REAL ESTATE ANALYSIS VOLUME II

Radio Shack®
TRS-80
MICRO
COMPUTER
SYSTEM

Catalog Number 26-1572

1. Mortgage Amortization Schedule
2. Mortgage Balances
3. Mortgage Payments and Terms
4. Wrap Around Mortgage Analysis

Custom Manufactured by Radio Shack A Division of Tandy Corporation

Operation Instructions

For TRS-80 operating instructions, refer to your TRS-80 Manual. After you load and RUN the program, follow the instructions as they appear on the screen. You will quickly learn that you have a great deal of flexibility in using these programs, particularly with their self contained Editing sections. Here is a brief description of basic operating instructions with which you should quickly become familiar.

A. **Equipment**
Minimum hardware required is a 16K Level II Basic TRS-80, with cassette recorder.

B. **Powering Up**
Check all TRS-80 connections to verify that each component is properly attached; press ON button at right rear of machine; when MEMORY SIZE? appears on screen, press [ENTER] .

C. **Loading Program**
Insert proper cassette into recorder and press the recorder's "PLAY" lever (rewind first if this was not done in previous use of the program); DO NOT press the red "RECORD" lever except when recording programs;

1. Type [C][L][O][A][D], and press [ENTER] .

2. When READY >_ appears on the screen, you are ready to proceed with execution of the program.

D. **Running Program**
After program is loaded, simply type [R][U][N] and press [ENTER] ; if for any reason the program did not load properly on the first attempt, you can not RUN the program; in this case, rewind the cassette, press reset button on left rear of TRS-80, and return to Step C.

E. **Program Operation**
Once the program has been started in Step D, you simply follow all screen instructions by answering the program input requests; the following conventions are used:

1. (.XXXXXX) indicates to enter number as a decimal; for example the number 12-1/2 per cent would be entered as .125; trailing zeroes are not necessary.

2. (+/–$) indicates the response should be in whole dollar amounts, but in the event that the number is **negative**, a minus sign should proceed the number.

3. (Y or N) indicates a yes or no response is required. Enter a [Y] for yes or an [N] for no.

4. All other commands should be self explanatory.

Mortgage Amortization
(Mortgage Amortization Schedules and Data)

Program Overview

For basic financial planning purposes and for preparation of cash flow schedules, it is often necessary or beneficial to have access to a complete amortization schedule. These schedules list principal and interest payments, remaining balances on mortgages, and other data. This program accomplishes all of these functions as well as other unique analytical routines.

The mortgage amortization program calculates, and displays, a standard mortgage amortization schedule, with allocations to principal and interest for each payment. If the regular periodic debt service payment (principal and interest) is unknown, the program will calculate the necessary payment. If known, the stated amount may be entered. This permits the amortization schedule to be calculated for mortgage requirements, even where the payments may be slightly different than those which would normally be calculated by the program, based on common mortgage formulas.

Prior to printing the amortization schedule, you have the opportunity to edit the original entries. When used in conjunction with the full amortization schedule, this permits sensitivity testing or the production of a series of amortization schedules with minimum re-entry of data.

Once the option for printing an amortization schedule is selected, a full amortization schedule is screen displayed in increments of 1Ø consecutive payments. Displays include amounts which have been paid to interest, accumulated interest, amounts paid to principal, accumulated principal, and finally, the mortgage balance after each payment.

Since you can enter any given mortgage amount, rate, term, and frequency of payment, there is virtually an infinite series of mortgage situations which can be handled by this program. If a schedule is calculated for a given mortgage, with a stated debt services requirement, it is often interesting to compare the program's calculated debt service requirement with the given payment amount.

Screen Shows:	You Type:
MORTGAGE AMOUNT	DOLLARS
ANNUAL INTEREST RATE	XXXXXX
TERM OF THE MORTGAGE	Years____ Months __
NUMBER OF PAYMENTS PER YEAR	NUMBER
REGULAR PAYMENT AMOUNT (ZERO IF UNKNOWN)	DOLLARS
ANY CORRECTIONS (Y OR N)	Y OR N
(Summary of Program Inputs)	
ANY CORRECTIONS (Y OR N)	Y OR N
(The regular payment amount can be manually adjusted at this point using the "correction" routine).	
WOULD YOU LIKE TO DISPLAY THE AMORTIZATION SCHEDULE	Y OR N
(If "Yes"): These categories are displayed:	
PAYMENT NUMBER	
AMOUNT TO INTEREST	
ACCUMULATED INTEREST	
AMOUNT TO PRINCIPAL	
ACCUMULATED PRINCIPAL	
MORTGAGE BALANCE	

Applications

Mortgage (or trust deed) commitments from financial institutions typically state a given payment amount which may vary from that which a user would otherwise calculate. This is due to the wide variety of computer programs which generate payment amounts, and the slight differences which are found in printed tables of mortgage payments.

