

INTRODUCTION

The Monroe **TRADER II** is a versatile investment tool designed to provide a simplified method for computing bonds and other financial instruments. The fixed income computations included in the **TRADER II** provide fixed income professionals and investors the capability of performing basic trading and investment calculations.

TRADER II groups security instruments into 6 general categories.

<u>Type of Security</u>	<u>Security Code</u>
Municipal, Corporate, Agency Bonds	0
U.S. Government Bonds	1
Municipal Notes	2
Actual 360 Notes	3
Actual 365 Notes	4
Treasury Bills, Discount Securities	5
Stepped Coupon Bonds	6

TRADER II also contains more sophisticated fixed income computations, such as after tax calculations, duration, production analysis, average life and volatility measures which enhance the capabilities of the investment decision maker.

This manual provides an introduction to using the **TRADER II** as well as example problems. General operating instructions are provided for entering dates, prices and correcting errors. Also, detailed instructions are given for each function key.

GENERAL ENTRIES

NUMBERS

Numbers are keyed in as written using the decimal point key to define the position of the decimal point in the number, if any. The decimal point key is not necessary for numbers without a fractional part.

CHG SIGN is used to make a positive number negative, or a negative number positive.

DATES

Dates are entered just like numbers, using the decimal point key to separate the month from the day-of-the-month:

Month - Enter 1 or 2 digits, not to exceed "12" for December.

Day - Enter 2 digits, not to exceed "31". If the day is from the first to the ninth (only one digit), enter a leading zero to fill in the first digit.

Year - Enter 4 digits, the century and the year.

or

- Enter 2 digits, the last two digits of the year. When the century digits are not entered, **TRADER II** assumes the date is a valid date between January 1, 1970 and December 31, 2069.

For example, enter the number of the month, a decimal point, a "two digit" day and the last "two digits" of the year. "Two digit" means that the day and year must take up two places. If the day or year is less than 10, add a leading zero.

June 4, 1987 is entered as 6.0487

Pressing any key with the word date on it causes the date to be stored, according to the key depressed. **TRADER II** displays it with a message indicating the key pressed and punctuates the date in a conventional format.

EXAMPLE: June 24, 1987

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
6.2487	SETTLEMENT DATE	Settlement Date Wed. 06-24-1987

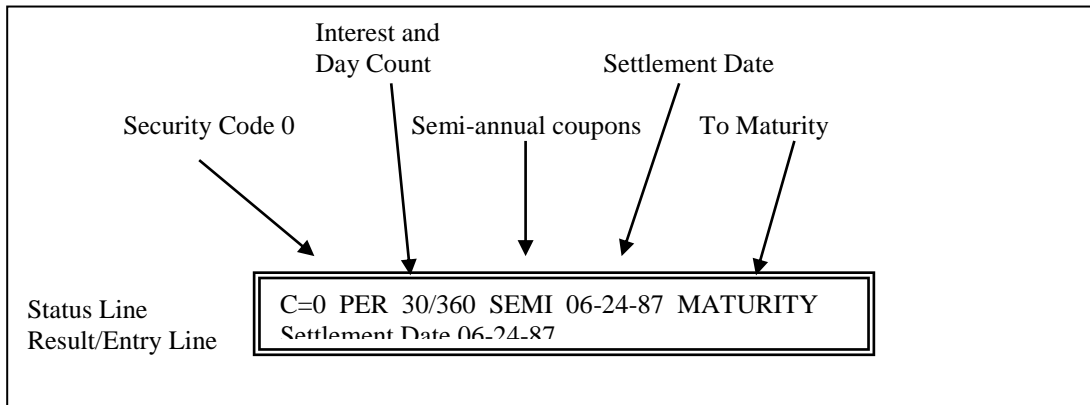
EXAMPLE: Oct. 1, 2000

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
10.0100	MAT DATE END	Maturity Date Sun. 10-01-2000

STATUS MODE

The **CODE**, **CALL/MATURITY**, and **COUPONS ER YEAR** keys are considered to set modes of operation for keys which perform calculations. The "status" of all the modes is continuously displayed on line 1 of the display. Each mode is defined in the Description of Keys section and illustrated in the example calculations.

The following is a typical example of the mode settings:



Security Code 0 (Municipal, Corporate, Agency Bond) Periodic Semi-annual coupons, Calculating to Maturity Date.

FED/MUNI SWITCH

This switch controls the number of decimal places of price results in Security Codes 0, 2, 3, 4, and 6. Prices are rounded to 6 places in the **FED** position and truncated to 3 places in **MUNI**. Security Code 1 and 5 prices are calculated to 6 and 7 decimal places respectively.

CORRECTIONS & ERROR MESSAGES

If an error is made when keying a number or date, the **TRADER II** will display a message. For example, if an invalid security code is entered (using the **CODE** key) the message Invalid Code, will be displayed. The error message need not be cleared. Just continue, by entering the correct number. An invalid date entry will result in a date of 00-00-0000. Whenever possible, the **TRADER II** will indicate which entry is incorrect refer to Appendix C for a complete list of error conditions.

If an error is detected before an entry is complete, press the **C/CE** key and enter the number again.

OVERFLOW AND UNDERFLOW

Calculation results which are too large (overflow) or small (underflow) will cause the number to be displayed in a special format.

Numbers have an internal capacity of fourteen digits (14) with a floating decimal point. When the decimal point is greater than the maximum number of digits, **TRADER II** displays as 1.234567890123+14 which represents the actual number 123,456,789,012,340. In other words, the 14 most significant digits of the result will be displayed along with an E+nn or E-nn indicating the placement of the decimal. In the example above, the actual number was obtained by moving the decimal point to the right 14 digits. If E-nn is displayed, move the decimal point to the left nn digits. Overflow will be displayed to indicate an error.

DESCRIPTION OF KEYS

DISPLAY This key is used with the other keys to display the current values stored in the **TRADER II**. The result of pressing the **DISPLAY** key, if any, will be explained as each key is defined below.

C/CE (Clear/Clear Entry) When an entry is not being made, single depression of **C/CE** clears any pending arithmetic sequence in progress, any constant, as well as the entry display, allowing you to start the calculation over. This may be referred to as the *clear* function.

During a numeric entry, single depression of this key clears the display and allows you to re-enter without disturbing the calculation in progress. This may be referred to as the *clear entry* function.

A double depression (two consecutive depressions) of **C/CE** at any time executes the *clear* function.

CODE The entry of this key determines the formula and day count basis used in subsequent calculations. Refer to Appendix B for a more complete list of securities and their day count basis. **TRADER II** groups security instruments into 6 general categories.

<u>Type of Ssecurity</u>	<u>Security Code</u>
Municipal, Corporate, Agency Bonds	0 PER 30/360
U.S. Government Bonds	1 PER ACT/ACT
Municipal Noted	2 MAT 30/360
Actual 360 Notes	3 MAT ACT/360
Actual 365 Notes	4 MAT ACT/365
Treasury Bills, Discount Securities	5 DISC ACT/360
Stepped Coupon Bonds	6 STEP 30/360

Each category is based on:

- 1) Interest Classification – method and timing of interest payments
 - a) PER - Periodic Coupon
 - b) MAT - At Maturity
 - c) DISC - Discounted
 - d) STEP - Periodic with two coupon periods

- 2) The calendar – method used to count the number of days between two dates.
 - a) 30/360 -30 days in each month; 360 days per year
 - b) ACT/ACT -Actual days in each month; Actual days per year
 - c) ACT/365 -Actual days in each month; 365 days per year
 - d) ACT/360 -Actual days in each month; 360 days per year

- 3) Industry Rules
 - a) Municipal Securities Rulemaking Board
 - b) National Association of Securities Dealers

**CALL/
MATURITY** Selects the calculation mode of subsequent calculations. This key toggles between the following three modes:

1. **MATURITY** – selects calculations to maturity date only.
2. **CALL** – selects calculations to call date only
3. **CALL+MAT** – selects calculations to call and to maturity.

When both values are calculated, they are displayed side-by-side (Call on the left and Maturity on the right), the **TRADER II** retains the lower of the two for use in subsequent calculations.

The mode of the **CALL/MATURITY** key may be set at any time before a price or yield calculation.

**COUPONS
PER YEAR** If a number entry is made before pressing this key, it changes the frequency of coupon payments for Security Codes 0, 1, and 6; and compound periods per year for the Compound Interest/Annuity functions.

<u>ENTRY</u>	<u>DISPLAY STATUS</u>	<u>MEANING</u>
1	ANNL	Annual Coupons
2	SEMI	Semi-Annual Coupons
4	QTR	Quarterly Coupons
12	MNTH	Monthly Coupons
Any other number	SEMI	Semi-Annual Coupons

**ISSUE/
DATED** Accepts the issue date or dated date. An issue date is required in Security Codes 2, 3, and 4. The dated date is used to calculate accrued coupon interest in Codes 0, 1, and 6.

**SETTLEMENT
DATE** Stores the settlement date, using the standard date format (Refer to General Entries section), for all securities calculations. **DISPLAY, SETTLEMENT DATE** displays the most recent entry.

COUPON Accepts a coupon rate, as a percentage, on a bond, the interest rate on a note, or the interest rate for Compound Interest/Annuity functions. **DISPLAY, COUPON** displays the most recent entry.

**1ST COUPON
DATE** Stores the 1st coupon date, using the standard date format. The 1st coupon date is used to determine if an “odd” coupon period applies to Code 0 and 1 securities when computing price/yield. **DISPLAY, 1ST COUPON DATE** displays the most recent entry.

**MAT
DATE
END** Accepts the maturity date of a security using the standard date format. **DISPLAY, MAT DATE END** display the most recent entry.

