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THE BOND DESK

Demonstration Version 1.0

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GENERAL

The Bond Desk is a bond calculation program that calculates prices and yields for bonds to maturity and to the call according to the formulae and methods presented in "Standard Securities Calculation Methods", Volume 1, Third Edition, by Jan Mayle, President of TIPS, published by the Securities Industry Association in 1993 and according to Rule G33 of the Municipal Securities Rulemaking Board.

Calculations on municipal, corporate and agency bonds are made using the 30/360" day count method. Treasury Notes and Bonds are calculated using Act/Act day count method. Calculations on discounted instruments are made using the day count method of Act/360". Calculations for instruments paying interest only at maturity are made using either 30/360", Act/360" or Act/365" day count methods. The mode being used shows on the screen. User interested in learning more about these day count methods are referred to "Standard Securities Calculation Methods". The HP-12c Users Manual also has a discussion of day count methods.

OPERATION

To begin The Bond Desk double click The Bond Desk icon or enter "BondDesk at the Program Manager Run prompt.

To enter data into a field, select the field by clicking with your mouse or use the Tab key to cycle though the fields until you get to the desired field. The selected field will show as light green instead of black. Enter the data for the field. It will be stored when you move to the next field, press the Enter key or press one of the Calc buttons. Use the backspace key to correct errors before pressing the applicable data storage key. **The Bond Desk** will validate all date entries and make sure other entries are reasonable.

INSTALLATION INSTRUCTIONS

Quick Start:

1. Insert **The Bond Desk** floppy disk in the appropriate drive.
2. Select **Run** from the **File** menu of Windows Program Manager (or select **Run** from the Windows 95 **Start** menu).
3. Type A:**BondDesk** (or B:**BondDesk**).
4. Click OK.
5. For detailed operating instructions see Operation

Full Installation (Windows):

1. Insert **The Bond Desk** floppy disk in the appropriate drive.
2. Open File Manager from the **Main** program group.
3. Select the drive containing **The Bond Desk** floppy disk.
4. Select **BondDesk.exe** and **BondDesk.hlp**.
5. Click and drag to destination directory of your choice.
6. Open Program Manager.
7. Click **New** in the File menu.
8. Click **Program** in the dialogue box.
9. Enter **Bond Desk** in the name box.
10. Press Tab.
11. Click **Browse**.
12. Select the directory that contains **BondDesk.exe** (see Step 5).
13. Click **OK** then click **OK** again.

Full Installation (Windows 95):

1. Insert **The Bond Desk** floppy disk in the appropriate drive.
2. Open Explorer by clicking the **Start** button, **Programs**, **Explorer**.
3. Select the drive containing **The Bond Desk** floppy disk.
4. Select **BondDesk.exe** and **BondDesk.hlp**.
5. Click and drag to destination directory of your choice.
6. Click **Start**, **Settings**, **Task Bar**.
7. Click **Start Menu Programs**.
8. Click **Add**
9. Click **Browse**.
10. Select the directory that contains **BondDesk.exe** (see Step 5).
11. Select **BondDesk.exe** and click **Next**.
13. Select folder of your choice and click **Next**.
14. Enter **The Bond Desk** and click **Finish**.

CALCULATION MODES

Municipal Bonds

Corporate Bonds

Agency Bonds

Treasury Notes/Bonds

T-Bills / Banker Acceptances / Commercial Paper
Notes

Municipal Bonds

Municipal bonds are issued by municipalities to fund capital projects such as roads, schools, water and sewers, etc. They vary in term from six months to thirty or, occasionally, forty years. They are usually exempt from taxation. Their prices and yields are calculated using the concept of twelve (12) thirty (30) day months (30/360": $12 \times 30 = 360$ therefore 30/360). The user should treat all municipal bonds that pay more than one coupon on a semi-annual basis as bonds regardless of the actual name on the instrument. In order to complete the calculation the following fields must contain data:

Settlement Date

Coupon/Rate

Maturity

Price or **Yield**

Additional calculations are made if the following optional fields contain data:

Call Date

Call Price

Price to Call or **Yield to Call**

The **Bond Desk** will provide the results of the calculation requested plus

Current Yield

Accrued/\$1,000

Duration

Price and Yield results are presented to three significant decimal places.

