

# PORT AUTHORITY POLICE ACADEMY



## LESSON PLAN

**SECTION** : MARINE

**LESSON TITLE** : CHALLENGER/TRAILER DATA & COMPONENTS

**TRAINEE LEVEL** : BASIC

**OBJECTIVES** : Upon completion of this section the trainee will be able to:

1. Name the three major systems of the Challenger
2. Know the basic specification of the vessel such as the length, width, draft, horse power, load capacity.
3. will know other specifications such as lights, switches, rub rails, etc.
4. will know specification for the Load Rite trailer

**METHOD OF INSTRUCTION** : Lecture, Demonstration

**TRAINING AIDS** : Overheads, Slides

**CLASSROOM REQUIREMENT** : Load Rite trailer, Boat, slide projector, overhead projector.

**TIME** : 4 hours

**REFERENCES** : Boston Whaler Owner's Manual, OMC Instructions (25' Challenger Operation's Manual)

**PREPARED BY** : William Oorbeek

**DATE:** 1/06/94

**APPROVED BY** :

**DATE:**

\_\_\_\_\_  
SIGNATURE

## **I. INTRODUCTION**

**NAME, BACKGROUND, TRAINING,  
EXPERIENCE**

## **II. MOTIVATION**

knowing your equipment, its abilities and limitations, is the most important thing for a rescuer. Your life, the lives of your crew, and the lives of the people you wish to help are all dependent on that equipment and your knowledge of its use.

## **III. STATEMENT OF OBJECTIVES**

Upon completion of this lecture the trainee will be able to;

1. Name the three major systems of the Challenger
2. Know the specifications of the vessel such as length, width, draft, power plant horse power, etc.
3. Know other specifications and equipment such as lights, switches, rub rails, load capacity, etc.
4. will know specifications of the Load Rite trailer

I GENERAL:

A. VENDOR

1. Boston Whaler  
Commercial Products Division  
1149 Hingham Street  
Rockland MA 02370-0611  
Tel. (617) 871-1400

B OVERVIEW

1. The Port Authority Police Rescue Vessel is a 25' Challenger manufactured by Boston Whaler. It is a commercial work boat with a unsinkable hull that is designed to provide boat operations into areas well offshore and because of its shallow draft, will also operate in shelter bays and rivers.

2.. The Challenger's overall length is 25' and consists of three work areas; a cockpit area, cabin area, and pilot house area. Below the cabin is a lower cuddy or V-berth area for equipment storage and access to other boat accessories. Additional storage space is located in a utility storage box in the cockpit area.

3. There are three primary systems used to operate the vessel; Electrical, Gasoline and Hydraulic. The DC electrical system is used to power all instruments and controls. The gasoline systems powers two twin outboard 150 h.p. engines and the Hydraulic system controls all steering, engine trim and trim tabs.

Instructor Notes:

Content Activity:

4. A full compliment of communications equipment is aboard the challenger. The antennas for these systems in addition to various lighting are located on a folding mast located above the pilot house. The mast is normally stored in the horizontal mode when the vessel is garaged and during transportation. It must be raised to the vertical position before getting underway.

5. Launching - accomplished in two ways;

a. Towing of the vessel is possible via a 27' Load Rite trailer. The Trailer is designed and fitted for the hull size of the challenger to insure proper hull support, balance and safety. The trailer also includes an electric winch and fixed roller train assembly for easy drive-on/drive-off.

b. The boat may also be launched by utilizing a lift attached to the seawall.

Instructor Notes:

Content Activity:

## II VESSEL DATA AND COMPONENTS

### **A. GENERAL ARRANGEMENT-PLAN AND PROFILE:**

1. Hull
2. Pilot House
3. Cabin
4. V-Berth
5. Forward Deck
6. Cockpit
7. Transom

NOTE: Instructor to identify these area on overhead to establish common terminology and reference points for class. (fig.1)

#### 1. HULL

##### a. Dimensions

LOA	24'7"
BEAM	8'0"
DRAFT	16"
LOAD CAP.	3,035 lbs.
PERSON CAP.	12
RESERVE BUOYANCY	8,000 lbs.
BOAT WGMT O/B	4,100 lbs.

NOTE: Reserve buoyancy or swamped capacity refers to total weight (persons, gear, and motors) boat will support if filled with water.

