Treatments of Static and Dynamic Draft in HYPACK®

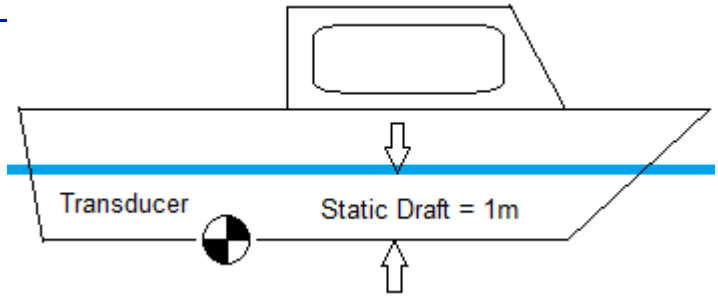
By Pat Sanders

The following document illustrates the different methodologies for treatment of the Static and Dynamic Draft inside of HYPACK®.

STATIC DRAFT

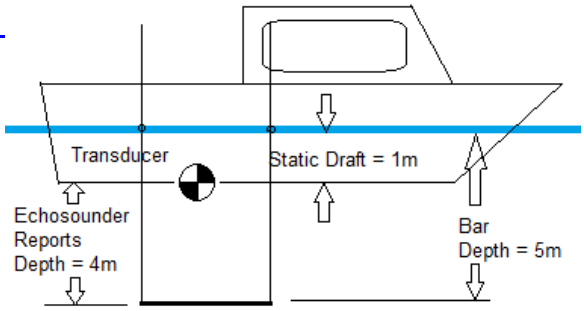
The 'Static Draft' represents the vertical offset of the transducer beneath the static waterline. 'Static' refers to the fact that the vessel is not moving.

FIGURE 1. *Static Draft*



The 'Static Draft' is best determined by performing a bar check with the echosounder. Lower a bar or plate a pre-determined distance beneath the water surface. (Keep the bar close enough to the transducer so that sound velocity errors don't enter into this.) You can then adjust the echosounder 'Draft' or 'Zero' (it's called different things) until the sounder reads the correct value. You have now incorporated the Static Draft into your echosounder!

FIGURE 2. *Performing a Bar Check*



In Figure 2, the bar is lowered to 5m beneath the waterline. The echosounder (with all internal draft and other settings set to 0.00) reads 4m. The static draft is the difference between the two values, or Static Draft = 5m – 4m = 1m.

In HYPACK®, Static Draft (and Dynamic Draft) are measured positive downwards. The deeper the transducer is beneath the static waterline, the larger (more positive) the Static Draft Correction.

Static Draft can be corrected in one of two different methods in HYPACK®.

- Enter the Static Draft adjustment into the Echosounder and set the vertical offset for the echosounder to 0.00 in the HYPACK® HARDWARE program. Most surveyors use this method. The echosounder will then output a sounding that incorporates the static draft.
- Set a Static Draft adjustment of 0.00 into the Echosounder and enter the static draft as the vertical offset into HYPACK®.

Important! Do one or the other, but *not both*. Otherwise, you will be double-correcting for the Static Draft.

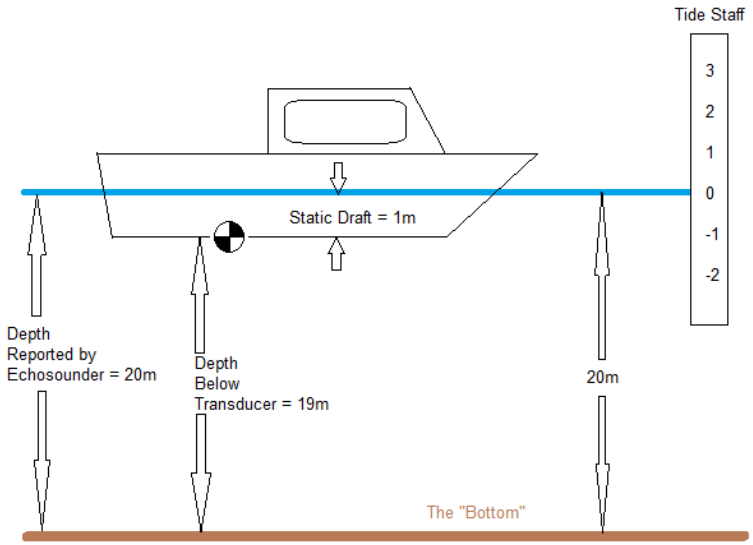
Let's take a look at both methods:

EXAMPLE 1: STATIC DRAFT IS INCORPORATED INTO THE ECHOSOUNDER

In this example, our bar check shows the Static Draft to be 1.0m. The Static Draft will be incorporated directly into the echosounder, so that when the transducer is 19m above the bottom, the echosounder will report a depth of 20m.

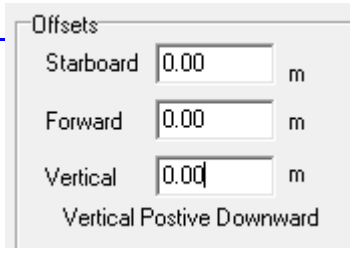
Since the echosounder is taking care of the Static Draft, HYPACK® does not need to correct for it. The vertical offset for your echosounder in the HYPACK® HARDWARE program should be set to 0.0.

FIGURE 3. *Incorporating Static Draft into the Echosounder*



IN HYPACK®HARDWARE

FIGURE 4. *Offsets are Zero when Static Draft is in the Echosounder*



For your echosounder device, we will set the Vertical Offset to 0.00m The Vertical Offset is where we would enter the Static Draft of your echosounder if we did not correct for it directly in the echosounder.

IN SURVEY

In the HYPACK® SURVEY program, the 'Draft' displayed in the Data Display window is the Dynamic Draft and will be 0.00. The depth reported from the echosounder will be 20.00. The corrected depth will be 20.00.

IN THE RAW DATA FILE

In the header, the INF record shows the Initial Dynamic Draft correction (second value from end) to be 0.00. There are no DFT (Draft records) in the body of the file, as the user has not changed the Dynamic Draft (we're ignoring it in the first two examples…)

```
INF "Pat Sanders0" "RV 103" "Sample_Survey_A" "Savannah River"
0.000000 0.000000 1529.000000
```

The vertical offset for the Echosounder, shown in the 2nd line (below) shows the 0.00m setting.

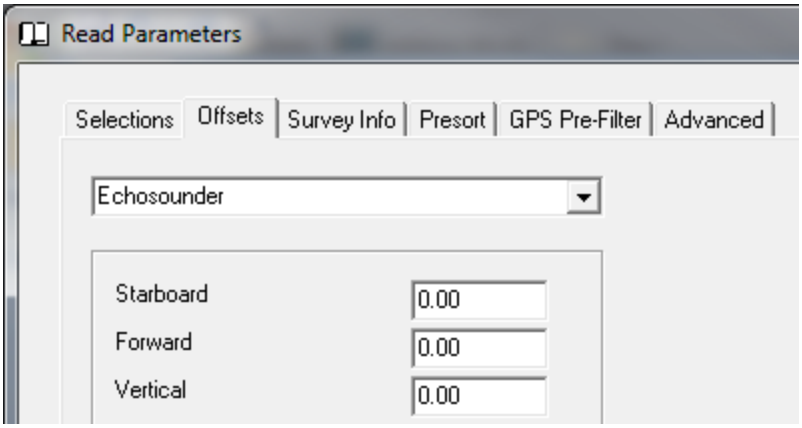
```
DEV 0 16 "Echosounder" 0 C:\HYPACK 2010\devices\sim32.dll 9.0.3.5
OFF 0 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
```

There are no DFT records, as we did not change the Dynamic Draft Correction while ON-LINE.

IN THE SINGLE BEAM EDITOR

The Read Parameters show the Vertical Offset for the Echosounder was set to 0.00.

FIGURE 5. *Offsets as Recorded in SURVEY*



In the Spreadsheet window (Figure 6), the Raw Depth coming from the Echosounder is 20.00m This results because the echosounder has already combined the Depth Below Transducer (19.00m) with the Static Draft correction (1.00m) incorporated directly into the Echosounder. The sounder outputs a depth of 20.00m, which is what the SURVEY program reads.