Generally there is no difference in the calculation methods for a Municipal bond and a Corporate bond except for bonds with Odd Coupon Periods.

Corporate Bonds

Corporate bonds are issued by corporations for various corporate purposes. They vary in term from one year to as long as forty years. Their prices and yields are calculated using the concept of twelve (12) thirty (30) day months (30/360": $12 \times 30 = 360$ therefore 30/360). The user should treat all corporate bonds that pay more than one coupon on a semi-annual basis as bonds regardless of the actual name on the instrument. In order to complete the calculation the following fields must contain data:

Settlement Date

Coupon/Rate

Maturity

Price or Yield

Additional calculations are made if the following option fields contain data:

Call Date

Call Price

Price to Call or Yield to Call

The **Bond Desk** will provide the results of the calculation requested plus

Current Yield

Accrued/\$1,000

Duration

Price and Yield results are presented to three significant decimal places.

Generally there is no difference in the calculation methods for a Corporate bond and a Municipal bond except for bonds with Odd Coupon Periods.

Agency Bonds

Agency bonds are issued by agencies of the federal government to finance their operations. They vary in term from one year to as long as fifty years for some Tennessee Valley Authority issues. Their prices and yields are calculated using the concept of twelve (12) thirty (30) day months (30/360": $12 \times 30 = 360$ therefore 30/360). The user should treat all agency bonds that pay more than one coupon on a semi-annual basis as bonds regardless of the actual name on the instrument. In order to complete the calculation the following fields must contain data:

Settlement Date

Coupon/Rate

Maturity

Price or Yield

Additional calculations are made if the following option fields contain data:

Call Date

Call Price

Price to Call or **Yield to Call**

The **Bond Desk** will provide the results of the calculation requested plus

Current Yield

Accrued/\$1,000

Duration

Price results are presented to six significant decimal places, and yields are presented to three significant decimal places.

Treasury Notes / Bonds

Treasury notes and bonds are issued by the federal government to finance its operations. They vary in term from one year to as long as thirty. Their prices and yields are calculated using the concept of actual days per month and per year (Act/Act). The user should treat all treasury bonds and notes that pay more than one coupon on a semi-annual basis as bonds regardless of the actual name on the instrument. In order to complete the calculation the following fields must contain data:

Settlement Date

Coupon/Rate

Maturity

Price or **Yield**

Additional calculations are made if the following option fields contain data:

Call Date

Call Price

Price to Call or **Yield to Call**

The **Bond Desk** will provide the results of the calculation requested plus

Current Yield

Accrued/\$1,000

Duration

Price results are presented to six significant decimal places, and yields are presented to three significant decimal places.

T-Bills / Banker Acceptances / Commercial Paper

These all represent short-term financial instruments sold at a discount to their value at maturity. All calculations are made on a simple interest basis and use the actual days/month and a 360 day year (Act/360"). In order to complete the calculation the following fields must contain data:

Settlement Date

Coupon/Rate

Maturity

Price, Yield or Disc Rate

Since these instruments are usually sold on the basis of their Discount Rate or Price, the user should enter either the Disc Rate or Price last. **The Bond Desk** will use the last entered data as the controlling data. The Yield produced is an annual or money market yield. Recalculations may not produce the same price as was produced using the Calc Yield or Calc Price. This is a result of the accuracy of the Disc Rate or Yield as entered and not a limitation of **The Bond Desk**. E.G. for a Settlement Date of 1/1/92, a Maturity date of 7/1/92 and a Price of 98, **The Bond Desk** provides a Yield of 4.036780% and a Disc Rate of 3.956%. Reenter 3.956 in the Disc Rate field and press the Calc Price button and **The Bond Desk** provided a Price of 98.0000222% and a Yield of 4.036734%.

