

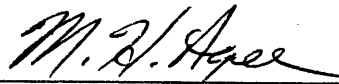
MICROCOMPUTER SOFTWARE FOR THE LEASING INDUSTRY

by

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ABSTRACT

Leasing has become a desirable alternative for acquiring capital equipment in the 80's. However, there are many tangible and intangible conditions that must be taken into consideration before signing a lease contract. This report presents leasing terminology, and the new tax laws that are relevant to leasing; explaining and illustrating common true lease plans on a before and after-tax basis, and finally, developing microcomputer software for the discussed true lease plans.

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Chapter I

INTRODUCTION

1.1 OBJECTIVES OF THE REPORT

Equipment leasing has become a popular way of acquiring capital equipment in the 80's. There are many reasons why leasing has become a more desirable alternative than purchasing. Some of these reasons are: avoid large capital investments, arrange favorable payment schedules, tax benefits, off-balance-sheet financing, and obtain outside maintenance, among others. Because of advantages like the above, the leasing industry is in its best time. It has grown from an almost non-existent industry ten years ago to now capturing more than 20% of all the business investment in capital equipment. In 1979, an estimated \$150 billion in leases were outstanding.[22]

Nowadays, you can lease almost any type of equipment that can be purchased. The contents of this report may be applied to the materials handling equipment leasing industry in general, but it will focus specifically on industrial truck leasing.

It is common knowledge that leasing may be more desirable than purchasing and that almost any type of industrial equipment can be leased; but few people are aware of how the

equipment leasing industry works, how the payments per period are computed, and what type of interest rates are commonly used.

The specific objectives of this report are the following:

- A) to present leasing terminology,
- B) to explain/illustrate common leasing plans (before-tax basis),
- C) to review and specify the 1982 Tax Laws that have an impact on industrial truck leasing/financing/purchasing,
- D) to illustrate the application of the 1982 Tax Laws to both true leases and financial leases, and
- E) to develop software (Apple II Plus Microcomputer) for typical true lease plans, on a before-tax basis and after-tax basis. The specific true lease plans covered are:
 - a) Uniform Payments,
 - b) Skipped Payments,
 - c) Accelerated/Decelerated Payments, and
 - d) Uniform Payments with a Balloon Payment.

1.2 ADVANTAGES AND DISADVANTAGES OF LEASING

A list of the main advantages and disadvantages of leasing is given below [4,13,25]:

Advantages

1. Leases are usually easy to obtain, and the asset is readily available.

2. Leasing provides the lessee with the flexibility of acquiring advanced state-of-the-art equipment without capital outlay (This avoids the risk of obsolescence).

3. When leasing, maintenance may be included so that maintenance is assured and the cost fixed.

4. Working capital is freed for other uses.

5. Leases avoid the restrictions of loan agreements.

6. Leases (Operating) do not appear as a liability on the lessee's balance sheet (the lessee's lines of credit are left undisturbed).

7. Leases provide the convenience of making only one periodic payment rather than separate payments for insurance, maintenance, etc.

8. Lease agreements may be tailored to the lessee's needs easier than ordinary financing.

9. In contrast to financial (purchasing) arrangements, leases typically do not require any down payment.

Disadvantages

1. Leasing is usually more expensive than purchasing.

2. Capital leases reduce the lessee's ability to obtain more debt or financing.

3. Interest rates for leasing are normally higher than commercial bank loan rates.

1.3 SCOPE OF THE REPORT

The report is organized as follows: Chapter Two presents the terminology, the lease plans, and the interest rates used for lease plans in general. The tax laws for Financial Leases are also presented in this chapter. Chapter Three is devoted to the Selected True Lease plans. This includes a discussion of interest rates, before-tax analysis examples, and an after-tax analysis for one of the true lease plans. The software developed is based on this chapter. Results and areas for further development are also included. Finally, Appendix I includes a block diagram and a sample run of the microcomputer software for the leasing industry. (The User's Guide and Computer Code of the above software can be found in the Technical Report RMH2 published by the Productivity Evaluation Center (PEC), VPI&SU, Blacksburg, Virginia 24061).

Chapter II

LEASING PLANS

2.1 INTRODUCTION

There is a great selection of lease plans for industrial trucks ranging from long term capital (financial) lease to long term operating (true) lease, to short term rental. According to FASB No. 13 (Financial Accounting Standards Board), a lease can be classified as either a capital lease or an operating lease, that is,

A lease that transfers substantially all of the benefits and risks incident to ownership of property should be accounted for as the acquisition of an asset and the incurrence of an obligation by the lessee . . . All other leases should be accounted for as operating leases.[15]

Therefore, operating leases are those lease plans in which the lessor retains the ownership of the equipment, while with capital leases, the lessee acquires the ownership of the equipment. A long term lease is classified as a lease that typically has a life greater than one year. A short term rental is intended for short periods of time, such as days, weeks, or months.

All of these plans differ from one leasing company or material handling distributor to another. Although most of the leasing companies/distributors (lessors) can arrange any type of lease plan with the customer (lessee), there are

certain lease plans that may be common or typical among leasing companies. The author has summarized them in the following manner.

A) Long Term True Lease (Operating Lease)

- a. Uniform Payments,
- b. Accelerated/Decelerated Payments,
- c. Skipped Payments (uniform), and
- d. Uniform Payments with a Balloon Payment.

For each of these plans, the lessor retains ownership, the lease term ranges from 3 to 6 years, it may be a partial or full payout lease, there may be a periodic inspection, partial, or full maintenance contract, and a guaranteed residual value may be involved.

In a partial payout lease, the lessee agrees only to pay part of the equipment price during the lease term plus interest, that is, the lease term usually is less than the depreciable life of the equipment. With a full payout lease, the lessee agrees to pay the full amount of the equipment price during the lease term plus interest. For a lease with a periodic inspection contract, the lessee is responsible for full maintenance of the equipment, and the lessor provides periodic inspection to assure the equipment is being operated in the proper conditions. For a lease with partial maintenance contract, the lessee pays for major re-

pairs, while the lessor provides periodic inspection and service. Under a lease with full maintenance contract, the lessor provides full maintenance to the equipment on the lessee's premises.

B) Long Term Lease With Option To Purchase (This can be either a capital lease or an operating lease, depending upon the conditions of the leasing agreement.)

- a. Uniform Payments,
- b. Accelerated/Decelerated Payments,
- c. Skipped Payments (uniform), and
- d. Uniform Payments with a Balloon Payment.

For each of these plans, the lessee may or may not acquire ownership, depending upon the conditions of the lease. If the lessee becomes the owner, then he would be entitled to the benefits of the Investment Tax Credit and depreciation under the Accelerated Cost Recovery System (ACRS). Also, a small down payment may be required, the lease term typically is from 3 to 5 years, and optional maintenance may be offered. The salvage value of the truck at the end of the lease must be stated, (the optional purchase price), and the purchase option may be cancelled at any time by the lessee.

C) Long Term Financing Lease (Capital Lease)

- a. Uniform Payments,
- b. Accelerated/Decelerated Payments,

c. Skipped Payments (uniform), and

d. Uniform Payments with a Balloon Payment.

For each of these plans, the lessee acquires the ownership and the ACRS benefits, a down payment or trade-in may be required, the financing term is usually from 3 to 5 years, and optional maintenance may be offered.

D) Short Term Rental

Designed for short periods of time only.

Rental Term: day, week, or month.

One of the above plans is explained and illustrated by an example in the following section of this chapter. The illustration for short term rental is judged by the author to be outside the scope of this report. However, before explaining and illustrating some of the above plans, it is first necessary to illustrate the terminology concerning interest rates, lease plans, and the new tax laws.

2.2 SIMPLE VS. ADD-ON INTERST RATES

Lease rates may vary widely depending on the risk involved in the business transaction. The more complex and expensive the equipment or the longer the term of the lease, the higher the risk to the lessor. So, the lessor has to protect his investment by increasing the lease rates; by doing so, the faster his principal or net value of the equip-

ment is recovered. This is why more than one type of interest rate is used by today's leasing industry. The two most widely used interest rates are:

- A. Simple, and
- B. Add-On.

2.2.1 Simple Interest Rate

Simple interest is that interest rate charged on the unpaid balance or principal amount as each payment is made. The following example illustrates the above concept.

Example:

Assume Company X borrows \$10,000 from Bank Y. The loan term is 5 years, a simple interest rate of 10% per year applies, and Company X agrees to pay off the loan in five uniform payments of \$2,637.97 ($\$10,000(A/P\ 10,5) = \$2,637.97$), payable at the end of each year. The amount of interest paid by Company X with each payment is given in the table below:

	A	B	C	D
		(D*i)	(A-B)	(D-C)
<u>Year</u>	<u>Payment</u>	<u>Interest</u>	<u>Principal</u>	<u>Balance</u>
0				\$10,000.00
1	\$2,637.97	\$1,000.00	\$1,637.97	8,362.03
2	2,637.97	836.20	1,801.77	6,560.25
3	2,637.97	656.03	1,981.95	4,578.30
4	2,637.97	457.83	2,180.14	2,398.16
5	2,637.97	239.82	2,398.16	0.00

Simple interest is also referred to in other texts as the compound interest approach. (More information on compound interest can be found in any Engineering Economy book).

2.2.2 Add-On Interest Rate

Add-On interest is the interest rate per period (usually a year) which is charged on the entire principal over the total duration of the loan. The payment per period is calculated by dividing the total principal plus total interest by the total number of periods involved in the loan. Total interest is determined by multiplying the principal by the add-on interest rate by the number of periods of the loan. For example,

Assume Company X borrows \$10,000 from Bank Y. The loan term is five years, the add-on interest rate is 10% per year, and Company X agrees to repay the loan in 5 uniform payments. The uniform payments are calculated as follows:

$$\begin{aligned}\text{Total Interest} &= \$10,000(0.10)(5) \\ &= \$5,000\end{aligned}$$

$$\begin{aligned}\text{Total of Payments} &= \$10,000 + \$5,000 \\ &= \$15,000\end{aligned}$$

$$\begin{aligned}\text{Payment/Period} &= \$15,000/5 \\ &= \$3,000\end{aligned}$$

The equivalent simple interest rate for the above example is 15.2385%. It can be seen that a 10% simple interest rate will yield a lower payment (\$2,637.97) than a 10% add-on interest rate, which yields payments of \$3,000. Therefore, the lessee should be aware of the interest type and interest rate used in the computation of the payments. It seems typical that lessors specify add-on rates which appear to be a much lower interest rate than the current market interest rates (simple interest). This has a psychological effect of seeming a better deal than is actually the case. A 10% simple interest rate for the previous example is equivalent to a 6.3797% add-on interest rate. The relationship between the simple interest rate and the add-on interest rate will be fully explained in Chapter Three of this report.

2.3 TAX LAWS

It is the purpose of this section to illustrate some fundamental tax considerations when a financial (or capital) lease is involved. For a financial lease, the lessee becomes the owner of the equipment item and is entitled to the appropriate income tax deductions. A financial lease is actually a purchase of the equipment, with the purchase price of the equipment being paid by the lessee over time. Certain conditions of a "lease with option to purchase" can result in ownership passing to the lessee (thus, a financial lease) and certain conditions can result in ownership being retained by the lessor (a true lease). These conditions are reasonably complicated and are judged beyond the scope of this report.

In any case, a financial lease is assumed in this section. Pertinent tax laws for a true (or operating) lease will be presented in Chapter Three.

In the example to follow, a complete economic analysis has not been performed. The intent is to present calculations illustrating the following:

- A) The investment tax credit options, and
- B) the depreciation allowances under the ACRS.

2.3.1 Investment Tax Credit and Depreciation Allowances (Based on 1982 Tax Laws)

This section will illustrate the investment tax credit rules/options, and the current depreciation methods as stated in the Recovery Act of 1982 [10]. There are basically two options for the investment tax credit (ITC):

A) Full ITC with a Reduction in Asset's Depreciable Basis, and

B) Partial ITC with no Reduction in Asset's Basis.

These options will be illustrated in the sections to follow.