For example, let us explore the following mortgage's requirements: $125,ØØØ to be amortized in monthly payments over 25 years and 5 months, with annual interest at 9.5%. Debt service is to be $1,Ø9Ø per month.

Screen Shows:	You Type:
MORTGAGE AMOUNT	1 2 5 Ø Ø Ø
ANNUAL INTEREST RATE	. Ø 9 5
TERM OF THE MORTGAGE	YEARS 2 5 MONTHS 5
NUMBER OF PAYMENTS PER YEAR	1 2
REGULAR PAYMENT AMOUNT (Ø IF UNKONWN)	Ø
RESULT INDICATES: REGULAR PAYMENT AMOUNT	$1,Ø87.76
ANY CORRECTIONS (Y OR N)	Y
WHICH ONE (1-5)	5
REGULAR PAYMENT AMOUNT (Ø IF UNKNOWN)	1 Ø 9 Ø
ANY CORRECTIONS (Y OR N)	N
WOULD YOU LIKE TO DISPLAY THE AMORTIZATION SCHEDULE (Y OR N)	Y

PMT. NO.	AMOUNT TO INTEREST	ACCUMULATED INTEREST	AMOUNT TO PRINCIPAL	ACCUMULATED PRINCIPAL	MORTGAGE BALANCE
1	989.58	989.58	100.42	100.42	124,899.58
2	988.79	1,978.37	101.21	201.63	124,798.37
3	987.99	2,966.36	102.01	303.64	124,696.36
4	987.18	3,953.54	102.82	406.46	124,593.54
5	986.37	4,939.91	103.63	510.09	124,489.91
6	985.55	5,925.46	104.45	614.54	124,385.46
7	984.72	6,910.18	105.28	719.82	124,280.18
8	983.88	7,894.06	106.12	825.94	124,174.06
9	983.04	8,877.10	106.96	932.90	124,067.10
10	982.20	9,859.30	107.80	1,040.70	123,959.30

Press [ENTER] to Continue

The above amortization schedule is displayed as the first 10 months amortization of the given mortgage, using the stated payment amounts. For additional months the [ENTER] key should be pressed at the end of each summary of 10 additional monthly periods.

Although all calculations are actually in dollars and cents, only the dollar amounts are displayed, to allow screen capacity for very large mortgage amounts.

To exit from the read-outs once they have started, wait until the "PRESS ENTER TO CONTINUE" command appears at the bottom of the screen. Press [BREAK] . Next type [R] [U] [N] , then press [ENTER] to return to the beginning of the program.

Mortgage Balance
(Balances and other Mortgage Data)

Program Overview

It is often necessary to determine the status of a mortgage during, but prior to its final amortization. Such analysis may be performed during the mid-life of an investment, or in advance of final investment decisions. Borrowers often need to check the status of existing loans, and accountants are often asked to audit mortgages to ascertain their current status. All require some means of calculating mortgage balances on existing loans.

This program calculates the percentage of loan paid off, dollars paid off, and the mortgage balance for a loan at any point of a mortgage amortization period. Final results list cumulative interest, and principal payments which have been made to a particular projection point.

Correction, or editing, modes in the program permit simple and speedy sensitivity testing to be performed, or corrections made as necessary. These are particularly useful to appraisers, analysts, brokers, and others involved in investment analysis where the effects of mortgage amortization on eventual equity return are particularly important.

Since balloon mortgages are common, this program also offers a powerful means of calculating the amount which will be required to retire a loan at any given point in the future. In this application, input values are summarized, along with output values, to assure proper interpretations of results.

