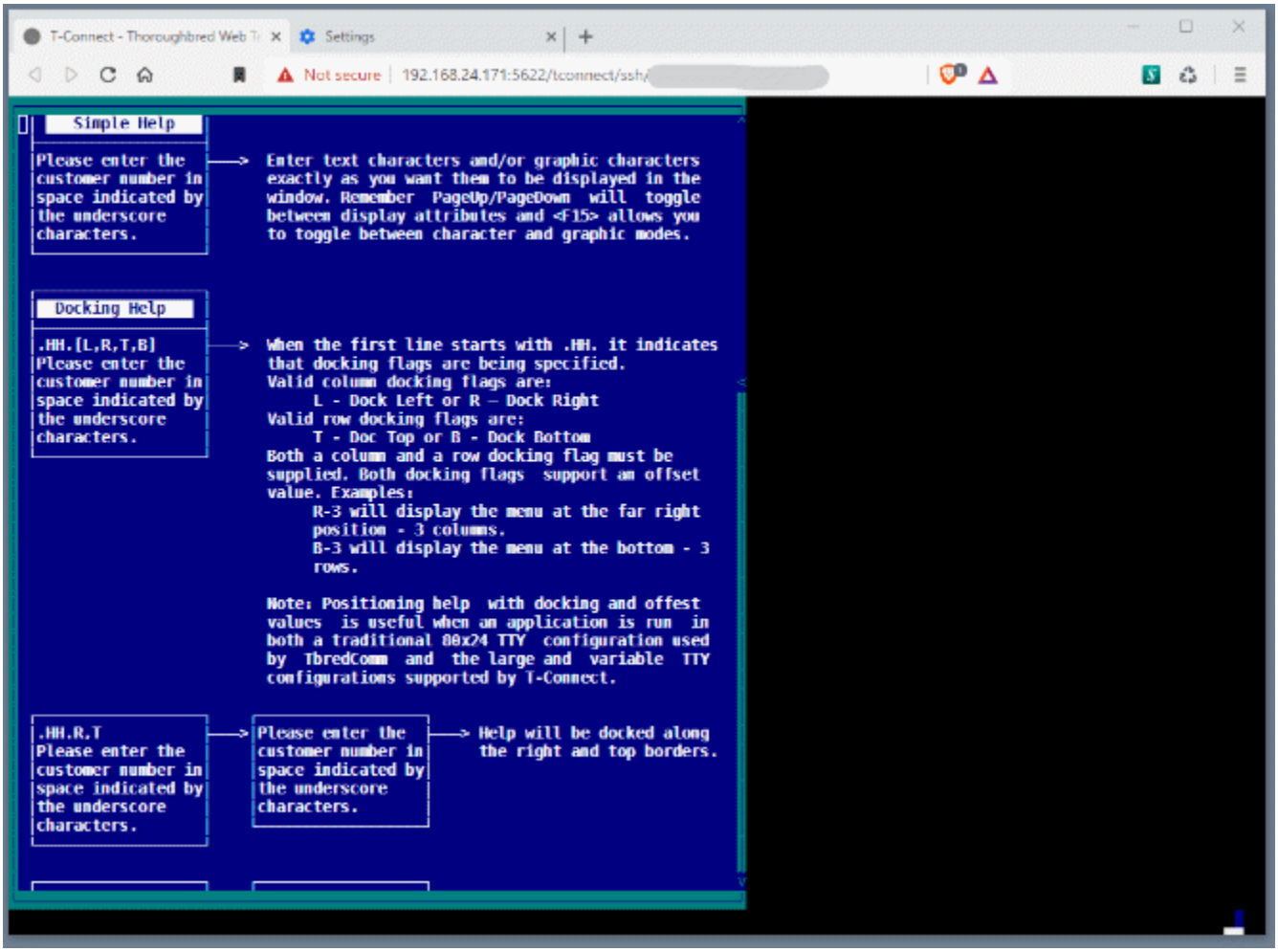
.HH. Simple Help
.HI. Index Help.
.HM. PopUp Menu
.MM. PopUp Menu
.HF. Function Key Help

Valid column docking flags are: L - Dock Left or R - Dock Right
Valid row docking flags are: T - Doc Top or B - Dock Bottom