Since there is no Dynamic Draft correction in this example and since the Static Draft correction is being taken care of in the echosounder, the Draft Correction column in the SINGLE BEAM EDITOR shows 0.00m. The final Corrected Depth shows 20.00m, which is correct!

FIGURE 6. *Static Draft in the Sounder and No Dynamic Draft - Draft Correction Appears as Zero*

Spreadsheet

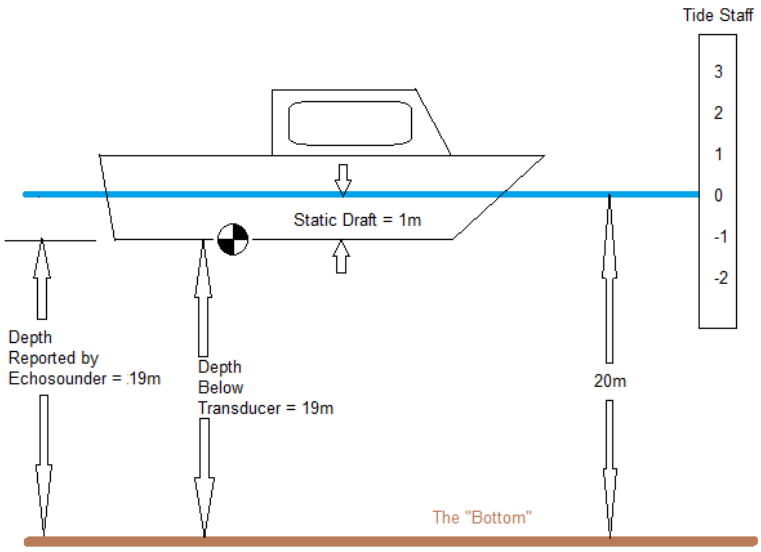
Fill Column | Swap Depth 1,2 | Export

Record	Raw Depth 1	Tide Corr	Draft Corr	SV Corr 1	Corr. Depth 1
1	20.00	0.00	0.00	0.00	20.00
2	20.00	0.00	0.00	0.00	20.00
3	20.00	0.00	0.00	0.00	20.00
4	20.00	0.00	0.00	0.00	20.00
5	20.00	0.00	0.00	0.00	20.00
6	20.00	0.00	0.00	0.00	20.00
7	20.00	0.00	0.00	0.00	20.00
8	20.00	0.00	0.00	0.00	20.00
9	20.00	0.00	0.00	0.00	20.00

EXAMPLE 2: STATIC DRAFT IS INCORPORATED IN HYPACK®

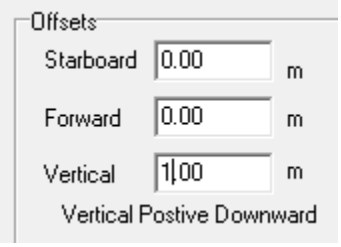
In this example (Figure 7), we have once again determined the Static Draft to be 1.0m. We will not incorporate the Static Draft in the echosounder, so that it will report the Depth Below Transducer, which is 19m. To account for the Static Draft in this example, we will set the Vertical Offset for the echosounder to 1.0m in the HYPACK® HARDWARE program.

FIGURE 7. *Static Draft in HYPACK®*



IN HYPACK® HARDWARE

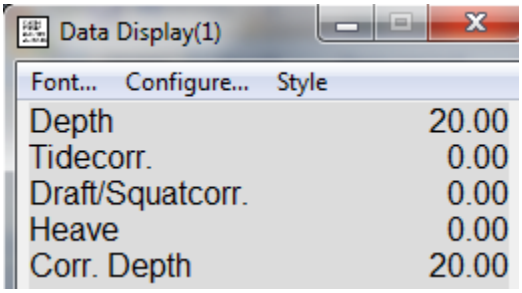
FIGURE 8. *Draft Entered as Vertical Offset of the Echosounder*



We'll set the Vertical Offset for the echosounder equal to our Static Draft correction of 1.0m. Remember that the vertical offsets are 'Positive Downwards'. You should never have a vertical offset for your echosounder, unless it is somehow above the static waterline.

IN SURVEY

FIGURE 9. *Depth Calculations Include the Echosounder's Vertical Offset*



In the HYPACK® SURVEY program's Data Display window, the Static Draft (Vertical Offset) is added to the Raw Sounding reported by the echosounder. In our case, SURVEY combines the 1.0m Vertical Offset with the 19.0m reported by the echosounder and displays Depth = 20.0, Draft = 0.00 and Corrected Depth = 20.0. The Dynamic Draft (Draft/Squat Corr.) is 0.00m in this example.

IN THE RAW DATA FILE

In the header, the INF record shows an Initial Dynamic Draft value of 0.00.

```
INF "Pat Sanders0" "RV 103" "Sample_Survey_A" "Savannah River"
0.000000 0.000000 1529.000000
```

Also in the header, the device record for the Echosounder has a vertical offset (Static Draft) of 1.00m

```
DEV 0 16 "Echosounder" 0 C:\HYPACK 2010\devices\sim32.dll 9.0.3.5
OFF 0 0.000000 0.000000 1.000000 0.000000 0.000000 0.000000 0.000000
```

In the body of the file, the EC1 records show the Raw Depth received from the Echosounder as 19.00

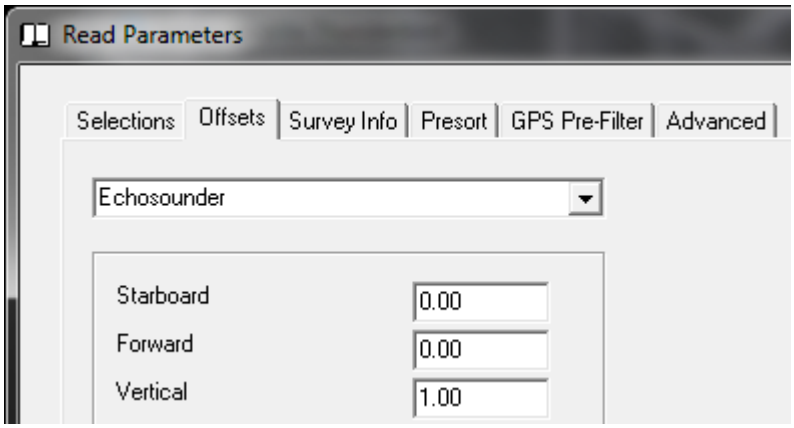
```
EC1 0 41193.724 19.000
EC1 0 41193.927 19.000
```

```
EC1 0 41194.130 19.000
```
There are no DFT records in the body of the file, as we haven't made any changes to the draft settings while the program is "ON LINE".

IN THE SINGLE BEAM EDITOR

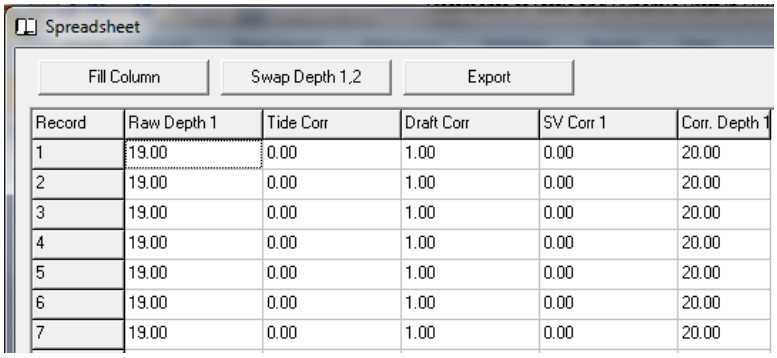
The Read Parameters show the Vertical Offset for the Echosounder is 1.0m.

FIGURE 10. *Sounder's Vertical Offset = 0*



In the Spreadsheet window, the Raw Depth reported by the echosounder is the Depth Below Transducer, which is 19.00m. The Static Draft (Vertical Offset) is shown in the Draft Correction column as 1.00m. The Corrected Depth is shown as 20.00m, which is correct!

