

USER'S MANUAL

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2. Introduction

Welcome to the YP-TDS User's Manual. The YP-TDS is a tactical battle simulator intended for use aboard US Naval Academy **Yard Patrol Craft (YP)**. It consists of one or more YPs each with a **Local Area Network (LAN)** that is in turn consisting of four laptops connected through a hub.

The **Wide Area Network (WAN)** is established using the ICOM 710 **High Frequency (HF)** radios aboard the YPs as well as **Terminal Node Controllers (TNC)** to interface between the radio and the laptop. The WAN facilitates the exchange of tactical data between YPs. Within the WAN, there is one YP designated as a **Master Server** and all other YPs are designated **Remote Servers**. The differences and capabilities of both will be discussed in greater detail in Chapter 7.

Equipment Needed



ICOM 710

Each YP should possess this radio.



GPS

Each YP should possess some form of GPS.



DIN-5 to DIN-8 Adapter

Used to connect the TNC to the radio. This adapter must be built. Schematics are available in the Appendix..



RS232 DB9 to DB25 Adapter

Used to connect the laptop to the TNC. This adapter must be built. Schematics are available in the Appendix.



Four Laptops Per YP

Some YPs carry up to two PCs on board that may. The fourth laptop is for the optional **Big Screen** terminal.



Ethernet Hub

This is to network the laptops over a LAN.



TNC

This device encodes and decodes binary information to and from audio frequencies coming through the radio.

TNC Power Supply

This device is a 12V AC adapter with reverse polarity. None come with the TNC and must be purchased.

Ethernet Cables

To connect four laptops, five long cables will be required.

IMPORTANT: When constructing adapter cables it is vital that the proper pins are soldered together. Incorrect wiring may cause permanent damage to a laptop, TNC or radio. Also, connecting the wrong power supply to the TNC may result in damage to that unit. Ensure the power supply you use is the correct voltage and polarity.

3. Installing YP-TDS Software

Installing

Copy all files from the YP-TDS CD ROM onto your local harddrive under the folder YP-TDS. Once this is done, you may wish to make a shortcut to the YP-TDS.exe file and place it on your desktop.

All files after being copied off of the CD ROM are set to *read only*, select the entire YP-TDS folder and right click. You should see a grayed out checkbox for *read only*. Uncheck the read only box, and hit apply.

Configuring the Software

Locate the file **config.txt** and double click on it. You should see this:

```
<HULL_NUMBER>
689
<SERVER_IP_ADDRESS>
169.254.22.70
<GRAPHICS>
16
<SOUND>
1
<TNC_XMIT_DELAY>
12
```

The **HULL NUMBER** is only important if the computer you are configuring is the server for your YP. As a rule of thumb, you should set this value to match the hull number of your YP regardless.

SERVER IP ADDRESS should be set to the IP address of the server on board the YP. This isn't required if the computer being configured is the actual server. To find the IP address of any computer, click the windows **START** button, click on **Run...** and run **command**. A black DOS box should now appear. In this new window type **ipconfig** and press enter. The computer's **IP Address** will be displayed among other addresses.

Currently, the color bit depth under **GRAPHICS** is set to 16-bit mode. This can be changed to 24-bit or 32-bit color modes depending on your computer's hardware by changing the number.

Caution: Most computers do not support all three of these modes. If the YP-TDS displays garbled pixels or exits upon start up, you may have selected an invalid mode.

The **SOUND** toggle is used to turn sound on and off. A **1** will enable sound, a **0** will disable.

TNC XMIT DELAY is used to control the time between sending a packet to the radio for transmission and actual transmission. The Default is 12. This not important if the system you are configuring is not the server.

Configuring the PC

If you are using sound you must turn off Audio Acceleration.

The configuration menu varies from system to system.

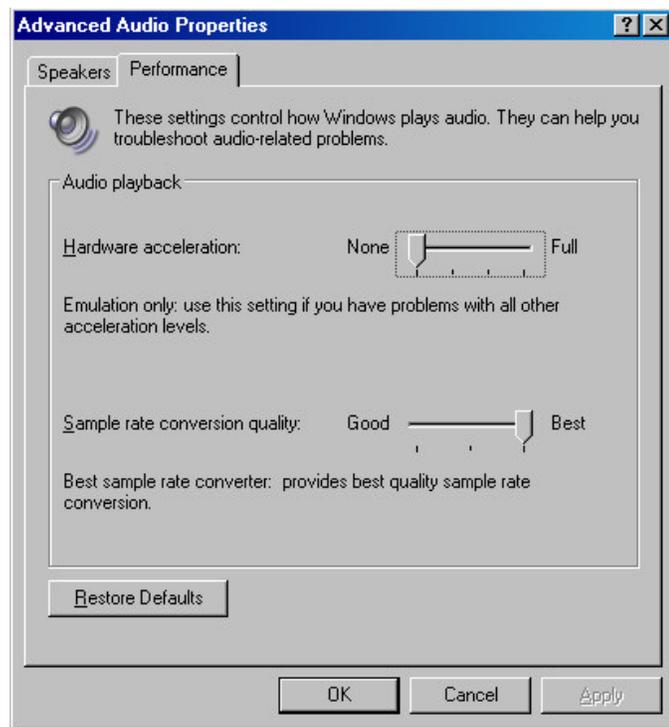
A common path is: **START**

->**Settings->Control Panel**

->**Sounds and Audio Devices**

->**Audio->Advanced**

->**Performance**



If you experience your mouse cursor spontaneously halting during the main menu screen, this is most likely caused by the audio acceleration.