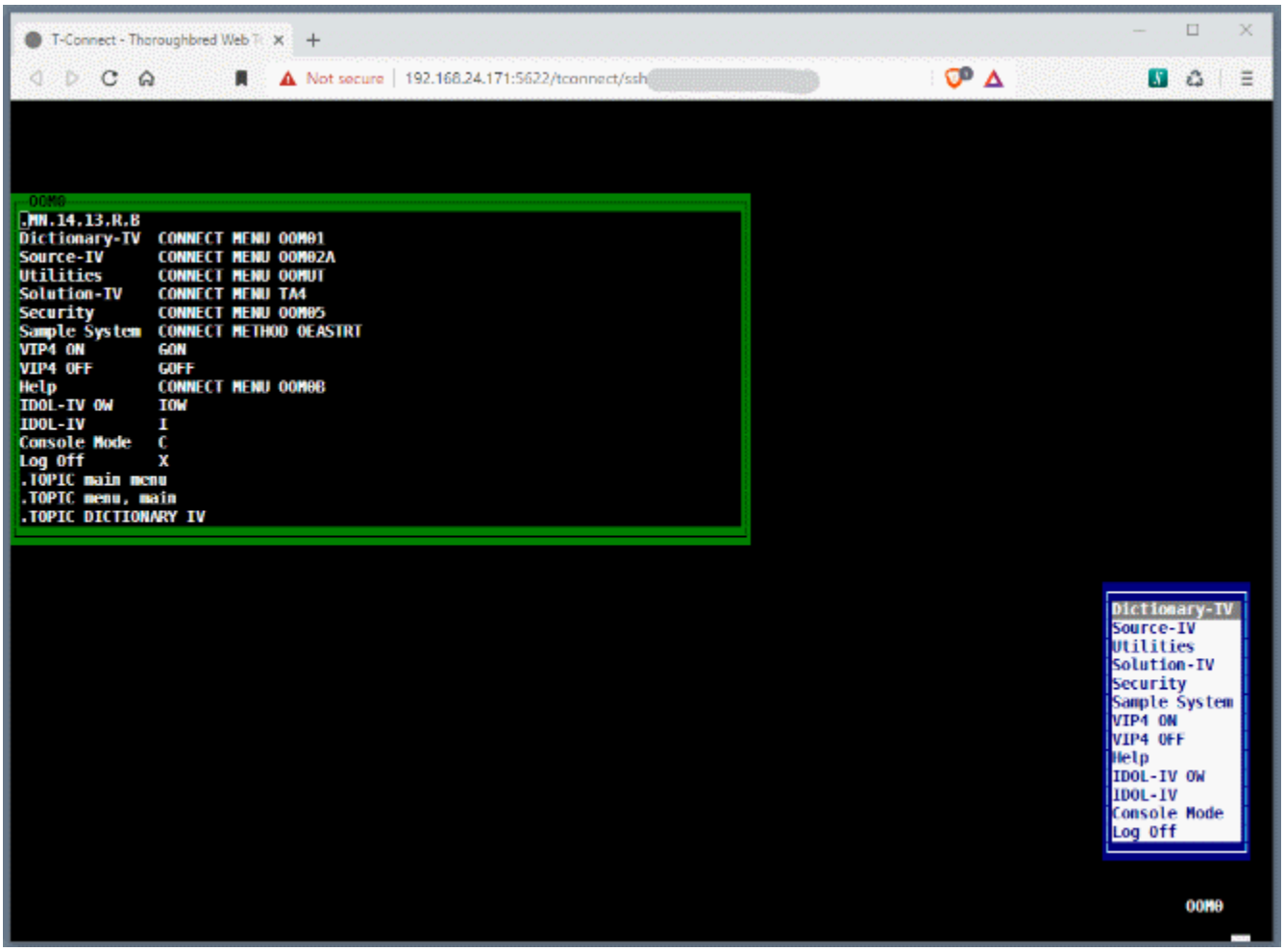
Both a column and a row docking flag must be supplied. Both docking flags support an offset value. Examples:

R-3 will display the menu at the far right position - 3 columns.
B-3 will display the menu at the bottom - 3 rows.