FIGURE 11. *Sounder's Vertical Offset Shows as a Draft Correction in the SINGLE BEAM EDITOR*



Record	Raw Depth 1	Tide Corr	Draft Corr	SV Corr 1	Corr. Depth 1
1	19.00	0.00	1.00	0.00	20.00
2	19.00	0.00	1.00	0.00	20.00
3	19.00	0.00	1.00	0.00	20.00
4	19.00	0.00	1.00	0.00	20.00
5	19.00	0.00	1.00	0.00	20.00
6	19.00	0.00	1.00	0.00	20.00
7	19.00	0.00	1.00	0.00	20.00

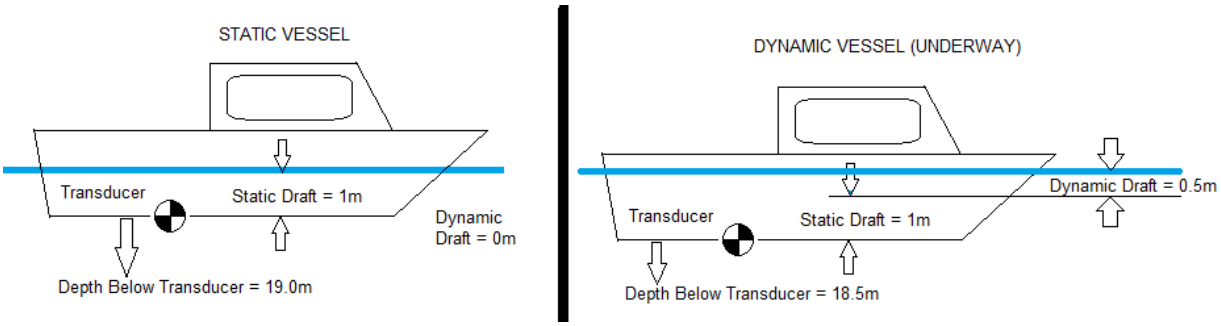
DYNAMIC DRAFT

'**Dynamic Draft**' represents the vertical movement of the echosounder transducer as the vessel is underway. There are two components to Dynamic Draft:

- **Squat**: As you apply power to the back end of the vessel, the front end moves upward and the back end moves downward. Depending where your transducer is mounted, this can result in either an increase or a decrease in the depth reported by the echosounder.
- **Settlement**: Due to the hydrodynamic effects of the vessel moving through the water, a pressure wave can form in advance of the vessel, resulting in water 'stacking up' in front

of the vessel. The water in the stack can come from the water surrounding the vessel, resulting in a downward displacement of the vessel.

FIGURE 12. *Static Draft (left) vs Dynamic Draft (right)*



In Figure 12, the vessel on the left is 'Static' (not moving). We have determined the Static Draft is 1.0 m and the Depth Below Transducer is 19.0m. The same vessel on the right is underway and the transducer has descended 0.5m in the water column. The Static Draft is still 1.0m, the Dynamic Draft is 0.5m and the Depth Below Transducer is now 18.5. We'll use these settings in the next examples.

In HYPACK®, Final Depth = Raw Depth + Static Draft + Dynamic Draft (+ Tide, SV and Heave corrections)

- **In the Static Case:** Final Depth = 19.0 + (1.0 + 0.0) = 20.0
- **In the Dynamic Case:** Final Depth = 18.5 + (1.0 + 0.5) = 20.0

How to Determine the Dynamic Draft for your Survey Boat

There are two practical methods for determining the Dynamic Draft for your vessel. Before making that determination, you should first correct for the Static Draft, by performing a bar check. You should also perform these measurements at slack tide, or make a note of the changes in the water level so they can be factored out of your test. We will need to determine the Dynamic Draft correction over a range of engine power settings, as the correction can vary due to amount of power being applied.

- **Method 1: Use a Level Instrument.**
  a. Set up a level instrument on the end of a pier.
  b. Have a crew member hold a stadia rod vertically above the transducer.
  c. Have the level operator make readings when the vessel is static and underway at different power settings.

Note: Try to make the reading when the vessel is the same distance from the level instrument.

---

d. You can then compare the level readings and create a table that has the Dynamic Draft correction for different power settings.
e. Use your GPS to determine the speed over ground for each power setting.

- **Method 2: Run Survey Lines over a Flat Area at Different Power Settings.**
  To use this method, you need to find a survey area where the bottom is relatively flat.
  a. Create a survey line through the flat area.
  b. With the vessel in static mode (no power being applied), try to get some depth samples along the line.
  c. run the survey line at different power settings, saving each run to a separate data file.
  d. Process the data files in the SINGLE BEAM EDITOR (applying tide corrections)
  e. display the files in the CROSS SECTIONS AND VOLUMES program. Determine the vertical difference in each profile as a function of the power applied and create a table of the settings.

The results of our test may look like Table 1:

TABLE 1. *Dynamic Draft vs Speed*

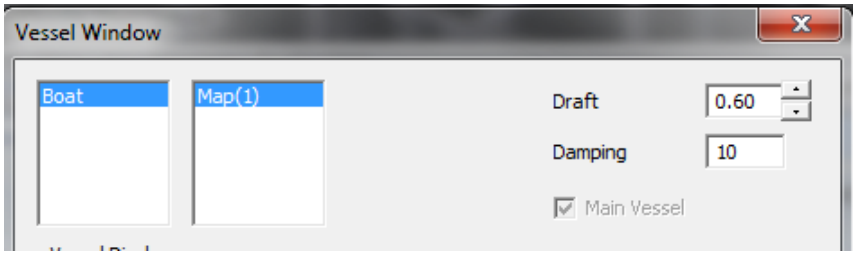
Power	Dynamic Draft Correction	Speed (SOG)
None	0.0	0.0
Idle (Slow Ahead)	0.25	0.5 kts
First Notch	0.40	4.5 kts
Second Notch (Survey Speed)	0.60	8.0 kts

APPLYING DYNAMIC DRAFT IN SURVEY

To apply the dynamic draft settings in SURVEY, you can either manually enter the settings as the power changes, or use the DRAFTTABLE driver to automatically adjust the dynamic draft based upon the speed of the vessel.

- **Method 1: Manually Adjusting the Draft.**
  In SURVEY, you can manually change the Dynamic Draft at any time by clicking on the Vessel menu and manually entering the new value. The program will then write a DFT record in the data file at the time of change (if you are “ON LINE”) and also write the current setting anytime you Start Line. In the latest version of SURVEY, the window looks like the following:

FIGURE 13. *Entering Draft in the Vessel Dialog*

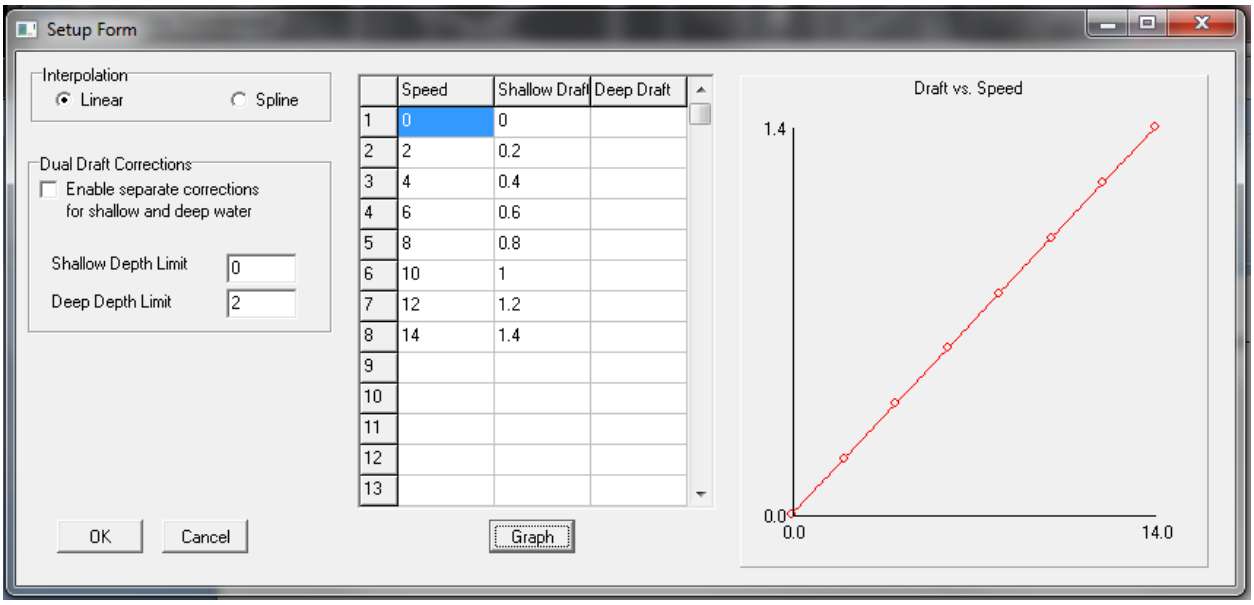


If you have multiple vessels, you should make sure you highlight the appropriate vessel in the top-left list box.