NOTE: Remember to quit all non essential applications that may be running in the background to gain the best performance from the YP-TDS and the computer system.

4. Hardware Setup

For the YP-TDS system to be properly set up, several external devices must be attached and most require a configuration of their own.

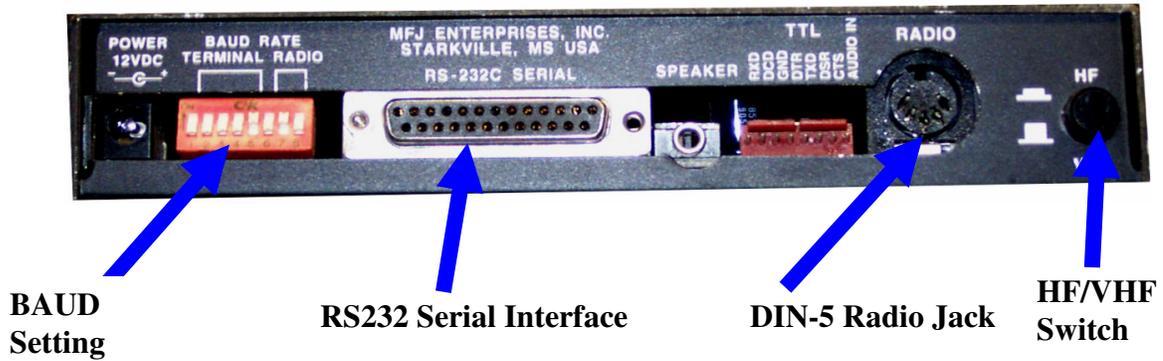
4a. Setting Up The TNC



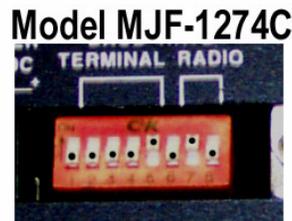
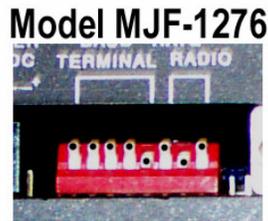
To facilitate your YP-TDS server's communication through HF radio to other YP-TDS Servers, a crucial link is the Terminal Node Controller (TNC). This will interface with the radio and convert the audio tones it receives to binary information, and vice versa.

The Baud speed for serial communications to the laptop must be set as well as the radio audio data speed, transmit audio and receive audio. If any of these settings are not configured properly, the system will not work.

You will need to connect the RS232 DB-9 to DB-25 connector into your laptop's COM1. Schematics detailing the construction of this adapter are located in the **Appendix**.



The BAUD DIP Switches must be set to 9600. There are two versions of TNCs, the MFJ-1274C and the MFJ-1276. Their model number is located on their front panel. Their DIP configurations are detailed below.



The HF/VHF switch should be in the VHF position (out).

To configure the transmit and receive audio. Use a small screwdriver to gently turn both potentiometers to the right until they cannot move. Then turn them back to the left one quarter of a turn. This is to ensure that both transmit and receive audio levels are satisfactory for the YPs HF radios.



Finally, the TNC must be plugged in and turned on. The large red button on the face of the unit must be pushed in. Immediately, the red PWR led should be lit. If the PWR led is not lit, check and make sure the power supply is attached. The power supply must be 12 Volts and must have the $\ominus \oplus$ symbol located on it indicating it is reverse polarity.

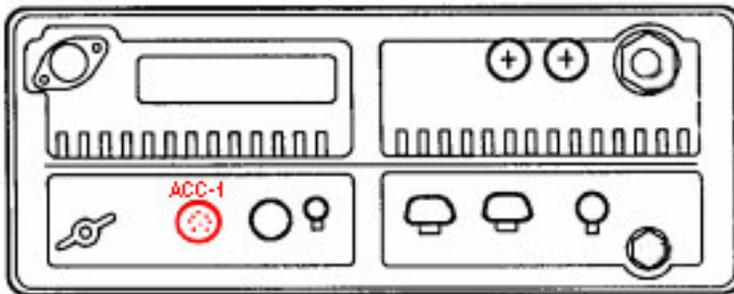
WARNING: You must not connect a power supply that is not reverse polarity or permanent damage to the TNC may occur.