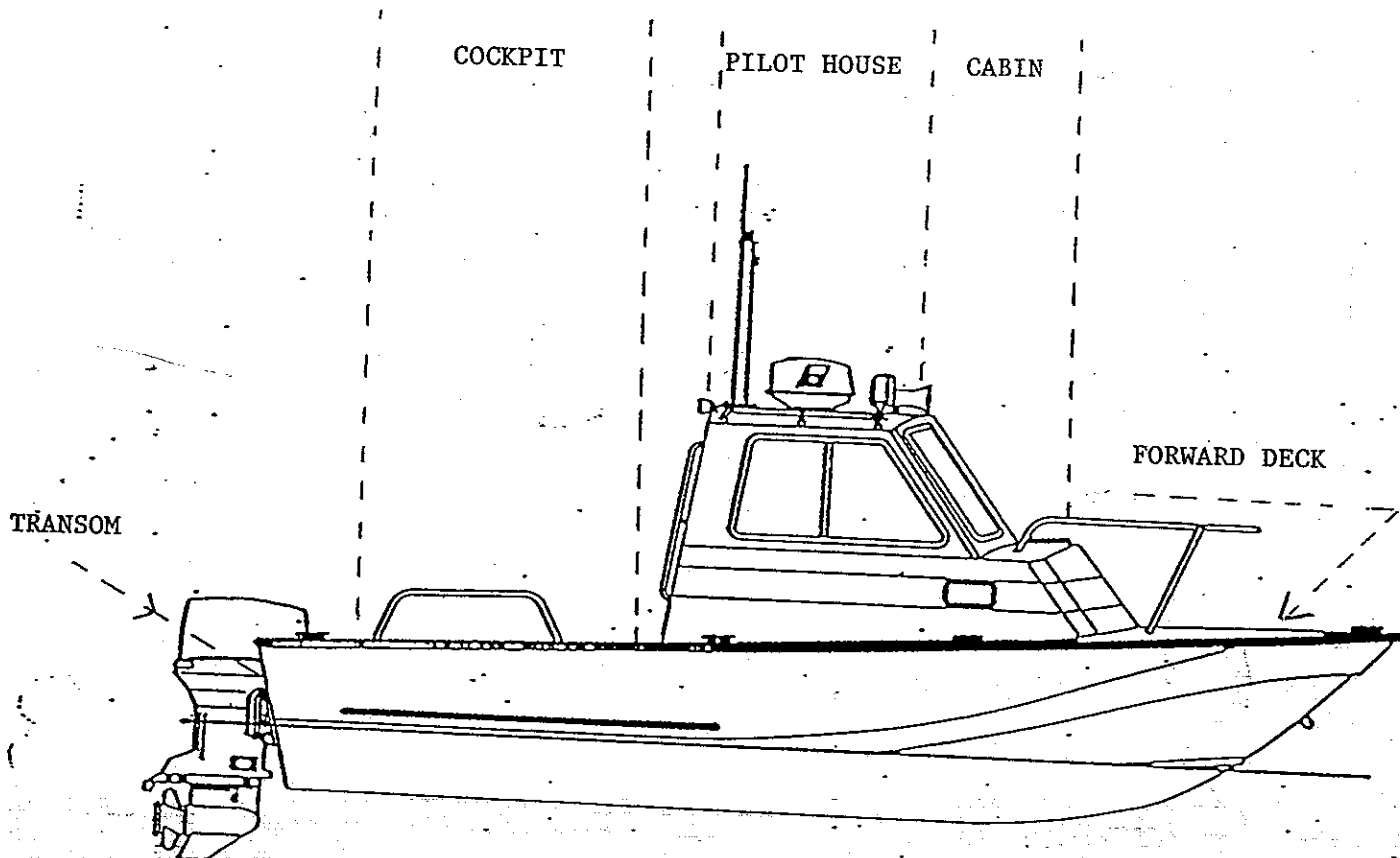
##### b. Construction

**HULL**

**a. Dimensions**

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(fig. 1)

Instructor Notes: \_\_\_\_\_ Content Activity: \_\_\_\_\_

1. Reinforced fiberglass molded keel and frames with foam fill construction. All materials are applied as one at the time of construction, similar to a uni-body design in automobiles.

2. Planning hull - "V" shape

3. Longitudinal strakes or spray strakes at different angles;

-help to lift boat out of water.

-guide water down and away from boat.

c. Composition- unsinkable hull with commercial fiberglass laminate and foam fill construction.

d. Finish- Gel Coat, hull white, cabin and decking haze gray.

e. Other specifications and equipment;

1. Heavy duty stainless steel cutwater.

2. Heavy duty bow eye reinforcement.

3. Stern splashwell bulkhead.

4. Self-bailing scupper package.

5. Heavy duty rubbing stakes.

6. Rescue rails.

7. Deck lashing rails

Instructor Notes:

Content Activity:

8. 34" Hull cutout with removable door which is stored on starboard side opposite cutout.