- **Method 2: Using the DRAFTTABLE.DLL:**
  The DRAFTTABLE.DLL allows you to construct a table of Dynamic Draft Correction versus Speed. The driver then uses the Speed Over Ground from the GPS (or the internal speed computed by SURVEY) and interpolates a draft correction based on the Speed Over Ground.

Note On a river, your speed through the water column may not equal your speed over ground. This could cause some significant errors in the Dynamic Draft correction being assigned by the driver.

FIGURE 14. *Configuring the DraftTable Driver*



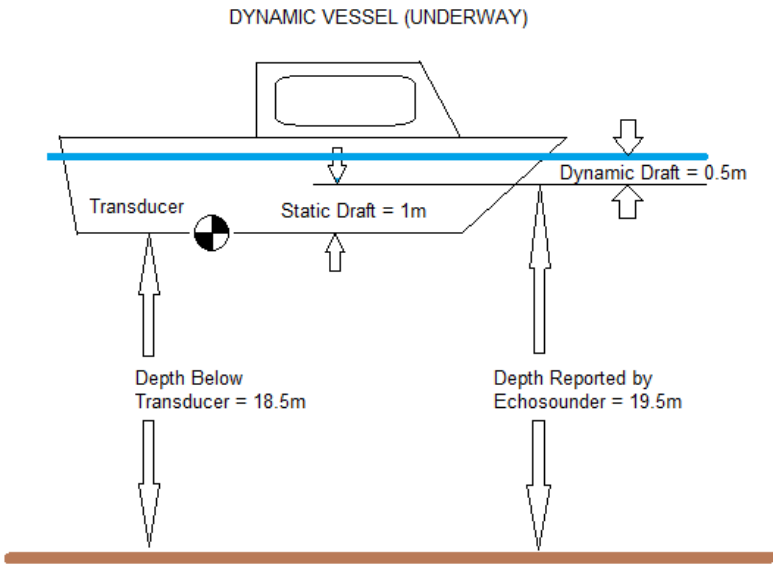
This driver is actually capable of computing both a shallow water and a deeper water correction. The German Hydrographic Office demonstrated in a technical paper several years ago that their 8m survey vessels experienced a 15cm difference in the dynamic draft depending on whether the vessel was operating in shallow water (less than 4m) or deeper water (greater than 8m). This was due to the limitation of the hydrodynamic forces that contribute to the Settlement of the vessel in shallow water compared to deeper water. Most of our surveyors only use a single correction curve and the driver can be set up for that by disabling the checkbox in the Dual Draft Correction box.

When configuring this device driver in HYPACK® HARDWARE, you should limit the update rate (use the Advanced Tab for the driver). You don't need to have 20 DFT records per second. I would recommend you limit the update rate of the driver to 1000mSec (1 second).

EXAMPLE 3: STATIC DRAFT IS INCORPORATED IN ECHOSOUNDER AND DYNAMIC DRAFT IS MANUALLY ENTERED

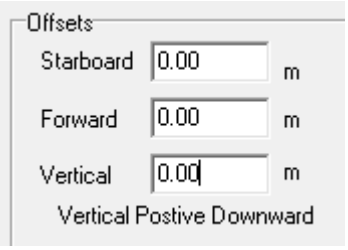
In this example, the bottom is 20m beneath the static waterline. We have determined a Static Draft correction of 1.0m and it has been incorporated into the echosounder. Since we are working on a river, we are going to manually enter a Dynamic Draft correction of 0.5m, which we have determined is our correction at normal survey speed. The echosounder reports a depth of 19.5m.

FIGURE 15. *Static Draft in the Sounder and Manual Dynamic Draft*



IN HYPACK®HARDWARE

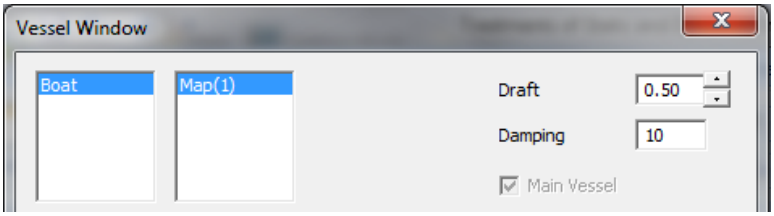
FIGURE 16. *Vertical Offset for the Echosounder is Zero*



For the Echosounder device, we have already entered the Static Draft correction into the echosounder. The Vertical Offset (Static Draft) for the Echosounder in HYPACK® HARDWARE should be set to 0.0.

IN SURVEY

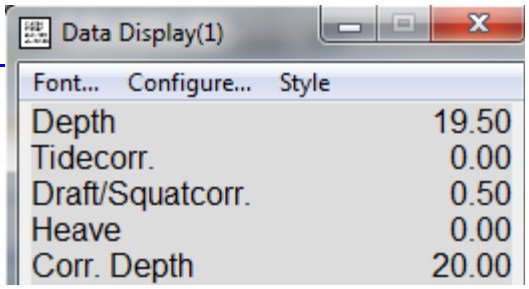
FIGURE 17. *Manually Entering Draft in the Vessels Dialog*



We need to go into the 'Vessel' menu and set the Draft for our Survey vessel to 0.5.

IN THE DATA DISPLAY WINDOW

FIGURE 18. *The Draft Correction is reported in the Data Display*



The Depth is displayed as 19.50m. SURVEY takes the depth received from the echosounder (19.50m) and adds any Vertical Offset (0.00m) from the device driver. The Draft correction is shown as 0.50m (our manual setting) and the Correct Depth is shown as 20.00m

IN THE RAW DATA FILE

The INF record at the top of the file shows an initial Dynamic Draft Correction as 0.50m. This is because we manually set the correction to 0.50m before starting the line.

```
INF "Pat Sanders0" "RV 103" "Sample_Survey_A" "Savannah River"
0.000000 0.500000 1529.000000
```

The vertical offset for the Echosounder shows the 0.00m setting.

```
DEV 0 16 "Echosounder" 0 C:\HYPACK 2010\devices\sim32.dll 9.0.3.5
OFF 0 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
```

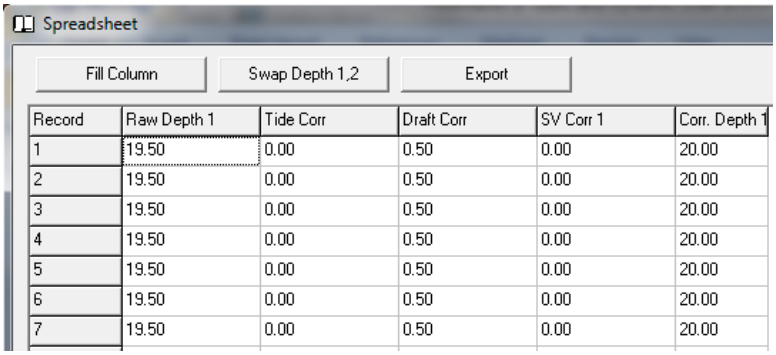
There are no DFT records, as we did not change the Draft Correction Value while ON-LINE.