TO PRICE Accepts a yield, such as 8.125, and calculates the price of a security. **DISPLAY, TO PRICE** displays the most recent price.

32^{NDS} Accepts a value in dollars and 32^{nds} and converts to decimal dollars. For example, for 104 2/32, enter 104.02. The third and fourth decimal positions may be a "5" for an additional 64th, a "35" for 1/128 or a "75" for 3/128. For Example:

<u>FRACTIONAL PRICE</u>	<u>ENTER</u>	<u>DISPLAY</u>
100 1/32	100.01	100.03125
100 1/32 + 1/64	100.015	100.046875
100 1/32 + 1/128	100.0125	100.0390625
100 1/32 + 3/128	100.0175	100.0546875

DISPLAY, 32^{NDS} converts dollars as a decimal to dollars and 32^{nds}.

TO YIELD Stores the entry of dollar price and calculates the yield of a security. **DISPLAY, TO YIELD** displays the last yield entered or calculated and the equivalent yield according to the following table:

<u>COUPONS PER YEAR</u>	<u>EQUIVALENT YIELD</u>
1 (ANNL)	SEMI-ANNUAL
2 (SEMI)	ANNUAL
4 (QTR)	SEMI-ANNUAL
12 (MTH)	SEMI-ANNUAL

NOTE: For Treasury Bials, Security Code 5, this key calculates the discount rate and displays the effective (coupon equivalent) yield.

CURR YIELD Pressing this key computes the current yield for a security after a price o yield calculation.

CALL DATE BEGIN Accepts the call date using the standard date format (Refer to General Entries section). **DISPLAY, CALL DATE BEGIN** displays the most recent entry.

CALL PRICE Accepts a call price. **DISPLAY, CALL PRICE** displays the most recent entry.

CONV COUPON Stores the second coupon rate, as a percentage, for computing a Code 6 securities (Step Coupon). **DISPLAY, CONV COUPON** displays the most recent entry.

CONV DATE Stores the conversion date, using the standard date format. The conversion date determines when the conversion coupon rate is applied to Code 6 security calculations. **DISPLAY, CONV DATE** displays the most recent entry.

CONC Accepts a concession and deducts it from dollar price. If the price is 104.375 and the concession is .25, the response will be 104.125. **DISPLAY, CONC** displays the most recent entry. The concession amount is erased after any price or yield calculation.

NOTE: Concession affects the dollar price only, it does not recalculate a new yield. If yield to "price less concession" is desired simply press **TO YIELD** when "Price less Conc" is in the display.

EXT	Accepts the entry of a quantity of securities, per thousand face value, (or uses previously stored number) to compute extended price less concession (principal amount) and accrued interest.
DISPLAY, EXT	Accepts the entry of a quantity of securities, per thousand face value, (or uses previously stored number) to compute net amount (extended total).
TAX RATE	Accepts income tax rate and capital gains rate, as percentages, to be used in all the after-tax calculators. Each percentage is two digits, separated by a decimal point. DISPLAY, TAX RATE displays the most recent entries.
AFTER TAX	Computes an after-tax yield using the previously calculated (price and yield) values in conjunction income and capital gains tax rates. DISPLAY, AFTER TAX performs after-tax-yield to price calculation.
DISPLAY, AFTER TAX	(After-tax-yield to price) Accepts the after-tax-yield and calculates before-tax dollar price for a given tax rate or rates and a specific after-tax yield. Enter the after-tax yield and depress DISPLAY, AFTER TAX .
DUR	Calculates the duration and modified duration of coupon security (Security Codes 0, 1, and 6).
DISPLAY DUR	Calculates the duration and modified duration of a coupon security without accrued interest.
VAL	Accepts the number of basis points (up to 99), and calculates the difference in dollar price, between the last entered (or calculated) price and the dollar price at the yield plus the entered basis points. If no entry is made, this key automatically assumes 5 basis points for codes 0, 1, and 6; adds 1 basis point to the discount rate for Code 5.
DISPLAY, VAL	Accepts the number of 32 ^{nds} , and calculates the difference in basis points between currently entered (or calculated) yield and the yield at the dollar price plus the entered 32 ^{nds} (thirty second of a point). If no entry is made, this key sequence automatically assumes 1/32 nd for all security codes.
N	Accepts a total number of compounding periods; or pressing this key without a number entry, calculates the total number of periods. This number can represent days, weeks, months or any other time unit, but always corresponds to the number of COUPONS PER YEAR entry. For example, if COUPONS PER YEAR is set to 2, then the total number of compounding periods for five years is 10. DISPLAY, N will display the most recent entry stored.
PRESENT VALUE	Accepts a present value amount; or pressing this key without a number entry, calculates the present value. a present value can be calculated for a future value and/or the present value of a series for future payments. DISPLAY, PRESENT VALUE will display the most recent entry stored.

FUTURE VALUE Accepts a future value amount; or pressing this key without a number entry, calculates the future value. A future value can be calculated for a present value and/or the compound value of a series of prior payments, **DISPLAY, FUTURE VALUE** will display the most recent entry stored.

PAYMENT Accepts a periodic payment amount; or pressing this key without a number entry, calculates a periodic payment amount. **DISPLAY, PAYMENT** will display the most recent entry stored.

BEGIN This key initializes the production (**PROD**) or average life (**AVG LIFE**) calculation sequences. If **BEGIN** is followed by a **PROD** key, the *issue memory* is erased and ready for new entries. if the **BEGIN** key is followed by the **AVG LIFE** key the Average Life summation is erased.

Pressing **BEGIN** and the **ADD ISSUE** or **STR BOND** key erases all of the securities stored in the specified memory area.

AVG LIFE This key, preceded by **BEGIN**, clears the average life summary and starts the average life calculation sequence; enters the number of securities retired per period (sinks) into the average life computation.

PROD This key, preceded by **BEGIN**, clears the *issue memory* and is ready for new entries. **BEGIN, PROD** starts the production calculation sequence.

Accepts the number (sequence #) of the production summary to display or pressing with no entry displays the next summary.

DISPLAY, PROD Computes a production analysis summary for the securities currently stored with the **ADD ISSUE** key. The sequence # and associated production summary follows:

<u>SEQUENCE #</u>	<u>PRODUCTION SUMMARY</u>	<u>COMMENT</u>
0.	Total Par	Dollar Amount
1.	Bond Years	
2.	Average Coupon	Weighted by Par
3.	Average Interest	Weighted by Bond Years
4.	Total Coupon	Coupon Interest for Life of Bonds
5.	Average Price	Weighted by Par
6.	Total Extension	Extended Price Plus Accrued Interest
7.	Total Principal	Extended Price
8.	Average Redemption	Decimal Years and Date
9.	Average Yield	Weighted by Par
10.	Average Current Yield	Weighted by Par
11.	Annual Income	Current Annual Coupon Interest
12.	Average Duration	Weighted by par
13.	Total Accrued Interest	
14.	Gross Profit	Redemption Value + Total Interest - Cost

**STR
BOND** Stores any security currently in working memory into a specific *bond memory* location according to the number (1-50) entered prior to pressing the key. If no storage location is specified, the **TRADER II** will automatically store the bond into the next available location.

Storing a bond in location 1 will erase any bond previously stored but does not affect the bonds stored in locations 2 through 50.

**DISPLAY,
STR
BOND** Recalls a security to working memory from a specific *bond memory* according to the number (1-50) entered prior to pressing the key.

**ADD
ISSUE** Stores the security currently in working memory into a specific *issue memory* location according to the number (1-50) entered prior to pressing the key. If no storage location is specified, the **TRADER II** will automatically store the bond into the next available location.

Storing a bond in location 1 will erase any bond previously stored but does not affect the bonds stored in locations 2 through 50.

NOTE: Issue memory is used to store securities which are used as input to the production analysis calculations. Any security stored here must have a computed price or yield and extended principal and interest.

**DISPLAY,
ADD
ISSUE** Recalls a security to working memory from a specific *issue memory* according to the number (1-50) entered prior to pressing the key.

SECURITY CODE 0

Security Code 0 calculates Municipal, Corporate, and Federal Agency Bonds as well as any security which pays periodic interest on a 30/360 (30 day month/360 day year) calendar. Refer to Appendix B for a more complete list of securities and the day count basis.

PRICE AND YIELD TO MATURITY

EXAMPLE: A 8.5% Municipal Bond maturing on April 9, 11996 is sold to yield 9%. Find the dollar price and the current yield.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
0	CODE	Security Code 0
6.2487	SETTLEMENT DATE	Settlement Date Wed. 06-24-87

To **FED/MUNI** switch and status line should be set as follows for this example:

FED/MUNI SWITCH to **MUNI**

C=0 PER 30/360 SEMI 06-24-87 MATURITY

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
8.5	COUPON	Coupon Rate 8.500%
4.0996	MAT DATE END	Maturity Date Tue. 04-09-1996
9	TO PRICE	Price 96.983(M)
	CURR YIELD	Current Yield 8.764%

The same bond is bought at a price of 96.5. What is the yield to maturity?

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
96.5	TO YIELD	Yield 9.083% (M)

NOTE: Since the settlement date, maturity date and coupon had already been stored, they need not be re-entered.

The maturity date in the previous example should have been April 15, 1996, not April 9, 1996. Recalculate the yield.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
4.1596	MAT DATE END	Maturity Date Mon. 04-15-1996

Since the dollar price is already stored, there is no need to re-enter. The **DISPLAY** key together with the **TO PRICE** key will recall the previous dollar price.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
	DISPLAY, TO PRICE	Price 96.500
	TO YIELD	Yield 9.082% (M)

CALLABLE BONDS

For bonds with a call option, you must enter a call price and call date using the **CALL PRICE** and **CALL DATE BEGIN** keys (in any order).