Price results are presented to seven significant decimal places, Yields are presented to six significant decimal places and Discount Rate uses three significant decimal places.

Notes

Notes are issued by any number of entities, including governments, agencies and corporations. In **The Bond Desk** Notes are defined as instruments with one year or less to maturity at the time of issuance that pay interest only at maturity. They are priced using simple interest formulae and may use either 30/360, Act/360 or Act/365 day count calculations. In order to complete the calculation the following fields must contain data:

Settlement Date

Coupon/Rate

Maturity

Price or Yield

Issue Date

The **Bond Desk** will provide the results of the calculation requested plus

Accrued/\$1,000

DATA FIELDS

Settlement Date

Coupon/Rate

Maturity

Yield

Price

Call Date

Call Price

Yield to Call

Price to Call

Current Yield

Accrued/\$1,000

Duration

Disc Rate (T-Bills / Banker Acceptances / Commercial Paper only)

Issue Date (Notes only)

Settlement Date

The Settlement Date is the date on which the transaction settles.

The Settlement Date is automatically computed to three (3) days after the current date in your computer. This is usually the regular settlement date. **The Bond Desk** Version 1.0 takes into consideration weekends, New Years Day, the 4th of July, and Christmas.

To change the settlement date select the Settlement Date Field and enter the date you wish to use in the format "mm/dd/yy". The Settlement Date will be stored when you move to another field, press a Calc Button or press Enter. The same formats are used for entering all dates.

When double-clicked by the left button on the mouse, a calendar window appears that can be used to select the Settlement Date.

Coupon/Rate

This is the rate of interest stated on the Bond or Note. It should be entered as a percent **NOT** as a decimal; i.e. 4.50% should be entered as 4.5 **not** as .045. The Coupon/Rate will be stored when you move to another field, press a Calc Button or press Enter.

Maturity

This is the date when payment of the principal of the Bond or Note is to be paid. It is entered in the format mm/dd/yy". The Maturity will be stored when you move to another field, press a Calc Button or press Enter.

When double-clicked by the left button on the mouse, a calendar window appears that can be used to select the Maturity Date.

Yield

This is the basis on which the bond is priced and sold. It reflects the value of the instrument giving consideration to time to maturity, credit quality of the issuer/guarantor, and general market conditions. It should be entered as a percent **NOT** as a decimal; i.e. 4.50% should be entered as 4.5 **not** as .045. The Yield will be stored when you move to another field, press a Calc Button or press Enter.

Price

This is the price of the bond expressed as a percent. Bonds may be quoted and sold on a price basis. This price usually reflects the value of the bond on a yield basis plus a mark-up by the dealer.

Price should be entered as a percent **NOT** as a decimal; i.e. 98.50% should be entered as 98.5 **not** as .985. The Price will be stored when you move to another field, press a Calc Button or press Enter.

Call Date

This is the date for the next optional call on a bond. Most bonds are subject to optional redemption by the issuer after a certain date that is set forth the Official Statement or Prospectus for the bond.

To properly calculate the Price or Yield to Call, the user should enter the date of the next possible call in the Call Date field in the format "mm/dd/yy". The Call Date will be stored when you move to another field, press a Calc Button or press Enter.

When double-clicked by the left button on the mouse, a calendar window appears that can be used to select the Call Date.

Call Price

This is the price at which the bond can be redeemed on the next optional Call Date for a bond. Most bonds are subject to optional redemption by the issuer after a certain date, and frequently at a price in excess of par as forth the Official Statement or Prospectus for the bond. For Zero Coupon Bonds the Call Price is based on the Accreted Value.