The EC1 (Single Beam Echosounder) records show a value of 19.5 being received from the sounder. Remember, we incorporate the Static Draft (1.0m) into the echosounder. The echosounder adds the Static Draft to the Depth Below Transducer (18.5m) and outputs a depth of 19.5m to the computer.

```
EC1 0 45275.192 19.500
EC1 0 45275.395 19.500
EC1 0 45275.599 19.500
```

In the Single Beam Editor

FIGURE 19. *Manually Entered Draft Corrections Displayed Under Draft Corr*



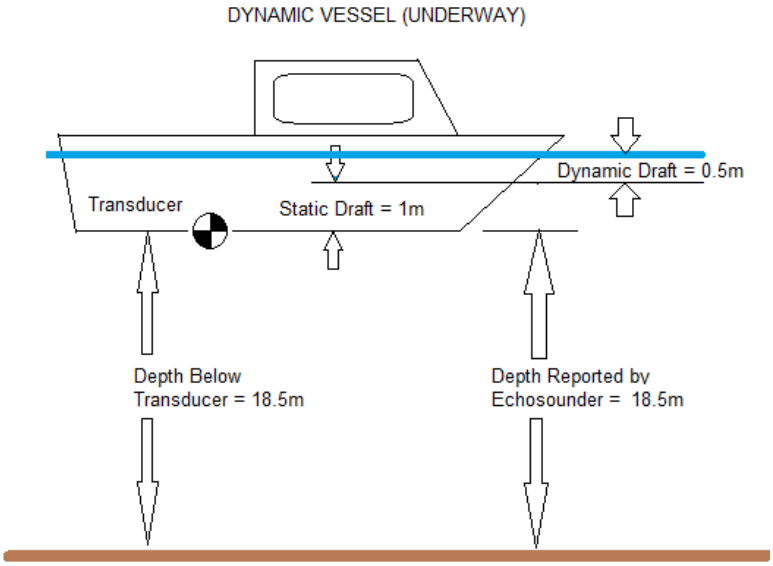
Record	Raw Depth 1	Tide Corr	Draft Corr	SV Corr 1	Corr. Depth 1
1	19.50	0.00	0.50	0.00	20.00
2	19.50	0.00	0.50	0.00	20.00
3	19.50	0.00	0.50	0.00	20.00
4	19.50	0.00	0.50	0.00	20.00
5	19.50	0.00	0.50	0.00	20.00
6	19.50	0.00	0.50	0.00	20.00
7	19.50	0.00	0.50	0.00	20.00

The Vertical Offset for the Echosounder is displayed as 0.00m in the Read Parameters – Offsets window. In the Spreadsheet window, the Raw Depth is displayed as 19.50m. The Static Draft correction has been incorporated into the Raw Depth by the echosounder. The Draft correction represents the Dynamic Draft correction and is displayed as 0.50m. Our final Corrected Depth is displayed as 20.00m and is correct.

Example 4: Static Draft is Entered in HYPACK® and Dynamic Draft is Manually Entered

In this example, the bottom is 20m beneath the static waterline. We have determined the Static Draft Correction is 1.0m. The echosounder is set up to output the Depth Below Transducer, so we will enter the Static Draft as our Vertical Offset of the Echosounder in HYPACK® HARDWARE. As in the previous example, we are going to manually enter the Dynamic Draft of 0.5m.

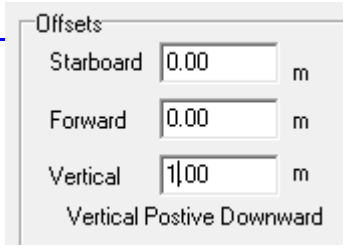
FIGURE 20. *Static Draft as a Vertical Offset, Manual Dynamic Draft*



IN HYPACK®HARDWARE

Since we are correcting for the Static Draft in HYPACK®, we will enter the Static Draft (1.0m) as the Vertical Offset for the Echosounder in HYPACK® HARDWARE.

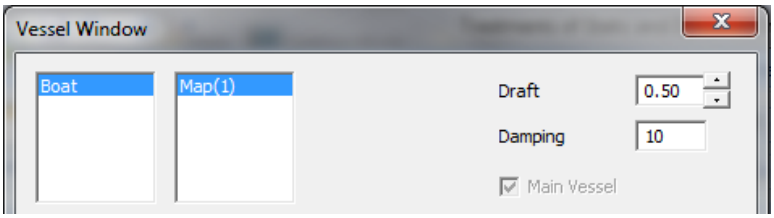
FIGURE 21. *Entering Static Draft as a Vertical Offset of the Sounder*



IN SURVEY

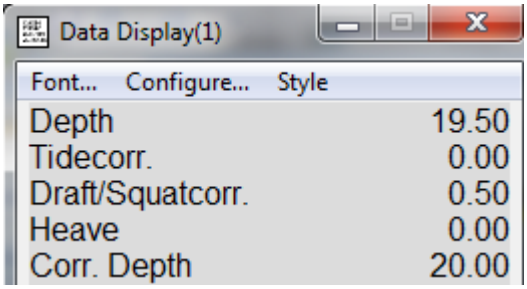
Once again, since we are manually entering the Dynamic Draft, we need to go to the 'Vessel' menu and set it for 0.50m. (SURVEY should remember your previous setting.)

FIGURE 22. *Entering Dynamic Draft in the Vessels Dialog*



In the Data Display Window, SURVEY combines the Raw Depth reported by the echosounder (18.5m) with the Static Draft (Vertical Offset = 1.00m) and shows a Depth = 19.50m. The Dynamic Draft is shown as 0.50m and the Final Corrected Depth is shown as 20.00m, which is correct!

FIGURE 23. Survey Reports Depth that Includes Static Draft, Draft Correction Equal to Dynamic Draft



IN THE RAW DATA FILE

The INF record near the top of the header shows an initial Dynamic Draft correction of 0.50. This is because we manually set the correction before starting the survey line.

```
INF "Pat Sanders0" "RV 103" "Sample_Survey_A" "Savannah River"
0.000000 0.500000 1529.000000
```

The Device record in the header shows a Vertical Offset of 1.00m for the Echosounder device. This is our Static Draft value that we entered as the Vertical Offset for the echosounder driver.

```
DEV 0 16 "Echosounder" 0 C:\HYPACK 2010\devices\sim32.dll 9.0.3.5
OFF 0 0.000000 0.000000 1.000000 0.000000 0.000000 0.000000 0.000000
```

The Single Beam Echosounder records (EC1) show a depth received from the sounder of 18.50.

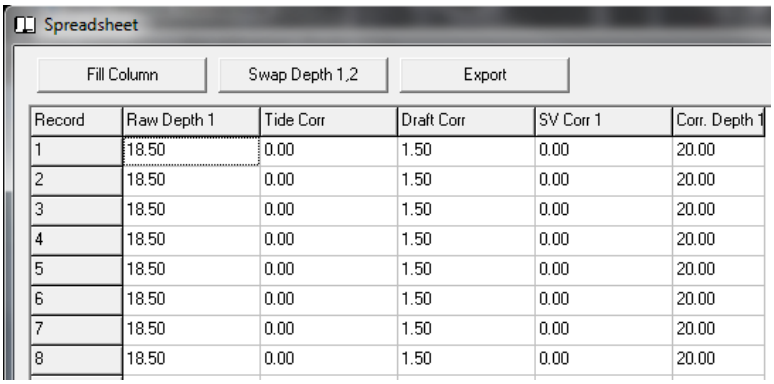
Note Although the depth reported by the echosounder and the Static Draft are combined for display in the Data Display window, *they are maintained as separate entities in the RAW data file*.

```
EC1 0 48142.276 18.500
EC1 0 48142.479 18.500
EC1 0 48142.682 18.500
```

IN THE SINGLE BEAM EDITOR

The Vertical Offset (Static Draft) is displayed as 1.00m in the Read Parameters – Offsets window.