4b. Setting Up The Radio

Each YP is equipped with an Maritime ICOM 710 HF radio. The radio must be programmed with the correct transmit and receive frequency, be put in the proper mode, and must be hooked up to the TNC for it to function correctly.



Connecting the ICOM and TNC:



Attach the 8 pin side of the ICOM-to-TNC adapter to the **ACC-1** port located on the left side of the radio when looking from behind. Plug the other 5-pin end into the TNC jack marked **RADIO** on the back



.Configuring the ICOM 710.

If the radio is already programmed, you may skip to **Step 13**.

Step 1: To program the receive channel select the desired channel by rotating the **CHANNEL** selector knob.

Step 2: Push and hold the **CE** button to enter frequency selection mode. A ► symbol should now appear in the display.

Step 3: Enter the desired frequency using the keypad with 5 or 6 digits. You may also rotate the **CHANNEL** knob.

Step 4: Change the operating mode to **USB** mode by pushing the **MODE** button. Now push and hold **RX** for one second to save your settings.

Step 5: To set the transmit channel, push **TX** until  begins to blink.

Step 6: Push the **CE** to select frequency selection mode again,  should appear on the display.

Step 7: Enter the same frequency as your receive frequency using the keypad. Note: The **CHANNEL** selector can't be used to do this.

Step 8: Push and hold **TX** for one second to save your new settings. Push **TX** again to clear the blinking .

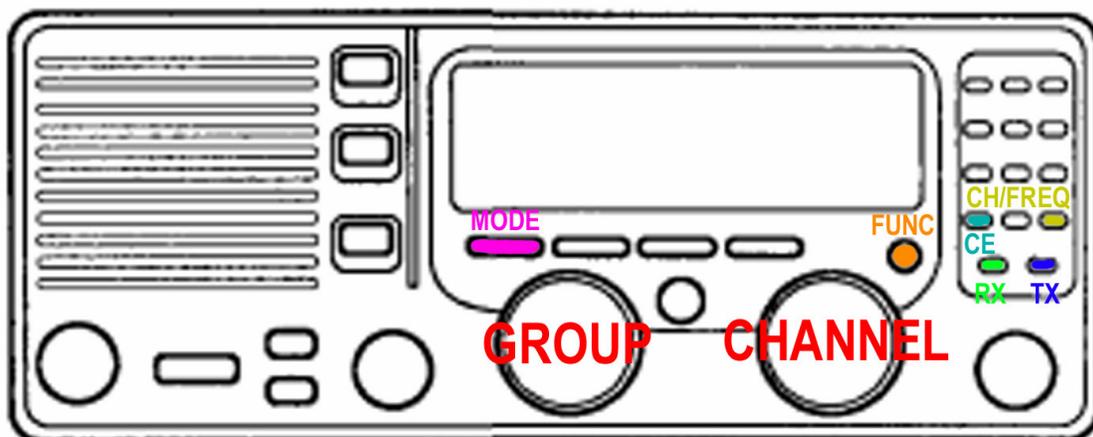
Step 9: You should program this channel to display **YP_TDS**. To select a name for the channel, push **CH/FREQ** to select channel indication.

Step 10: Push the **FUNC**, then **CE**. The channel's text box should now blink.

Step 11: Rotate the **GROUP** selector for cursor position and the **CHANNEL** selector to change cycle through available characters. To cancel, push **CE** again.

Step 12: To save your work, push and hold **RX** until the blinking stops.

Step 13: Rotate the **CHANNEL** knob to select the channel labeled **YP_TDS**.



4c. Setting Up The GPS



Depending on the type of GPS used onboard your YP, the configuration method may vary widely. You should consult the user's manual for your GPS unit for specific details.

The GPS must have the following configuration:

Bits Per Second:	4800 baud
Data Bits:	8 bits
Parity:	None
Stop Bits:	1 bit
Flow Control:	None

When connected correctly to **COM3**, the **GPS** on the Network Menu will be illuminated. Do not connect the GPS unit after starting the YP-TDS as it will not detect it and may cause malfunctions.

5. Starting The Program

In the main menu, you are presented with five options.

SINGLE PLAYER and

MULTI PLAYER are

grayed out, and reserved for

future use. **OPTIONS**

allows you to toggle

various game settings but is

not functional in this build of the program.

EXIT quits the YP-TDS program.

FLEET BATTLE takes you to the Local Area Network screen. Whenever you exit the simulation, you will be brought back to this menu.