2.3.1.1 Full ITC with a Reduction in Asset's Depreciable Basis.

For any qualifying property placed in service after 1982, the Recovery Act requires that, if the full investment tax credit allowance is taken, then the depreciable basis must be reduced by an amount of 50% of the full ITC allowable.

For properties classified as having a three-year recovery life, the allowable ITC is 6% of the asset's depreciable basis (usually the asset's purchase price). For properties where the recovery life is 5, 10, or 15 years, the allowable investment credit is 10% of the asset's basis.

Since the 1982 Recovery Act permits the basis of an asset to be recovered (depreciated to zero salvage value) over the recovery life, the year-by-year percentage recovery figures, in concept, sum to 100%. However, depending upon the basis used (original or reduced), two sets of year-by-year percentages can result. These two calculation methods are explained below for a three-year property.

Let

B_3 = original basis before ITC. Then,

B_3' = new basis after ITC

$$= B_3 - (50\%)(6\%)B_3$$

$$= 0.97B_3$$

Also, let

D_i = depreciation allowance for year i ,

where $i = 1, 2, 3$.

Then, Method I of calculating depreciation allowances each year is:

$$D_1 = (25\%)B_3'$$

$$D_2 = (38\%)B_3'$$

$$D_3 = (37\%)B_3'$$

Method II of calculating depreciation allowances each year is:

$$D_1 = (0.97)(25\%)B_3 = (24.25\%)B_3$$

$$D_2 = (0.97)(38\%)B_3 = (36.86\%)B_3$$

$$D_3 = (0.97)(37\%)B_3 = (35.89\%)B_3$$

The table of depreciation percentages below for 3, 5, and 10 year properties are based on the Method II of calculation.

<u>Class of Property</u>			
<u>Recovery Year</u>	<u>3-year</u>	<u>5-year</u>	<u>10-year</u>
1	24.25%	14.25%	7.60%
2	36.86%	20.90%	13.30%
3	35.89%	19.95%	11.40%
4		19.95%	9.50%
5		19.95%	9.50%
6			8.55%
7			8.55%
8			8.55%
9			8.55%
10			8.55%

Example:

Suppose an industrial truck is purchased for \$20,000 in 1983 and qualifies for a five-year recovery life. The purchasing company elects to take the full ITC and reduce the truck's basis accordingly. Then,

ITC = 10% of \$20,000

= \$2,000

Reduction In Asset Basis = 50% of ITC

= \$1,000

Using the depreciation percentages from the preceding table (Method II of calculation), the yearly depreciation charges are:

<u>Year</u>		<u>Amount</u>
1983	(14.25% of \$20,000)	\$2,850
1984	(20.90% of \$20,000)	\$4,180
1985	(19.95% of \$20,000)	\$3,990
1986	(19.95% of \$20,000)	\$3,990
1987	(19.95% of \$20,000)	\$3,990

TOTAL: \$19,000

It is noted that the total of \$19,000 depreciated equals the new basis calculated from:

$$\begin{aligned}
 B_5' &= B_5 - (50\%)(10\%)B_5 \\
 &= \$20,000 - (50\%)(10\%)(20,000) \\
 &= \$19,000
 \end{aligned}$$

Excluding any maintenance, operating, or possible interest expenses, the tax deductible items each year are:

<u>Year</u>		<u>Total</u>
1983	ITC + Depreciation	\$4,850
1984	Depreciation	\$4,180
1985	"	\$3,990
1986	"	\$3,990
1987	"	\$3,990
	TOTAL	\$21,000

The present value of tax deductions, as of the beginning of 1983 and assuming a minimum attractive rate of return (MARR) of 10%, is \$17,670.23

2.3.1.2 Partial ITC with no Reduction in Asset's Basis

The taxpayer has to reduce his regular investment tax credit percentage by an amount of 2%. Thus, the reduced credit is 8% for recovery property other than three-year property and 4% for three-year property. The ACRS depreciation percentages under this ITC option are given in the table below:

<u>Recovery Year</u>	<u>Class of Property</u>		
	<u>3-year</u>	<u>5-year</u>	<u>10-year</u>
1	25%	15%	8%
2	38%	22%	14%
3	37%	21%	12%
4		21%	10%
5		21%	10%
6			10%
7			9%
8			9%
9			9%
10			9%

Example:

Using the data from the previous example,

Truck Price (Basis) = \$20,000

ITC = 8% of \$20,000

= \$1,600

The annual depreciation charges are then:

<u>Year</u>		<u>Amount</u>
1983	(15% of \$20,000)	\$3,000
1984	(22% of \$20,000)	\$4,400
1985	(21% of \$20,000)	\$4,200
1986	(21% of \$20,000)	\$4,200
1987	(21% of \$20,000)	\$4,200

Total: \$20,000

Excluding any maintenance, operating, or possible interest expenses, the tax deductible items each year are:

<u>Year</u>		<u>Total</u>
1983	ITC + Depreciation	\$4,600
1984	Depreciation	\$4,400
1985	"	\$4,200
1986	"	\$4,200
1987	"	\$4,200

Total: \$21,600

Using MARR= 10%, the present value of the tax deductions at the beginning of 1983 is equal to \$18,094.98. Thus,

in this example of purchasing a \$20,000 truck, the ITC option of "Partial ITC, No Basis Reduction" is preferred.

2.4 BEFORE-TAX AND AFTER-TAX ANALYSIS OF A FINANCIAL LEASE PLAN

It is the purpose of this section to illustrate more completely the economic analysis of a particular lease plan. This analysis is typical of the analysis which will be performed on each leasing plan investigated in this Report. As mentioned in Chapter One, software will be developed only for those leasing plans which are classified as true (or operating) leases. However, a financial lease plan illustrates more completely the tax considerations and so, in this section, a financial lease plan is chosen as the example. In particular, a "Uniform Payment" type of financial lease will be analyzed on both a before-tax and after-tax basis.

This example will show how payments for a financial lease may be computed and the different tax alternatives the lessee may look into.

EXAMPLE LEASE PLAN:

- Financial lease
- Quarterly uniform payments
- Financing interest rate: 12% simple interest per year
- Purchase Price of Industrial Truck: \$20,000

- Down payment: Zero
- Lease Term: 3 years
- Maintenance Contract: Full maintenance at a cost of \$1,200/year
- Residual Value of Truck: Zero

The relevant calculations are given in the following sub-sections.

2.4.1 Uniform Payment Calculation

The factor to calculate the uniform payment each period is:

$(A/P \ i, n)$, where

A = uniform payment per period

P = present worth (lease cost)

i = interest rate per period

n = number of periods

The Uniform Series Factor, $(A/P \ i, n)$, is a compound interest factor and can be found in any standard engineering economy book. It is noted that, in the industrial truck leasing business, the term "simple" interest is really a compound interest rate.

The formula to calculate the above factor is the following:

$$\frac{i(1+i)^n}{(1+i)^n - 1}$$

where: i = interest rate per period

n = number of periods

The relationship between the payments, A , and the principal, P , is given by the formula:

$$A = P(A/P \ i, n)$$

Then, substituting into the above formula for this example, the quarterly payment, which includes

a) interest due and

b) payment on the principal, is:

$$A = \$10,000 \left[\frac{0.03(1+0.03)^{12}}{(1+0.03)^{12} - 1} \right]$$

$$= \$2,009.24$$

2.4.2 Before-Tax Analysis

The before-tax analysis is as follows:

<u>Payment number</u>	<u>Payment per period</u>	<u>Maintenance per period</u>	<u>Total per period</u>
1	\$2,009.24	\$300.00	\$3,209.24
2	2,009.24	300.00	3,209.24
3	2,009.24	300.00	3,209.24
4	2,009.24	300.00	3,209.24
5	2,009.24	300.00	3,209.24
6	2,009.24	300.00	3,209.24
7	2,009.24	300.00	3,209.24

8	2,009.24	300.00	3,209.24
9	2,009.24	300.00	3,209.24
10	2,009.24	300.00	3,209.24
11	2,009.24	300.00	3,209.24
<u>12</u>	<u>2,009.24</u>	<u>300.00</u>	<u>3,209.24</u>
Totals	24,110.88	3,600.00	27,710.88

Total Interest Paid: \$4,110.88

Equivalent Add-On Interest Rate: 6.8515% per year

2.4.3 After-Tax Analysis

The after-tax analysis is a more complicated procedure since there are two alternatives the lessee may choose from as stated in Section 2.4.1 of this chapter. For this example, both alternatives will be developed so the reader will have a better understanding about the tax laws.

Before going on with the development of the after-tax analysis, the reader should know that the interest charges per payment, depreciation charges on the equipment (industrial truck), and the operating expenses or maintenance charges can be deducted from the company's gross income for tax purposes. Thus, tax savings to the company result from the industrial truck's associated tax-deductible items.

Using a corporate income tax rate equal to 46% as the current tax laws specify, the author will proceed with the development of the after-tax analysis for both alternatives.

2.4.3.1 Full ITC - Reduction in Asset Basis

The relevant data and calculations follow. (For illustrative purposes, a recovery life of three years was chosen. In actuality, an industrial truck would be qualified as a five-year property).

Recovery Life: 3-years

Investment credit: 6%

Date of first payment: 1/9/83

Investment Tax Credit = 6% of \$20,000

= \$1,200.00

Reduction in Asset Basis = 50% of ITC

= 50% of \$1,200.00

= \$600.00

Depreciable Basis = \$20,000.00 - \$600.00

= \$19,400.00

Depreciation charges (By Method II of Calculation):

<u>Year</u>		<u>Amount</u>
1983	(24.25% of \$20,000)	\$4,850
1984	(36.86% of \$20,000)	\$7,372
1985	(36.86% of \$20,000)	\$7,372
Total:		\$19,400

<u>Date of Payment</u>	<u>Interest Payment</u>	<u>Principal Payment</u>	<u>Balance Due On Principal</u>
1/9/83	\$600.00	\$1,409.24	\$18,590.76
4/9/83	557.72	1,451.52	17,139.24

7/9/83	514.18	1,495.06	15,644.18
<u>10/9/83</u>	<u>469.33</u>	<u>1,539.91</u>	<u>14,104.27</u>

Totals:	2,141.23	5,895.73	
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<u>Date of Payment</u>	<u>Total Payment</u>	<u>Maintenance Payment</u>	<u>Grand Total</u>
1/9/83	\$2,009.24	\$300.00	\$3,209.24
4/9/83	2,009.24	300.00	3,209.24
7/9/83	2,009.24	300.00	3,209.24
<u>10/9/83</u>	<u>2,009.24</u>	<u>300.00</u>	<u>3,209.24</u>
Totals:	8,036.96	1,200.00	9,236.96

Total interest charges for 1983: \$2,141.23

Total maintenance for 1983: \$1,200.00

<u>Date of Payment</u>	<u>Interest Payment</u>	<u>Principal Payment</u>	<u>Balance Due On Principal</u>
1/9/84	\$423.13	\$1,586.11	\$12,518.16
4/9/84	375.54	1,633.70	10,884.46
7/9/84	326.53	1,682.71	9,201.75
<u>10/9/84</u>	<u>276.05</u>	<u>1,733.19</u>	<u>7,486.56</u>
Totals:	1,401.25	6,635.71	

<u>Date of Payment</u>	<u>Total Payment</u>	<u>Maintenance Payment</u>	<u>Grand Total</u>
1/9/84	\$2,009.24	\$300.00	\$3,209.24
4/9/84	2,009.24	300.00	3,209.24
7/9/84	2,009.24	300.00	3,209.24
<u>10/9/84</u>	<u>2,009.24</u>	<u>300.00</u>	<u>3,209.24</u>

Totals: 8,036.96 1,200.00 9,236.96

Total interest charges for 1984: \$1,401.25

Total maintenance for 1984: \$1,200.00

<u>Date of Payment</u>	<u>Interest Payment</u>	<u>Principal Payment</u>	<u>Balance Due On Principal</u>
1/9/85	\$224.06	\$1,785.18	\$5,683.38
4/9/85	170.50	1,834.74	3,884.64
7/9/85	115.34	1,893.90	1,950.74
<u>10/9/85</u>	<u>58.52</u>	<u>1,950.72</u>	<u>0.02</u>
Totals:	568.42	8,036.96	