Screen Shows:	You Type:
AMOUNT OF ORIGINAL MORTGAGE	DOLLARS
ANNUAL INTEREST RATE	.XXXXXX
TERM OF THE MORTGAGE	YEARS____MONTHS___
NUMBER OF PAYMENT PERIODS PER YEAR	NUMBER
PROJECTION PERIOD	YEARS____MONTHS___
ANY CORRECTIONS	Y OR N

Screen Shows:	You Type:
(Summary of Program Inputs)	
NUMBER OF PAYMENTS MADE	NUMBER
REGULAR PAYMENT AMOUNT	DOLLARS
TOTAL AMOUNT PAID	DOLLARS
TOTAL INTEREST PAID	DOLLARS
TOTAL PRINCIPAL PAID	DOLLARS
PORTION OF LOAN PAID OFF	.XXXXXX
MORTGAGE BALANCE	DOLLARS

Applications

As an example of the numerous situations for which mortgage balance and other related mortgage data may be needed, let us assume that a mortgage lender proposes the following loan: A loan amount of $125,ØØØ is to be amortized with monthly payments at an annual interest rate of 1Ø%. The loan is to be amortized as though the full term were to be 25 years and no months, but the loan will "balloon", or require payment in full of the outstanding balance, at the end of 1Ø years. Calculations are as follows:

Screen Shows:	You Type:
AMOUNT OF ORIGINAL MORTGAGE	125ØØØ
ANNUAL INTEREST RATE	.1
TERM OF THE MORTGAGE	YEARS 25 MONTHS Ø
NUMBER OF PAYMENT PERIODS PER YEAR	12
PROJECTION PERIOD	YEARS 1Ø MONTHS Ø
ANY CORRECTIONS (Y OR N)	N
REGULAR PAYMENT AMOUNT	$1,135.88
TOTAL AMOUNT PAID	$136,3Ø5.6Ø
TOTAL INTEREST PAID	$117,ØØ6.68
TOTAL PRINCIPAL PAID	$19,298.92
PORTION OF LOAN PAID OFF	Ø.154391
MORTGAGE BALANCE	$1Ø5,7Ø1.Ø8
ANY CORRECTIONS (Y OR N)	

At this point, it is possible to make an entirely new analysis by answering the "Corrections" question with an N . However, corrections or sensitivity testing may be accomplished by answering Y , as follows:

Screen Shows:	You Type:
ANY CORRECTIONS (Y OR N)	Y
WHICH ONE (1-5)	2
ANNUAL INTEREST RATE	.Ø975
ANY CORRECTIONS (Y OR N)	N
REGULAR PAYMENT AMOUNT	$1,113.93
TOTAL AMOUNT PAID	$133,671.6Ø
TOTAL INTEREST PAID	$113,821.43
TOTAL PRINCIPAL PAID	$19,85Ø.17
PORTION OF LOAN PAID OFF	Ø.158ØØ1
MORTGAGE BALANCE	$1Ø5,149.83
ANY CORRECTIONS (Y OR N)	

Additional sensitivity tests may now be run. This analysis indicates that the effect of lowering the mortgage interest rate to .Ø975 is not substantial from the viewpoint of the borrower, although some savings would be effected. Approximately $55Ø difference in mortgage balances would be realized, which is also only a slight difference when delayed for the 1Ø year projection period contemplated in the problem statement.

Mortgage Payments And Terms
(Calculations of Various Mortgage Requirements)

Program Overview

This is a utility program which permits calculation of unknown elements of the requirements for an amortizing mortgage. Five elements may be considered: mortgage amount, annual interest rate, mortgage term, number of payments per year, and regular payment amount. Given any four of these elements, the program will solve for the fifth.

While other mortgage routines in the Real Estate Analysis series can also accomplish some of the same results, the internal logic of this program provides simple and speedy opportunity to calculate any of the mortgage requirements from those which are known.

These routines can be especially helpful in structuring of real estate purchases and loans. For example, if loan interest rate and term are known market factors, and if a given amount of money will be available to satisfy debt service (principal and interest) requirements, the program can solve for the amount of loan which can be amortized over the stated term.

Likewise, if there is a maximum loan amount which is available (in dollars), and a stated amount of debt service which the real estate can support, the program can solve for the rate of interest on mortgage which these facts would indicate. This situation sometimes occurs after real estate has been appraised for mortgage loan purposes and a financial institution (or others) establish ceilings on loan amount. The net income expectancy may be required to have a minimum "debt service coverage ratio", which establishes the amount which will be available for debt service. Given these facts and the allowable mortgage term, this program can solve for the interest rate on the mortgage which would be consistent with other data.