To properly calculate the Price or Yield to Call, the user should enter the Call Price on the next possible Call Date as a percent **NOT** as a decimal; i.e. 102.50% should be entered as 102.5 **not** as 1.025. The Call Price will be stored when you move to another field, press a Calc Button or press Enter.

Yield to Call

Yield to Call is the yield on the bond to the Call Date, at the Call Price.

It should be entered as a percent **NOT** as a decimal; i.e. 4.50% should be entered as 4.5 **not** as .045.
The Yield to Call will be stored when you move to another field, press a Calc Button or press Enter.

Price to Call

Price to Call is the price of the bond, as a percent, to the Call Date, at the Call Price.

It should be entered as a percent **NOT** as a decimal; i.e. 98.50% should be entered as 98.5 **not** as .985.
The Price to Call will be stored when you move to another field, press a Calc Button or press Enter.

Current Yield

This is the rate of actual cash flow as percent of the purchase price. It is calculated by dividing the annual interest received on the bond by the purchase price. E.G. a bond with a coupon of 4.5% purchased at 96.625% of par has a Current Yield of 4.66% ($45 / 966.25$).

Accrued/\$1,000

This is the amount of accrued interest to be paid the seller of a bond on a sale completed between interest payment dates. This result is per \$1,000 par amount of bonds.

Duration

A mathematical measure (Macaulay method) of how quickly an investor recovers his or her investment. Bonds of similar duration will have the similar price movements for a given move in interest rates. For a more complete discussion of Duration see "Duration Analysis, Managing Interest Rate Risk" by Gerald O. Bierwag, 1987, by Ballinger Publishing Company.

Disc Rate (T-Bills / Banker Acceptances / Commercial Paper only)

This is the rate usually quoted by dealers and is the basis for computing the price of a discounted instrument.

It should be entered as a percent **NOT** as a decimal; i.e. 4.50% should be entered as 4.5 **not** as .045. The Disc Rate will be stored when you move to another field, press a Calc Button or press Enter.

Issue Date (Notes only)

Issue Date is the date that a Note was issued. This field must be entered in order to calculate the Price or Yield on a Note.

Issue Date should be entered in the format "mm/dd/yy". The Issue Date will be stored when you move to another field, press a Calc Button or press Enter.

When double-clicked by the left button on the mouse, a calendar window appears that can be used to select the Issue Date.

CALCULATIONS

Calc Yield

Calc Price

Calc Yield to Call

Calc Price to Call

Calc Disc Rate

Calc Yield

Calculates the Yield on the bond.

Requires:

Settlement Date

Coupon/Rate

Maturity

Price

Optional:

Call Date

Call Price

To Calculate, either click the Calc button to the left of Yield or press Ctrl+Y.

Calc Price

Calculates the Price of the bond as a percent.

Requires:

Settlement Date

Coupon/Rate

Maturity

Yield

Optional:

Call Date

Call Price

To Calculate, either click the Calc button to the left of Price or press Ctrl+P.

Calc Yield to Call

Calculates the Yield to Call on the bond.

Requires:

Settlement Date

Coupon/Rate

Call Date

Call Price

Price to Call

Optional:

Maturity

To Calculate, either click the Calc button to the left of Yield to Call or press Ctrl+E.

Calc Price to Call

Calculates the Price to Call of the bond.

Requires:

Settlement Date

Coupon/Rate

Call Date

Call Price

Yield to Call

Optional:

Maturity

To Calculate, either click the Calc button to the left of Price to Call or press Ctrl+I.

Calc Disc Rate (T-Bills / Banker Acceptances / Commercial Paper only)

Calculates the Discount Rate on a discounted instrument.

Requires:

Settlement Date
Coupon/Rate
Price or Yield

To Calculate, either click the Calc button to the left of Disc Rate or press Ctrl+D.

Calculation Priorities

The Bond Desk will compute prices and yields to the call and to maturity if all information is available. If the call information is omitted, **The Bond Desk** will only calculate the price or yield to maturity. Similarly, if the maturity is omitted, **The Bond Desk** will only calculate the price or yield to the call.