<u>Date of Payment</u>	<u>Total Payment</u>	<u>Maintenance Payment</u>	<u>Grand Total</u>
1/9/85	\$2,009.24	\$300.00	\$3,209.24
4/9/85	2,009.24	300.00	3,209.24
7/9/85	2,009.24	300.00	3,209.24
<u>10/9/85</u>	<u>2,009.24</u>	<u>300.00</u>	<u>3,209.24</u>
Totals:	8,036.96	1,200.00	9,236.96

Total interest charges for 1985: \$568.42

Total maintenance for 1985: \$1,200.00

Total Tax Savings:

<u>Year</u>	<u>Total</u>
1983 Tax*(Interest+Depreciation+Maintenance)+ITC	\$4,967.97
0.46*(2,141.23 + 4,850 + 1,200) + 1,200	
1984 Tax*(Interest + Depreciation + Maintenance)	\$4,587.70

$$0.46*(1,401.25 + 7372 + 1200)$$

1985 Tax*(Interest + Depreciation + Maintenance) \$4,204.59

$$0.46*(568.42 + 7372 + 1200)$$

2.4.3.2 Partial ITC - no Reduction in Basis

Recovery Life: 3-years

Investment credit: 4%

Date of first payment: 1/9/83

Investment Tax Credit= 4% of \$20,000

$$= \$800.00$$

Depreciable Basis= \$20,000.00

$$= \$20,000.00$$

Depreciation charges:

<u>Year</u>		<u>Amount</u>
1983	(25.00% of \$20,000)	\$5,000
1984	(38.00% of \$20,000)	\$7,600
1985	(37.00% of \$20,000)	\$7,400
Total:		\$20,000

Interest charges and operating expenses are the same as in the previous section, therefore the author will proceed directly with the calculation of the tax savings, or

Total Tax Savings:

<u>Year</u>	<u>Total</u>
1983 Tax*(ITC+Interest+Depreciation+Maintenance)	\$4,636.97
$0.46*(2,141.23 + 5,000 + 1,200) + 800$	

1984 Tax*(Interest + Depreciation + Maintenance) \$4,692.58

$0.46*(1,401.25 + 7,600 + 1,200)$

1985 Tax*(Interest + Depreciation + Maintenance) \$4,217.47

$0.46*(568.42 + 7,400 + 1,200)$

Chapter III

SELECTED TRUE LEASE PLANS

3.1 INTRODUCTION

It is the purpose of this chapter to explain and illustrate, by examples, the true lease plans for which microcomputer software has been developed as a part of this report. The four lease plans selected are classified as follows:

1. Uniform Payments Lease,
2. Skipped Payments Lease,
3. Accelerated/Decelerated Payments Lease, and
4. Uniform Payments Plus Balloon Payment Lease

Each of these lease plans will be defined, and illustrated using both a before-income tax and an after-income tax analysis.

From the perspective of the Internal Revenue Service, the lease payments made by the lessee to the lessor are fully tax-deductible under a true (or operating) lease plan. The lessor, in turn, is permitted the tax benefits of ownership through depreciation deductions and an investment tax credit.

According to FASB No. 13,[15] a true (operating) lease is a transaction that meets all of the following four criteria:

1. There is no transfer of ownership from lessor to lessee during the lease term.

2. The lease plan has no option to purchase at a "bargain" price at the end of the lease term, such as the "option to purchase for \$1.00".

3. The lease term is less than 75% of the estimated economic life of the leased equipment.

4. The present value of the lease is less than 90% of the selling value minus the investment tax credit.

If a lease plan violates any of the above criteria, it is considered by the IRS to be a capital (financial) lease. In this case, the lessee is considered by the IRS as the owner of the leased equipment.

For a true lease transaction, the lessee is entitled to a tax deduction for "rentals or other payments required to be made as condition to the continued use or possession, for purposes of the trade or business, of the property to which the taxpayer has not taken or is not taking title or in which he has no equity." [17]

For a true lease situation, the lessor retains ownership of the property and therefore has the right to claim depreciation deductions, and take an investment tax credit, according to the current ACRS (Accelerated Cost Recovery System) rules and regulations. However, Section 38(d)(1) of

the Internal Revenue Code permits the lessor to transfer the investment tax credit privileges to the lessee. This transfer election can be made by the lessor only if new Section 38 property is involved. Such an election, once made, is irrevocable and must be filed with the IRS by the lessor on or before the due date for the lessee's income tax return. Also, the election must be made during the tax year when possession of the property is transferred to the lessee.

If the lessor "passes through" the investment tax credit privilege to the lessee, the amount of the investment tax credit is based on the "fair market value" of the property (as if the lessee had purchased the property). From the lessee's point of view for purposes of calculating the investment tax credit, the useful life of the property must be the same as the recovery life of the equipment used by the lessor to determine annual depreciation allowances.

Perhaps because of the above income tax considerations, true lease plans have become attractive alternatives to financial leases (purchases, with financing arrangements) or outright equipment purchases with equity capital. The "passing through" of the investment tax credit, with different options, is thus a factor which is included in the after-tax software programs developed for this report. The details of the "pass through" options will be presented by examples in the after-tax section of this chapter.

In addition to the investment tax credit pass through factor, another important consideration in true lease plans is the interest rate used to calculate the lease payments required of the lessee by the lessor. It is common in the leasing industry to use either (1) a simple interest rate, or (2) an add-on interest rate. The relationship between these two rates is discussed and illustrated in Section 3.2 to follow.

3.2 SIMPLE INTEREST VS. ADD-ON INTEREST

Even though the simple interest rate is used by most lessors to determine the value of lease payments, the "add-on" interest rate is often emphasized because of its lower value. In actuality, there is a direct relationship between the two rates and the lessee should realize he is paying an annual interest rate equal to the "simple rate". Therefore, the purpose of this section is to show how to obtain this add-on interest rate when a simple interest rate is used to calculate the lease payments, or alternatively, when payments are calculated using the add-on interest rate, the calculations required to obtain the equivalent simple interest rate will be explained. These calculations are presented in the section to follow and the examples used assume a Uniform Payments type of true lease (The procedure also applies to a financial loan situation).

3.2.1 Lease (or Loan) Payments Calculated Using Simple Interest Rate

The example given in Section 2.2.1 of Chapter Two is now recalled, namely,

Assume Company X borrows \$10,000 from Bank Y. The loan term is 5 years, a simple interest rate of 10% per year applies, and Company X agrees to pay off the loan plus accrued interest in five uniform annual payments.

The uniform payments required are then calculated by the use of a compound interest factor, $(A/P \ i, n)$, where

$$(A/P \ i, n) = \frac{\left[\begin{array}{c} i(1+i)^n \\ \hline (1+i)^n - 1 \end{array} \right]}{1}$$

The relationship between the payments, A , and the principal of the loan, P , is given by the formula:

$$A = P(A/P \ i, n)$$

In this example,

$$\begin{aligned} A &= \$10,000 \left[\frac{0.10(1+0.10)^5}{(1+0.10)^5 - 1} \right] \\ &= \$10,000(0.263797) \\ &= \$2,637.97 \end{aligned}$$

The annual add-on interest rate which is equivalent to the annual simple interest rate of 10% can be determined by the following procedural steps:

1. Calculate the total amount paid by the borrower (or lessee). That is,

$$\begin{aligned}\text{Total amount paid} &= \$2,637.97(5 \text{ payments}) \\ &= \$13,189.85\end{aligned}$$

2. Calculate the total interest paid, or

$$\begin{aligned}\text{Total Interest Paid} &= \$13,189.85 - \$10,000 \\ &= \$3,190.85\end{aligned}$$

3. Determine the average amount of interest paid per payment. That is,

$$\begin{aligned}\text{Average Interest/Payment} &= \$3,189.85/5 \\ &= \$637.97\end{aligned}$$

4. Express the average amount of interest paid per payment as a percentage of the principal borrowed, or

$$\begin{aligned}\text{Add-on interest rate/period} &= \frac{\$637.97}{\$10,000.00} \times 100\% \\ &= 6.3797\%\end{aligned}$$

5. Now determine the annual add-on interest rate charged,

$$\begin{aligned}\text{Add-On Interest Rate/Year} &= 6.3797\% \times (1 \text{ period in a year}) \\ &= 6.3797\%\end{aligned}$$

3.2.2 Lease Payments Calculated Using Add-On Interest Rate

Using the example from the previous section, and a given add-on interest rate of 6.3797%, the annual payments required can be calculated as follows:

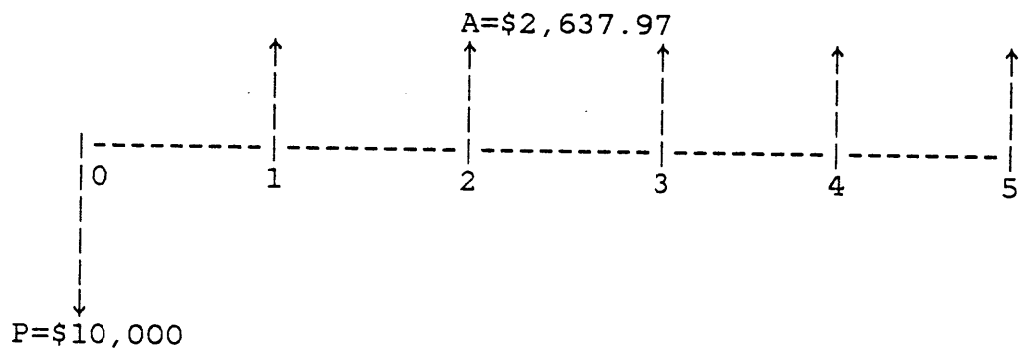
$$\begin{aligned}\text{Total Interest To Be Paid} &= \$10,000(0.063797)(5 \text{ yrs.}) \\ &= \$3,189.85\end{aligned}$$

$$\begin{aligned}\text{Total Amount To Be Paid} &= \$10,000 + \$3,189.85 \\ &= \$13,189.85\end{aligned}$$

$$\begin{aligned}\text{Amount of Each Payment} &= \$13,189.85/5 \text{ yrs.} \\ &= \$2,637.97\end{aligned}$$

The procedure to calculate the equivalent annual simple interest rate is the procedure for calculating the internal rate of return (a compound interest rate) of a cash flow series.

The example of concern can be interpreted in the cash flow diagram shown below:



The borrower (or lessee) receives \$10,000 (or a \$10,000 value) at time $t=0$. He repays the principal and the

accrued interest by the five uniform payments of \$2637.97 each. The internal (or compound) interest rate involved is that interest rate, i^* , which makes the present worth of the loan equal to the present worth of the payments. Symbolically,

$$P = \sum_{j=0}^n A_j (1+i^*)^{-j}, \text{ where}$$

P = present worth of the investment

(in this case the original value of the truck)

A_j = payment received for period j , $j = 0, 1, \dots, n$,

n = total number of periods.

i^* = the internal rate of return or interest rate gained on the investment that satisfied the above equation.

Therefore, the equivalent simple interest rate must to be obtained, using the above formula, and the following trial and error procedure is as follow:

That is, find the value of i^* that satisfies,

$$P = \sum_{j=0}^n A_j (1+i)^{-j}$$

$$P = A_0 (1+i)^{-0} + A_1 (1+i)^{-1} + \dots + A_5 (1+i)^{-5}$$

$$10,000 = 0(1) + 2,637.97(1+i)^{-1} + \dots + 2,637.97(1+i)^{-5}$$

Let $i^* = 0$, then

$$10,000 = 2,637.97(1)^{-1} + 2,637.97(1)^{-2} + \dots + 2,637.97(1)^{-5}$$

$$\$10,000 \neq \$13,189.85$$

With the right hand side of the above equation greater than the left hand side at $i=0$, the next step is to look carefully and try to select an i^* that will make the right hand side closer or equal to the left hand side. If the result from the right hand side of the above equation using i^* is less than the previous result using i^* interest rate and greater than P , (\$10,000), then increase the present interest rate, i^* , by Y amount. If the result is less than P , then subtract Y' amount. Continue this procedure until both sides of the equation are equal or sufficiently close. The interest rate found, i^* , is the internal rate of return or the true simple interest rate charged on the investment.