9. Diving ladder (JFK)

10. Forward safety rails.

11. Blue Identification and trim markings.

12. Total of eight(8) 10" cleats. located on bow, bow springline, springline and stern.

13. Forward and aft bilge pump with auto/manual feature.

2. PILOT HOUSE

a. Dimensions

Width 62"

Length 39"

Headroom 75"

b. Standard Equipment

1. Fixed bulkhead.

2. Locking sliding door.

3. Fixed forward windows.

4. Sliding side windows.

5. Overhead folding mast with two blue beacons, anchor light, and communication antenna's.

Instructor Notes:

Content Activity:

6. Instrumentation panel and controls. (Will be discussed later)
7. Communications equipment.
8. Navigational Aids.
9. Flood and other lighting to be discussed in detail under instruments and controls.
10. Dome light-red
11. Helm seat and one additional fold down seat.
12. Windshield wipers.
13. Defroster fans.
14. Kerosene Heater; 6 gal. tank located under helm seat, Heater switch on side of instruments and controls.
15. Fire Extinguisher

### 3. CABIN and V-BERTH

#### a. Dimensions

Width	65"
length	57"
Headroom	60"
Bunk length	72"

#### b. Standard Equipment

1. Porch lights with screens.
2. Locking hatch and two(2) mushroom vents

Instructor Notes:

Content Activity:

width 18"

height 13"

D. Non skid deck matting.

e. Fuel tanks located under deck with viewable gasoline gauge.

f. Two 50 amp. battery switches and reset breakers on starboard wall.

g. Fuel line inspection port.

h. Drain plugs (two) and rear bilge pump.

NOTE: Water in drain compartment moves from port rear to port starboard where bilge pump discharges same.

**7. TRANSOM**

a. Standard Equipment

1. Reinforced transom

2. Transom height 20"

3. Hydraulic trim tabs

4. Splashwell bulkhead

5. Twin 150 envinrude engines O/B.

6. Engine crash bar and rail.

7. Rail torsional tow bar

**B. ENGINES**

### 1. Specifications

- a. Evinrude 150Hp engine two cycle -60o "V" angle. (twin screw) counter rotating.
- b. Full Throttle operating range @ 5000 rpms.
- c. Gasoline requirements- 87 pump posted AKI(90 RON)
- d. Engine weight - 370 lbs.
- e. Fuel oil ration required by engine injection system 50:1.

### 2. Features

- a. Tilt support (Tilt switch located on engine itself and in pilot house).
- b. Battery cable.
- c. Trim Gauge.
- d. Trailering brackets.
- e. Water intakes.
- f. Trim tab.
- g. Water pump indicator.
- h. Flushing port.
- i. Electric fuel primer
- j. ignition system with key start.
- k. Hydraulic engine lifts.

### 3. Motor Controls

- a. Dual throttle controls with intergral trim guages.

Instructor Notes: \_\_\_\_\_ Content Activity: \_\_\_\_\_

-forward

-neutral

-reverse

b. Solenoid start (two push button switches)

-start

-stop

-choke

c. Clip and Lanyard

d. Pullout Neutral lockout tab.

e. Fast idle lever

f. Warning horn for engine overheat and low oil.

g. Trim/tilt switch.

h. emergency stop.

#### 4. Power Trim and Tilt

a. Features

1. trim range of 21 degrees  
1,3 and 5 o'clock positions.

2. motor to any position  
within this range while under-  
way at any speed.

b. Purpose

1. to improve acceleration

2. speed

-toggle switches and fuses for electronic masters.

-navigation light switch.

-panel dimmer.

b. The helm panel is pre-wired to the terminal board behind the helmstation which includes switches and fuses for all electronic equipment on boat.

c. Switches are set to the "on" position by pushing to right. Red light will illuminate.

d. Heater switch is connected directly to battery.

e. Both bilge pumps are also connected directly to batteries.

### 3. Other Panels and Switches

a. 100 amp main breaker panel- located near battery switches.

b. Bilge pump switch panel- located above the binacle controls.

NOTE: Switch normally in the "auto" mode to operate. To bypass switch turn to "man". Bilge pump connected directly to batteries to avoid unnecessary operation be sure floats are clear of debris.

c. Instrument gauge panel- located above the steering wheel.