Press the **CALL/MATURITY** key, until **CALL** is displayed, this causes the **TRADER II** to calculate “to call” only; maturity date is ignored.

If the **CALL/MATURITY** key is in the **CALL+MAT** mode, computing a price or yield calculates both “to call” and “to maturity”, both values are displayed simultaneously, the “to call” on the left, and the “to maturity” on the right. Only the lower of the two values is retained for further calculations.

EXAMPLE: A 6% Municipal Bond due April 25, 2016 is sold to yield 5.5%. It is callable on April 2, 1996 at a price of 102.50. Settlement date is June 24, 1987. Calculate price to call and to maturity.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
0	CODE	Security Code 0.
6.2487	SETTLEMENT DATE	Settlement Date Wed. 06-24-87

The status lien should be set as follows for this example:

C=0 PER 30/360 SEMI 06-24-87 CALL+MAT

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
0	COUPON	Coupon Rate 6.00%
4.2516	MAT DATE END	Maturity Date Mon. 04-25-2016
4.2596	CALL DATE BEGIN	Call Date Thur. 04-25-1996
102.5	CALL PRICE	Call Price 102.5
5.5	TO PRICE	Price 105.001 (C) 107.180 (M)

Since the price "to call" is lower, that value is stored so you may extend the trade (See Extensions).
Verify which value is stored by depressing **DISPLAY, TO PRICE**.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
	DISPLAY, TO PRICE	Price 105.001

Find the yield "to call" and "to maturity" if the price is 104.25.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
104.25	TO YIELD	Yield 5.605% (C) 5.697% (M)
	DISPLAY, TO YIELD	Yield 5.605% .684% ANNL Equiv

YIELD TO INVESTOR

The **CALL/MATURITY** mode can also be used to calculate “yield to the investor” for a bond currently held. To calculate the yield to investor, treat the bond as if it were called. Enter the market price on the **CALL PRICE** key, and settlement date on the **CALL DATE BEGIN** key.

EXAMPLE: A 5.5% agency bond was purchased on July 12, 1971 for 81.75 and is currently selling for 91.645. What is the investors yield, if the bond is sold on June 24, 1987.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
0	CODE	Security Code 0.
7.1271	SETTLEMENT DATE	Settlement Date Mon. 07-12-71

The status line should be set as follows for this example:

C=0 PER 30/360 SEMI 07-12-71 CALL

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
5.5	COUPON	Coupon Rate 5.500%
6.2487	CALL DATE BEGIN	Call Date Wed. 06-24-87
91.645	CALL PRICE	Call Price 91.645
81.75	TO YIELD	Yield 7.146% (C)

BOND EXTENSIONS

After a price or yield calculation, securities may be extended, taking into account a concession, if any. The extension calculates the principal and accrued interest amounts as well as the net amount.

To calculate bond extension, do a price or yield calculation in the normal way. If there is a concession, enter it in dollars per hundred par value and press **CONC**. The price less concession is displayed. With or without the concession, enter the number of bonds (per thousand) and proceed with one or both of the following functions:

<u>KEY</u>	<u>FUNCTION</u>
EXT	Extended price (less concession, if any) and accrued interest.
DISPLAY/EXT	Extended net amount (extended price less concession plus accrued interest).

Once the number of bonds has been entered using one of the above methods, that number of bonds remain stored and need not be re-entered to proceed to another extension. The number of price or yield is calculated.

EXAMPLE: A 6% Municipal Bond maturing on October 25, 1990 at a price of 90. Find the yield, the extended principal, accrued interest and net amount for 100 bonds sold on June 24, 1987.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
0	CODE	Security Code 0.
6.2487	SETTLEMENT DATE	Settlement Date Wed. 06-24-1987

Set the **FED/MUNI** switch and status line as follows:

C=0 PER 30/360 SEMI 06-24-87 MATURITY

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
6	COUPON	Coupon Rate 6.000%
10.2590	MAT DATE END	Maturity Date Thur. 10-25-1990
90	TO YIELD	Yield 9.566% (M)

Enter the number of bonds and press **EXT**

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
100	EXT	Prtn 90,000.00 Int 983.33

To see the extended principal plus the accrued interest:

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
	DISPLAY, EXT	Net Amount 90,983.33

What is the accrued interest, for 2000 bonds?

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
200	EXT	Prtn 180,000.00 Int 1,966.67

DATED BONDS

To calculate extensions for bonds which have an irregular first coupon (Dated Bonds), enter the dated date then press **ISSUE/DATED**. Then proceed in the normal manner as for regular bonds. The dated date may be entered at any time prior to performing the calculation for which is to be used. The dated date will remain stored until it is removed by entering **0** and pressing the **ISSUE/DATED** key.

EXAMPLE: Find the accrued interest for 10 Municipal Bonds dated January 15, 1987 and sold June 24, 1987. The coupon value is 8% the maturity date is June 1, 1994 and the yield is 9.25%.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
0	CODE	Security Code 0.
6.2487	SETTLEMENT DATE	Settlement Date Wed. 06-24-1987

Set the **FED/MUNI** switch and status line as follows:

C=0 PER 30/360 SEMI 06-24-87 MATURITY

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
1.1587	ISSUE/ DATED	Iss/Dated Date Thu. 01-15-1987
8	COUPON	Coupon Rate 8.000%

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
6.0194	MAT DATE END	Maturity Date Wed. 06-01-1994
9.25	TO PRICE	Price 93.693(M)
10	EXT	Prin 9.369.30 Int 353.33
	DISPLAY, EXT	Net Amount 9,722.63

Clear the dated date:

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
	0. ISSUE/ DATED	Iss/Dated Date 00-00-0000

AFTER-TAX CALCULATIONS

The **TRADER II** has the capability of calculating several after-tax functions.

- Before-tax price to After-tax yield
- Before-tax yield to After-tax yield
- After-tax yield to Before-tax price
- After-tax yield to Before-tax yield

These calculations are always based on either or both of two different tax rates, the income tax and capital gains rates. The **TRADER II** can be used to compute after-tax calculations for notes as well as bonds. After-tax yield calculations cannot be done for Treasury Bills. (Refer to Code 5 After-Tax Calculations.)

Before after-tax calculations can be performed, store the appropriate tax rates. The tax rates, like the coupon rate, are entered as percentages, each rate is a two digit number separated by a decimal point, and press **TAX RATE**.

Once entered, there is no need to re-enter the tax rate, unless the rate changes. To see the rates previously stored, press **DISPLAY, TAX RATE**.

After-tax calculations can be done for all securities, by the selection of the appropriate Security Code. In most cases, Municipal Bonds do not require an income tax rate. Just enter zero for the income tax rate.

Premium bonds and notes, in accordance with convention, are calculated using the tax rate for both the tax on interest and the tax on the capital loss.

AFTER-TAX YIELD

To determine the after-tax yield of a security, begin by performing a normal **TO PRICE** or **TO YIELD** calculation. When the proper tax rates are stored, press **AFTER-TAX**. (No entry is required, since all information needed for the calculation is already stored.) The after-tax yield is displayed.

EXAMPLE: A Corporate Bond with a 7% coupon is offered at a price of 92.625. It matures on January 5, 1992. What is the after-tax yield to a purchaser whose tax rate is 33% and capital gains is 28%? The settlement date is June 24, 1987.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
0	CODE	Security Code 0.
6.2487	SETTLEMENT DATE	Settlement Date Wed. 06-24-1987

Set the **FED/MUNI** switch and status line as follows:

C=0 PER 30/360 SEMI 06-24-87 MATURITY

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
7	COUPON	Coupon Rate 7.000%
1.0592	MAT DATE END	Maturity Date Sun. 01-05-1992
33.28	TAX RATE	Inc Tax 33% Cap Gains 28%
92.625	TO YIELD	Yield 9.018% (M)
	AFTER TAX	After-Tax Yield 6.179%

Find the municipal equivalent after-tax yield for the bond above.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
0.28	TAX RATE	Inc Tax 0% Cap Gains 28%
	AFTER TAX	After-Tax Yield 8.617%

AFTER-TAX YIELD TO PRICE

To find the price which must be paid to obtain a desired after-tax yield (calculate the before-tax price), use the **DISPLAY, AFTER-TAX** keys. Price or yield does not have to be computed prior to calculating the before-tax price, unless in the **CALL+MATURITY** mode; in this case, the price or yield must be done first to determine whether the calculation is to call or to maturity. **DISPLAY, AFTER-TAX** always uses the values currently stored for a security and assumes the after-tax yield is entered in the display or is the last value displayed.

EXAMPLE: What price would you have to pay for the previous bond if you required an after-tax yield of 7.5%?

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
33.28	TAX RATE	Inc Tax 33% Cap Gain 28%
7.5	DISPLAY AFTER TAX	B-Tax Price 86.703

BEFORE-TAX YIELD FROM AFTER-TAX YIELD

You may want to calculate the before-tax yield, if the bond is available at that after-tax price. With the price still in the display, simply press **TO YIELD**.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
	TO YIELD	Yield 10.786% (M)

ZERO-COUPON BONDS

Zero Coupon or stripped coupon bonds can be calculated exactly as a normal coupon bond by entering a coupon interest rate of 0%.