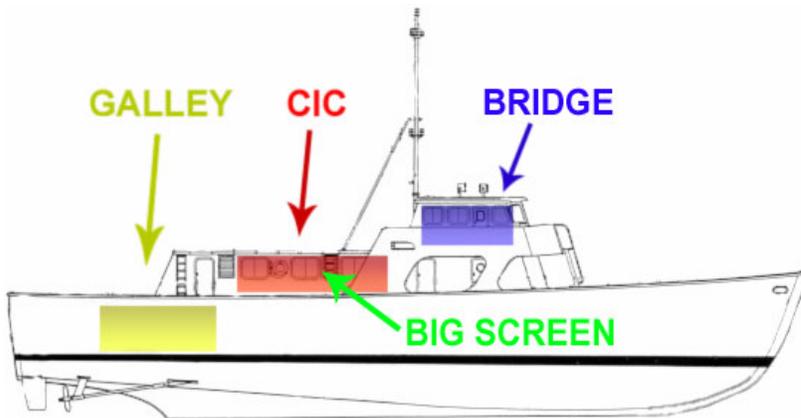


6. Local Area Network

The YP-TDS system relies on a **Local Area Network (LAN)** to be installed on board all YPs participating in the YP-TDS battle simulation. The LAN requires the use of an Ethernet hub such as the



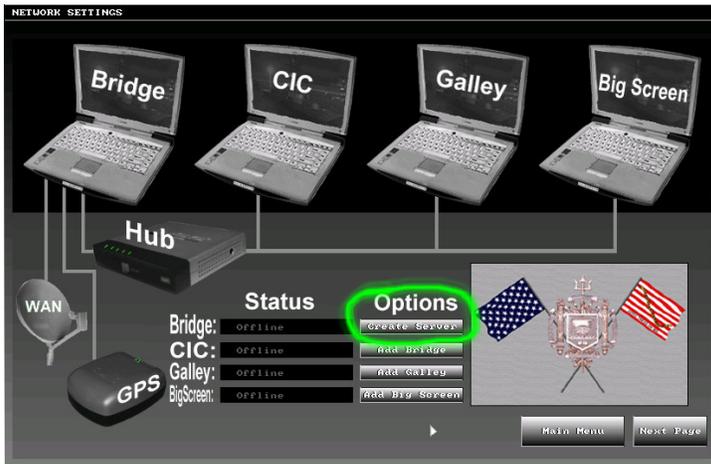
LINKSYS SD208 shown to the right. A total of four systems may be connected through a LAN on each YP. Each system, called a Terminal will be located in a specific location to facilitate that Terminal's role in the YP-TDS simulation.



The four terminals are the **Galley**, **CIC**, **Bridge** and **Big Screen**. And their respective locations are

represented in the diagram above.

6a. Running as a Client

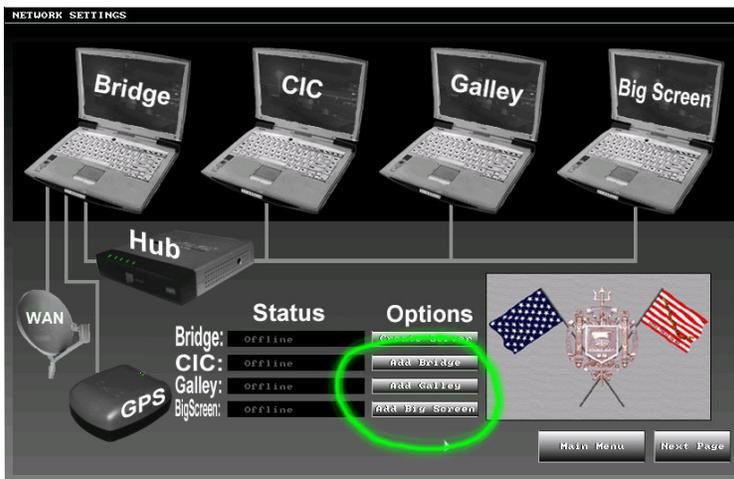


If the server has been established, select the **CIC**, **GALLEY**, or **BIG SCREEN** buttons to connect to the server as the respective role of your client computer. Once connected, your computer will automatically begin the simulation once the server has begun. If you attempt to connect to the server and get a **Connection Failed**, verify you have entered the server's IP

Address in correctly, and that the Server has been established. Also be sure to check your Ethernet connection to the hub. If all else fails, simply keep trying. Once connected, you will now wait for the Server to initiate the simulation.

6b. Running as a Server

Click the **BRIDGE** button to establish the server. You may see additional client servers connect to you at this time. Click the **Next Menu** button to proceed to the Wide Area



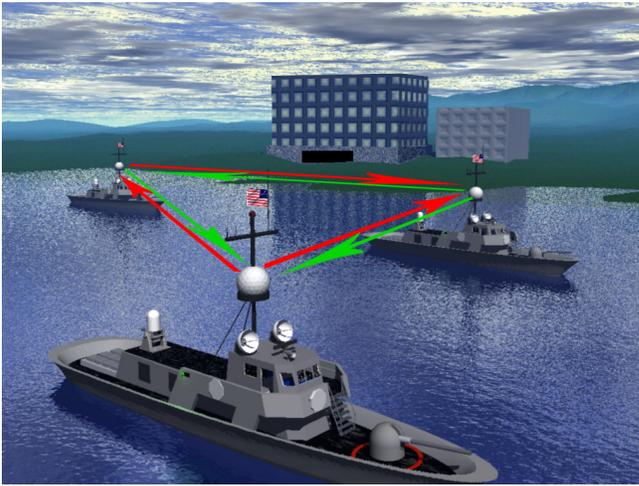
Network Menu. If for some reason, you get an error when trying to connect the server, verify you are plugged into the hub.

