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HYPACK
HYdrographical Surveying PACKage

• What does this program do?
• Why do we need it in law enforcement?
• How does this program fit in with law enforcement operations?

This instructional presentation was created in January 2008 by Lt. Darryl Armentor of the East Baton Rouge Parish (LA) Sheriff’s Office Marine Unit. Contact information: 225.389.5000 or Darmentor@ebrso.org.

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HYPACK

• Software for marine surveying and navigation.

• Assists hydrographical engineers and surveyors in conducting surveys of the sea bottom.

• Used to draw grid lines on charts to follow according to GPS plus a lot more.
HYPACK
Application for Public Safety

– Maritime Operations: Used to set up a series of lines to allow a coxswain to follow a detailed, pre-determined path during a Side Scan Sonar area sweep.

– Search And Rescue Operations: Used by an ATV operator or foot teams to search large wooded areas in a pre-determined pattern.

– Using this program is like drawing lines on the water or ground.
HYPACK: The Goal

The Survey Screen
HYPack: The Goal

The Survey Screen

Parallel Lines according to programmer’s specifications.

Indicator bar shows distance from programmed parallel line.
HYPERACK: The Goal

The Survey Screen

Coxswain, ATV operator, or Search Team Leader just watches the screen to stay on course. No areas are accidentally missed as with a random search pattern.
HYPACK

• Creating the Search Grid Parallel Lines
  – Must have two GPS points
  – Why? To create the initial straight line.
  – Other, more complex patterns are possible.
HYPACK

• Creating the Search Grid Parallel Lines

– Must have two GPS points

Latitude 1
Longitude 1

Latitude 2
Longitude 2
HY PACK

- Creating the Search Grid Parallel Lines

1. Must know the number of parallel lines you want to run on the search.

Original Line

This example lists TWO lines on each side.
HYPACK

• Creating the Search Grid Parallel Lines

1. Must know the number of parallel lines you want to run on the search.

2. Must know how far apart you want the lines.

Original Line

This example lists TWO lines on each side.
HYPACK
Search Grid Parallel Lines

• Coxswain pilots the boat along the lines.
• Coxswain and Sonar Operator communicate to insure each corridor is scanned **twice**.
HYPACK

Additional information needed to set up the search grid.
Parallel Lines

- How far apart to set the lines?
  - “Corridor Width” = the distance between lines.
  - Consider the RANGE of your search swath.
  - Set the lines to have sufficient overlap to insure the area was thoroughly swept.
  - Hypack Corridor = ½ of Single Channel Sonar Range.
  - Land search: Hypack Corridor = ½ of visual range.
• Parallel Lines – how far apart, “Corridor”? 
  – You want each area scanned twice.
  – Set Sonar Range to 66 feet, SINGLE channel.
  – Set Parallel Lines at 33 feet, gives 200% overlap

| sea bottom | Corridor A 33 ft | Corridor B | Corridor C |
• Parallel Lines – how far apart, “Corridor”?
  – You want each area scanned twice.
  – Set Sonar Range to 66 feet, SINGLE channel
  – Set Parallel Lines at 33 feet, gives 200% overlap

Parallel Lines created by programmer.

sea bottom

<table>
<thead>
<tr>
<th>Corridor A</th>
<th>Corridor B</th>
<th>Corridor C</th>
</tr>
</thead>
<tbody>
<tr>
<td>33 ft</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
• Parallel Lines – how far apart, “Corridor”?

– You want each area scanned twice.
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HYPACK

• RUN EACH GRID LINE TWICE:
  – Once from each direction, optimal
• All sweeps done SINGLE Channel

• Overlap set to scan each corridor twice.
• Corridor Width = ½ Single Channel Range.

• Why set an overlap?
  – This allows two scans of the same area from different angles. Note the sonar works off a “shadow.” See Underwater Recovery. Allows the coxswain room for error if having trouble staying on the designated track line.
• Additional information needed:
  – UTM Grid Zone - Universal Transverse Mercator
HYPACK

• Additional information needed:
  – UTM Grid Zone

Baton Rouge is Zone 15
HYPACK

- You must have an external GPS device to feed GPS information to HYPACK.

- A handheld GPS with a Serial Cable will work.

- It is recommended to use Serial Cabled GPS devices.

- Due to the variable timing of USB interfaces, this type of connection is not recommended with HYPACK. If the machine only has a USB port available, a GPS connected with USB to Serial will work.
Panasonic Toughbook laptop computer

USB port

Serial Port
HYPACK

• Additional information needed:
  – GPS Device Particulars

Baud Rate from GPS must equal Hypack setting.