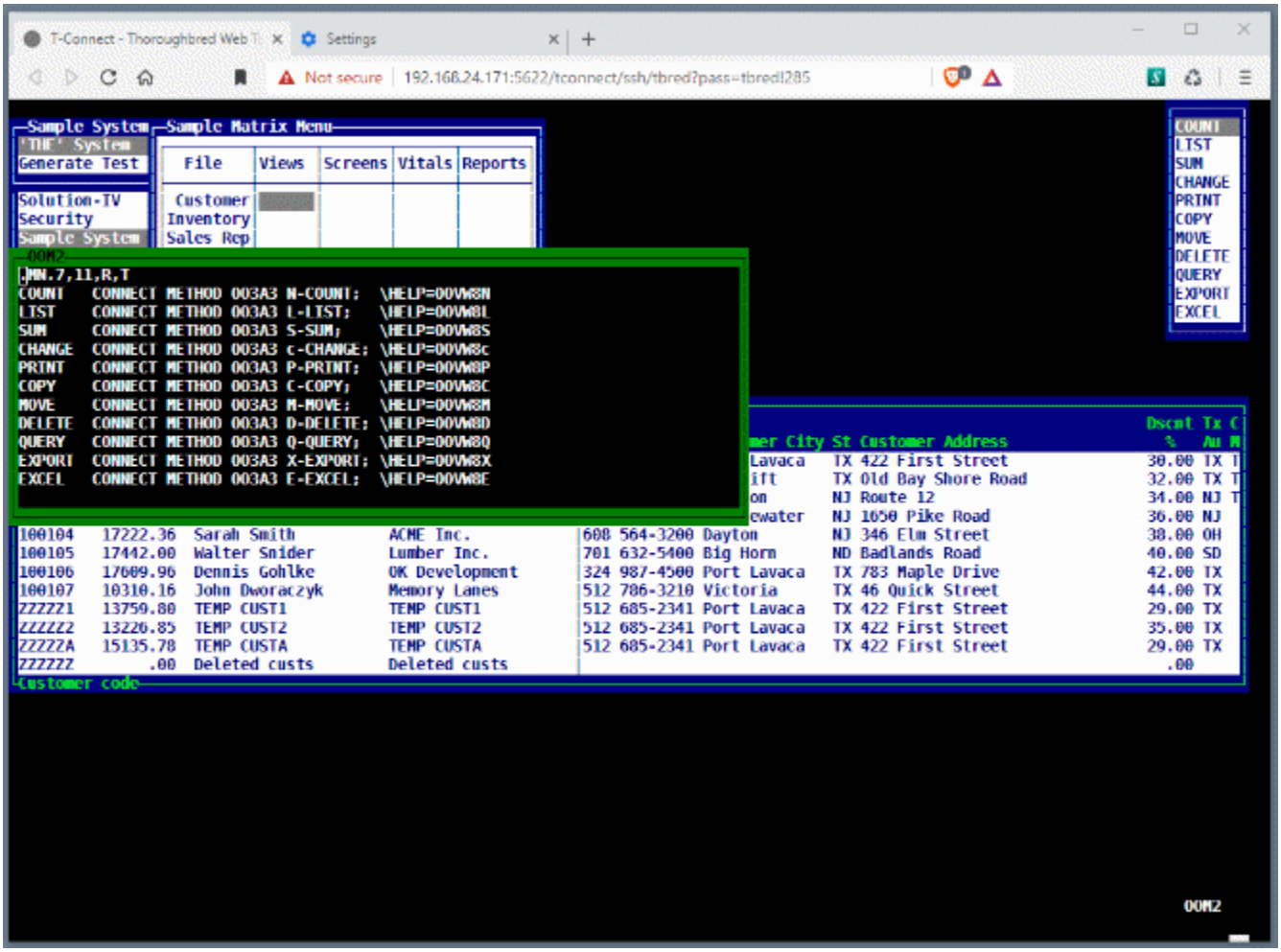
Positioning help with docking and offset values is useful when an application is run in both a traditional 80x24 configuration used by TbredComm and the large configurations supported by T-Connect.



In menu OOM0 setting the first line to .MN.14,13,R,B will result in the main OPENworkshop menu being docket Right and Bottom.