As the server, you will need to plug in the GPS used by the YP into your laptop's COM3 port. Connect the RS232 DB-9 to DB-25 adapter into your laptop's COM1. Schematics of this adapter are available in the **Appendix**. Shown below is

where you are to plug the other side into the TNC.



7. Wide Area Network



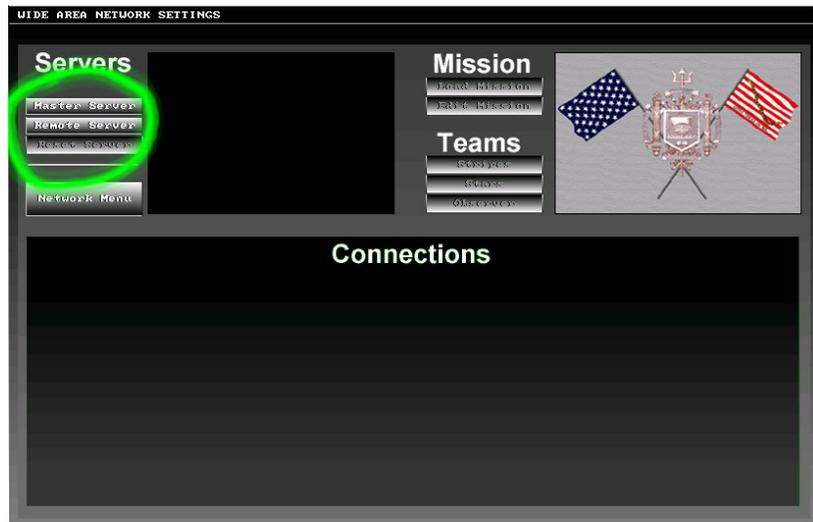
The YP-TDS utilizes the HF radios on board to implement a **Wide Area Network (WAN)** that can be used to transmit and receive tactical data.

Just as in a local area network, a wide area network requires a server.

In the case of the YP-TDS system,

the WAN server is referred to as a **Master Server**, and all WAN clients are **Remote Servers**.

To select which type of WAN Server your YP is to be, click either the **Master Server** or **Remote Server** buttons on the left of the Wide Area Network Menu.



NOTE: If you want to be an **Observer** your server cannot be the **Master Server**.

7a. Master Server

Once you have established the **Master Server**.

You will need to load a mission file.

Currently, this requires only the clicking of the

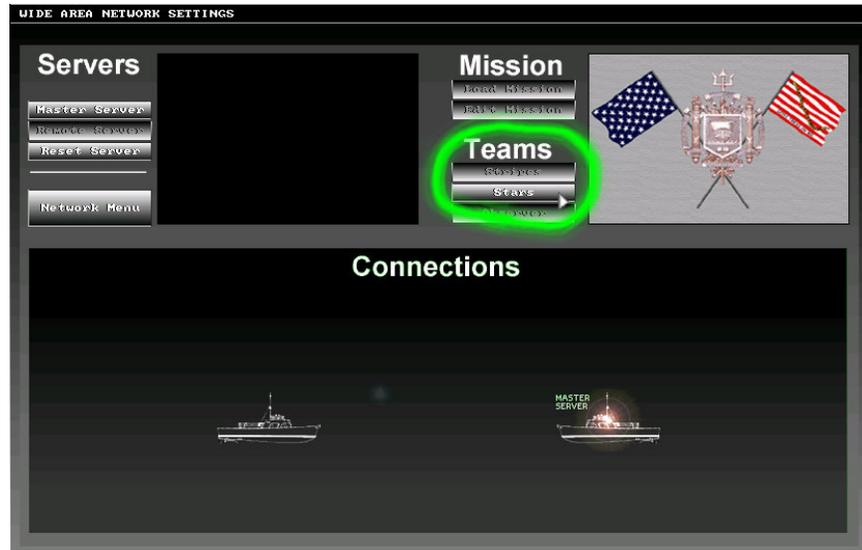


LOAD MISSION button. In the **Connections** box, you will see a grayed out diagram of the YPs that are expected to participate in the mission scenario. You must then select a team, either **STARS** or **STRIPES**.