EXAMPLE: Find the yield of a Zero Coupon Bond that matures on January 01, 1999 at a price of 24.90 on June 24, 1987.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
0	CODE	Security Code 0.
6.2487	SETTLEMENT DATE	Settlement Date Wed. 06-24-1987

Set the **FED/MUNI** switch and status line as follows:

FED/MUNI SWITCH to **MUNI**

C=0 PER 30/360 SEMI 06-24-87 MATURITY

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
0	COUPON	Coupon Rate 0.000%
1.0199	MAT DATE END	Maturity Date Fri. 01-01-1999
24.9	TO YIELD	Yield 12.44% (M)

The same bond is callable on January 01, 1995 at a price of 65.811. To find the yield to call:

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
	CALL/MAT	C=0 PER 30/360 SEMI 06-24-87 CALL
1.0195	CALL DATE BEGIN	Call Date Sun. 01-01-1995
65.811	CALL PRICE	Call Price 65.811
	DISPLAY TO PRICE	Price 24.900
	TO YIELD	Yield 13.352% ©

ANNUAL-COUPON AND EUROBONDS

Most domestic bonds are issued to pay coupon interest semi-annually. However, most Eurobonds, pay coupons on an annual basis.

EXAMPLE: Find yield to maturity for \$25,000.00 annual-coupon bond with a 7.5% coupon currently available at a 7% yield, maturing October 25, 1989.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
1	COUPONS PER YEAR	Coupons/Year 1
6.2487	SETTLEMENT DATE	Settlement Date Wed. 06-24-1987

The status line should be as follows for this example:

C=0 PER 30/360 SEMI 06-24-87 MATURITY

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
7.5	COUPON	Coupon Rate 7.500%
10.2589	MAT DATE END	Maturity Date Wed. 10-25-1989
7	TO PRICE	Price 100.987 (M)
25	EXT	Prin 25,246.75 Int 1,244.79
	DISPLAY EXT	Net Amount 26,491.54
	DISPLAY TO YIELD	Yield 7.000% (M) 6.882% SEMI Equiv

DURATION

Duration is a measure of the timing of the cash flow (i.e., the interest payments and the principal repayment) to be received from a given coupon security. The duration of the security is equal to (a) the sum of the present values of each of the cash flows weighted by the time to receipt of each cash flow divided by (b) the total of the present values of the cash flows. The duration of a bond is used by many investors because it is a convenient way of combining the time elements of a security for coupons and term to maturity.

The modified duration is the duration (computed as above) divided by $(1 + \text{Yield}/\text{coupons per year})$.

TRADER II will compute the duration for any coupon security (Codes 0, 1 and 6).

EXAMPLE: A 7.5% Municipal Bond maturing on November 9, 1989 is sold to yield 8%. Find the dollar price and duration of the security.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
0	CODE	Security Code 0.
6.2487	SETTLEMENT	Settlement Date Wed. 06-24-1987

Set the **FED/MUNI** switch and status line as follows:

FED/MUNI SWITCH to **MUNI**

C=0 PER 30/360 SEMI 06-24-87 MATURITY

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
7.5	COUPON	Coupon Rate 7.500%
11.0989	MAT DATE END	Maturity Date Thu. 11-09-1989
8	TO PRICE	Price 98.923 (M)
	DUR	Duration 2.200 Mod 2.115

Here's some characteristics of Duration:

1. If the bond has coupons, the duration of the bond will always be less than the term.
2. If two bonds have the same maturity date, the bond with a larger coupon will have a shorter duration.
3. Generally, there is a positive relationship between term to maturity and duration. (Normally the longer the term to maturity, the longer the duration.)
4. In most cases, the higher the market yield, the lower the duration.
5. Zero or stripped coupon bonds will have a duration equal to the term to maturity.

VALUE OF A BASIS POINT

The **VAL** key provides two calculations which combine several **TRADER II** functions to obtain the movement of either price or yield. **VAL** calculates the difference in dollar price, if the yield moves by .05% (Codes 0 – 4 and 6) or if the discount rate changes by .01% for Code 5. **DISPLAY, VAL** calculates the difference in yield in basis points if the price changes by 1/32nd of a point.

The **VAL** key also allows you to enter other spread values.

VAL accepts number of basis points (up to 99), and calculates the difference in price, between the dollar price and the dollar price at the yield plus the entered basis point.

DISPLAY, VAL accepts the number of 32^{nds}, and calculates the difference in basis points between the yield and the yield at the dollar price plus the entered 32^{nds} (thirty second of a point).

EXAMPLE: A 6.5% Agency Bond maturing on November 24, 2010 is sold to yield 7.75%. Find the dollar price and compute the dollar movement if the yield changed by 5 basis points.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
0	CODE	Security Code 0.
6.2487	SETTLEMENT DATE	Settlement Date Wed. 06-24-1987

Set the **FED/MUNI** switch and status line as follows:

FED/MUNI SWITCH to **MUNI**

C=0 PER 30/360 SEMI 06-24-87 MATURITY

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
6.5	COUPON	Coupon Rate 6.500%
11.2410	MAT DATE END	Maturity Date Wed. 11-24-2010
7.75	TO PRICE	Price 86.580(M)
	VAL	VAL .05 = 4.780

Now compute how much the yield will change if the bond moves 1/32 of a point.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
	DISPLAY VAL	VAL 1/32 nd 0.30 Basis Points

SECURITY CODE 1

Code 1 calculates Government Bonds as well as any coupon security which pays periodic interest on an Actual (Actual days in a month/actual days in a year) calendar. All of the calculations and options available in Code 0 can also be performed using Code 1. Refer to Appendix B for a more complete list of securities and the day count basis.

EXAMPLE: A 8.5% Government Bond due on December 20, 1999 is sold at 104 3/32. Find the yield to maturity, current yield, and extended net amount for 100 bonds.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
1	CODE	Security Code 1.
2	COUPONS PER YEAR	Coupons/Year 2.
6.2487	SETTLEMENT DATE	Settlement Date Wed. 06-24-87

The status line should be set as follows for this example:

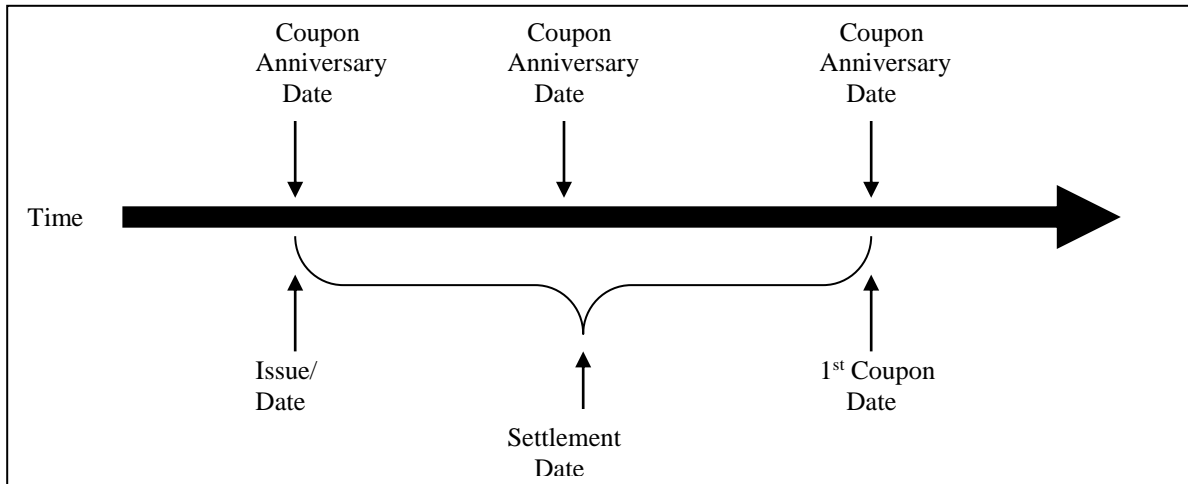
C=1 PER 30/360 SEMI 06-24-87 MATURITY

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
8.5	COUPON	Coupon Rate 8.500%
12.2099	MAT DATE END	Maturity Date Mon. 12-20-1999
104.03	32 ^{nds}	104.09375
	TO YIELD	Yield 7.976% (M)
	CURR Yield	Current Yield 8.166%
100	EXT	Prin 104,093.75 Int 92.90
	DISPLAY EXT	Net Amount 104,186.65

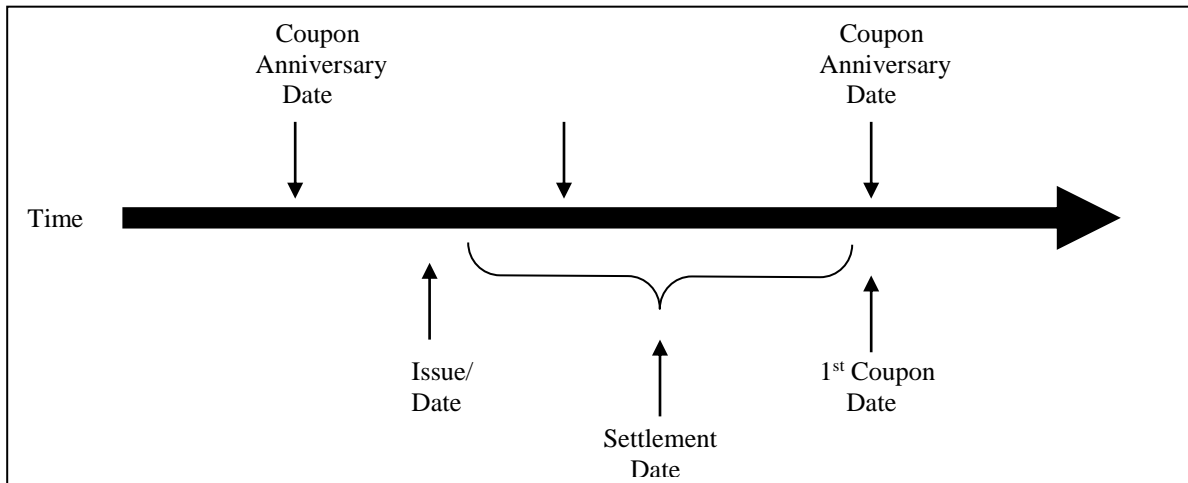
ODD COUPONS

Some bonds are issued with an "odd first coupon". This is a bond for which there is more (or less) than one normal coupon period from issue date to the date of the first coupon payment. For example, a semi-annual coupon is considered to be "short" if the first period is less than six months and "long" if more than a six month period. Traditionally, when settlement occurs during the odd period (before the first coupon payment), an odd coupon amount has been included in the invoice extension of accrued interest but not in the price and yield calculations. The **TRADER II** can include the odd coupon period when computing price, yield and accrued interest.