Screen Shows:	You Type:
Select One of the Following Options	
1. SOLVE FOR THE MORTGAGE AMOUNT	
2. SOLVE FOR THE ANNUAL INTEREST RATE	
3. SOLVE FOR THE TERM OF THE MORTGAGE	
4. SOLVE FOR THE NUMBER OF PAYMENTS PER YEAR	
5. SOLVE FOR THE REGULAR PAYMENT AMOUNT	
OPTION (1-5)	[NUMBER]
(Depending upon option chosen):	
1. MORTGAGE AMOUNT	[DOLLARS]
2. ANNUAL INTEREST RATE	[.XXXXXX]
3. TERM OF THE MORTGAGE	YEARS____ MONTHS____
4. NUMBER OF PAYMENTS PER YEAR	[NUMBER]
5. REGULAR PAYMENT AMOUNT	[DOLLARS]
ANY CORRECTIONS (Y OR N)	[Y] OR [N]

Applications

As with each of the Real Estate Analysis programs, these routines allow either repeated entry of data by returning to the program's starting point, or the use of the Correction mode for changes of input values. The following example will illustrate the various routines available, and extensive use of the Correction facility:

A mortgage commitment has been issued for a $1Ø0,ØØØ loan to be amortized in level monthly installments of principal and interest at 9.5% over 25 years and 7 months. What is the regular monthly payment required?

Screen Shows:	You Type:
OPTION (1-5)	[5]
MORTGAGE AMOUNT	[1][Ø][Ø][Ø][Ø][Ø]
ANNUAL INTEREST RATE	[.][Ø][9][5]
TERM OF THE MORTGAGE	YEARS [2][5] MONTHS [7]
NUMBER OF PAYMENTS PER YEAR	[1][2]
ANY CORRECTIONS (Y OR N)	[N]
REGULAR PAYMENT AMOUNT	$868.86

This amount will amortize the mortgage fully in level monthly payments over the stated term. Presume, however, that after the mortgage application is submitted, it is learned that the interest rate requirement will be 1Ø%. A new run may be made as follows:

Screen Shows:	You Type:
ANY CORRECTIONS (Y OR N)	Y
WHICH ONE (1-5)	3
ANNUAL INTEREST RATE	.1
ANY CORRECTIONS (Y OR N)	N
REGULAR PAYMENT AMOUNT	$904.09

Option 1 can be illustrated using the data from our first example, adding the calculated Regular Payment Amount of $868.86 to calculate the mortgage amount which is to be amortized:

Screen Shows:	You Type:
OPTION (1-5)	1
ANNUAL INTEREST RATE	.0996
TERM OF THE MORTGAGE	YEARS 25 MONTHS 7
NUMBER OF PAYMENTS PER YEAR	12
REGULAR PAYMENT AMOUNT	868.86
ANY CORRECTIONS (Y OR N)	N
MORTGAGE AMOUNT	$99,999.70

The actual amount should be $100,000, but the answer is slightly off due to the rounding used in calculations.

Option 2 solves for the annual interest rate required to amortize a mortgage given the other mortgage data. Using the same data:

Screen Shows:	You Type:
OPTION (1-5)	2
MORTGAGE AMOUNT	100000
TERM OF THE MORTGAGE	YEARS 25 MONTHS 7
NUMBER OF PAYMENTS PER YEAR	12
REGULAR PAYMENT AMOUNT	868.86
ANY CORRECTIONS (Y OR N)	N
ANNUAL INTEREST RATE	.094998

Again, the answer is slightly different due to rounding, but is a reasonable representation of the 9.5% interest rate with which the problem began. To solve for mortgage term:

Screen Shows:	You Type:
OPTION (1-5)	3
MORTGAGE AMOUNT	100000
ANNUAL INTEREST RATE	.095
NUMBER OF PAYMENTS PER YEAR	12
REGULAR PAYMENT AMOUNT	868.86
ANY CORRECTIONS (Y OR N)	N
TERM OF THE MORTGAGE	YEARS 25 MONTHS 7

Although the occasion to use the last program mode may be rare, the program has the capacity to solve for the frequency of payments, given all other mortgage data. Using our same data:

Screen Shows:	You Type:
OPTION (1-5)	4
MORTGAGE AMOUNT	100000
ANNUAL INETEREST RATE	.095
TERM OF THE MORTGAGE	YEARS 25 MONTHS 7
REGULAR PAYMENT AMOUNT	868.86
ANY CORRECTIONS (Y OR N)	N
NUMBER OF PAYMENTS PER YEAR	12

These routines can be used quite effectively in investment analysis situations, where only portions of mortgage information may be available. They are also powerful brokerage tools as they can be used in structuring purchase or sale of investments with special mortgage terms, especially where financing is wholly or partially provided by the seller.