FIGURE 24. *Static and Dynamic Draft Corrections Combine to Display as 1.5.*



Record	Raw Depth 1	Tide Corr	Draft Corr	SV Corr 1	Corr. Depth 1
1	18.50	0.00	1.50	0.00	20.00
2	18.50	0.00	1.50	0.00	20.00
3	18.50	0.00	1.50	0.00	20.00
4	18.50	0.00	1.50	0.00	20.00
5	18.50	0.00	1.50	0.00	20.00
6	18.50	0.00	1.50	0.00	20.00
7	18.50	0.00	1.50	0.00	20.00
8	18.50	0.00	1.50	0.00	20.00

In the Spreadsheet window, the Raw Depth is displayed as 18.50m. The Draft Correction now combines both the Static Draft (Vertical Offset = 1.0m) and the Dynamic Draft value (0.50) and displays a Draft Correction of 1.50m. The Corrected Depth shows 20.00m, which is correct.

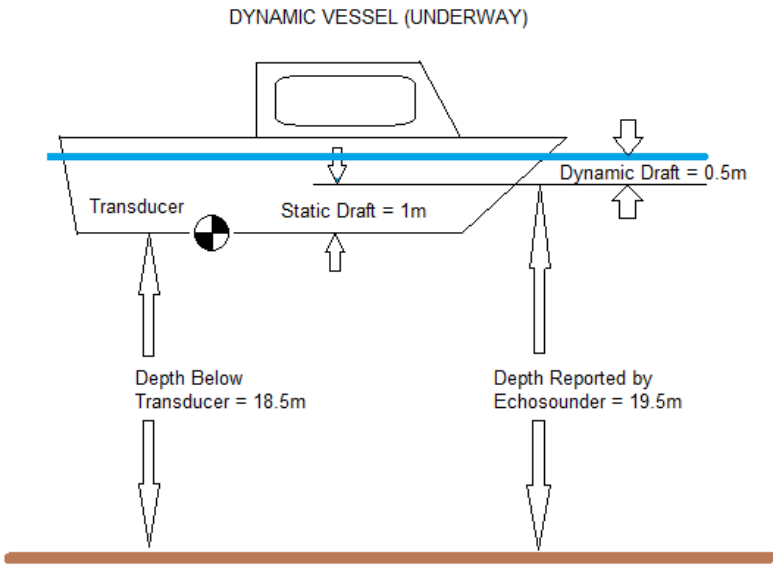
Note: It is important to note that the SINGLE BEAM EDITOR combines the Static and Dynamic Draft values into a single Draft Correction component. In future versions, we hope to keep the two corrections as separate entities.

EXAMPLE 5: STATIC DRAFT IS INCORPORATED IN ECHOSOUNDER AND DYNAMIC DRAFT COMES FROM DRAFTTABLE

This example is similar to Example 3, except that instead of manually entering the Dynamic Draft correction, we will be using the DRAFTTABLE.DLL to assign the correction based upon the vessel's speed over ground.

The echosounder has the Static Draft (1.0m) set into it and will report a Depth = 19.5m. The Dynamic Draft at our survey speed (5kts) is determined to be 0.5m.

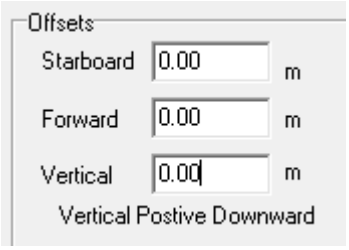
FIGURE 25. *Static Draft is Incorporated into the Echosounder, Dynamic Draft Fro the DraftTable.dll*



IN HYPACK® HARDWARE

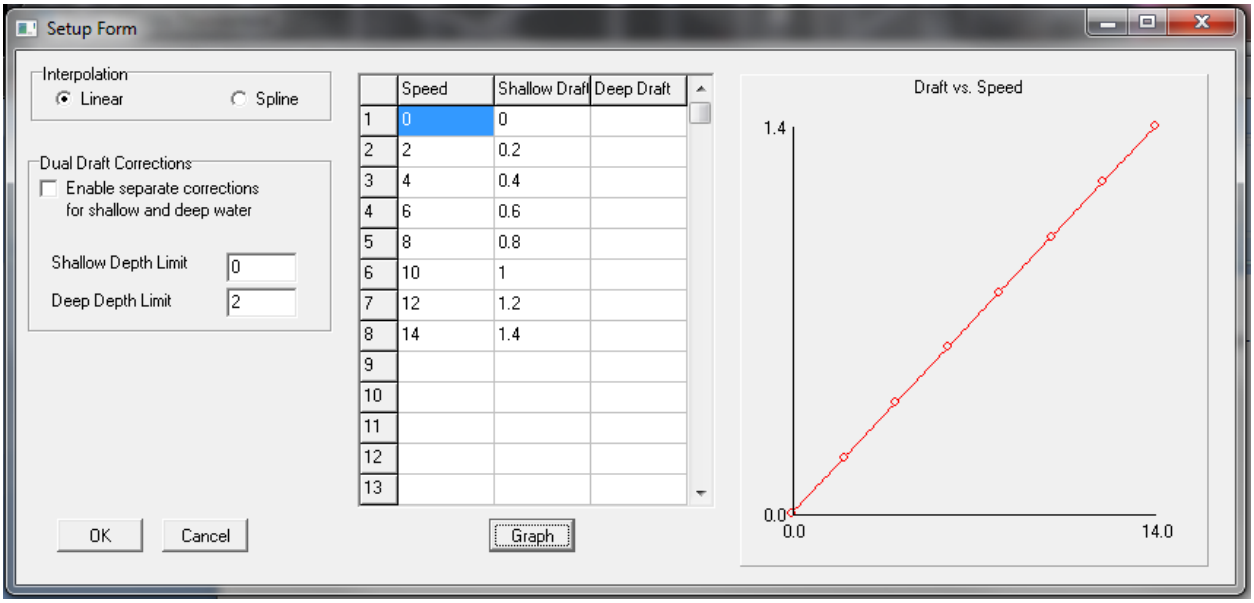
- **For the Echosounder:** Since the Static Draft (1.0m) is incorporated directly into the echosounder. We will set the Vertical Offset for the echosounder to 0.00m.

FIGURE 26. *Static Draft is in the Sounder so its Veritical Offset is Zero*



- **For the DRAFTTABLE.DLL:** There are no offsets associated with the DRAFTTABLE.DLL. After selecting the driver, click the Setup button to access the table entries and driver settings.

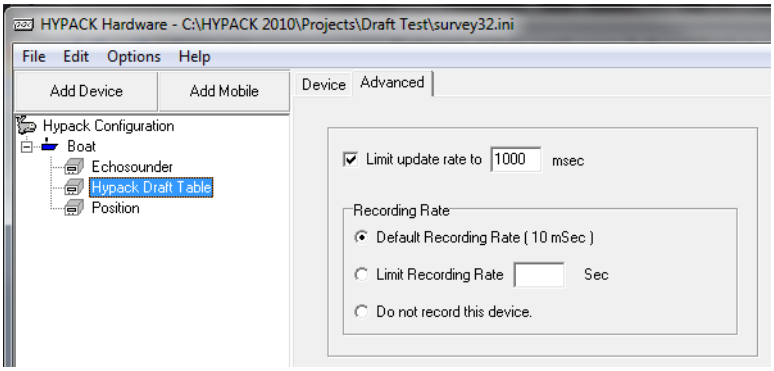
FIGURE 27. DraftTable Driver Setup



My settings (Figure 27) show that at 5kts, we should have an interpolated Dynamic Draft value of 0.5m. I have elected to use only a single Speed versus Dynamic Draft graph in my examples.

Also, under the Advanced tab, I have instructed the DRAFTTABLE.DLL to only update once a second. You don't need 20 dynamic draft updates per second….