The following two graphics illustrate the long and short coupon periods:



Odd Long Coupon Period



Odd Short Coupon Period

Odd Coupon bonds are tested regularly by the U.S. Treasury and other Federal Agencies. These issuers consider the odd period when computing price and yield as well as when extending the accrued interest. For municipal securities, as required by MSRB, the odd period should not be considered when computing price and yield but should be when calculating the accrued interest. Corporates presently follow the accepted practice of municipals, however, a trend is starting whereby the Treasury method will be used.

PRICE AND YIELD TO MATURITY

The **TRADER II** will consider the odd coupon for price, yield and accrued interest calculations whenever the settlement date is prior to the 1st coupon date. If the odd coupon is not to be considered, enter a zero (0) and press the **1st COUPON DATE** key. This method allows the correct accrued interest to be computed from the issue/dated date but not in the price or yield calculation.

EXAMPLE: A Treasury Bond with an 8.5% coupon, due on March 1, 2001 is sold to yield 8.48% on May 29, 1987. Find the price to maturity and accrued interest for 100 bonds. The bonds were issued May 1, 1987 and pays the first coupon on March 1, 1988. (Settlement date occurs before the 1st coupon.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
1	CODE	Security Code 1.
2	COUPON PER YEAR	

The status line should be set as follows for this example:

C=1 PER ACT/ACTG SEMI 06-24-87 MATURITY

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
5.0187	ISSUE/ DATED	Iss/Dated Fri. 05-01-1987
5.2987	SETTLEMENT DATE	Settlement Date Fri. 05-29-1987
3.0188	1 st COUPON DATE	1 st Coupon Date Tue. 03-01-1988
8.5	COUPON	Coupon Rate 8.500%
3.0101	MAT DATE END	Maturity Date Thu. 03-01-2001
8.487	TO PRICE	Price 99.999026 (M)
100	EXT	Prin 99,999.03 Int 646.74
0	1 st COUPON DATE	1 st Coupon Date 00-00-0000

SECURITY CODES 2 – 4

Security Codes 2, 3 and 4 is used to calculate notes paying interest at maturity. Notes may be calculated based on three different day count basis according to the code entered:

<u>CODE</u>	<u>DAY COUNT</u>
2	30/360
3	Actual/360
4	Actual/365

Entries describing a note are the same for Security Code 0. The interest rate us entered using the coupon key and the issue date on the issue/dated key. The price is calculated to 6 or 3 places depending on the setting of the **FED/MUNI** switch. In **MUNI** mode three decimal places are calculated, in accordance with rules for municipal notes. The **FED** mode is used when six decimal places are required.

Refer to Appendix B for a more complete list of securities and the day count basis.

EXAMPLE: A Municipal Note (Coed 2 – 30/360 calendar) is sold on May 8, 1982 to yield 10.5% The issue date is May 1, 1987 and the interest rate is 11%. Maturity is on May 1, 1991. Calculate the price.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
2	CODE	Security Code 2.
6.2487	SETTLEMENT DATE	Settlement Date Wed. 06-24-1987

Set the **FED/MUNI** switch and status line as follows:

FED/MUNI SWITCH to **MUNI**

C=2 MAT 30/360 SEMI 06-24-87 MATURITY

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
5.0187	ISSUE/ DATED	Iss/Dated Date Fri. 05-01-1987
5.0191	MAT DATE END	Maturity Date Wed. 05-01-1991
11	COUPON	Coupon Rate 11.000%
10.5	TO PRICE	Price 100.0-5 (M)

Calculate the yield of the previous note, if the price is 100.50

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
100.5	TO YIELD	Yield 10.645%

NOTE EXTENSIONS

Extensions for these securities are done in exactly the same manner as for Code 0 securities, except the number of bonds entry prior to the extension is replaced with the face value is retained and does not have to be re-entered for subsequent extensions.

For example, calculate the extended principal, accrued interest and net amount of the note in the previous example.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
450	EXT	Prin 452,2500.00 Int 7,287.50
	DISPLAY, EXT	Net Amount 459,537.50

MATURE NOTES (CODES 2, 3 and 4)

To calculate interest on mature securities in Code 2, 3 and 4, simply enter the maturity date on both the **MAT DATE END** and **SETTLEMENT DATE** keys. Enter issue date and interest rate as usual, and use **EXT** to find the net interest.

EXAMPLE: A 500,000.00 certificate of deposit issued May 4, 1987, when sold on June 24, 1987, and matures on November 3, 1987, with interest at 5.25%. Calculate the total extended price, and the interest due at maturity.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
3	CODE	Security Code 3.
6.2487	SETTLEMENT	Settlement Date Wed. 06-24-1987 DATE Set the FED/MUNI switch and status line as

follows:

FED/MUNI SWITCH to **FED**

C=3 MAT ACT/360 SEMI 06-24-87 MATURITY

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
5.0487	ISSUE/ DATED	Iss/Dated Due Mon. 05-04-1987
11.0387	MAT DATE END	Maturity Date Tue 11-03-1987
5.25	COUPON	Coupon Rate 5.250%
5.5	TO PRICE	Price 99.895443 (M)
500	DISPLAY,	Net Amount 503,195.98

Now compute the interest due at maturity.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>	
	DISPLAY, MAT DATE END	Maturity Date Tue.	11-03-87
	SETTLEMENT DATE	Settlement Date Sat.	11-03-1987
	EXT	Prin 499,477.22 Int	13,343.75

SECURITY CODE 5

Security Code 5 is used to calculate Treasury Bills and other discount instruments, such as banker's acceptances, on an Actual/360 calendar. Refer to Appendix B for a more complete list of securities and the day count basis. Given the price, the discount rate is calculated. The bond equivalent yield is also available (**DISPLAY, TO YIELD**). In addition, the price and the total discount can be extended.

ESAMPLE: A Treasury Bill is sold on June 24, 1987 at a 7.8% discount. It matures on March 1, 1988. Calculate the price and effective yield.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
5	CODE	Security Code 5.
6.2487	SETTLEMENT DATE	Settlement Date Wed. 06-24-1987

The status line should be set as follows for this example:

C=5 DISC ACT/360 SEMI 06-24-87 MATURITY

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
3.0188	MAT DATE END	Maturity Date Tue. 03-01-1988
7.8	TO PRICE	Price 94.5616667 (M)

DISCOUNT EXTENSIONS

For discounted securities, **EXT** calculates the extended amounts of principal and discount interest; **DISPLAY, EXT** displays the extended par amount

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
250	EXT	Prin 236,404.17 Int 13,595.83
	DISPLAY EXT	Net Amount 250,000.00

After the price or discount rate calculation, the entered or calculated discount is not stored; **DISPLAY, TO YIELD** recalls the *effective yield*.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
	DISPLAY TO YIELD	Effective Yield 8.27%

CODE 5 AFTER-TAX CALCULATIONS

The **TRADER II** has the added capability of performing after-tax calculations in Security Code 5.

The basic operating procedures remain the same as in other Codes, however, the nature of discount securities changes the results obtained using the after-tax functions.

AFTER TAX DISCOUNT RATE

AFTER-TAX provides the after-tax discount rate (not yield); that is the effective discount rate after tax considerations.

BEFORE-TAX PRICE FROM AFTER-TAX DISCOUNT RATE

DISPLAY, AFTER-TAX accepts the entry of a desired after-tax discount rate (not yield), and calculates the before-tax discounted price which would be paid to obtain the entered after-tax discount rate.

EXAMPLE: Use the previous Treasury Bill example to perform the after-tax functions. With an income tax rate of 28%, find the price needed to obtain a 4% after-tax discount rate. Find the actual after-tax discount rate and effective yield for the bill as calculated.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
28	TAX RATE	Inc Tax 28% Cap Gains 0%
4	DISPLAY AFTER TAX	B-Tax Price 96.1265432

AFTER-TAX EFFECTIVE YIELD

For comparison to securities in other codes, the after-tax effective yield (coupon equivalent yield can be calculated by the following sequence.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
	AFTER TAX	After-Tax Yield 5.616%
	TO PRICE	Price 96.0844000 (M)
	DISPLAY, TO YIELD	Effective Yield 5.879%

SECURITY CODE 6

Security Code 6 calculates stepped coupon bonds, as well as any security which has two coupon periods, each with its own coupon rate, and pays periodic interest on a 30/360 (30 day month/360 day year) calendar. Typical examples of stepped coupon instruments are: Growth and Income Securities and Capital Appreciation/Future Income Securities. These instruments function essentially as zero coupon securities for a period of time after issuance, then on a conversion date they begin to pay coupon interest semi-annually. The **TRADER II** can compute the price and yield of any security which contains two interest rate periods (Stepped coupons). The first coupon rate does not have to be zero. For example, for the first 15 years, a security may have a coupon of 4.5% and then for the next 10 years a coupon of 9.5%.