Therefore, let $i^* = 9\%$, then

$$10,000 = \sum_{j=0}^5 2,637.97(1+.09)^{-j}$$

$$\$10,000 \neq \$10,260.78$$

Since the right hand side is still greater than the left hand side, then increase i by Y amount, therefore, the next iteration is as follow:

Let $i^* = 11\%$, then

$$10,000 = \sum_{j=0}^5 2,637.97(1+.11)^{-j}$$

$$\$10,000 \neq \$9,749.67$$

Now, the right hand side is less than the left hand side. Therefore, it is known that i^* must lie between 9% and 11%. Continuing, let

$i^* = 10\%$, then

$$10,000 = \sum_{j=0}^5 2,637.97(1+.10)^{-j}$$

$$\$10,000 \approx \$9,999.98$$

Therefore, $i^* = 10\%$ which goes in accordance with the example in the previous section.

3.3 BEFORE-TAX ANALYSIS OF SELECTED TRUE LEASE PLANS

In this section, the explanation and illustration of different true lease plans will be given by examples and, as stated in the previous section, the microcomputer software development has been based on these examples/lease plans.

The four true lease plans to be explained are classified as follows:

1. Uniform Payments Lease,
2. Skipped Payments Lease,
3. Accelerated/Decelerated Payments Lease, and
4. Uniform Payments plus Balloon Payment Lease.

As stated in Chapter Two, for each of these plans, the lessor retains ownership. Typically, the lease term ranges from 3 to 6 years, lease payments may result in partial of

full payout, there may be a periodic inspection, partial or full maintenance contract involved, a guaranteed residual value may be involved, and a deposit and/or payments in advance may be required. (For definitions of terms, please refer to section 2.1 in Chapter Two of this report).

There are some common assumptions that will be stated before illustrating the above plans, and these are:

1. A deposit at the beginning of the lease term is not required by the lessor.
2. All lease payments are made at the end of payment periods.
3. The maximum lease term is 10 years (The author has found that the longest lease term offered by three major lift-truck leasing companies was seven years).

As a preface to the examples to follow, other relevant points that should be mentioned are:

1. The microcomputer software developed permits the user the choice of four payment periods: monthly, quarterly, semi-annually, and annually. However, in all the examples to follow, quarterly payments are assumed.
2. For the four lease plans to be illustrated, the size of the lease payments can be calculated using either the "simple" interest rate or the "add-on" interest rate. With one exception, the calculations are less tedious if the

"simple" interest rate is used. (The reader will recall that the term "simple", as used by the leasing industry, is really a compound interest rate). However, for the Uniform Payments type of lease plan, the lease payments will be determined by using both the simple and the add-on interest rate, for illustrative purposes.

3. The time horizon for a lease (lease term) may be expressed in total years or total periods, where a period is less than a year (month, quarter, six month periods). However, because of the method of calculating lease payments for an Accelerated/Decelerated Lease Plan, the lease term must be expressed in years. A three year lease term is used in all of the examples to follow.

4. An equipment cost of \$10,000 will be assumed for all of the lease plans.

5. In a lease plan, the Residual Value is an estimate of the salvage value of the equipment item at the end of the lease term, based on a percentage of the equipment's value at the beginning of the lease term. For the examples to follow, a residual percentage of 0% has been assumed.

6. For the four lease plans of concern, annual maintenance expenses are independent of the type of lease plan. However, for completeness, provisions for entering annual maintenance expenses have been included in the microcomputer

software developed. In the examples to follow, an annual maintenance cost of \$1,200 has been assumed for each year of the lease term.

In the section to follow, each of the four lease plans will be illustrated with before-income tax calculations. A common example will be used to illustrate the four plans (see 3.3.1.1 below).

3.3.1 Uniform Payments Lease

A uniform payment lease, as its name implies, is a lease plan whereby all of the periodic lease payments are of the same size. The common example chosen to illustrate all the lease plans and facilitate comparisons among plans follows.

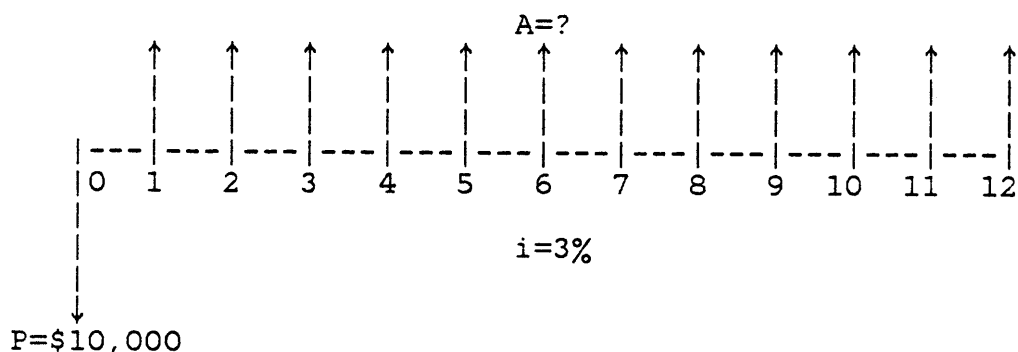
3.3.1.1 Example 1a

Assume Company A has agreed to lease a fork lift truck from Material Handling Distributor Y. The data pertinent to the transaction is:

- Lift truck sales price: \$10,000
- Financing interest rate: 12% simple
- Deposit Required: zero
- Residual Percentage: 0%
- Payment Period: Quarterly
- Lease Term: 3 years or 12 quarters

- Maintenance Contract: Full maintenance at a cost of \$1200 per year.

The Uniform Payment Lease Plan for the above truck can be interpreted as the cash flow diagram shown below (from the lessee point of view):



where,

P = truck sales price,

A = quarterly lease payments (amount to be determined)

i = interest rate per payment period

= i_y/N , and

i_y = simple interest rate per year.

N = the number of payment periods per year

In this example,

$$i = 12\%/4 = 3\%, \text{ or } 0.03.$$

The next step is to find A (payment size per period), and it is calculated by the use of a compound interest factor, $(A/P \ i, n)$, where,

$$(A/P \ i, n) = \frac{\left[\begin{array}{c} i(1+i)^n \\ (1+i)^n - 1 \end{array} \right]}{[(1+i)^n - 1]}$$

That is,

$$A = P(A/P \ i, n)$$

$$= P \frac{\left[\begin{array}{c} i(1+i)^n \\ (1+i)^n - 1 \end{array} \right]}{[(1+i)^n - 1]}$$

In this example,

$$A = \$10,000 \left[\frac{0.03(1+0.03)^{12}}{(1+0.03)^{12} - 1} \right]$$

$$= \$1,004.62 \text{ per quarter}$$

The annual maintenance expenses of \$1200 are assumed to occur uniformly each quarter, or \$300 per quarter.

The methodology described previously, in Section 3.2.1 will be employed to determine the equivalent add-on interest rate for this same example. That is,

$$1. \text{ Total Amount Paid} = \$1,004.62(12)$$

$$= \$12,055.44$$

$$2. \text{ Total Interest Paid} = \$12,055.44 - \$10,000$$

$$= \$2,055.44$$

$$3. \text{ Average Interest Per Period} = \$2,055.44/12$$

$$= \$171.287$$

$$4. \text{ Add-on Interest Rate Per Period} = (\$171.287/\$10,000)$$

$$\begin{aligned} & \times 100\% \\ & = 1.71287\% \end{aligned}$$

5. Annual Add-On Interest Rate = 1.72187%

$$\begin{aligned} & \times (4 \text{ periods/year}) \\ & = 6.8515\% \end{aligned}$$

A complete summary of the results is given below:

1. Type of Payments: Quarterly
2. Interest Rate: 12% simple
3. Lease Payments: Quarterly
4. Lease Term: 3 years or 12 quarters
5. Equipment Value: \$10,000
6. Residual Percentage: 0%
7. Lease Cost: \$10,000
8. Maintenance Charge: \$1,200/year
9. Total Interest Paid: \$2,055.44
10. Total of Payments: \$12,055.44
11. Equipment Add-on Rate: 6.8515%

The lease cost is calculated as follows:

$$\begin{aligned} \text{Lease Cost} &= \text{Equipment Price} - (\text{Equipment Sales price} \\ & \quad \times \text{Decimal equivalent Residual Percentage}) \\ &= \$10,000 - \$10,000(0.00) = \$10,000 \end{aligned}$$

A tabulation of the quarterly payments over the entire lease term is:

<u>Period Number</u>	<u>Lease Payment</u>	<u>Maintenance Payment</u>	<u>Total Payment</u>
1	\$1,004.55	\$300	\$1,304.55
2	1,004.55	300	1,304.55
3	1,004.55	300	1,304.55
4	1,004.55	300	1,304.55
5	1,004.55	300	1,304.55
6	1,004.55	300	1,304.55
7	1,004.55	300	1,304.55
8	1,004.55	300	1,304.55
9	1,004.55	300	1,304.55
10	1,004.55	300	1,304.55
11	1,004.55	300	1,304.55
12	1,004.55	300	1,304.55

The following lease plan example to be illustrated is basically the same as Example 1a. previously, except that the quarterly payments will be calculated using the add-on interest rate rather than the simple interest rate. An add-on rate of 6.8515% is used.

3.3.1.2 Example 1b

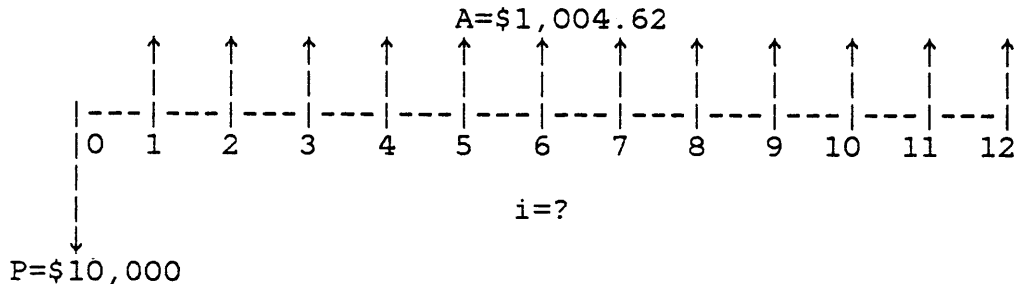
Using the same lease plan specifications as before and the add-on rate of 6.8515%, the quarterly payments (excluding maintenance) are calculated as follows:

$$\begin{aligned}
 \text{Total Interest To Be Paid} &= (\$10,000)(0.068515)(3 \text{ years}) \\
 &= \$2,055.44
 \end{aligned}$$

$$\begin{aligned}\text{Total Amount To Be Paid} &= \$10,000 + \$2,055.44 \\ &= \$12,055.44\end{aligned}$$

$$\begin{aligned}\text{Amount of Each Payment} &= \$12,055.44/12 \text{ periods} \\ &= \$1,004.62\end{aligned}$$

If the periodic lease payment (excluding maintenance) is calculated by using the add-on rate, then the equivalent "simple" interest rate is calculated by the internal rate of return methodology described in section 3.2.2. Graphically, we have the cash flow diagram shown below:



The internal rate of return is the value of i which satisfies the equation

$$\begin{aligned}P &= \sum_{j=1}^n A_j (1+i)^{-j}, \text{ or in this example,} \\ \$10,000 &= \sum_{j=1}^{12} \$1,004.62 (1+i)^{-j}\end{aligned}$$

By virtue of Example 1a. previously, we know the solution to this equation is $i=3\%$. Thus, checking this result, we have

$$\$10,000 = \$1,004.52 \left\{ \sum_{j=1}^{12} (1+0.03)^{-j} \right\}$$

$$\$10,000 = \$1,004.62(9.954993884)$$

$$\$10,000 \approx \$9,999.996$$

$$\$10,000 = \$10,000, \text{ and therefore}$$

$i^* = 3\%$ per quarter or 12% per year simple interest rate.