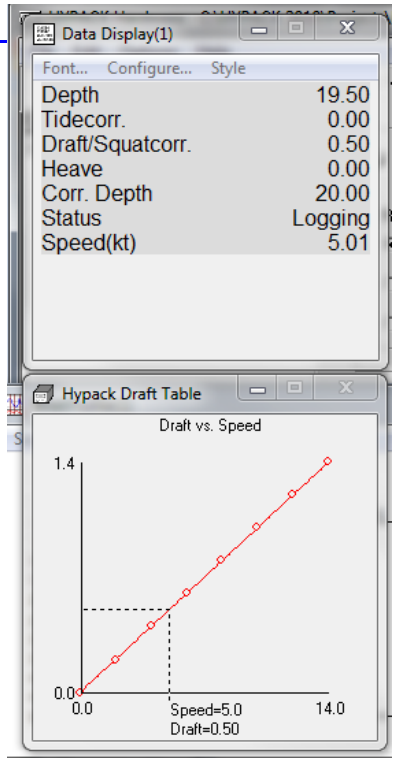
FIGURE 28. *Limiting the Update Rate to Once Each Second*



IN SURVEY

I've captured both the window from the DRAFTTABLE.DLL and the Data Display window (Figure 29) . The Draft Table window shows the driver has determined that at a speed of 5kts, the correction is 0.50m

FIGURE 29. *Data Display (top), DraftTable Device Window (below)*



In the Data Display window, it shows the depth reported from the Echosounder as 19.50m. This is correct, as the Static Draft (1.0m) is incorporated into the echosounder along with the Depth Below Transducer (18.50m), giving an output Depth of 19.50m.

The Dynamic Draft (Draft/Squat Corr) is shown as 0.50m, with a resulting corrected depth of 20.00m. Once again, everything is correct!

IN THE RAW DATA FILE

The INF record shows that there when we started line, the Dynamic Draft correction was 0.50m.

```
INF "Pat Sanders0" "RV 103" "Sample_Survey_A"
"Savannah River" 0.000 0.500 1529.000
```

The Device record for the Echosounder shows that there is no Static Draft (Vertical Offset) being applied by HYPACK®.

```
DEV 0 16 "Echosounder" 0 C:\HYPACK
2010\devices\sim32.dll 9.0.3.5
OFF 0 0.000 0.000 0.000 0.000 0.000 0.000 0.000
```

The Single Beam Echosounder (EC1) records show a reported depth from the echosounder of 19.50m.

```
EC1 0 49924.199 19.500
EC1 0 49924.401 19.500
EC1 0 49924.604 19.500
```

There are now DFT (Dynamic Draft) records in the data file every one second that show the Dynamic Draft correction (0.50m) as determined by the DRAFTTABLE.DLL:

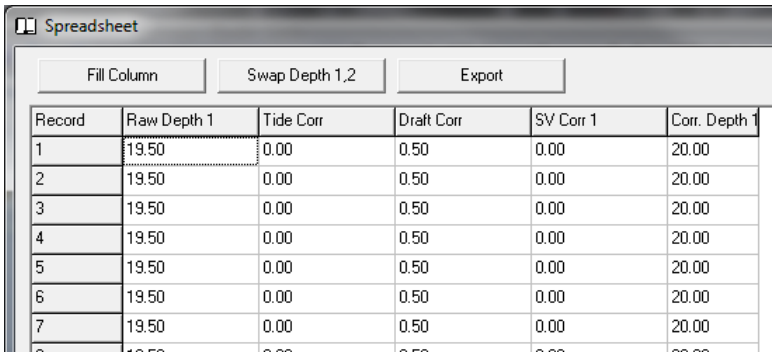
```
DFT 1 49924.167 0.500
```

IN THE SINGLE BEAM EDITOR

The Vertical Offset for the Echosounder is displayed as 0.00m in the Read Parameters – Offsets window.

In the Spreadsheet window, the reported depth from the echosounder which already contains the Static Draft correction is shown as 19.50m. The Draft Correction now just displays the Dynamic Draft correction, which is 0.50m. The Corrected Depth is shown as 20.00m, which is correct!

FIGURE 30. *Static Draft Incorporated in Raw Depth, Dynamic Draft as Draft Corr.*



Record	Raw Depth 1	Tide Corr	Draft Corr	SV Corr 1	Corr. Depth 1
1	19.50	0.00	0.50	0.00	20.00
2	19.50	0.00	0.50	0.00	20.00
3	19.50	0.00	0.50	0.00	20.00
4	19.50	0.00	0.50	0.00	20.00
5	19.50	0.00	0.50	0.00	20.00
6	19.50	0.00	0.50	0.00	20.00
7	19.50	0.00	0.50	0.00	20.00

EXAMPLE 6: STATIC DRAFT IS INCORPORATED IN HYPACK® AND DYNAMIC DRAFT COMES FROM DRAFTTABLE.DLL

In our final example, the echosounder is set up to output the Depth Below Transducer (18.50m). The Static Draft (1.00m) will be entered into HYPACK® HARDWARE as the Vertical Offset for the Echosounder. The Dynamic Draft will be determined by the DRAFTTABLE.DLL, as it was in the previous example.

FIGURE 31. *Static Draft as Sounder's Vertical Offset, Dynamic Draft from DraftTable.dll*

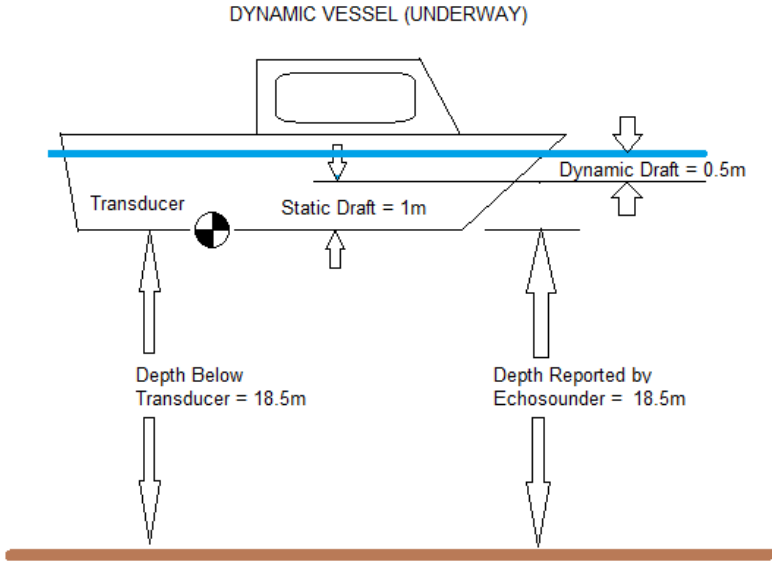
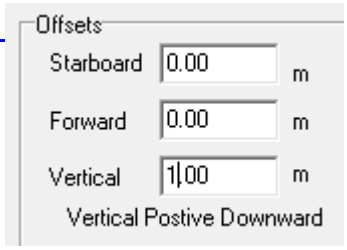
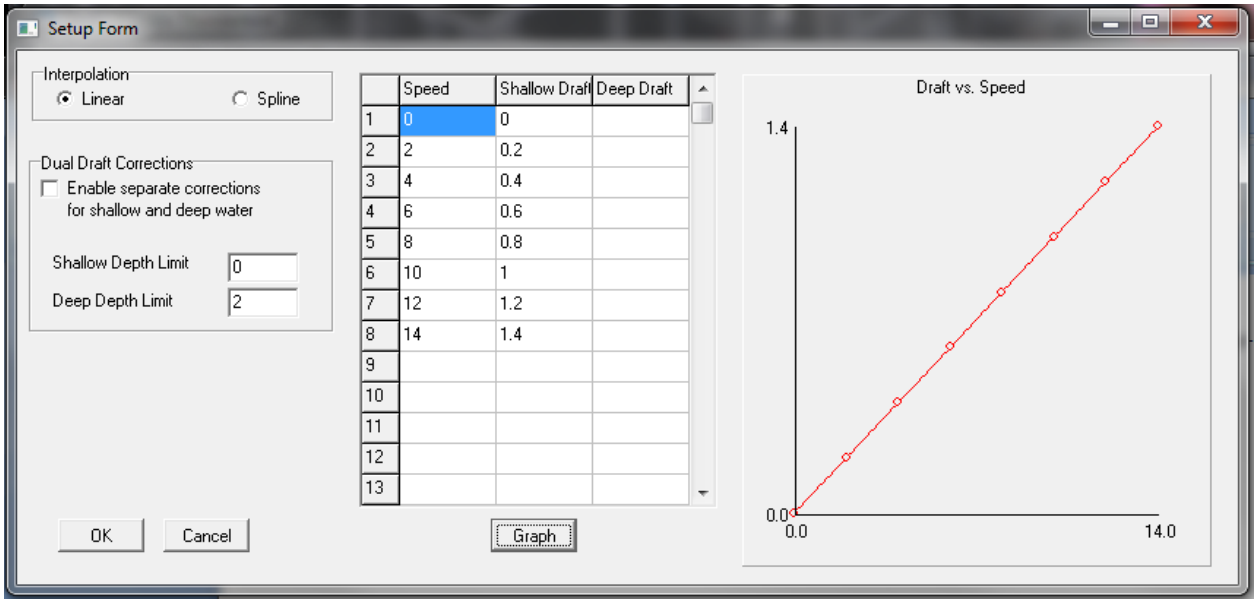