Enter the security just as in Code 0 with the additional entries of **CONV DATE** and **CONV RATE**. The conversion date must be a normal coupon date and is the date at which the conversion coupon rate takes effect.

EXAMPLE: A Capital Appreciation Bond maturing on November 1, 2010, pays no coupon until November 1, 2000, and then pays 9% semi-annually until maturity is sold to yield 8.75%. The bond is bought for settlement on June 24, 1987. Find the dollar price.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
6	CODE	Security Code 6.
6.2487	SETTLEMENT DATE	Settlement Date Wed. 06-24-1987

Set the **FED/MUNI** switch and status line as follows:

FED/MUNI SWITCH to **FED**

C=6 STEP 30/360 SEMI 06-24-87 MATURITY
--

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
0	COUPON	Coupon Rate 0.000%
11.0110	MAT DATE END	Maturity Date Mon. 11-01-2000
9	CONV COUPON	Conv. Rate 9.000%
11.0100	CONV DATE	Conv. Date Wed. 11-01-2000
8.75	TO PRICE	Price 32.392 (M)

COMPOUND INTEREST/ANNUITY FUNCTIONS

The compound interest functions provide present value, future value, N (Number of Periods) and payment calculations. In all cases the annual interest rate is entered on the **COUPON** key and the number of compounding periods is entered on the **COUPONS PER YEAR** key. The Security Code and other status modes in the display have no meaning for the Compound Interest/Annuity functions.

FUTURE VALUE CALCULATION

What is the balance of a saving account, paying 6% annually – compounded monthly, at the end of 6 months. There is an initial balance of \$1,000.00 in the account.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
6	COUPON	Coupon Rate 6.000%
12	COUPONS PER YEAR	Coupons/Year 12.
6	N	Number of Periods 6.
50	PAYMENT	Payment Amount 50.00

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
0	PRESENT VALUE	Present Value 0.00
	FUTURE VALUE	Future Value 303.78

Here is the payment schedule of the account over the 6 periods.

Note that the balance at the end of the first period is \$50.00. Interest accrues for the first period but is not credited to the account until after a complete compounding period. Such payments are called payments in arrears or ordinary annuities.

<u>PERIOD</u>	<u>PAYMENT</u>	<u>BALANCE</u>	<u>INTEREST</u>
1	\$50.00	\$ 50.00	\$0.25
2	\$50.00	\$100.25	\$0.50
3	\$50.00	\$150.75	\$0.75
4	\$50.00	\$201.50	\$1.01
5	\$50.00	\$252.51	\$1.26
6	\$50.00	\$303.77	

The penny difference comes from the fact that the Compound Interest/Annuity functions are using maximum decimal place accuracy to calculate and rounds the final answer to obtain the ending balance.

EXAMPLE: Now combine the previous two examples, the present value of a saving account is \$1,000.00 and \$50.00 is deposited each month, what is the balance after six deposits? Since all the values (interest rate coupons per year, total number of periods and payment amount) are still stored from the previous example, just enter the **PRESENT VAL** amount and press the **FUTURE VALUE** key.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
1000	PRESENT VALUE	Present Value 1,000.00
	FUTURE VALUE	Future Value 1,334.15

PRESENT VALUE CALCULATION

The Present Value calculates the initial amount required accumulating a Future Value. The present Value and Payment amounts are taken into account in the calculation.

EXAMPLE: What is the maximum amount that can be borrowed at 15% for 4 years, at payments of \$150.00 per month. In other words, what is the present value of the 48 payments (4 years x 12) monthly payments.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
15	COUPON	Coupon Rate 15.999%

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
15	COUPON	Coupon Rate 15.000^%
12	COUPONS PER YEAR	Coupons/Year 12.
60	N	Number of Periods 60.
5000	PRESENT VALUE	Present Value 5,000.00
0	FUTURE VALUE	Future Value 0.00
	PAYMENT	Payment Amount -118.95

The \$118.95 monthly payment is displayed with a minus sign to indicate computing a payment for a Present Value.

EXAMPLE: What semi-annual deposit is required to accumulate \$50,000.00 in 15 years at 8% compounded semi-annually? The account is opened with an initial deposit of \$500.00.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
9	COUPON	Coupon Rate 9.000%
2	COUPONS PER YEAR	Componds/Year 2
30	N	Number of Periods 30
500	PRESENT VALUE	Present Value 500.00
50000	FUTURE VALUE	Future Value 50,000.00
	PAYMENT	Payment Amount 788.88

NUMBER OF PERIODS

The **N** key calculates the number of payments to obtain a future value or the number of compound periods required for a present value to obtain a future value. (when computing Number of Periods the result is always displayed without a fraction, **N** is not rounded in any way. In some cases, this will cause the number of payments to be one less than the actual number of periods.)

EXAMPLE: How many monthly deposits of \$200.00 are required to accumulate \$20,000.00 at 5.75% compounded monthly?

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
5.75	COUPON	Coupon Rate 5.750%
12	COUPONS PER YEAR	Coupons/Year 12.
0	PRESENT VALUE	Present Value 0.00
20000	FUTURE VALUE	Future Value 20,000.00
200	PAYMENT	Payment Amount 200.00
	N	Number of Periods 82

EXAMPLE: How many periods are required for a deposit of \$5000.00 to grow to \$12,000.00 at 7.5% compounded yearly?

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
7.5	COUPON	Coupon Rate 7.50%
1	COUPONS PER YEAR	Coupons/Year 1
5000	PRESENT VALUE	Present Value 5,000.00
12000	FUTURE VALUE	Future Value 12,000.00
0	PAYMENT	Payment Amount 0.00
	N	Number of Periods 12

AVERAGE LIFE

The average life function calculates the average life and maturity date of a sinking fund issue. Average life calculations may be performed for Code 0 issues only.

Retirements may be annual or semi-annual, or a combination of both; the **COUPON PER YEAR** key is set before each group of sinkers is entered. Enter each group of sinkers in consecutive order, starting with the group with the earliest beginning retirement date. The number retired must always be entered before pressing the **AVG LIFE** key, the previous number is not retained (even if it is the same).

The beginning date for the group is entered on the **CALLD ATE BEGIN** key and the ending date is entered on the **MAT DATE END KEY**. The number of bonds for the sinker is then entered on the **AVG LIFE** key, completing the retirement for the group.

The dates are updated automatically, depending on the **COUPONS PER YEAR** key setting, to six or twelve months after the last ending date. (Assuming that the next group is contiguous and contains only one sinker.)

If the next group is contiguous but has more than one sinker, you must modify the ending date according to the number of sinkers with the same number of bonds per sinker.

Of course, if the next group is not contiguous, you must enter both the beginning and the ending dates.

ENTERY SEQUENCE FOR AVERAGE LIFE CA

Start the average life sequence by entering the quantity of bonds outstanding nt he **BEGIN, AVG LIFE** key.

<u>FOR EACH GROUP ENTER</u>	<u>KEY PRESSED</u>
Beginning Date	CALL DATE BEGIN
Ending Date	MAT DATE END
Set the sinker frequently, if necessary	COUPONS PER YEAR
Quantity to be sunk each period	AVG LIFE

Remember the contiguous beginning date is automatically computed and stored on the **CALLD ATE BEGIN** and **MAT DATE END** keys. Therefore, if the groups are contiguous, the beginning date need not be entered and if the group has only one sinker, the ending date also does not need to be entered.

Note: The beginning and ending dates may be verified at any time during the entry sequence by pressing **DISPLAY< CALL DATE BEGIN** and **DISPLAY, MAT DATE END** respectively. Compute Average Life by pressing **DISPLAY, AVG LIFE** and the average life in decimal years' displays. This also calculates the date of the average life and stores it on the **MAT DATE END** key. **DISPLAY, MAT DATE END** displays the date of average life which is stored.

Example: Calculate the average life and date of average life for the following issue:

Settlement date June 24, 1987
 Coupon 6.5%
 Total bonds outstanding 6000
 Final Maturity date March 1, 2009

<u>GROUP</u>	<u>BEGINNING DATE</u>	<u>ENDING DATE</u>	<u>NUMBER RETIRED</u>
1	September 1, 1994	September 1, 1999	80 Annually
2	September 1, 2000	September 1, 2000	40 Semi-Annually
3	March 1, 2002	September 1, 2005	80 Semi-Annually
4	March 1, 2006	September 1, 2008	95 Semi-Annually
<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>	
0	CODE	Security code 0.	
6.2487	SETTLEMENT DATE	Settlement Date Wed. 06-24-1987	

Set the **FED/MUNI** switch and status line as follows:

FED/MUNI SWITCH to **MUNI** C=0 PER 30/360 ANNL 06-24-87 MATURITY

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>	
6.5	COUPON	Coupon Rate 6.500%	
6000	BEGIN, AVG LIFE	6,000 Bonds Outstanding	
<u>Group 1</u>			
9.0194	CALL DATE BEGIN	Call Date Thur.	09-01-1994
9.0199	MAT DATE END	Maturity Date Wed.	09-01-1999
80	AVG LIFE	5,520 Bonds Remaining	

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>	
<u>Group 2</u>			
	DISPLAY, CALL DATE BEGIN	Call Date Fri.	09-01-2000
	DISPLAY, MAT DATE END	Maturity Date Fri.	09-01-2000
2	COUPONS	Coupons/Year	2

To continue with this example, set status line as shown below.