Wrap Around Mortgage Analysis
(Yield and Interest Rate on Wrap Around Mortgages)

Program Overview

The wrap around mortgage is a special financing arrangement in which an existing mortgage amount and payment terms are used as a part of a new loan structure. Normally, a new loan is executed in a face amount (equal to, or greater, than the existing mortgage), but the new lender advances only the difference between the two loans in actual cash. Mortgage payments are calculated on the new mortgage's full face amount, and the borrower pays debt service on the new mortgage at the stated rate of interest on the new mortgage.

However, the "old mortgage" is retained, and debt service payments on the old mortgage must be paid to the original lender, as required in the original mortgage agreement. The new lender typically receives the **difference** between the debt service requirements which must be paid to the original lender, and those required under the new mortgage instruments. The advantage to the new lender is that the yield on the new loan can often be much higher than the stated interest rate on the new mortgage, because of the benefits from differential in mortgage payments, as compared with the amount of new money advanced.

This program calculates the yield on a wrap around mortgage, or the interest rate required on the new mortgage, to achieve a given yield on the mortgage. Because of the special editing options included within the program, you have a simple but very effective means of structuring wrap around mortgages, or analyzing given situations.

The term "wrap around mortgage" is possibly a misnomer in certain legal jurisdictions, but is a colloquial term applied because the new loan effectively "wraps around" the old loan, rather than replacing it. Depending upon a number of factors, these loans may constitute a second lien on real property, or may have other legal treatment.

Wrap around mortgages have been frequently used where existing mortgages cannot be paid off, because of excessive prepayment penalties, or mortgage clauses which prohibit early prepayment. They may also be effective in circumstances where interest rates rise above legal usury ceilings, as the wrap around mortgage may have a stated interest rate which is legal, but an effective yield to the lender which is more competitive with the market. They are also effective where older loans have lower interest rates which would be lost if the older loan were retired.

As an example, assume that an existing 7% mortgage has 2Ø years remaining to maturity, monthly loan payments of $8,481, and a current balance of $91,162. Approximately $33,5ØØ is needed by the owner, and a lender proposes a new wrap around mortgage or $125,ØØØ, at 9% to be fully amortized in monthly payments over the next 2Ø years.

In terms of the new lender, the effect of the wrap around mortgage may be summarized as follows:

	Loan Amount	Debt Service
New Loan Face Amount	$125,ØØØ	$13,496
Old Mortgage	91,162	8,481
New Money	$ 33,838	$ 5,Ø15

You can see that the new lender will receive a substantially higher effective return on the money actually advanced $33,838 when compared with the new amount of new payments to be received $5,Ø15, than that which is apparent from the total debt service, as related to the full face amount of the new loan. This program calculates the effective yield in such situations, or the interest rate required to achieve a given mortgage yield.

Screen Shows:	**You Type:**
CALCULATION OPTION (YIELD OR INTEREST RATE)	[1] OR [2]
ORIGINAL MORTGAGE AMOUNT	[DOLLARS]
TERM OF ORIGINAL MORTGAGE	YEARS____MONTHS__
ORIGINAL MORTGAGE INTEREST RATE	[.XXXXXX]
NUMBER OF PAYMENTS PER YEAR	[NUMBER]
NUMBER OF PAYMENTS REMAINING TO MATURITY	[NUMBER]
TOTAL NEW MORTGAGE AMOUNT	[DOLLARS]
TERM OF NEW MORTGAGE	YEARS____MONTHS__
NEW MORTGAGE INTEREST RATE	[.XXXXXX]
or	
REQUIRED YIELD ON MORTGAGE	[.XXXXXX]
ANY CORRECTIONS (Y OR N)	[Y] OR [N]