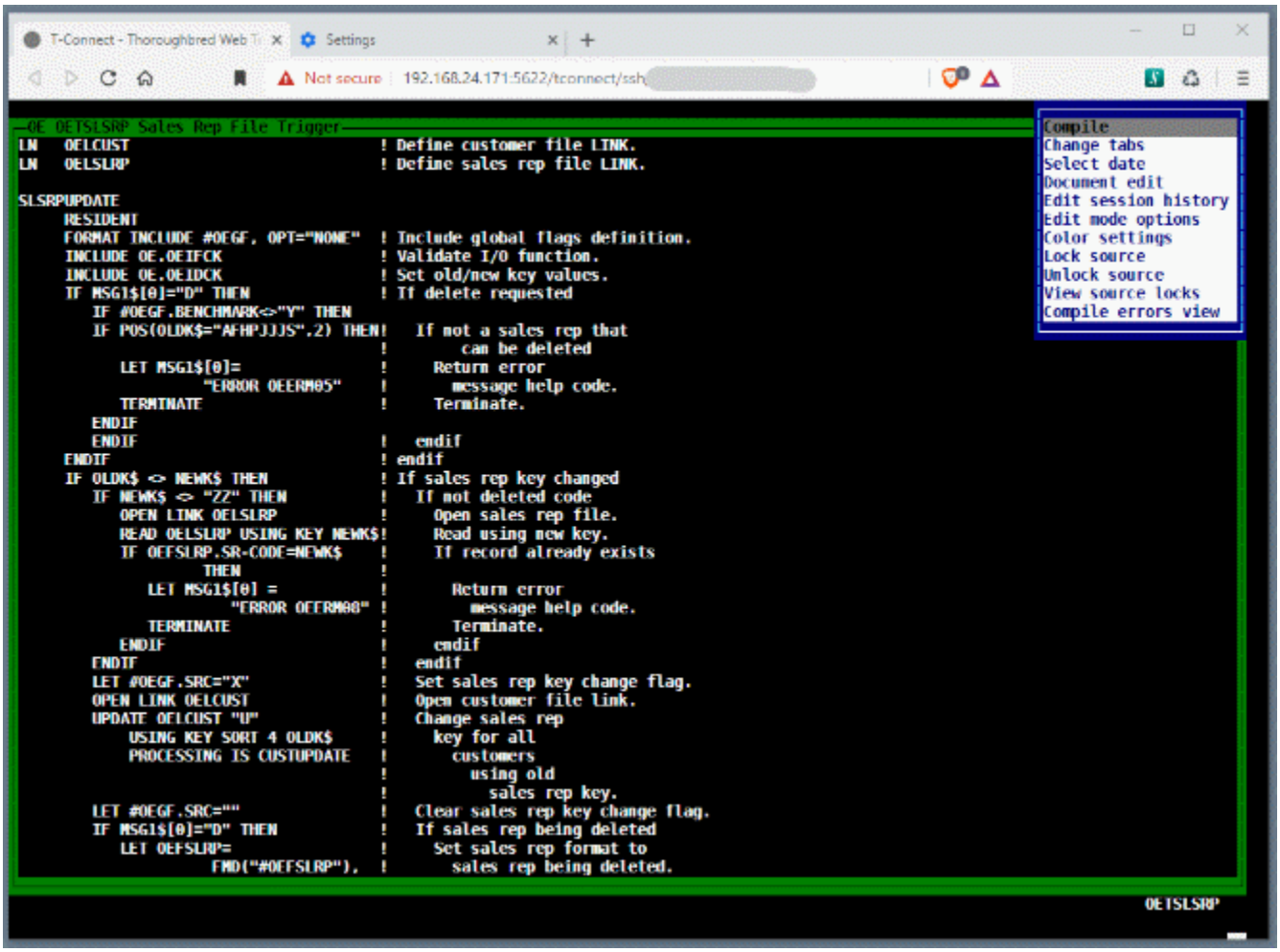
In the following example the **F8** View Special Function menu is defined to dock Right and Top:



To review the online help, from the main OPENworkshop menu select **Help**, **Language Help**, **API Services**, and then **8HELP**.

Source-IV and EDITF

Both the Source-IV editor and console editor EDITF will maximize the browser space. In Source-IV, wide text (more than 80 cols) is only supported by T-Connect, it is not supported by TbredComm. If displayed in a standard 80 column wide emulator window, text beyond column 78 will be truncated. Once saved this way it cannot be undone. A warning message will be displayed before saving an 80 col wide Source definition to a wider width.



Downloading Files

T-Connect supports downloading files to the workstation through the browser. To accomplish this CALL Method GWWCOMD from the application code.

MSG$[0] = Return status, if no error occurred will be “.”
MSG$[1] = “O” dOwnload function
MSG$[2] = DF message string for the browser
(1,4) “DF**” function code
(5,5) length of message starting in byte 5
(10,1) “B” block mode
(11,3) length of directory name
(14,x) directory name
(14+x, y) length of file name
(14+x+y, z) file name
MSG$[3] = “FILE “ + directory name + file name

In the following example GWWCOMD is CALLed to download a PDF file through the browser:

```
METHOD MSG$[ALL]
....
PROCEDURE
    F1$="/opt/tbred/basic/PDFiles/",        ! directory containing PDF file
    F2$="A00001.pdf";                       ! file name to download
    DIM M$[3];                              ! dim GWWCOMD array
    M$[1]="O",                              ! set function to Open/Download
    M$[2]="DF**"+                           ! set GWWCOMD message type:
    "00000"+                                ! message length place holder
    "B"+                                    ! block mode
    STR(LEN(F1$):"000")+                    ! length of directory name
    F1$+                                    ! directory name
    STR(LEN(F2$):"000")+                    ! length of file name
    F2$,                                    ! file name
    M$[2](5,5)=                             ! set length of message string
    STR(LEN(M$[2](10)):"00000");            ! Starting in byte 5
    M$[3]="FILE "+F1$+F2$;                  ! set file name with full path
    CALL "GWWCOMD",M$[ALL];                 ! call GWWCOMD to download the file
    GOTO CUEXIT                             ! Standard Method exit logic
```