C=0 PER 30/360 SEMI 06-24-87 MATURITY

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>	
40	AVG LIFE	5,480 Bonds Remaining	
<u>Group 3</u>			
3.0102	CALL DATE BEGIN	Call Date Fri.	03-01-2000
9.0105	MAT DATE END	Maturity Date Thur.	09-01-2005
80	AVG LIFE	4,840 Bonds Remaining	
<u>Group 4</u>			
	DISPLAY, CALL DATE BEGIN	Call Dae Wed.	03-01-2996

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
9.0108	MAT DATE END	Maturity Date Mon. 09-01-2008
95	AVG LIFE	4,270 Bonds Remaining

The schedule is complete, enter the final maturity date (the remaining bonds are accumulated using the date) and calculate the average life in decimal years and the date of average maturity.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
3.0109	MAT DATE END	Maturity Date 03-01-2009
	DISPLAY AVG LIFE	Avg Life 19.943 Years 06-02-2007
	DISPLAY MAT DATE END	Maturity Date Sat. 06-02-2007

Calculate the average yield to average life.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
80.7	TO YIELD	Yield 8.529% (M)

AVERAGE LIFE CORRECTIONS

To correct data stored for a group before pressing the **AVG LIFE** key, reenter the correct value on the appropriate key.

Corrections for groups of bonds which have been entered using the **AVG LIFE** key can be made by entering the beginning and ending dates for the group in question, setting the **COUPON PER YEAR** key to the coupon payment frequency, keying in the number of bonds to be deleted or added and press the **AVG LIFE** key. After corrections are made, re-enter the final maturity date on **MAT DATE END** and recalculate the correct average life (**DISPLAY, AVG LIFE**).

Remember, calculating the average life changes the ending date (**MAT DAT END** key) to the date of the average maturity and subsequent depressions of **DISPLAY, AVG life** will compute incorrect results using the average maturity date as the end date.

BOND MEMORY

INTRODUCTION

The **TRADER II** has three security memory areas.

- 1) *Working Memory* is the area where security information is stored upon entry to perform all calculations. This memory can only hold one security description at a time. Each time you enter a security's coupon rate, maturity date, call feature, etc. you are describing the security to the **TRADER II** working memory. Once you have described a security to the **TRADER II**, it then can be stored in either bond memory or issue memory.
- 2) *Bond Memory* is a permanent storage area where up to 50 security descriptions can be stored. The **TRADER II** never disturbs this memory and you can recall any security to working memory at any time. Bond memory is battery supported and therefore retain any securities stored even when the **TRADER II** is powered off or while unplugged from electrical power and moved from location to location.

Use the **STR BOND** key to store a security into the bond memory area and **DISPLAY, STR BOND** to recall a security from bond memory back into working memory.

- 3) *Issue Memory* is volatile storage area to store the securities for production analysis total and averages. You must compute price or yield and extend the accrued interest before storing a security into issue memory. Up to 50 securities can be stored in this memory but unlike bond memory are not retained when the **TRADER II** is powered off.

Use the **ADD ISSUE** key to store a security into the issue memory area and **DISPLAY, ADD ISSUE** to recall a security from bond memory back into working memory.

STORING SECURITIES INTO BOND MEMORY

Adding a security to bond memory stores the security currently in working memory into a specific bond memory location according to the number (1 - 50) entered prior to pressing the key. Storing a bond in location 1 will erase any bond previously stored in location 1 but does not affect the bonds stored in locations 2 through 50.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
1	STR BVOND	Bond 1 Saved.

RECALLING SECURITIES FROM BOND MEMORY

Use the **DISPLAY, STR BOND** key to recall a security to working memory from a specific bond memory according to the number (1 – 50) entered prior to pressing the key. The status line (top line of the display) is updated to the status stored along with the security when saved previously, and the securities maturity date and coupon is displayed on the entry/result line (bottom line of the display).

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
1	DISPLAY, STR BOND	

C=0 PER 30/360 SEMI 06-24-87 MATURITY
B(01) Maturity 06-02-07 Coupon 6.500

DELETING ONE SECURITY FROM BOND MEMORY

Use the **STR, BOND** key to delete (erase) a security from a specific bond memory location, according to the negative number (1 – 50) entered prior to pressing the key. Only the security stored in then specified location is deleted.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
1	CHG SGN, STR BOND	

C=0 PER 30/360 SEMI 06-24-87 MATURITY
Bond 1 Deleted.

STORE/RECALL/DELETE ISSUE MEMORY

The key sequences used to “store into”, “recall from” and “delete from” bond memory are the same as those used to access issue memory. Substituting the **ADD ISSUE** key in place of **STR BOND** in the above examples will access issue memory.

PRODUCTION ANALYSIS

Production analysis allows a group of bonds and other securities with varying interest rates, maturities, prices and yields, to be totaled and averaged, as in a portfolio, using the production function.

ENTRY SEQUENCE FOR PRODUCTION ANALYSIS

The securities are entered and calculated in the usual manner, except that all securities must have the same settlement date throughout the production. For accruing interest before the settlement date, enter the dated date on the **ISSUE/DATED** key for the applicable securities.

Start the production calculation by pressing the **BEGIN, PROD** keys. This sequence will clear issue memory.

Proceed with security calculations as needed, calculating price, yield, concession, and extension information for each individual issue.

Then, store the security in issue memory. As you proceed with the next group of securities, you needn't enter information, which has not changed since the last group, such as coupon, maturity or call feature. Remember to enter any applicable concession after each price or yield calculation.

When the last security has been stored, press **DISPLAY, PROD** to accumulate the securities stored in issue memory. The total par amount of all securities will be displayed. Then the production totals and averages may be displayed sequentially using the **PROD** key. Entering the sequence number and pressing the **PROD** key will directly display the corresponding summary.

The sequence number and associated production summary follows:

<u>SEQ. #</u>	<u>PRODUCTION SUMMARY</u>	<u>COMMENT</u>
0.	Total Par	Dollar Amount
1.	Bond Years	
2.	Average Coupon	Weighted By Par
3.	Average Interest	Weighted By Par Years
4.	Total Coupon	Coupon Interest For Life Of Bond
5.	Average Price	Weighted By Par
6.	Total Extension	Extended Price Plus Accrued Interest
7.	Total Principal	Extended Price
8.	Average Redemption	Decimal Years and Date
9.	Average Yield	Weighted By Par
10.	Average Current Yield	Weighted By Par
11.	Annual Income	Current Annual Coupon Interest
12.	Average Duration	Weighted By Par
13.	Total Accrued Interest	
14.	Gross Profit	Redemption Value + Total Interest - Cost

EXAMPLE: Perform a production analysis on the following series of bonds with semi-annual maturities. The settlement date is June 24, 1987 and interest is calculated from January 15, 1987.

<u>GROUP</u>	<u>BONDS</u>	<u>MATURITY DATE</u>	<u>COUPON</u>	<u>PRICE</u>	<u>YEILD</u>	<u>CONCESSION</u>
1	100	November 25, 1987	7.00		8.00	.125
2	50	May 25, 1989	7.50		8.25	
3	100	November 25, 1989	7.75	96		.25
4	125	May 25, 1999	7.75		8.00	

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
0	CODE	Security Code 0.

Set the **FED/MUNI** switch and status line as follows:

FED/MUNI SWITCH TO **MUNI**

C=0 PER 30/360 SEMI 06-24-87 MATURITY

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
	BEGIN, PROD	Issues Cleared.
6.2487	SETTLEMENT DATE	Settlement Date Wed. 06-24-1987
<u>Group 1</u>		
1.1587	ISSUE/ DATED	Iss/Dated Date Thur. 01-15-1987
11.2597	MAT DATE END	Maturity Date Tue. 11-25-1997
7	COUPON	Coupon Rate 7.000%
8	TO PRICE	Price 93.10 (M)
.125	CONC	Price Less Conc 92.885
100	EXT	Prin 92,885.00 Int 3,091.67
	ADD ISSUE	Issue 1 Saved.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
<u>Group 2</u>		
7.5	COUPON	Coupon Rate 7.500%
8.25	TO PRICE	Price 94.814 (M)
50	EXT	Prin 47,407.00 Int 1,656.25
	ADD ISSUE	Issue 2 Saved
<u>Group 3</u>		
7.75	COUPON	Coupon Rate 7.750%
11.2598	MAT DATE END	Maturity Date Wed. 11-25-1998
96	TO YIELD	Yield 8.297% (M)
.25	CONC	Price Less Conc 95.75
100	EXT	Prin 95,750.00 Int. 3,422.92
	ADD ISSUE	Issue 3 Saved.
<u>Group 4</u>		
3.2599	MAT DATE END	Maturity Date Thur. 03-25-1999
8	TO PRICE	Price 98.099 (M)
125	EXT	Prin 122,623.75 Int. 4,278.65
	ADD ISSUE	Issue 4 Saved.

Adding issues is now complete, press the **DISPLAY, PROD** key to compute the averages and totals of the bonds. The first display is the Total Par Amount. Successive depressions of **PROD** will cause the numbers to increase from the current position to Total Profit (14), then return to Total Par Amount (0).

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>	
	DISPLAY, PROD	0. Total Par	375,000.00
	PROD	1. Bond Years	4339,538
	PROD	2. Avg Coupon	7.516667
	PROD	3. Avg Interest	7.531005
	PROD	4. Total Coupon	326,814.24
	PROD	5. Avg Price	95.644200
	PROD	6. Total Extension	371,115.24
	PROD	7. Total Principal	358,665.75
	PROD	8. Avg Redemption	11.131 Yrs 08-10-1998
	PROD	9. Avg Yield	8.112533
	PROD	10. Avg Current Yield	7.847821
	PROD	11. Annual Income	28,187.50
	PROD	12. Avg. Duration	7.561
	PROD	13. Accrued Interest	12,449.49
	PROD	14. Gross Profit	343,148.49

To access any result directly, enter the appropriate sequence number and press **PROD**. For example, to start from the 8th summary (Average Redemption), enter and press **PROD**.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>	
8	PROD	8. Avg Redemption	11.131 Yrs 08-10-1998

Successive depressions of **PROD** will cause the numbers to increase from the current position for each summary until "14 Total Profit" displays, then returns to "0" Total Par Amount".