Screen Shows:	**You Type:**
(Summary of Program Inputs)	
CURRENT BALANCE – ORIGINAL MORTGAGE	[DOLLARS]
ANNUAL DEBT SERVICE REQUIRED – NEW MORTGAGE	[DOLLARS]
MORTGAGE INTEREST RATE REQUIRED	[.XXXXXX]
or	
EFFECTIVE YIELD FOR THE PROPOSED MORTGAGE	[.XXXXXX]
ANY CORRECTIONS (Y OR N)	[Y] OR [N]

Applications

The example cited earlier may be used for this purpose. To calculate the effective yield on the proposed wrap around mortgage, the data may be entered and analyzed as follows (additional facts as shown):

Screen Shows:	You Type:
CALCULATION OPTION	1
ORIGINAL MORTGAGE AMOUNT	100000
TERM OF ORIGINAL MORTGAGE	YEARS 25 MONTHS 0
ORIGINAL MORTGAGE INTEREST RATE	.07
NUMBER OF PAYMENTS PER YEAR	12
NUMBER OF PAYMENTS REMAINING TO MATURITY	240
TOTAL NEW MORTGAGE AMOUNT	125000
TERM OF NEW MORTGAGE	YEARS 20 MONTHS 0
NEW MORTGAGE INTEREST RATE	.09
ANY CORRECTIONS (Y OR N)	N

(Summary of Program Inputs)

CURRENT BALANCE – ORIGINAL MORTGAGE	$91,162.08
ANNUAL DEBT SERVICE – NEW MORTGAGE	$13,495.99
EFFECTIVE YIELD FOR THE PROPOSED MORTGAGE	.138811
ANY CORRECTIONS (Y OR N)	

At this point it is possible to use the Corrections routine to vary any of the input values for additional analysis. For example, if a 22 year term were proposed for the new mortgage:

Screen Shows:	You Type:
ANY CORRECTIONS (Y OR N)	Y
WHICH ONE (1-9)	8
TERM OF THE NEW MORTGAGE	YEARS 22 MONTHS 0
ANY CORRECTIONS (Y OR N)	N

(Summary of Program Inputs)

CURRENT BALANCE – ORIGINAL MORTGAGE	$91,162.08
ANNUAL DEBT SERVICE REQUIREMENT – NEW MORTGAGE	$13,067.70
EFFECTIVE YIELD FOR THE PROPOSED MORTGAGE	.132201
ANY CORRECTIONS (Y OR N)	N

It is also possible to change the calculation option to solve for the interest rate for a stated rate of yield. In the last example, assume that we now want to test a yield rate of .1322Ø5 to see the required mortgage interest rate (remember that the term is still 22 years);

Screen Shows:	**You Type:**
ANY CORRECTIONS (Y OR N)	Y
WHICH ONE (1-9)	1
WHICH WOULD YOU LIKE TO CALCULATE	2
REQUIRED YIELD ON THE WRAP AROUND MORTGAGE	.13220 1
ANY CORRECTIONS (Y OR N)	N

(Summary of Program Inputs)

CURRENT BALANCE – ORIGINAL MORTGAGE	$91,162.Ø8
ANNUAL DEBT SERVICE REQUIREMENT – NEW MORTGAGE	$13,Ø67.7Ø
RATE REQUIRED TO ACHIEVE STATED YIELD	.Ø89991
ANY CORRECTIONS (Y OR N)	N

Again, any changes required may be made through the Corrections routine to perform additional sensitivity testing, or to calculate other variations.

This program mode does not support terms of the proposed mortgage which are less than the remaining term of the original mortgage, but it will handle terms equal to or greater than the remaining term. Proposed new mortgage amounts must be at least equal to the remaining balance on the old mortgage. It is possible (in cases when the relative amount of "new money" advanced is small) that an extremely high effective yield rate will be produced, which may exceed the program's format capabilities.

Important Information for Cassette Users

Free Modification for LEVEL II Units

A modification that helps cassette loads in LEVEL II computers is available **free** to TRS-80 LEVEL II owners. This modification makes the volume setting less critical so that variations in different tapes usually will not require volume readjustments.

Some of the more recent LEVEL II Keyboard units have had this modification factory-installed. To see if the modification has been included in your computer, look at the catalog number on the bottom of the keyboard case. The modification has been made if the number ends in -1. For example, if the number is 26-1004-1, the modification has already been installed; if the number is 26-1004, the modification has not been installed.