As soon as a team has been selected, your system will begin to send an information pulse out into the airwaves for other YPs that are configured as **Remote Servers** to receive. As they receive the pulse, they will transmit their own pulse containing their identity, and team. You will see them light up on the **Connections** diagram at this time. When all members of the YP-TDS battle scenario have joined the WAN, you may begin the simulation by clicking the **LAUNCH** button.

7b. Remote Server

When you have chosen your YP to be a **Remote Server** your terminal will wait indefinitely for either a pulse from the YP acting as the



Master Server, or until you quit the program. Once the pulse has been received the Connections diagram will display grayed out YPs that are expected to participate in the mission scenario. Currently your YP is in **Observer** mode. If they are not already filled to capacity, you may select a team, either **STARS** or **STRIPES**.

Once selected, your YP will wait until the **Master Server** initiates the simulation, at which time you will automatically launch. If you stay as an **Observer**, you will automatically launch, but will be allowed to observe the battle with all unknown tracks automatically identified and have infinite radar coverage. You will not, however be able to communicate with the either team, nor will you be able to launch any weapons or in any way interfere with the battle.

8. Running the Simulation

Once the simulation begins, all YPs will be in synchronization. Each terminal aboard each YP will be able to access different menus depending on that terminal's location.

Each terminal will be able to manipulate the interface independently from any other terminal. A description of the controls are detailed below.



Interface Controls

Action

Pan Left/Right
 Pan Up/Down
 Zoom In/Out
 Grid Lines On/Off
 Mini-Map On/Off
 Profile Window On/Off
 Hook a Track
 Track Menu
 Draw Bearing Tool

Keyboard

Left/Right Arrow Keys
 Up/Down Arrow Keys
 A or Z key
 G
 M
 P

Mouse

Cursor Left/Right Edge of Screen
 Cursor Top/Bottom Edge of Screen
 Mouse Wheel Up/Down

 Left Click
 Right Click
 Left Click and Drag

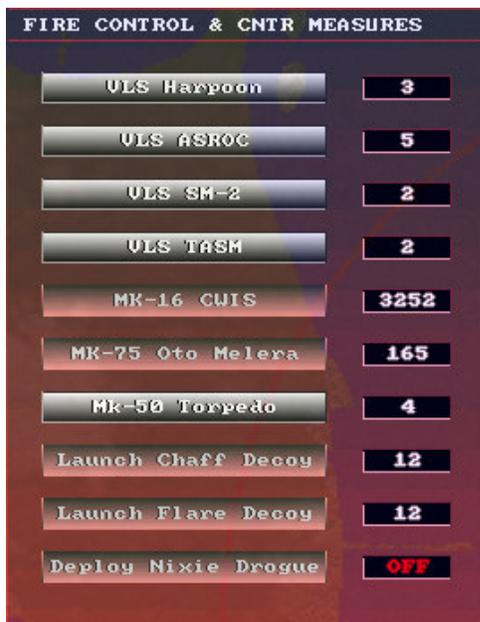
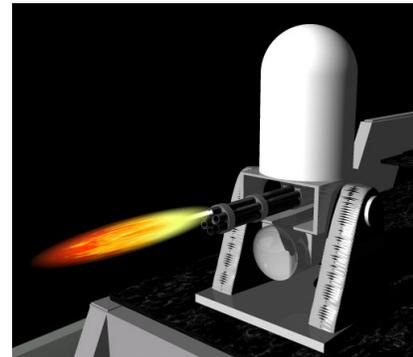
Grid Lines: This option allows you to toggle the nautical grid lines on the interface.

Mini-Map: The mini-map is displayed in the lower left hand corner, and allows you to see the entire operational area at once. By clicking anywhere in the minimap, you're view will be taken there.

Profile Window: This window will display important information about the track that is currently hooked. You may hook a track by left clicking on it.

8a. Weapons and Countermeasures

If your terminal is set up as the **CIC**, you will have the option to launch weapons counter measures. There are two menus that control this: One is located in the **Tool Bar**, which is available if you click at the top of the screen. The other is available when you right click on the track you wish to target.



In the **Tool Bar** accessible menu, you can select the weapon by clicking on its button. The ammunition count is displayed in the small box to the right of the button.

From here, countermeasures can be toggled on and off, or launched. The current build of the YP-TDS does not allow the use of the MK-16 CWIS, MK-75 Oto Melera or any of the countermeasures such as Chaff, Flare and Nixie drone.



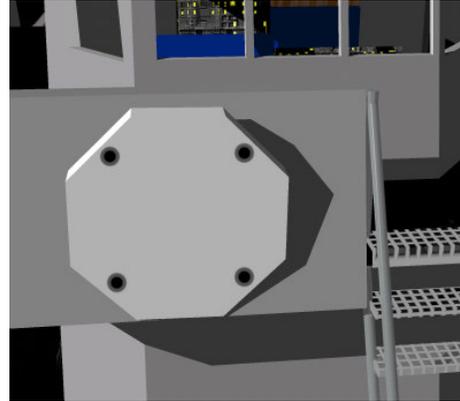
When right clicking on a track and selecting the **Engage** option, you will be given a menu like the one to the right. Simply click the weapon you wish to engage the track with. The ammunition of the weapon is displayed following the X after its name.