A summary of results for Example 1b. will not be given since it is the same as for Example 1a, except for the interest rate used. The Skipped Payments type of lease will be illustrated next.

3.3.2 Skipped Payments Lease

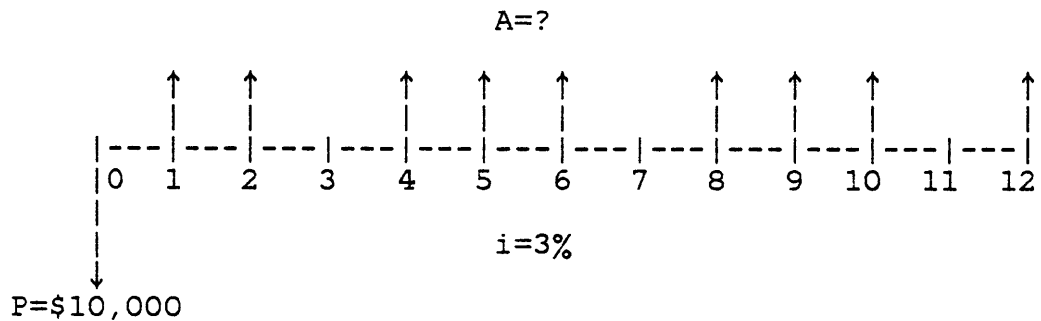
A Skipped Payments Lease is basically a Uniform Payments Lease, with the exception that it will allow the lessee to skip a payment, or a series of payments within the lease term.

The example to be used for illustrative purposes is the same as the one in the previous section of this chapter, except that it will be assumed that the lessee wishes to skip the third, seventh, and eleventh lease payments. The example Skipped Payments Lease Plan is summarized as:

- Lift Truck Sales Price: \$10,000
- Financing Interest Rate: 12% simple
- Deposit Required: Zero
- Residual Percentage: 0%
- Payment Period: Quarterly

- Lease Term: 3 years or 12 quarters
- Maintenance Contract: Full maintenance at a cost of \$1200 per year.
- Payments Skipped: 3, 7, and 11

The cash flow diagram for this situation is:



where,

P = Equipment Sales Price

A_{sk} = Quarterly Payment (to be determined)

i = interest rate per payment period

Before proceeding to calculate the value of A_{sk} in this type of lease plan, it is necessary to recall some relationships from Engineering Economy. Recall from the Uniform Payments Lease Plan section that

$$A = P(A/P \ i, n)$$

$$= P \left[\frac{i(1+i)^n}{(1+i)^n - 1} \right]$$

Thus,

$$P = A \frac{[(1+i)^n - 1]}{[i(1+i)^n]}$$

$$= A(P/A \ i, n)$$

The factor $(P/A \ i, n)$, is of course the inverse of the factor,

$$(A/P \ i, n).$$

In the case of uniform, periodic payments (no skipped payments), the following relationship is also true [26]:

$$P = \sum_{j=1}^n A(1+i)^{-j} = A \sum_{j=1}^n (1+i)^{-j}$$

Thus,

$$A = \frac{P}{\sum_{j=1}^n (1+i)^{-j}}$$

and we can use this relationship to solve for A .
First, a binary variable X_j is defined as follows:

$$X_j = 1, \text{ if the payment is not skipped}$$

$$0, \text{ if the payment is skipped}$$

The relationship is then

$$A_{sk} = \frac{P}{\sum_{j=1}^n X_j (1+i)^{-j}}$$

Applying this relationship to the example situation, the denominator term of the above equation is expanded to be:

$$\begin{aligned}
 & \frac{1}{(1+.03)^1} + \frac{1}{(1+.03)^2} + \frac{0}{(1+.03)^3} + \frac{1}{(1+.03)^4} + \frac{1}{(1+.03)^5} \\
 & + \frac{1}{(1+.03)^6} + \frac{0}{(1+.03)^7} + \frac{1}{(1+.03)^8} + \frac{1}{(1+.03)^9} + \frac{1}{(1+.03)^{10}} \\
 & + \frac{0}{(1+.03)^{11}} + \frac{1}{(1+.03)^{12}}
 \end{aligned}$$

with a numerical value equal to 7.50335

$$\begin{aligned}
 A_{sk} &= \frac{\$10,000}{7.50335} \\
 &= \$1,332.74
 \end{aligned}$$

The maintenance charges per period are calculated in the same way as in the uniform payments lease, and it is assumed there will not be any skipped payment for them. Therefore

$$\begin{aligned}
 \text{Maintenance Per Period} &= \$1,200/4 \\
 &= \$300
 \end{aligned}$$

The equivalent add-on rate is as follows:

1. Total Amount Paid = $\$1,332.74(12 - 3)$
 $= \$11,994.66$
2. Total Interest Paid = $\$11,994.66 - \$10,000$
 $= \$1,994.66$
3. Average Interest Per Period = $\$1,994.66/12$

$$= \$166.22$$

$$4. \text{ Add-on Interest Rate Per Period } = (166.22/1,000)(100\%)$$

$$= 1.6622\%$$

$$5. \text{ Annual Add-on Interest Rate } = 1.6622(4)$$

$$= 6.6489\%$$

A summary of the results for this example is given below:

1. Type of Payments = Quarterly
2. Interest Rate: 12% simple
3. Lease Term: 3 years or 12 quarters
4. Equipment Value: \$10,000
5. Residual: 0%
6. Lease Cost: \$10,000
7. Maintenance Charges: \$1,200/year
8. Total Interest Paid: \$1,994.66
9. Total of Payments: \$11,994.66
10. Equivalent Add-on Rate: 6.6489%

A tabulation of quarterly payments over the lease term is shown below:

<u>Period Number</u>	<u>Lease Payment</u>	<u>Maintenance Payment</u>	<u>Total Payment</u>
1	\$1,332.74	\$300	\$1,632.74
2	1,332.74	300	1,632.74
3	0.00	300	300.00
4	1,332.74	300	1,632.74
5	1,332.74	300	1,632.74

6	1,332.74	300	1,632.74
7	0.00	300	300.00
8	1,332.74	300	1,632.74
9	1,332.74	300	1,632.74
10	1,332.74	300	1,632.74
11	0.00	300	300.00
12	1,332.74	300	1,632.74

3.3.3 Accelerated/Decelerated Payments Lease Plan

As the title of this type of lease plan suggests, a lease agreement may be made whereby the periodic lease payments increase or decrease over the lease term. No doubt a variety of these plans are offered by lessors in the total leasing industry. Assuming such variety in plans exist, it is virtually impossible to develop a generalized procedure to calculate the periodic lease payments. Thus, the development of a microcomputer program to solve the "general" accelerated/decelerated lease plan was not attempted.

The microcomputer program which was developed will handle one type of such plans and was patterned after the decelerated lease plan offered by one of the major lift-truck leasing companies. The essence of the plan is that a certain percentage of the Lease Cost (selling price of the equipment minus the residual value) should be recovered in

each year of the lease term. A table of the percentages for various lease terms is shown below:

PERCENTAGE OF TIME BALANCE

<u>Contract Term</u>	<u>1st Year</u>	<u>2nd Year</u>	<u>3rd Year</u>	<u>4th Year</u>	<u>5th Year</u>	<u>6th Year</u>	<u>7th Year</u>
2-year	67	33					
3-year	50	33	17				
4-year	40	30	20	10			
5-year	33	27	20	13	7		
6-year	29	24	19	14	10	4	
7-year	25	21	18	14	11	7	4

It will be noted from the above table that the percentages are termed "Percent of Time Balance". Also, for a given lease term, the percentages sum to 100%. That is, the total Lease Cost is recovered (plus interest) over the term of the lease (even though the example to follow uses the "percent of time balance" given by the above table, the computer software will handle any combination of percentages other than those presented in the above table as long as they add-up to 100%).

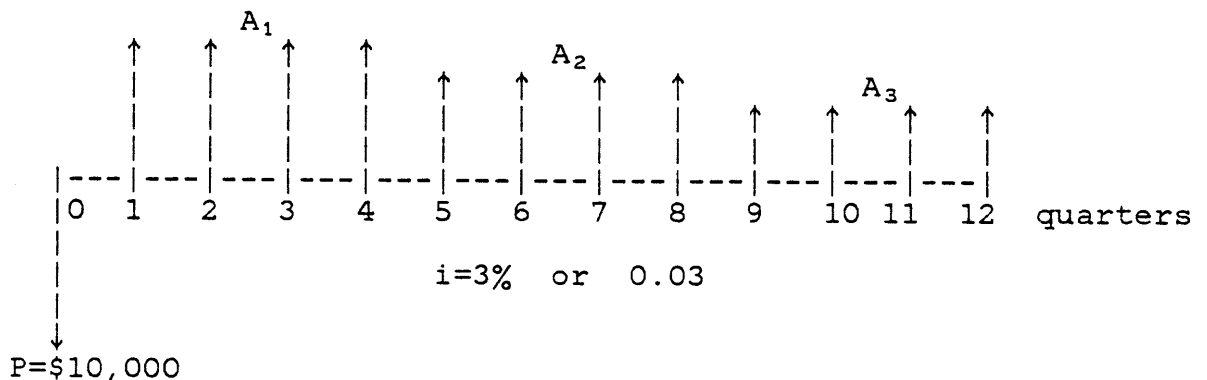
As a point of interest to the reader, the author wishes to observe that the material handling distributor from whom this table (and plan) was obtained did not know how the actual lease payments were calculated from the table information. Further, personnel contacted at the leasing company

headquarters did not know either. Thus, the calculation procedure described subsequently resulted from a search by the author to find a methodology that would obtain (explain) the actual lease payments.

An example will first be shown and then comments made concerning the example and calculation methodology. Assume the following lease agreement:

- Quarterly Payments
- Lift Truck Sales Price: \$10,000
- Financing Interest Rate: 12% simple
- Deposit Required: 0%
- Lease Term: 3 years
- Maintenance Contract: Full maintenance at a cost of \$1200 per year.
- Percent Time Balance Paid: 1st year: 50%
2nd year: 33%
3rd year: 17%

The cash flow diagram for the above plan is as follows:



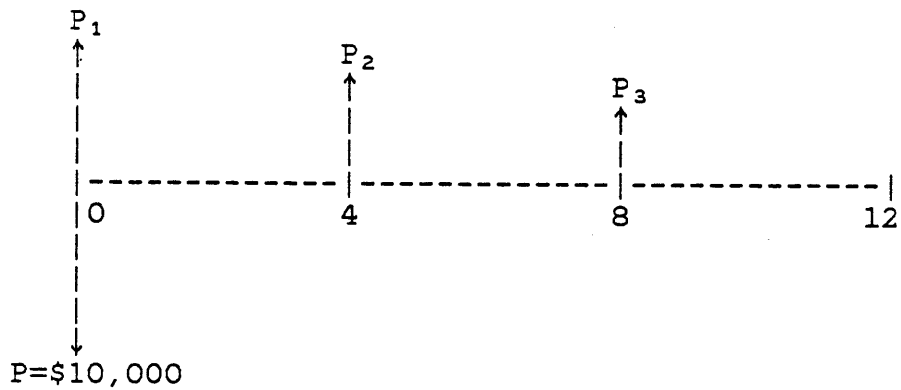
The above cash flow diagram represents one general type of Accelerated/Decelerated Lease Plan. That is, the accelerated or decelerated lease payments occur on an annual basis, but within a given year, the periodic payments are uniform in size. Thus, for the example depicted by the diagram above, the uniform payments that occur in years 1, 2, and 3 are of size A_1 , A_2 , and A_3 , respectively. Since the Residual Value has been assumed zero in this example, the present worth equivalent of all the periodic lease payments is $P = \$10,000$, the lift truck sales price. That is,

$$P = \$10,000 = A_1(P/A\ i, 4) + A_2(P/A\ i, 4)(P/F\ i, 4) + A_3(P/A\ i, 4)(P/F\ i, 8).$$

Values for the three unknown variables (A_1 , A_2 , A_3) can not be determined from this single equation and a further interpretation is required. The interpretation follows:

Let

P_i = the present worth equivalent of the uniform series of payments occurring during the i th year of the lease agreement. (In this example, $i = 1, 2, 3$). We then have the cash flow diagram below:



Then, for the lease plan considered in this example, it is also reasoned that P_1 must be equivalent to 50% of the lease cost (capital to be recovered) plus interest, as measured at time $t=0$. The value P_2 must be equivalent to 33% of the lease cost plus interest, as measured at time $t=4$. The value P_3 must be equivalent to 17% of the lease cost plus interest, as measured at time $t=8$.