If the number does not end in -1 and you have not already had the cassette modification installed by Radio Shack, you may arrange for installation at your local Radio Shack store.

Using Your Cassette Deck

Many factors affect the performance of a cassette system. The most significant one is volume. Too low a volume may cause some of the information to be missed. Too high a volume may cause distortion and result in the transfer of background noise as valid information.

Three different cassette models have been supplied with the TRS-80 system – the CTR-40, CTR-41 and CTR-80. Each model has its own loading characteristics. The table below gives suggested volume ranges for each of the CTR models. Figures are for systems **without** the CLOAD modification.

Notice that volume ranges for LEVEL I and LEVEL II are different. This is because the LEVEL II data transfer rate is faster (500 baud vs. 250 baud). Also, notice that pre-recorded Radio Shack programs need a slightly **higher** volume setting than that required by your own CSAVEd tapes. The pre-recorded tapes are produced with high-speed audio equipment at a slightly lower level than the CSAVE process provides.

RECORDER MODEL	USER-GENERATED TAPES		PRE-RECORDED RADIO SHACK TAPES	
	LEVEL I	LEVEL II	LEVEL I	LEVEL II
CTR-40	YELLOW LINE	RED LINE	YELLOW LINE	RED LINE
CTR-41	6 – 8	4 – 6	6½ – 8½	5 – 7
CTR-80	4½ – 6½	3 – 5	5½ – 7½	2½ – 5

Recommended Volume Settings for RADIO SHACK Cassette Decks

(With CTR-40 and CTR 80, to increase volume, turn the control to the left. With CTR-41, turn control to the right.)

When information is being loaded from the cassette tape, two asterisks will appear on the screen. The one on the right will flash on or off each time a new line of data or program is read in. If the asterisks do not appear, or the one on the right does not flash, then the volume setting is probably too low. If the asterisks appear but one is not flashing, try increasing the volume setting. Use the reset button to stop the cassette and return control to you if loading problems occur.

Radio Shack programs are recorded at least twice on each tape (usually once on each side). You should do the same when you record programs on tape. This will give you a back-up if one does not load properly or if it becomes damaged.

Important Note: The CTR-41 requires that you keep the supplied "dummy plug" in the **MIC** jack at all times. However, the CTR-40 and the CTR-80 should never be used with the "dummy plug."

LEVEL I

Sometimes you will get an error message during an attempted CLOAD. This means that some information was lost or garbled. Adjust the volume level slightly and try again.

LEVEL II

In case of an error message, proceed as above. In LEVEL II, there is also a rare case in which the program has not loaded correctly *even though no error is generated.* So, after CLOADing a program, be sure to LIST it. If some data was garbled, then at some point in the listing, the display will be filled with meaningless words and characters. Adjust the volume and try again.

Hints and Tips

Computer tapes should be stored in a relatively dust-free area (a cassette case is recommended) and protected from high temperatures. Magnetic and electrical fields may alter recorded information, so avoid them (i.e. household appliances, power sources such as transformers and television sets, etc.).

The cassette deck supplied with the TRS-80 is very compatible with the system and will perform its duties with great success. To keep the cassette deck in top condition and thus minimize your problems, you sould periodically perform some routine maintenance on it. Dirty heads can cause as much as a 50% loss in volume. Also, heads become magnetized with use and may cause distortion. We recommend that you clean the head, capstan and pinch roller after every four hours of operation. Heads on new recorders should always be cleaned before use.

Note: Cassette cleaning and demagnetizing accessories are available from your local Radio Shack store.

IMPORTANT NOTICE

ALL RADIO SHACK COMPUTER PROGRAMS ARE DISTRIBUTED ON AN "AS IS" BASIS WITHOUT WARRANTY

Radio Shack shall have no liability or responsibility to customer or any other person or entity with respect to any liability, loss or damage caused or alleged to be caused directly or indirectly by computer equipment or programs sold by Radio Shack, including but not limited to any interruption of service, loss of buisness or anticipatory profits or consequential damages resulting from the use or operation of such computer or computer programs.

NOTE: Good data processing procedure dictates that the user test the program, run and test sample sets of data, and run the system in parallel with the system previously in use for a period of time adequate to insure that results of operation of the computer or program are satisfactory.

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