### 4. Bonding, Grounding and Zinc System

a. All exposed non-current carrying parts of components served by the DC electrical are electrically connected by a common bonding conductor to a common ground;

Instructor Notes:

Content Activity:

to power all electrical systems on boat.

c. Battery switches are located in the stern compartment under the starboard gunnel board.

d. Port Battery - Port engine.

**Starboard Battery - Starboard engine and electronics.**

Starboard switch on top port switch on bottom.

**NOTE:** If one of the batteries are too weak to start the engines, the batteries may be momentarily paralleled to start the other. This is accomplished by depressing the rubber booted button on the helm panel and holding until engine starts, Release immediately when engine starts.

e. Batteries are installed in containers and are securely fastened in place to prevent vertical and horizontal movement.

f. Batteries are charged by the engines alternators during normal operation and by shore power when a power cord is connected.

**NOTE:** To verify AC power to charger open electrical closet door in cabin and verify red L.E.D. is lite in bottom right section of cabinet.

## 2. Helm Switch Panel

a. Located at the helm station and includes:

-toggle switches and fuses for lights.

e. Fuel vent located on hull port side under fill fore and aft and are fitted with cleanable flame arrestor screens which must not be removed.

f. External Racon fuel filters mounted in the transom well to clean out any solid contaminants and act as water separation unit. There is one filter for each engine.

## 2. Fueling Precautions

a. No smoking or other open flames.

b. Stop engines.

c. Turn "off" battery switch. and do not use any electrical item or any other device which can cause a spark.

d. Have a fire extinguisher and some rags on hand.

e. Open deck fill plate with key provided (do not misplace fuel key of custom design and difficult to replace).

f. Keep fuel nozzle in contact with fuel fill to prevent sparking due to static electricity.

g. Avoid overfilling and spilling on deck, into bilges or into water. Flush immediately.

h. Upon completion, recap the deck fill plate and clean up any spillage. DO NOT keep FUEL SOILED rags on boat !



i. Be sure no odor of fuel on boat. Open all windows, ports, hatches, and doors to vent area. Include "v" berth area.

NOTE: When fueling boat heater tanks exercise same procedures with the exception of steps "e" and "f".

## E. INSTRUMENTATION PANEL

### 1. Gauges

#### a. Port and Starboard Engines

- Temperature
- Volts
- Water
- Trim
- Tachometer
- Oil
- Hour meter

### 2. Switches

#### a. "on/off"

- Panel Lt
- Nav. Lt
- Cabin Lt
- Spot Lt
- Spot Lt
- Deck Lt
- Flood Lt
- Chart Lt
- Courtesy Lts
- Wiper
- Fans
- Strobe Lts
- Docking Lts

NOTE: Instructor to explain each light location and purpose. Also inform trainees that the fuse for each lighting switch is adjacent to indicator light.

Instructor Notes:

Content Activity:

b. Two-position Switches

- Panel dimmer/Nav.Lts
- Aft Bilge pump auto/man
- Fwd Bilge pump auto/man

c. Engine Switches

1. Port Engine

- start
- choke
- stop

2. Starboard

- start
- choke
- stop

3. Dead-Man clip w/lanyard

3. Engine Controls

a. Each engine control installation provides for the following;

1. Engine start and stop switch.

2. Engine "kill" switch w/lanyard.

3. Throttle and shift controls

- Forward
- Neutral
- Reverse

**F. STEERING SYSTEM**

Instructor Notes: \_\_\_\_\_ Content Activity: \_\_\_\_\_

**1. Description**

- a. Teleflex Seastar II hydraulic system.
- b. Manually operated closed loop system.
- c. requires no electrical pumps or motors.

**2. Components**

- a. Helm Pump Unit.
- b. Hydraulic Hoses.
- c. Hydraulic Drive Pistons (2).
- d. Steering Wheel.
- e. Tie Bar Between Engines.

**3. Operation**

- a. When turning the steering wheel the helm pump unit forces hydraulic fluid through the hoses to and from the hydraulic cylinders.
- b. The movement of the steering wheel and pistons simultaneously move the engines, thus turning the boat.

**G. TRIM PLANE SYSTEM**

**1. Description**

- a. Consists of two stainless steel movable trim planes.
- b. One trim plane is located on .

each side of stern.

**2. Components**

- a. Two (2) stainless steel trim planes.
- b. Electrically driven hydraulic pump. (Located on the inside of the transom.)
- c. Switched control at the helm station.

**3. Purpose**

- a. The system is used to control bow rise and to balance the boat's heeling due to off-center weights or crosswinds.
- b. Keeps boat in designated hydrodynamic attitude.
- c. This will result in;
  - greater speed
  - less water resistance
  - less strain on propulsion system and hull
  - less fuel consumption and smoother ride

**4. Operation**

- a. Automatically energized when batteries are turned on.
- b. To lower the bow push the switches to "bow down".
- c. To raise the bow push the switches the "bow up".