Letting y equal to some unknown numerical value, it is reasoned that $P_1 = 0.50y$, $P_2 = 0.33y$, and $P_3 = 0.17y$. Further,

$$P = \$10,000 = P_1 + P_2(P/F \ i, 4) + P_3(P/F \ i, 8), \text{ or}$$

$$\$10,000 = 0.50y + 0.33y(P/F \ i, 4) + 0.17y(P/F \ i, 8)$$

Using $i = 0.03$ for this example,

$$\$10,000 = 0.50y + 0.33y(0.8885) + 0.17y(0.7894)$$

Solving for y yields

$$y = 10,000 / .9274 = \$10,782.83$$

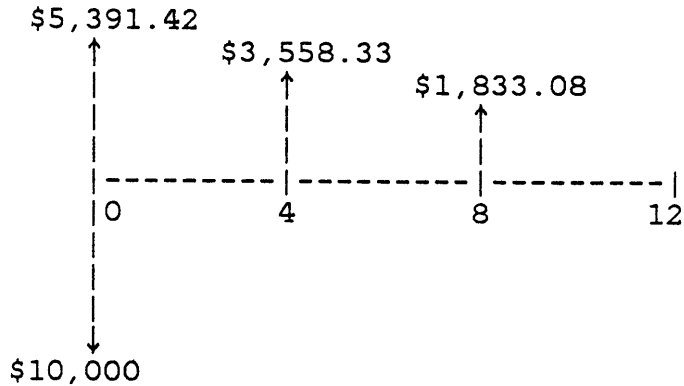
Then,

$$P_1 = (0.50)(10,782.83) = 5,391.42$$

$$P_2 = (0.33)(10,782.83) = 3,558.33$$

$$P_3 = (0.17) (10782.83) = 1,833.08$$

Summarizing these results in a cash flow diagram gives:



Continuing to work backwards,

$$\begin{aligned} A_1 &= P_1 (A/P \ 3, 4) \\ &= \$5,391.42 (0.2690) \\ &= \$1,450.29 \quad (\text{quarterly payments for the first year}) \end{aligned}$$

$$\begin{aligned} A_2 &= P_2 (A/P \ 3, 4) \\ &= \$3,558.33 (0.2690) \\ &= \$957.19 \quad (\text{quarterly payments for the second year}) \end{aligned}$$

$$\begin{aligned} A_3 &= P_3 (A/P \ 3, 4) \\ &= \$1,833.08 (0.2690) \\ &= \$493.10 \end{aligned}$$

Checking the results, the present worth equivalent for all the lease payments is

$$\begin{aligned} P &= \$1,450.19 (P/A \ 3, 4) + 957.19 (P/A \ 3, 4) (P/F \ 3, 4) \\ &\quad + 493.10 (P/A \ 3, 4) (P/F \ 3, 8) \\ &= \$9,999.02, \quad \text{or} \quad \$10,000 \end{aligned}$$

Other sets of values for A_1 , A_2 , A_3 can be found that will result in P being equal to \$10,000. However, as mentioned at the outset of these calculations, the author searched for a calculation methodology to arrive at the actual lease payments used by the leasing company and the methodology above does so. At this point, the reader may be concerned that the present worth equivalent for the first year payments does not equal 50% of the lift truck sales price. That is,

$$\begin{aligned} P_1 &= A_1(P/A \ 3,4) \\ &= \$1,450.19(3.7171) \\ &= \$5,391 \end{aligned}$$

This amount is not equal to $\$10,000(0.50) = \$5,000$ as one would expect from the "Percent of Time Balance" table given earlier. Thus, the question arises, what does 50% of the "time balance" for the first year of the lease term really mean? The logic used by the leasing company is made clearer by the explanation that follows.

For the first year, the total payments made by the lessee amount to \$5,800.76 ($4 \times \$1,450.19$). The total payments made in the second and third years of the lease amount to \$3,828.76 ($4 \times \$957.19$) and \$1,972.40 (4×493.10). The sum of all the lease payments is \$11,601.92. We then note that

$$(5,800.76/11,601.92) \times 100\% = 50\%,$$

$$(3,828.76/11,601.92) \times 100\% = 33\%, \quad \text{and}$$

$$(1,972.40/11,601.92) \times 100\% = 17\%$$

It is therefore finally concluded that the "Percent of Time Balance" table means that 50%, 33% and 17% of the total amount paid by the lessee will be paid in year 1, 2 and 3, respectively, for a three-year lease term.

For completeness, the equivalent add-on interest rate for this Accelerated/Decelerated Lease Plan example will now be calculated. That is,

1. Total Amount Paid By The Lessee = $(\$1,450.19 \times 4)$
 $+ (\$957.19 \times 4)$
 $+ (\$493.10 \times 4)$
 $= \$11,601.92$
2. Total Interest Paid = $\$11,601.92 - \$10,000$
 $= \$1,601.92$
3. Average Interest Per Period = $\$1,601.92/12$
 $= \$133.49$
4. Add-on Interest Rate Per Period = $(\$133.49/\$10,000)$
 $\times 100\%$
 $= 1.3349\%$
5. Annual Add-on Interest Rate = $1.3349\% \times 4$
 $= 5.34\%$

The maintenance charges per payment period are the same as the two previous example lease plans, namely, \$300 per quarter. A tabulation of the results for this example Accelerated/Decelerated Lease Plan is given below:

1. Type of Payments: Quarterly
2. Interest Rate: 12% Simple
3. Lease Term: 3 years
4. Equipment Sales Price: \$10,000
5. Residual Percentage: 0%
6. Lease Cost: \$10,000
7. Maintenance Charges: \$1,200/yr.
8. Total Interest Paid: \$1,601.92
9. Total of Payments: \$11,601.92
10. Equivalent Add-on Rate: 5.34%
11. Percentage of Time Balance:
 - 1st yr. - 50%
 - 2nd yr. - 33%
 - 3rd yr. - 17%

An itemized record of the lease payments over the duration of the lease term are given in the following table.

<u>Period Number</u>	<u>Lease Payment</u>	<u>Maintenance Charge</u>	<u>Total Payment</u>
1	\$1,450.19	\$300	\$1,750.19
2	1,450.19	300	1,750.19
3	1,450.19	300	1,750.19
4	1,450.19	300	1,750.19
5	957.19	300	1,257.19
6	957.19	300	1,257.19
7	957.19	300	1,257.19
8	957.19	300	1,257.19
9	493.10	300	793.10

10	493.10	300	793.10
11	493.10	300	793.10
12	493.10	300	793.10

If this same problem were input into the microcomputer software developed by the author, slightly different numerical values would result since the microcomputer program utilizes the actual compound interest formulas and therefore, outputs more accurate numerical values.

The fourth lease plan for which a microcomputer program has been developed is discussed in the next section.

3.3.4 Uniform Payments Plus Balloon Payment Lease

This plan is a subset of the Uniform Payment Lease Plan since all of the payments are uniform throughout the lease term, with the exception that the last payment made may be larger than the rest (i.e., a balloon payment). In this lease plan, the lessee is allowed to choose what payment size he wants to make. By doing so, three results can occur:

1. the lessee will overpay,
2. the lessee will pay exactly the principal plus interest, or
3. the lessee will underpay and the last payment will be a balloon payment.

If the lessee has overpaid, a smaller lease payment should of course be chosen (in iterative fashion). If, by chance, the exact lease payment which covers the lease cost plus interest is chosen, no further iterative choice of lease payment is required. If a lease payment chosen underpays the lease cost plus interest over the lease term, then a compensating single payment at the end of the lease term is required. This single payment is known as the "balloon" payment.

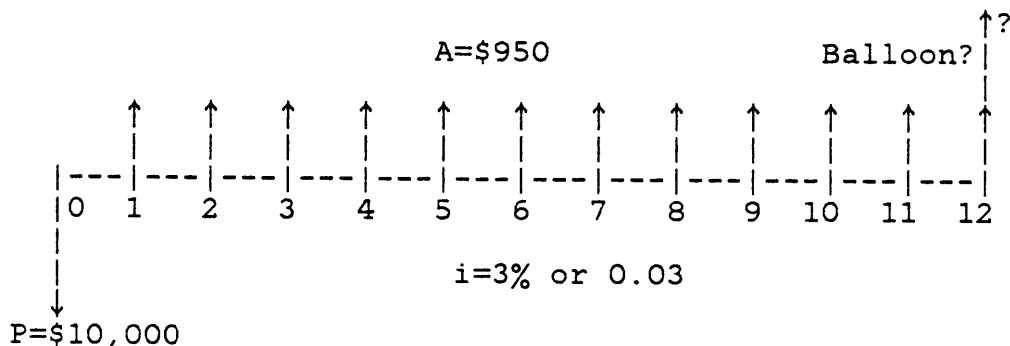
An assumption needs to be stated before continuing with an illustration of the Uniform Payments with Balloon Payment Lease Plan. Namely, if the uniform lease payment chosen by the lessee results in an underpayment, the balloon payment will be calculated based on the same interest rate used to calculate the regular, uniform lease payment. This assumption is made to simply highlight the fact that some leasing firms will include a higher interest rate on the balloon payment portion of the lease cost than on the uniform payments. As such, the higher interest rate is a penalty to the lessee.

The same basic lift-truck leasing situation used previously will be used to illustrate this type of leasing plan. However, in this case, the lease payment size is a variable, and the lessee inputs his choice.

This example is as follows:

- Payment period: Quarterly
- Lift truck purchase price: \$10,000
- Financing interest rate: 12% simple
- Deposit required: Zero
- Residual Percentage: 0%
- Lease term: 3 years
- Maintenance contract: Full maintenance at a cost of \$1200 per year
- Lease payment size: \$950 (Lessee's choice)

The cash flow diagram for the above example is as follows:



The question then is whether the \$950 quarterly payments will payout the principal (initial equipment value or lease cost) plus interest charges. That is, for a given value of A , i , and n , is the following relationship true?

$$P = A(P/A \ i, n)$$

For convenience, we can define

P' = the present worth of the planned uniform lease payments over the term of the lease, and

P = the present worth when the uniform lease payments exactly pay off the principal plus interest

B = the balloon payment at the end of the lease term

Then, three results can occur:

1. $P' > P$, or the lessee will overpay,
2. $P' = P$, or the lessee pays the correct amount, and
3. $P' < P$, or the lessee underpays and owes a balloon payment equal to B_0 , where $B_0 = P - P'$.

The result of $P' < P$ is the situation of concern with this type of lease plan. The resulting value for B_0 is a difference between P' and P which occurs at time $t=0$. Thus, the balloon payment which is paid at the end of the lease term, B_n , is a future worth value calculated from the following relationship:

$$B_n = B_0(F/P i, n)$$

In this example,

$$P = \$10,000$$

$$P' = A(P/A 3, 12)$$

$$= \$950(9.954)$$

$$= \$9,456.30$$

$$B_0 = P - P'$$

$$= 10,000 - 9,456.30$$

$$= \$543.70$$

and,

$$\begin{aligned} B_n &= B_0(F/P\ 3,12) \\ &= 543.70(1.4258) \\ &= \$775.18 \end{aligned}$$

It should be mentioned that the balloon payment due at time $t=n$ (or $t=12$ in this example) is in addition to the final uniform payment of \$950 also due at $t=n$. Thus, the total payment which the lessee is required to make at $t=12$ is \$1,725.18.