8b. Sensors

When operating your terminal as a **CIC**, you will be able to manipulate multiple types of sensors.

Other enemy YPs will be able to detect your radiating sensors such as your SPY-1D, and possibly identify you sooner, giving them an

advantage so you may wish to turn off this sensor as



well as some of your others and rely on those other members of your battlegroup to be your eyes and ears while you lay low. This can give you a tactical advantage. When accessing the sensor menu through the **Tool Bar** by clicking at the top of the screen you will be given a list of sensors. By clicking on each sensor's button, that sensor can be



toggled on or off. Only the SPS-64 is continuously on, because the YPs are equipped with a real SPS-64 radar, and this radar is not integrated with this system.

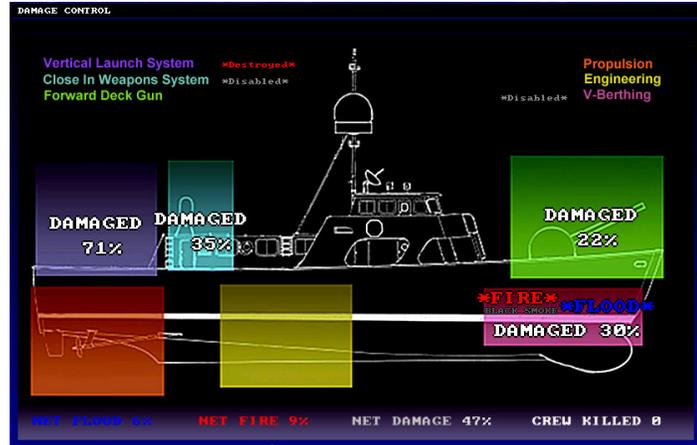
EMCON stands for emissions control.

When it is on, all sensors are controlled by their individual buttons. When it is set to off,

all sensors will shut off automatically making the YP radiate nothing aside from its SPS-64 navigational radar.

8c. Damage Control

When your YP sustains virtual damage it will be displayed on the **Damage Control** menu which is accessible through the **Tool Bar** by clicking the top of the screen.



This menu contains important data such as the **Net Fire**, **Net Fire**, **Net Damage** and **Crew Killed**, as well as individual damage levels and conditions of the six different damage control zones. In each of these zones a word “DAMAGED” will appear with a percentage of structural damage. This will contribute to the **Net Damage** readout, which upon reaching 100% will sink the ship. The system in any zone will become disabled if it reaches 25% or higher. 50% or higher will destroy the system entirely. Merely disabled systems will come back online after a certain amount of time has passed to simulate repair.



If the a zone is on fire the Net Fire readout will increment slowly. If one of the lower three zones are flooded, the flooding readout will also increment. If either two of these readouts reaches 100% the ship will sink. The more zones with fire and flooding, the

faster the incrementation. Only the **Galley** terminal will have the ability to top flooding and fire, and will be manned by a neutral referee during a YP-TDS battle simulation.

8d. Options, Tools and Other Menus

There are several options and tools available to the user to manipulate the interface. The **Options** menu is accessible to all terminals on the YP through the **Tool Bar**, which can be reached by clicking at the top of the screen. It allows you to alter the appearance of the interface and contains the following options:

Options Menu

IGNORE ALL NEUTRALS –Allows you to filter out all neutral tracks that otherwise may clutter your display.

IGNORE ALL WRECKS –This option is similar to the option above though it pertains to recently destroyed vessels and aircraft.

SHOW ALL CONTACTS – This will restore all hidden tracks to a visible status.

SHOW RANGE CIRCLES – This option has yet to be implemented.

SHOW VELOCITY LINE – This will toggle the velocity line that shows what course each track is holding and relative speed.

TOGGLE TRACK NUMBER – There are three different settings for this option: The track number will be hidden, printed above or printed below.

THICK SYMBOL MODE – If the symbols are thick they are slightly easier to see. Thin symbols look closer to the real NTDS used in the fleet.

The **Tools** menu, like the **Options** menu is also accessible through the **Tool Bar**. It contains various tools that help you gain better situational awareness by allowing you to access your radar coverage, and detailed track information. The menu options are detailed below:

Tool Menu

Mini Map –Toggles the Mini Map. Also bound to the **M** key.

Coordinate Grid – Overlays the nautical chart with gridlines. Bound to the **G** key.

Radar Range – This darkens the screen and displays each of your friendly track's radar envelope. This tool is bound to the **R** key.

Contact Profile – This toggles the Profile window. The profile window displays important information about the current hooked track. Bound by the **P** key.

Tool Bar Autohide – If off, the tool bar will remain open at the top of the screen.