If all information is entered calculations are made both to maturity and the call date. The following priorities apply:

1. Calc Price **The Bond Desk** calculates both the Price and the Price to Call using the Yield;
2. Calc Price to Call **The Bond Desk** first calculates the Price to Call using the Yield to Call and then computes the Yield using the Price to Call;
3. Calc Yield **The Bond Desk** calculates both Yield and Yield to Call using the Price;
4. Calc Yield to Call **The Bond Desk** calculates both Yield and Yield to Call using the Price to Call;

Examples of Calculation Priorities:

1. Calc Price A 7% bond matures 9/1/14 and is callable 9/1/94 at 104. The Broker wants to sell at a 7.50% yield. Under industry rules, bonds are sold at lower of (i) price to maturity or (ii) price to the call. Assume Settlement Date of 11/1/91. To find the selling price enter 7 in Coupon, 9/1/14 in Maturity, 9/1/94 in Call Date, 104 in Call Price and 7.5 in Yield. Click Calc Price and the Price field will show 94.560 in yellow. Yield to Call will show 7.50% and show a dollar price of 101.977. The broker should sell the bonds at 94.560 plus accrued interest. If the broker wants to know the Yield to Call, in the event that the bonds are called, he or she should click Calc Yield and **The Bond Desk**, using calculation priority 4 above, will calculate a Yield to Call of 10.510% using the selling price of 94.560.
2. Calc Price to Call A 0% bond matures 2/15/07 and is callable 2/15/02 at 61.391. The broker is bidding the bond to yield a 6.90% to the call. Assuming a Settlement Date of 11/1/91, what is the Price to Call and what is the Yield to Maturity if the bond is not called? Enter 0 (zero) in Coupon, 2/15/07 in Maturity, 2/15/02 in Call Date, 61.391 in Call Price, and 6.9 in Yield to Call. Click Price to Call and the Price to Call field will show 30.548 and a Yield (to Maturity) of 7.909%.

Results

Results are computed by clicking the applicable Calc key or by pressing Ctrl+(the underlined letter in the label to the right of the Calc key: i.e. to calculate the Price: Ctrl+P). The answer is then shown in yellow text. When new data is entered, the field reverts to green text. THE ANSWER IS ONLY VALID FOR THE DATA SHOWN WHEN THE CALCULATED FIELD HAS YELLOW TEXT!

Current Yield

Accrued/\$1,000

Duration

Zero Coupon Bonds

Zero Coupon Bonds do not pay interest prior to maturity. However, interest is accrued and compounded semi-annually. Zero Coupon Bonds are callable at their Accreted Value on a particular Call Date. The Accreted Value is the Price of the Zero Coupon Bond on the Call Date as calculated using the Original Issue Yield as the Yield, the Call Date as the Settlement Date, and the Maturity of the Bond.

In order to properly calculate the Price to Call of Zero Coupon Bonds the user must have access the Accreted Value of the bond that can be found in the Official Statement or Prospectus. If the user has the Original Issue Yield for the Bond the Accreted Value of the bond can be calculated as follows:

Settlement Date	=	Call Date
Coupon	=	0 (zero)
Maturity	=	Maturity Date
Yield	=	Original Issue Yield (found in the Official Statement or Prospectus)
Calc Price	=	Accreted Value

Multiply the Accreted Value by the Call Price (also found in the Official Statement or Prospectus) and place the result in the Call Price data field.

Then perform the following calculation:

Settlement Date	=	Proposed Settlement Date
Coupon	=	0 (zero)
Maturity	=	Bond Maturity
Yield	=	Proposed Yield to Maturity
Call Date	=	Next eligible Call Date or Optional Redemption Date
Call Price	=	Result of previous calculation
Calc Price	=	Price to Maturity and Price to Call will be properly shown.