The equivalent add-on interest rate for this example is determined below:

1. Total Amount Paid = $(\$950 \times 12) + \$775.18$
 $= \$12,175.18$
2. Total Interest Paid = $\$12,175.18 - \$10,000$
 $= \$2,175.18$
3. Average Interest Per Period = $\$2,175.18/12$
 $= \$181.265$
4. Add-on Interest Rate Per Period = $(\$181.265/10,000)$
 $\times 100\%$
 $= 1.81265\%$
5. Annual Add-on Rate = $1.81265\% \times 4$
 $= 7.25\%$

Recalling that the maintenance charges are \$300 per quarter, a summary of the results for this example are:

1. Type of Payments = Quarterly

2. Interest Rate: 12% simple
3. Lease Term: 3 years or 12 quarters
4. Equipment Value: \$10,000
5. Residual: 0%
6. Lease Cost: \$10,000
7. Maintenance Charges: \$1,200/year
8. Total Interest Paid: \$2,175.18
9. Total of Payments: \$12,175.18
10. Equivalent Add-on Rate: 7.25%

A tabulation of quarterly payments over the lease term is shown below:

<u>Period Number</u>	<u>Lease Payment</u>	<u>Maintenance Payment</u>	<u>Total Payment</u>
1	\$950.00	\$300	\$1,250.00
2	950.00	300	1,250.00
3	950.00	300	1,250.00
4	950.00	300	1,250.00
5	950.00	300	1,250.00
6	950.00	300	1,250.00
7	950.00	300	1,250.00
8	950.00	300	1,250.00
9	950.00	300	1,250.00
10	950.00	300	1,250.00
11	950.00	300	1,250.00
12	1,725.18	300	2,025.18

3.4 AFTER-TAX ANALYSIS OF SELECTED TRUE LEASE PLANS

It is the purpose of this section to present the after-tax analysis for the true lease plans illustrated in the previous section (3.3) of this chapter.

One advantage of leasing vs. purchasing an item of equipment that is often cited in the literature is the tax advantage that may result. The phrase "may result" is emphasized since whether there is a tax advantage or not depends on several parameters, primarily the tax laws at the time of the decision. Thus, it is not the purpose of this section to prove or disprove the claim of tax advantages for leasing. Rather, the purpose is to illustrate the after-tax analysis with current 1983 tax laws.

An interesting aspect of the 1983 income tax laws that particularly applies to leasing is the lessor option of "passing thru" the investment tax credit (ITC) to the lessee. Given that the lessor does indeed pass through the ITC to the lessee, there are also options on the method by which this is done. These are illustrated in the next section.

3.4.1 Pass Through Of ITC

There are two basic ways in which a lessor may pass through the ITC to the lessee:

1. The lessor passes through the privilege of taking the ITC to the lessee. (The specifics of this are given in Section 48(d) of the IRS code).

Once the lessor has transferred the ITC to the lessee, the lessee has two options, categorized as:

- a. Full ITC with Income Reporting
- b. Partial ITC with no Income Reporting

Both these options will be explained in a later section of this chapter.

2. The lessor passes through the ITC by virtue of reducing the size of payments required by the lessee.

In this option, the lessor retains the privilege of taking the ITC but agrees to reduce the lease payment amount required by the lessee. The lessor can reduce the payment by two calculation procedures:

- a. The lessor calculates the regular uniform payment required to pay off principal plus interest (at the current rate). Then, the lessor decides on the amount of the ITC he is willing to pass through (not necessarily the full ITC). This amount is simply divided by the number of lease payments in the lease term. The resulting value is subtracted from the regular uniform payment value.

- b. The lessor lowers the current interest rate, so that, when calculating the payment size, the reduction per

payment is already included in the lease payments. (Determining the new interest rate which will effect the appropriate payment reduction is a separate problem. It is believed by the author that this calculation method is rarely used by the lessor, and a judgment is made to forego an example calculation).

Option (a) above will be illustrated later by an example. Before doing so, let us return to Section 48(d) of the IRS Code and the specifics related to passing through the ITC.

3.4.1.1 Section 48(d) of the IRS Code

This section will illustrate the investment tax credit rules/options when a lessor elects to pass through the ITC to a lessee. As stated in the previous section, there are basically two options in which the lessee may take the ITC:

1. Full ITC with Income Reporting
2. Partial ITC with no Income Reporting

These two options will be illustrated in the sections to follow.

1. Full ITC With Income Reporting

Given that the leased property qualifies and the lessor elects to pass through the full ITC for which he is eligible, the Recovery Act of 1982 requires that, if the full ITC

allowable is taken by the lessee, then the lessee must report as income 50% of the investment tax credit uniformly distributed over the recovery life of the equipment used by the lessor to determine annual depreciation allowances.

For properties classified as having a three-year recovery life, the allowable ITC the lessee can take is 6% of the "fair market value" of the property (as if the lessee had purchased the property). For properties where the recovery life is 5, 10, or 15, the allowable ITC is 10% of the fair market value of the property.

Example:

Suppose an industrial truck is leased and the lessor elects to pass through the full investment tax credit to the lessee. The lessee elects to take the full ITC and report income accordingly. The fair market value of the truck is \$20,000. The truck is classified as a 5-year property, or the recovery life of the truck for depreciation purposes is 5 years. Then,

ITC = 10% of \$20,000

= \$2,000

Lessee's Income Reporting = 50% of ITC

= 50% of \$2,000

= \$1,000

Then for a 5-year recovery life, the income is uniformly spread as follows:

<u>Year #</u>		<u>Amount</u>
1	1/5 of \$1,000	\$200
2	1/5 of 1,000	200
3	1/5 of 1,000	200
4	1/5 of 1,000	200
5	1/5 of 1,000	200

Totals: \$1,000

The lessee will therefore claim an ITC of \$2000 in the first year of the lease term, but will report \$200 income in each of the five years.

2. Partial ITC With No Income Reporting

The lessee has to reduce the full investment tax credit percentage for which he is eligible by an amount of 2%. Thus, the reduced investment credit is 8% for recovery property other than three-year property and 4% for three-year property. An example is given below:

Using the example from the previous section, the fair market value is \$20,000, and

$$\begin{aligned} \text{ITC} &= 8\% \text{ of } \$20,000 \\ &= \$1,600 \end{aligned}$$

The lessee therefore would claim \$1600 as a tax credit in the first year of the lease term and there is no further reporting required of the lessee by IRS.

Each of the ITC options are illustrated for the Uniform Payment Lease Plan in Section 3.5 following. The assumptions/constraints on which the after-tax calculations are based in this section are isolated and enumerated next (Section 3.4.2)

3.4.2 Assumptions/Constraints of After-Tax Calculations

Assumptions on which the after-tax analysis in Section 3.5 are based and some constraints pertinent to the micro-computer software developed are enumerated below.

1. Cash flows follow the end-of-period convention. That is, all cash flows are assumed to occur at the end of a compound interest period.

2. A leasing agreement is initiated at time $t=0$. The first lease payment and/or maintenance payment occurs at the end of the first lease period (no payments in advance); the last lease and/or maintenance payment occurs at the end of the lease term ($t=n$).

3. Any ITC for which the lessee is eligible is taken at the end of the first year of the lease term. As a corollary, any income that must be reported as a result of an ITC "pass through" occurs at the end of each year of the lease term. (See item 4 below also).

4. When the lessee elects "Full ITC with Income Reporting", the lease term involved must be five or more years in duration.

5. The maximum lease term permitted by the microcomputer software developed is 10 years.

3.5 AFTER-TAX ANALYSIS FOR THE UNIFORM PAYMENTS LEASE PLAN

Recall from section 3.4 of this chapter that a lessor may transfer the ITC privileges to the lessee, or reduce the lease payments, or do neither. The Uniform Payments Lease Plan will be used to illustrate these options available to the lessee/lessor. In general, a complete after-tax cash flow analysis will be illustrated.

The data/results of the before-income tax analysis of the Uniform Payments Lease Plan in Section 3.4.1 are recalled below:

- Type of Lease Plan: Uniform Payments
- Interest Rate: 12% simple
- Payment Period: Quarterly
- Lease Term: 3 years, or 12 quarters
- Equipment Sales Price: \$10,000
- Residual Percentage: 0%
- Maintenance Contract: Full maintenance at a cost of \$1,200/year

Then,

- Lease Cost: \$10,000
- Maintenance Cost/Period: \$300
- Size of Quarterly Payments: \$1,004.55
- Total Interest Paid: \$2,055.44
- Total of Payments: \$12,055.44
- Equivalent Add-On Interest Rate: 6.8515%

Common data needed for the after-tax analysis is assumed to be:

- Lessee's Income Tax Rate: 46%
- Date of Lease: 2/12/83
- Date of First Payment: 5/12/83
- Minimum Attractive Rate of Return: 12%

Also, the following analysis can be useful to either the lessee or the lessor. The output information where the interest rate on the unpaid balance is calculated may be of particular interest to the lessor, and all the output information should be of interest to the lessee, since payment size, maintenance charges per period, tax savings per year, investment tax credit, income reporting per year, and the present worth of the lease cost will be given.

3.5.1 Zero ITC Transferred Option

The lessor may not agree to pass through any ITC. This situation can serve as the reference example for comparison purposes. In the after-tax analysis, the tax savings result from considering that deductible expenses resulting from the truck lease agreement serve to lower the taxable income generated from other business operations. Tax savings per year are calculated as follows:

$$\begin{aligned} \text{Tax Savings} = & (\text{Summation of base payments made in a year} \\ & + \text{Summation of any maintenance payments} \\ & \text{in a year}) \times (\text{Income Tax Rate}) \end{aligned}$$

(For information on how to calculate interest payment per period, see Section 2.2.1 in Chapter 2 of this report).

Then, the after-tax analysis is as follows:

For year 1983,

<u>Date of Payment</u>	<u>Interest /Payment</u>	<u>Principal /Payment</u>	<u>Total Payment</u>
5/12/83	\$300	\$704.62	\$1,004.62
8/12/83	278.86	725.76	1,004.62
<u>11/12/83</u>	<u>257.09</u>	<u>747.53</u>	<u>1,004.62</u>
Totals:	835.95	2,177.91	3,013.86

<u>Date of Payment</u>	<u>Maintenance /Period</u>	<u>Grand Total</u>	<u>Balance Due On Principal</u>
5/12/83	\$300	\$1,304.62	\$9,295.38
8/12/83	300	1,304.62	8,569.62
<u>11/12/83</u>	<u>300</u>	<u>1,304.62</u>	<u>7,822.09</u>

Totals: 900 3,913.86

Tax savings for year 1983 are then

$$\begin{aligned}\text{Tax savings} &= (\$3,013.86 + \$900) \times 0.46 \\ &= (\$3,913.86) \times 0.46 \\ &= \$1,800.38\end{aligned}$$

For year 1984,

<u>Date of Payment</u>	<u>Interest /Payment</u>	<u>Principal /Payment</u>	<u>Total Payment</u>
2/12/84	\$234.66	\$769.96	\$1,004.62
5/12/84	211.56	793.06	1,004.62
8/12/84	187.77	816.85	1,004.62
<u>11/12/84</u>	<u>163.27</u>	<u>841.35</u>	<u>1,004.62</u>
Totals:	797.26	3,221.22	4,018.48

<u>Date of Payment</u>	<u>Maintenance /Period</u>	<u>Grand Total</u>	<u>Balance Due On Principal</u>
2/12/84	\$300	\$1,304.62	\$7,052.13
5/12/84	300	1,304.62	6,259.07
8/12/84	300	1,304.62	5,442.22
<u>11/12/84</u>	<u>300</u>	<u>1,304.62</u>	<u>4,600.87</u>
Totals:	1,200	5,218.48	

Tax savings for year 1984: \$2,400.50

For year 1985,

<u>Date of Payment</u>	<u>Interest /Payment</u>	<u>Principal /Payment</u>	<u>Total Payment</u>
2/12/85	\$138.03	\$866.59	\$1,004.62
5/12/85	112.03	892.59	1,004.62
8/12/85	85.25	919.37	1,004.62

<u>11/12/85</u>	<u>57.67</u>	<u>946.95</u>	<u>1,004.62</u>
-----------------	--------------	---------------	-----------------

Totals:	392.98	3,625.50	4,018.48
---------	--------	----------	----------

<u>Date of Payment</u>	<u>Maintenance /Period</u>	<u>Grand Total</u>	<u>Balance Due On Principal</u>
------------------------	----------------------------	--------------------	---------------------------------

2/12/85	\$300	\$1,304.62	\$3,734.28
---------	-------	------------	------------

5/12/85	300	1,304.62	2,841.69
---------	-----	----------	----------

8/12/85	300	1,304.62	1,922.32
---------	-----	----------	----------

<u>11/12/85</u>	<u>300</u>	<u>1,304.62</u>	<u>975.37</u>
-----------------	------------	-----------------	---------------

Totals:	1,200	5,218.48	
---------	-------	----------	--

Tax savings for year 1985: \$2,400.50

For year 1986,

<u>Date of Payment</u>	<u>Interest /Payment</u>	<u>Principal /Payment</u>	<u>Total Payment</u>
------------------------	--------------------------	---------------------------	----------------------

<u>2/12/86</u>	<u>\$29.26</u>	<u>\$975.36</u>	<u>\$1,004.62</u>
----------------	----------------	-----------------	-------------------

Totals:	29.26	975.36	1,004.62
---------	-------	--------	----------

<u>Date of Payment</u>	<u>Maintenance /Period</u>	<u>Grand Total</u>	<u>Balance Due On Principal</u>
------------------------	----------------------------	--------------------	---------------------------------

<u>2/12/86</u>	<u>300</u>	<u>1,304.62</u>	<u>0.01</u>
----------------	------------	-----------------	-------------

Totals:	300	1,304.62	
---------	-----	----------	--

Tax savings for year 1986: \$600.13

With the last payment made, a "Balance Due on Principal" equal to \$0.01 is due to rounding in the microcomputer calculations. The last payment from the microcomputer output may therefore have to be corrected manually to arrive at zero Balance Due. In this case, the last payment should be \$1,004.62.