The **Air Assets** and **Help** menus are currently under construction.

The only options currently available on the setting menu is the **Network Settings** menu, which is covered under Chapter 4 and the **Exit Program** option.

This menu is accessible through the **Tool Bar**, which is invoked by clicking at the top of the screen.

Selecting the **Exit Program** will prompt you to confirm your decision to leave the simulation. If this is true, you must select **Confirm**. If not, select **Cancel**. Once confirmed, you will be taken back to the main menu. All wide and local area connections will continue to be connected. If your YP is the **Master Server**, quitting the simulation will halt it for everyone else on the Wide Area Network. If your terminal is a Server, all clients will exit the simulation and will have to rejoin after you have re-established your server.



9. Troubleshooting

The TNC won't turn on

Most likely you have plugged in the wrong type of power supply. Ensure that your power supply in face provides 12 volts and has the  symbol on it.

The TNC DCD led lights but no packet reaches the laptop

This is usually the result of a bad RS232 adapter. You should check the connections and ensure they are not loose. If this doesn't help, check the pins using an OHM meter to ensure continuity and also check to make sure they are not electrically shorted together.

The TNC PTT led lights but no transmission is made on the radio

Most likely, the DIN-5 to DIN-8 adapter is bad. Follow the same actions detailed above.

The TNC and Radios transmit a packet, but it is intermittently received

This could be the result of either a loose connection, a bad cable, or most likely too short of a **TX delay** setting. Within your configuration file **config.txt** verify that the **TNC_XMIT_DELAY** value is at least 12.

The opening YP-TDS screen is too big and the wrong colors and crashes

This is caused by an innapropriately configured graphics Bit Depth. Within your configuration file **config.txt** verify that the **GRAPHICS** value is set to a bit depth value your computer can display. The options are 16, 24 and 32.

The YP-TDS randomly pauses for several seconds at the main menu

You must disable audio accelaration. This procedure is described at the bottom of **Chapter 3**.

The YP-TDS clients cannot connect to the server

This is usually caused by the wrong IP address being entered into the **config.txt**. Open the configuration file and verify the IP address matches that of the server. This procedure is described in detail in **Chapter 3**. If that does not help, make sure your ethernet cables are properly connected. Make sure the Server is established. If it continues to fail, exit the program, restart it, and try again.

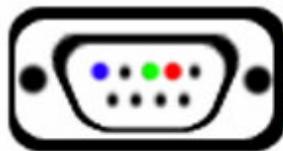
Appendix

WARNING! Incorrectly wired adapters may cause damage to equipment!

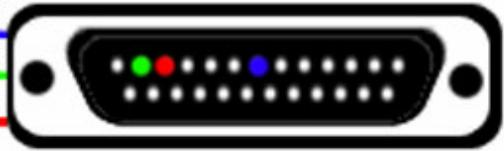
TNC to RS232 Connector – This cable will allow you to interface your TNC with your laptop via the RS-232 serial port.



DB-9 FEMALE



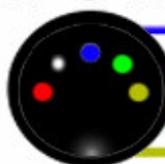
DB-25 MALE



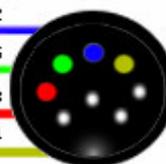
ICOM M710 to TNC Connector – This cable will allow you to interface your TNC with the radio on your YP.



DIN-5 MALE



DIN-8 MALE



Glossary

YP	-Yard Patrol Craft. Used at the USNA for afloat training.
LAN	-Local Area Network. A network of more than one computer to exchange data at high speeds.
WAN	-Wide Area Network. Wireless network.
Hub	-Ethernet hub. All Ethernet cables will route through here.
TNC	-Terminal Node Controller. Used to interface between the laptop and the radio.
LED	-Light Emitting Diode. On the TNC, these will light to display certain indications.
PTT	-Push-To-Talk indicator. When transmitting, this will light on the TNC.
DCD	-Decode indicator. On the TNC, this lights up when data is received.
Reverse Polarity	-The TNCs require a power supply with swapped negative and positive wiring.
Baud	-Bits per second. Rate of data.
RS232	-A serial interface between the laptop and TNC.
COM1	-A serial port installed in a laptop.
COM3	-A serial port installed in a laptop.
Pin	-The part of an adapter that plugs into a device. Connected to a single wire.
HF	-High Frequency. Refers to radio frequency or data rate
VHF	-Very High Frequency. The TNCs must be set to this mode.
Master Server	-A YP that is responsible for WAN synchronization and automated tracks.
Remote Server	-A YP that connects to the Master Server.
ICOM 710	-This is the radio used aboard the YP.
Tool Bar	-Menu options located at the top of the screen.
Track	-A neutral, friendly, hostile or unknown entity being tracked by a sensor.
GPS	-Global Positioning System. Satellite based navigation system.
USB	-Upper Side Band. Used in HF Radio communications.