Theory of Bond Pricing

Essentially the price of a bond represents the discounted present value of all the future income streams including (i) all interest payments to be paid in the future, (ii) the repayment of principal, (iii) any premiums earned, if any, less (iv) accrued interest paid. This theory is explained more fully in "Inside the Yield Book" by Sidney Homer and Martin L. Leibowitz, 1972, PrenticeHall and in Chapter 2 of Bierwag's "Duration Analysis" as well as many other sources. The methods for implementing this theory are presented in "Standard Securities Calculation Methods", Volume 1, Third Edition, by Jan Mayle, President of TIPS, published by the Securities Industry Association in 1993 and in Rule G33 of the Municipal Securities Rulemaking Board.

These formulae are as follows:

$$PV(\text{Principal}) = P / (1 + Y/2)^{(N1 + (EA)/E)}$$

$$PV(\text{Int Pmts}) = \text{SUMMATION of, for } X = 1 \text{ to } N, \\ (C/2) / (1 + Y/2)^{(N1 + (EA)/E)}$$

$$\text{Accrued} = C/2 * A/E$$

where

N = Number of interest payments to be made

E = Number of days in the coupon period in which settlement occurs

A = Number of days from the Dated Date or Last Interest Payment date to the Settlement Date

Y = Yield on the bond as a decimal (6.6% = .066)

P = Payment of principal due on the maturity date

C = Coupon on the bond as a decimal

ODD Coupon Periods

Purchasers of municipal bonds during an ODD Coupon Period should be aware that they may not be receiving the value represented by the Yield on the bond.

Because MSRB Rule G-33 formula does not consider either the time value of the Odd Coupon Period, or the changed value of the first interest payment, investors who buy municipal bonds during the initial coupon period will receive additional value if the Odd Coupon Period is more than six months and will receive less value if the Odd Coupon Period is less than six months. This is because, under the MSRB methodology, the above formula ignores the fact that for ODD First Periods, in the first period and the first period only, the interest paid to a bondholder is NOT

$$\text{Principal} * \text{Coupon} / 2$$

but is

$$\text{Principal} * \text{Coupon} * (\text{days in first period}) / 360.$$

In a July 1995 Notice To Members, the MSRB notified all members that in transactions involving Odd Coupon Periods, either the first or the last, that they must notify customers of the possibility that the yield or price quoted may not reflect the actuarially correct yield or price for these issues.

Corporate Bond calculations take the value of the Odd coupon into consideration.

Because of the limited impact of Odd Coupon Periods in the fixed-income marketplace, **The Bond Desk** does not provide calculations for Odd Coupon Periods. This limitation will only affect calculations made during the Odd Coupon Period. After the Odd Coupon has been paid, this aspect of the calculation has no further impact.

The Bond Desk should **not** be used for any bond with an Odd Last Coupon.

LIMITATIONS

The Bond Desk Version 1.0 does not support odd coupon period calculations. These are bonds that are issued with a first or last coupon period that is not six months. This limitation will affect a very small number of bonds issues, and then, only until the first coupon is paid for bonds with an Odd First Coupon. **The Bond Desk** should **not** be used for any bond with an Odd Last Coupon. See [ODD Coupon Periods](#).

In order to properly calculate the Price to Call of Zero Coupon Bonds the user must have the Accreted Value of the Bond on the Call Date. This may require an interim calculation by the user. See [Zero Coupon Bonds](#).

The Demonstration Version of **The Bond Desk** will accept only whole numbers in the [Coupon](#), [Price](#), [Yield](#), [Call Price](#), [Yield to Call](#), and [Price to Call](#) fields. This limitation on use is removed in the fully functioning version.

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Compound Solutions
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Pittsburgh, PA 15241

The Bond Desk may also be registered at CompuServe's Shareware Registration Database (GO SWREG), under ID# 11561. Your fully functioning, personally registered version will be E-Mailed to you.

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