NMEA 0183 compatible GPS.

(The Garmin rhino 130 is used for this example but any modern GPS device with a serial connection Cable will work.)
Garmin rino 130-HYPACK setup

1. Turn the device “on.”
2. Open the Main Menu by pressing the joystick button.
Garmin rino 130-HYPACK setup

Toggle the list until “Main Menu” is highlighted and press the joystick button.
Garmin rino 130-HYPACK setup

Toggle the list until “Setup” is highlighted and press the joystick button.
Garmin rino 130-HYPACK setup

Toggle the list until “Units” is highlighted and press the joystick button.
Garmin rino 130-HYPACK setup

Scroll down with the joystick button.

1. Select Position Format: hddd° mm.mmm’
2. Ensure Map Datum is “WGS 84”
3. Distance/Speed “Statute”

Once set, toggle to the “X” at the upper right hand of the screen, press the joystick, and exit to the prior screen.
Garmin rino 130-HYPACK setup

Select “Interface”
Garmin rino 130-HYPACK setup

1. Select “NMEA In/NMEA Out”
2. Ensure Baud set to “4800”
3. Output Rate set to “Fast”

Once set, toggle to the upper X and exit to the prior screen.
Garmin rino 130-HYPACK setup

Select “System”
Garmin rino 130-HYPACK setup

1. Select GPS “Normal”
2. Ensure WAAS “Disabled”
Garmin rino 130-HYPACK setup

Select “Satellite” to determine current GPS coordinates and signal strength.
Garmin rino 130-HYPACK setup

You can obtain GPS coordinates for the Line file in HYPACK here.
HYPACK

• The Garmin rino 130 is now configured to match the HYPACK program.

• We will now start the program and set the HYPACK program parameters to match the Garmin rino 130.
HYPACK

• Getting started:
  1. Boot up the computer loaded with HYPACK.
  2. Insert the USB Hardlock Key (Dongle) into the USB port of the computer.
     Note: The Hypack program will not run without the Hardlock dongle key inserted into the computer’s USB port.
  3. Connect the GPS Serial Cable to the computer.
HYPACK USB Hardlock “Dongle”

GPS Serial Cable
1. Turn ON the Garmin rino 130 GPS unit and make sure it is getting a location fix.

2. Double Click on the HYPACK shortcut.
Name of current Project.
HYPACK Terminology

• “Project” – a collection of files grouped together under one name.
• Each Project contains information about an operation that is specific to that operation.
  – UTM Zone
  – GPS driver and settings
  – Parallel Line File
  – Log file, if you made one
  – Etc.
HYPACK

• Easiest way to create the current Project is to open an earlier, similar project, and “COPY” it for the new Project under a different name.

• We will do this now.
Open a PROJECT

List of Projects

Select a similar project, and copy it to a new name.
Select a similar project, and copy it to a new name.
HYPACK New Project

Name of current Project.
Note now we are in the
“New Training Project 18Jan08”
HYPACK: Setting Parameters

Now you must tell HYPACK where on this planet you are going to work: The “UTM Zone.”

Note: This is NOT where you are NOW but where you are going to conduct the survey.
HYPACK

• Additional information needed:
  – UTM Grid Zone

Note Longitude is key.
HYPACK

- Additional information needed:
  - UTM Grid Zone

Baton Rouge is Zone 15
• Additional information needed:
  – UTM Grid Zone

  – At least two GPS coordinates for the first line of the search grid. Get the coordinates:
    • From a charting program.
    • **Recommended** - From an actual site visit with handheld GPS. By visiting the site, the search team can get a real-world view of possible obstructions or recent changes to the area.
• Additional information needed:
  – UTM Grid Zone
  – At least two GPS coordinates for the first line of the search grid.

  – Set HYPACK GPS settings to match your GPS.
    • Done in “Geodetic Parameters” in HYPACK.
HYPACK: Hardware

1. Select “Preparation”

2. Select “Geodetic Parameters”
HYPERPACK: Geodetic Settings

These settings may be okay because you copied over a project.

We will be North. Note your Latitude says xxx N

Longitude range where surveying.

US Survey Foot.

Must match GPS device.

Use WGS-84.
HYPACK: Hardware

Now, specify what type of devices and instruments being used.

We are only going to use the external GPS hardware in this project.