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>	
	PROD	9. Avg Yield	8.112533

PRODUCTION CORRECTIONS

Any security group can be deleted or added to manipulate the portfolio stored in issue memory. Refer to the Bond Memory Section for detailed examples. To correct erroneous input, recall the bond to working memory, make the necessary modification and restore the bond to issue memory. Remember, the production totals and averages will be re-computed using the security groups stored in issue memory each time memory each time **DISPLAY**, **PROD** key is pressed.

Changes can be made to issue memory using the following sequence.

- 1) Recall the incorrect security from issue memory to working memory.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
2	DISPLAY, ADD ISSUE	I(02) Maturity 11-25-97 Coupon 7.500

- 2) Complete the necessary change.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
8.75	TO PRICE	Price 91.556 (M)
25	EXT	Prin 22,889.00 Int. 828.13

- 3) Restore changed security to issue memory in the same location.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
2	ADD ISSUE	Issue 2 Saved

- 4) Re-compute the production totals and averages.

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
	DISPLAY PROD	0. Total Par 350,000.00

Production totals and averages may be displayed sequentially using the **PROD** key or by entering the sequence number and pressing the **PROD** key to display the corresponding summary directly.

ARITHMETIC

In addition to its securities calculation capabilities, **TRADER II** is a 14 digit, desktop display calculator. It operates in "algebraic logic", which means that all calculations are complete with the = key. All arithmetic results are shown in *floating decimal* format.

THE EQUALS (=) KEY

This key is used in all calculations to generate the final result; you need not press **C/CE** to proceed with the next calculations, as the **TRADER II** is automatically ready for the next calculation upon the depression of the equals (=) key.

ADDITION

EXAMPLE: 123 † 456 = 579

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
123	†	123
456	=	579

EXAMPLE: 7 † 8 † 9 = 24

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
7	†	7
8	†	8
9	=	24

CONSTANT ADDITION

The first number entered may be retained as a constant for continued addition. The constant is saved until **C/CE** is depressed or a new constant is entered.

EXAMPLE: 2 † 10 = 12
 2 † 100 = 102
 3 † 48 = 50

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
2	+	2
10	=	12
100	=	102
48	=	50

AUTOMATIC DOUBLING

Repeated consecutive depressions of + provides automatic doubling of the quantity.

EXAMPLE: 3 + + + + = 48

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
3	+	3
	+	6
	+	12
	+	24
	=	48

SUBTRACTION

EXAMPLE: 123 - 456 = 333

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
123	-	123
456	=	-333

EXAMPLE: 24 - 8 - 9 = 7

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
24	-	24

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
8	-	16
9	=	7

CONSTANT SUBTRACTION

The minuend may be retained as a constant for continued subtraction. The constant is saved until **C/CE** is depressed or a new constant is entered.

EXAMPLE: $100 - 50 = 50$
 $100 - 25 = 75$
 $100 - 48 = 52$

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
100	-	100
50	-	50
25	-	75
48	-	52

MULTIPLICATION

EXAMPLE: $123 \times 456 = 56088$

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
123	\times	123
456	=	56,088

EXAMPLE: $7 \times 8 \times 9 = 504$

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
7	\times	7
8	\times	56
9	=	504

CONSTANT MULTIPLICATIONS

The first number (multiplicand) may be retained for continued multiplication. The constant is saved until **C/CE** is depressed or a new constant is entered.

EXAMPLE: $5 \times 6 = 30$
 $5 \times 9 = 45$
 $5 \times 2 = 10$

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
5	×	5
6	=	30
9	=	45
2	=	10

AUTOMATIC SQUARING

Repeated consecutive depressions of **×** squares the displayed quantity.

EXAMPLE: $2 \times \times \times = 256$

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
2	×	2
	×	4
	×	16
	=	256

RAISING NUMBERS TO INTEGRAL POWERS

Storing a constant multiplicand, followed by repeated consecutive depressions of =, provides a convenient way of raising a number to an integral power.

EXAMPLE: $2^1 = 2$
 $2^2 = 4$
 $2^3 = 8$
 $2^4 = 16$
 $2^5 = 32$

ENTER PRESS RESULTS DISPLAYED

2	×	2
	=	4
	=	8
	=	16
	=	32

DIVISION

EXAMPLE: $456 \div 123 = 3.7073170731707$

ENTER PRESS RESULTS DISPLAYED

456	÷	456
123	=	37073170731707

EXAMPLE: $24 \uparrow 3 \uparrow 2 = 4$

ENTER PRESS RESULTS DISPLAYED

24	↑	24
3	↑	8
2	=	4

CONSTANT DIVISION

The second number (divisor) may be retained for continued multiplication. The constant is saved until **C/CE** is depressed or a new constant is entered.

EXAMPLE: $100 \uparrow 2 = 50$
 $48 \uparrow 2 = 24$
 $9 \uparrow 2 = 4.5$

ENTER PRESS RESULTS DISPLAYED

100	↑	100
2	=	50
48	=	24
9	=	4.5

RECIPROCAL

The constant division feature can be used to calculate reciprocals.

EXAMPLE: Find 1/32

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
32	†	32
	=	1
	=	.03125

MIXED CALCULATIONS

The arithmetic functions may be used in combination to solve mixed equations; intermediate results are displayed upon the depression of each function key.

EXAMPLE: $1 \div 2 \times 4 - 5 = 2.75$

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
1	†	1.
2	×	3.
3	÷	9.
4	-	2.25
5	=	-2.75

EXAMPLE: $5 \div 3 \times 4 = 24$

<u>ENTER</u>	<u>PRESS</u>	<u>RESULTS DISPLAYED</u>
5	†	5.
3	÷	8.
4	×	2.
12	=	24.

**APPENDIX A
ERROR CONDITIONS**

Invalid Code	Security Code must be a number zero through six.
Settlement Date Required	Settlement date has not be entered.
Invalid Date	A non-existent date or not in proper format.
Issue Date Required	Attempting a calculation requiring an Issue date (Security Code 2, 3 or 4), or the 1 st coupon date is greater than settlement date.
Dated Date > Settlement Date	Date date is greater than Settlement date.
Issue Date > Settlement Date	Issue date is greater than Settlement date.
Setl Date > Mat Date	Settlement date is greater than Maturity date.
Setl Date > Call Date	Settlement date is greater than Call date.
Setl Date > Conv. Date	Settlement date is greater then Conv. date.
Conv. Date > Mat Date	Conv. Date is greater than Maturity date.
Call Date > Mat Date	Call date is greater than Maturity date.
Call Price Required	Call price has not been entered for a calculation to call.
Coupon Rate Required	Present Value, Future Value, Payment and number of period calculations require an interest rate to be entered on the COUPON rate key.
Invalid Coupons/Year	This entry must be a whole number, no fractional part, greater than zero and less than 366.
Coe 0 or 1 only	The key pressed will not perform it's function for Codes other than Coide 0 or 1.
Compute Price/Yield First	This message will display when a function requires the Price or Yield for the currently entered security. For example, if the coupon rate has been changed, pressing the DUR key will cause this message to display.
Divide by 0	Attempting a division by zero.
Bond Numbers 1 to 50 only	Bond memory number must be a number 1 through 50.
Bond N has not been stored	Attempting to recall a Bond from bond memory which was not previously stored.
Issue Numbers 1 to 50 only	bone memory number must be a number 1 through 50.
Issue N has not been stored	Attempting to recall a Bond from bond memory which was not previously stored.

**APPENDIX B
LIST OF SECURITIES**

	Pricing/ Interest Classificaiton	Day Count Basis	Code
U.S. TREASUREY ISSUES::			
Certificates of Indebetedness	At Maturity	Actual/365	4
U.S. Treasury Bills	Discount	Actual/360	5
U.S. Treasury Tax-Anticipation Bills (TABs)	Discount	Actual/360	5
U.S. Treasury Bonds	Periodic	Actual/Actual	1
U.S. Treasury Notes	Periodic	Actual/Actual	1
FEDERAL AGENCY ISSUES:			
Commodity Credit Corporation (CCC's)	Periodic	30/360	0
Export-Import Bank Participation Certificates	Periodic	30/360	0
Farmers Home Administration Insured Notes	Periodic	Actual/Actual	1
Federal Home Loan Bank (FHLB) Notes & Bonds	Periodic	30/360	0
Federal Housing Administration (FHA) Debentures	Periodic	Acutal	1
Federal Intermediate Credit Bank (FICB) Debentures	At Maturity; Periodic	30/360 30/360	0 2
Federal Land Bank (FLB) Bonds	Periodic	30/360	0
Federal National Mortgage Association (FNMA) Debentures	Periodic	30/360	0
FNMA Short Term Notes	Discount	Actual/360	5
General National Mortgage Association (GNMA) Bonds and Participation Certificates	Periodic	30/360	0
U.S. Postal Service Bonds	Periodic	30/360	0
Tennessee Valley Authority (TVA) Bonds	Periodic	30/360	0
TVA Notes	Discount	Actual/360	5
Merchant Marine Bonds	Periodic	30/360	0

	Pricing/ Interest Classificaiton	Day Count Basis	Code
STATE AND LOCAL GOVERNMENT ISSUES:			
Tax Supported Bonds	Periodic	30/360	0
Revenue Supported Bonds	Periodic	30/360	0
Assessment Supported Bonds	Periodic	30/360	0
Special Supported Bonds	Periodic	30/360	0