FIGURE 32. Static Draft as Vertical Offset of the Echosounder



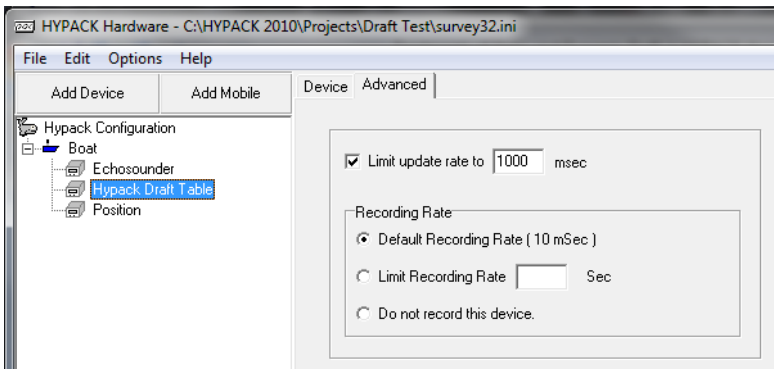
- **For the Echosounder:** The echosounder will be outputting the Depth Below Transducder (18.5m), so we need to enter the Static Draft value as the Vertical Offset for the Echosounder device in HYPACK® HARDWARE.
- **For the DRAFTTABLE.DLL:** There are no offsets associated with the DRAFTTABLE.DLL. After selecting the driver, click the Setup button to access the table entries and driver settings.

FIGURE 33. DraftTable Driver Setup



My settings (Figure 33) show that at 5kts, we should have an interpolated Dynamic Draft value of 0.5m. I have elected to use only a single Speed versus Dynamic Draft graph in my examples.

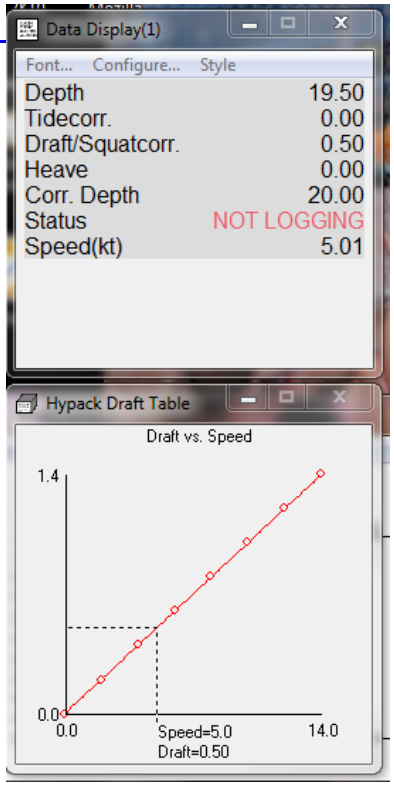
FIGURE 34. Limiting the Update Rate



Also, under the Advanced tab, I have instructed the DRAFTTABLE.DLL to only update once a second. You don't need 20 dynamic draft updates per second….

IN SURVEY

FIGURE 35. *Data Display (top), DraftTable Device Window (below*



The graph for the DRAFTTABLE driver is shown on the bottom. At 5kts, it is correctly generating a Dynamic Draft correction of 0.50m.

In the Data Display window, the Depth displayed combines the Depth reported from the echosounder (18.50m) with the Static Draft correction (1.00m) and shows 19.50m. The Dynamic Draft correction (Draft/Squat Corr.) shows 0.50m and the final Corrected Depth shows 20.00m and is correct!

IN THE RAW DATA FILE

The INF record in the header shows that the last Dynamic Draft value before the Start-of-Line was 0.50m.

```
INF "Pat Sanders0" "RV 103" "Sample_Survey_A"
"Savannah River" 0.000000 0.500000
1529.000000
```

The Device record for the Echosounder shows we need to apply a Static Draft correction of 1.00m.

```
DEV 0 16 "Echosounder" 0 C:\HYPACK
2010\devices\sim32.dll 9.0.3.5
OFF 0 0.000000 0.000000 1.000000 0.000000 0.000000 0.000000 0.000000
```

In the body of the file, the Single Beam Echosounder records (EC1) show the depth received from the echosounder is 18.50m

```
EC1 0 50764.637 18.500
EC1 0 50764.814 18.500
EC1 0 50765.016 18.500
```

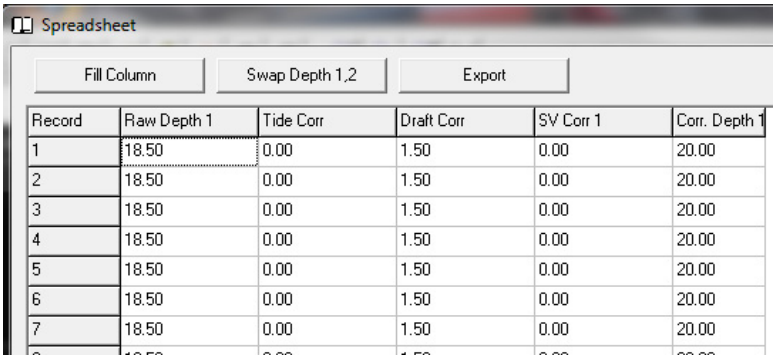
Also, in the body of the file, we have Dynamic Draft records every one second, showing a correction of 0.50m, generated by the DRAFTTABLE.DLL. (We told HARDWARE to generate one every one second.)

```
DFT 1 50764.439 0.500
```

IN THE SINGLE BEAM EDITOR

The Static Draft shows up as the Vertical Offset to the Echosounder of 1.00m in the Read Parameters – Offsets window.

FIGURE 36. *Static and Dynamic Draft Corrections are Combined Under Draft Corr*



Record	Raw Depth 1	Tide Corr	Draft Corr	SV Corr 1	Corr. Depth 1
1	18.50	0.00	1.50	0.00	20.00
2	18.50	0.00	1.50	0.00	20.00
3	18.50	0.00	1.50	0.00	20.00
4	18.50	0.00	1.50	0.00	20.00
5	18.50	0.00	1.50	0.00	20.00
6	18.50	0.00	1.50	0.00	20.00
7	18.50	0.00	1.50	0.00	20.00

In the Spreadsheet window, the Raw Depth shows the depth reported by the Echosounder (18.50m). The Draft Correction shows the sum of the Static Draft (Vertical Offset = 1.00m) and the Dynamic Draft (0.50m) and is correctly shown as 1.50m. The Corrected Depth is shown at 20.00m, which is correct!

SUMMARY

These examples have been created to illustrate that there are several methods that allow you to incorporate both the static and dynamic draft in HYPACK®.

Most of our small boat surveyors seem to prefer to incorporate the Static Draft correction directly into the echosounder. This is probably because they bar check the echosounder frequently and it is easier to just leave the Static Draft setting incorporated in the echosounder. The application of the dynamic draft depends on the type of survey. If you are in a river surveying up/down the current, the DRAFTTABLE.DLL is not a good choice, as your speed through the water column may differ drastically from your speed over ground.

Please make sure that you do not correct for the Static Draft both in your echosounder and in HYPACK® HARDWARE (as the Vertical Offset to the sounder).