We must “load” the driver for that GPS hardware.
HYPACK: Hardware

1. Select “Preparation”
2. Select “Hardware”
Setting up your GPS unit.

If there is a GPS loaded already, then skip the next slide. However, make sure the settings are correct.
Setting up your GPS unit.

Note the settings.

If you do NOT see this information, select “Connect” and choose “Serial Port.”
If no GPS device is loaded, then:

1. Select Add Device

2. Scroll down to “GPS With NMEA-0183 Output”
   Note: There may be similar choices on the list. Be sure to find this precise choice.

3. Select OK
Setting up your GPS unit.
Note the settings.

- Only Position.
- No Offsets, for now.
- Critical area.
- Obvious

If you do not see this, go to the next slide.
Setting up your GPS unit.

Note the settings.

If you do NOT see this information, select “Connect” and choose “Serial Port.”
Setting up your GPS unit.

Note the settings.
This should match your GPS readings.

If not, the possibilities are:

- Wrong COM port (use COM1).
- Wrong Baud (Speed) Rate (4800).
- No GPS fix on GPS unit.
- Incorrect sequence in connecting GPS. (Serial cable must be plugged to computer PRIOR to starting Hypack.)
- X out and return to main screen.
HYPACK

• Setup for Hardware is complete.
• NOW:
  – Setup your Search Grid.
HYPACK Planned Lines

Expand this section by clicking the + sign.
We will just change the old file and save over it.
Double Click on the .lnw file
HYPACK Planned Lines

Edit to change to Lat Long mode.
HYPACK Planned Lines

Note the line points are listed in GPS Lat Long.
HYPACK Planned Lines

Note there are 3 lines here. Delete number 2 and 3. We only need one line for our setup.
RIGHT click on the number and select “Delete” for each unwanted line. We only want #1.
Save the project before proceeding.
Enter the two GPS points for your line.

Note that Row 1 is the first point Lat-Long.

Note that Row 2 is the second point Lat-Long.
Now we can set up our Search Grid Lines.

Select “OFFSETS.”
Now, decide what type of Grid to establish. We typically use Parallel Lines for ease of operating the boat.
Select the Parallel tab.
Sample: 3 line search grid.
lines spaced 33 FEET apart - remember to make this consistent with the settings from slides 16 – 23.
Notice there are 3 lines listed now.

These are the GPS coordinates for your search grid.
SAVE the Project. Close the Planned Lines Editor.
• You have now completed:
  
  1. Properly setting up your external GPS device.
  3. Inputting Geodetic Parameters specific to your new Project.
  4. Installing the proper hardware drivers.
  5. Testing your GPS – Hypack program interface.
  6. Establishing your search grid.

  – You are ready to begin your scan or area search.
Select Survey
HYPACK - SURVEY

- The current screen will close.
- A new portion of HYPACK will open.
The Survey Screen

Note: You may have to size windows to get this display, but all these windows are there.
The Survey Screen

Various screen controls.

Your planned lines.

Position Indicator

Your current position.

Current time.
Position Indicator: I am 28.1 FEET off LINE 1.

Note: This information is critical during a search to insure a thorough sweep without gaps.
Select “Increment” to change lines. Alternatively, CNTRL-I increments to the next line and CNTRL-D decrements to the previous line.
Position Indicator: I am 5.2 FEET off LINE 2.
The Survey Screen

Select “Increment” again to change lines.
Position Indicator: I am 38.2 FEET off LINE 3.
If Survey is NOT tracking:

Select Helm Map – Tracking/Orientation
Select the tracking mode you prefer.
“Zoom Extents” takes the screen to the limits of the lines.
After selecting Zoom Extents, you may have to keep zooming to get low enough to see the detail of your lines.
HY PACK - SURVEY

• You can save your planned lines files as bitmaps by selecting the top row:
  “Helm Map”
  “Save Bitmap”

• This will be useful for the After Action Report.

• Next is an example of this project’s planned lines saved as a bitmap.
Saving the Planned Lines screen as a bitmap.
Survey project file saved in Hypack as a bitmap.
HYPACK

• When the scan project is complete, close the Survey window with the X.
• You are returned to the HYPACK Project window.
• Save your project and close the program.

Legal Disclaimer

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This concludes the instructional presentation for the basic use of HYPACK in area searches. This software is capable of much more. For more information, contact HYPACK, Inc.

- Internet website: www.hypack.com
- E-mail help: Help@hypack.com
- HYPACK phone: 1.860.635.1500
- Darryl Armentor: Darmentor@ebrso.org