Instructor Notes:

Content Activity:

d. Sufficient speed is necessary for planes to have effect.

**NOTE:** It is recommended by manufacturer that you start with "0" degrees of plane depression and gradually increase trim plane.

#### H. NAVIGATIONAL AIDS

1. Compass

2. Depth Finder

3. Radar

a. ??????

4. Global Navigational System

a. ??????

#### I. COMMUNICATION EQUIPMENT

1. All-Fax radio

a. Motorola nine(9) channel programable.

2. Ground Control

a. Aire-Science

3. Marine

a. Icom IC-M120  
VHF marine transceiver

III TRAILERING TO AERONAUTICAL LAUNCH SITES:

A. MOTORBOAT TRAILERING

1. Definitions

a. **Gross Vehicle Weight Rating (GVWR)**- The total combined weight of the trailer and its maximum load carrying capacity.

b. **Gross Axle Weight Rating (GAWR)**- The load carried by a single axle, to be used when checking tire capacity.

c. **Net Weight**- The weight of the empty trailer.

d. **Maximum Load Carrying Capacity**- The weight of the boat, motor, and gear that should not be exceeded when loading a trailer.

e. **Weight Carrying Hitches**-

1. **Frame Hitch**- a mechanical and/or structural device that bolts to at least two of the towing vehicle structural members, which can include frame, unitized body and bumper.

2. **Bumper Hitch**- A mechanical and/or structural device that bolts or is otherwise fastened to the bumper of the towing vehicle. No connection is made to other structural members of the towing vehicle.

f. **Tongue Weight**- The difference between the Gross Trailer Weight and the Gross Axle Weight.

This is the actual weight that is placed on the trailer hitch, It should be no more than 10% of ?????.

g. **Anti-Sway Device**- A device used to control trailer sway and improve control.

Instructor Notes:

Content Activity:

**NOTE:** Weight distribution in the trailer is important. It should not exceed the recommended tongue weight.

In Addition any equipment stored on the boat must be considered part of the trailer load and be well distributed and secured to prevent shifting or bouncing.

**h. Safety Chains-** are an important safety feature to secure the trailer to the towing vehicle.

1. They should be permanently affixed to the trailer, and crossed under the hitch so they will catch and hold the tongue should the ball fail.

2. The chains should be attached to the towing vehicle at points separate from the ball and brackets that hold the ball.

3. Chains should be long enough to allow free turn but not too long that the chains drag.

**NOTE:** " Shackles" of proper size are recommended to secure safety chains not "S-Hooks".

**i. Supports-** provide hull support when boat is on trailer.

1. There are two types;

a. Roller supports- are most efficient for launch and recovery because of minimum friction.

b. Padded Bolsters- are recommended if boat is launched with slings or hooks.

Instructor Notes:

Content Activity:

- m. Caster jack
- n. Galvanized finish
- o. Spare tire and carrier  
(wheel lock at JFK)

**3. Other Specifications**

- |                     |            |
|---------------------|------------|
| a. Load capacity    | 8,000 lbs  |
| b. G.V.W.           | 10,000 lbs |
| c. Trailer wght.    | 2,000 lbs  |
| d. Tire size        | 8/14.5F    |
| e. No. of axles     | Three      |
| f. Ball size        | 2 5/16"    |
| g. Chassis size     | 3" x 6"    |
| h. Overall Length   | 27' 5"     |
| i. Overall Width    | 96"        |
| j. 10" keel rollers | 8          |
| k. Keel guide bunks | 2          |
| l. Caster capacity  | 2,000 lbs  |
| m. Winch capacity   | 3,200 lbs  |
| n. Winch line       | Wire       |

**4. Winch Specifications**

- a. Fulton Sport Winch- electric
- b. Maximum boat wght 12,000 lbs
- c. Maximum line pull 4,000 lbs
- d. Cable specifications
  - 1/4" wire diameter
  - 30' in length

Instructor Notes:

Content Activity:

- 7,000 lbs breaking strength

e. Average load time 7.5 minutes

f. Electric supply - 12vdc supplied  
by tow vehicle

**NOTE: NEVER FULLY EXTEND CABLE FROM  
WINCH DRUM. ALWAYS MAINTAIN AT  
LEAST THREE (3) WRAPS OTHERWISE  
CABLE MAY PULL LOOSE.**