The present worth of the base cost can be calculated by discounting each lease payment and maintenance charge, if any, to time zero and subtracting the discounted after-tax savings. That is,

$$\begin{aligned}
 P &= \sum_{j=1}^n A_j (P/F \ i, j) - \sum_{j=1}^n T_j (P/F \ i, j) \\
 &= \sum_{j=1}^n A_j (1+i)^{-j} - \sum_{j=1}^n T_j (1+i)^{-j}
 \end{aligned}$$

where,

P = present worth of the total cash flow in period j

A_j = lease plus maintenance payment in period j ,

$j = 1, 2, \dots, n$

T_j = tax savings plus investment tax credit (if any)

for period j when j is the last payment in a
calendar year

= 0 otherwise

i = interest rate per period

n = number of periods in a lease term

For this example/plan,

$$\begin{aligned}
 P &= 1,304.62(1.03)^{-1} + 1,304.62(1.03)^{-2} \\
 &\quad + 1,304.52(1.03)^{-3} + \dots + 1,304.62(1.03)^{-12} \\
 &\quad - \{1,800.38(1.03)^{-3} + 2,400.5(1.03)^{-7} \\
 &\quad + 2,400.5(1.03)^{-11} + 600.13(1.03)^{-12}\} \\
 &= \$7,231.67
 \end{aligned}$$

Thus,

Lease Present Worth at 2/12/83: \$7,231.67

3.5.2 Full ITC with Income Reporting Option

For this option, the differences in calculation methodology from the "Zero ITC" option are illustrated below:

1. The tax savings for a given year are equal to

$$\text{Tax Savings} = (\text{Summation of lease payments in the year} \\ + \text{Summation of maintenance payments} \\ \text{in the year} - \text{the amount of ITC-related} \\ \text{income reported in the year}) \times (\text{Income} \\ \text{Tax Rate})$$

2. For purposes of calculating the present worth of the cash flows involved in the lease plan, the investment tax credit taken by the lessee will be treated as a separate cash flow item.

In this example of "Full ITC Pass Through With Income Reporting", and since the equipment recovery life is 3 years (lease term), the ITC to be passed through is 6% of the fair market value (\$10,000). That is,

ITC = 6% of \$10,000

= \$600

The lessee will have to report 50% of the ITC as income by the following schedule:

<u>Year</u>	<u>Amount</u>
1983 (1/3 x 50% x ITC)	\$100

1984	"	\$100
1985	"	\$100

The complete after-tax analysis follows:

<u>Date of Payment</u>	<u>Interest /Payment</u>	<u>Principal /Payment</u>	<u>Total Payment</u>
5/12/83	\$300.00	\$704.62	\$1,004.62
8/12/83	278.86	725.76	1,004.62
<u>11/12/83</u>	<u>257.09</u>	<u>747.53</u>	<u>1,004.62</u>
Totals:	835.95	2,177.91	3,013.86

<u>Date of Payment</u>	<u>Maintenance /Period</u>	<u>Grand Total</u>	<u>Balance Due On Principal</u>
5/12/83	\$300	\$1,304.62	\$9,295.38
8/12/83	300	1,304.62	8,569.62
<u>11/12/83</u>	<u>300</u>	<u>1,304.62</u>	<u>7,822.09</u>
Totals:	900	3,913.86	

ITC taken in year 1983: \$600

Taxable income for year 1983: \$100

Tax savings for year 1983: \$2,354.38

<u>Date of Payment</u>	<u>Interest /Payment</u>	<u>Principal /Payment</u>	<u>Total Payment</u>
2/12/84	\$234.66	\$769.96	\$1,004.62
5/12/84	211.56	793.06	1,004.62
8/12/84	187.77	816.35	1,004.62
<u>11/12/84</u>	<u>163.27</u>	<u>841.35</u>	<u>1,004.62</u>
Totals:	797.26	3,221.22	4,018.48

<u>Date of Payment</u>	<u>Maintenance /Period</u>	<u>Grand Total</u>	<u>Balance Due On Principal</u>
------------------------	----------------------------	--------------------	---------------------------------

2/12/84	\$300	\$1,304.62	\$7,052.13
5/12/84	300	1,304.62	6,259.07
8/12/84	300	1,304.62	5,442.22
<u>11/12/84</u>	<u>300</u>	<u>1,304.62</u>	<u>4,600.87</u>
Totals:	1,200	5,218.48	

Taxable Income for Year 1984: \$100

Tax Savings For Year 1984: \$2,354.50

<u>Date of Payment</u>	<u>Interest /Payment</u>	<u>Principal /Payment</u>	<u>Total Payment</u>
2/12/85	\$138.03	\$866.59	\$1,004.62
5/12/85	112.03	892.59	1,004.62
8/12/85	85.25	919.37	1,004.62
<u>11/12/85</u>	<u>57.67</u>	<u>946.95</u>	<u>1,004.62</u>
Totals:	392.98	3,625.50	4,018.48

<u>Date of Payment</u>	<u>Maintenance /Period</u>	<u>Grand Total</u>	<u>Balance Due On Principal</u>
2/12/85	\$300	\$1,304.62	\$3,734.28
5/12/85	300	1,304.62	2,841.69
8/12/85	300	1,304.62	1,922.32
<u>11/12/85</u>	<u>300</u>	<u>1,304.62</u>	<u>975.37</u>
Totals:	1,200	5,218.48	

Taxable Income For Year 1985: \$100

Tax Savings For Year 1985: \$2,354.50

<u>Date of Payment</u>	<u>Interest /Payment</u>	<u>Principal /Payment</u>	<u>Total Payment</u>
<u>2/12/86</u>	<u>\$29.26</u>	<u>\$975.36</u>	<u>\$1,004.62</u>
Totals:	29.26	975.36	1,004.62

<u>Date of Payment</u>	<u>Maintenance /Period</u>	<u>Grand Total</u>	<u>Balance Due On Principal</u>
<u>2/12/86</u>	<u>29.26</u>	<u>975.36</u>	<u>1,004.62</u>
Totals:	29.26	975.36	1,004.62

Lease Present Worth at 2/12/83: \$6,795.32

3.5.3 Partial ITC Pass Through/No Income Reporting Option

In this option, the tax savings will be calculated as in Section 3.5.1. Again, the investment tax credit will be included in the present worth calculation as a separate item.

With this option, the ITC passed through is 4% (6% eligible - 2%), or,

$$\begin{aligned}\text{ITC} &= 4\% \text{ of } \$10,000 \\ &= \$400\end{aligned}$$

Then, the after-tax analysis follows:

<u>Date of Payment</u>	<u>Interest /Payment</u>	<u>Principal /Payment</u>	<u>Total Payment</u>
5/12/83	\$300	\$704.623	\$1,004.62
8/12/83	278.86	725.76	1,004.62
<u>11/12/83</u>	<u>257.09</u>	<u>747.53</u>	<u>1,004.62</u>
Totals:	835.95	2,177.91	3,013.86

<u>Date of Payment</u>	<u>Maintenance /Period</u>	<u>Grand Total</u>	<u>Balance Due On Principal</u>
5/12/83	\$300	\$1,304.62	\$9,295.38
8/12/83	300	1,304.62	8,569.62
<u>11/12/83</u>	<u>300</u>	<u>1,304.62</u>	<u>7,822.09</u>

Totals: 1,200 3,913.86

ITC Taken In Year 1983: \$400

Tax Savings For Year 1983: \$2,200.38

<u>Date of Payment</u>	<u>Interest /Payment</u>	<u>Principal /Payment</u>	<u>Total Payment</u>
2/12/84	\$234.66	\$769.96	\$1,004.62
5/12/84	211.56	793.06	1,004.62
8/12/84	187.77	816.85	1,004.62
<u>11/12/84</u>	<u>163.27</u>	<u>841.35</u>	<u>1,004.62</u>
Totals:	797.26	3,221.22	4,018.48

<u>Date of Payment</u>	<u>Maintenance /Period</u>	<u>Grand Total</u>	<u>Balance Due On Principal</u>
2/12/84	\$300	\$1,304.62	\$7,052.13
5/12/84	300	1,304.62	6,259.07
8/12/84	300	1,304.62	5,442.22
<u>11/12/84</u>	<u>300</u>	<u>1,304.62</u>	<u>4,600.87</u>
Totals:	1,200	5,218.48	

Tax Savings For Year 1984: \$2,400.50

<u>Date of Payment</u>	<u>Interest /Payment</u>	<u>Principal /Payment</u>	<u>Total Payment</u>
2/12/85	\$138.03	\$866.59	\$1,004.62
5/12/85	112.03	892.59	1,004.62
8/12/85	85.25	919.37	1,004.62
<u>11/12/85</u>	<u>57.67</u>	<u>946.95</u>	<u>1,004.62</u>
Totals:	392.98	3,625.50	4,018.48

<u>Date of Payment</u>	<u>Maintenance /Period</u>	<u>Grand Total</u>	<u>Balance Due On Principal</u>

2/12/85	\$300	\$1,304.62	\$3,734.28
5/12/85	300	1,304.62	2,841.69
8/12/85	300	1,304.62	1,922.32
<u>11/12/85</u>	<u>300</u>	<u>1,304.62</u>	<u>975.37</u>
Totals:	1,200	5,218.48	

Tax Savings For Year 1985: \$2,400.50

<u>Date of Payment</u>	<u>Interest /Payment</u>	<u>Principal /Payment</u>	<u>Total Payment</u>
<u>2/12/86</u>	<u>\$29.26</u>	<u>\$975.36</u>	<u>\$1,004.62</u>
Totals:	29.26	975.36	1,004.62
<u>Date of Payment</u>	<u>Maintenance /Period</u>	<u>Grand Total</u>	<u>Balance Due On Principal</u>
<u>2/12/86</u>	<u>300</u>	<u>1,304.62</u>	<u>0.01</u>
Totals:	300	1,304.62	

Tax Savings For Year 1986: \$600.13

Lease Present Worth at 2/12/83: \$6,865.62

3.5.4 Payment Reduction ITC Pass Through Option

For this option, the lessor must decide on the amount to be passed through to the lessee as a payment reduction.

Suppose the lessor passes through \$400. Then,

$$\begin{aligned}\text{Payment Discount Per Period} &= \$400/12 \\ &= \$33.33\end{aligned}$$

Hence, the new payment per period is:

$$\begin{aligned}\text{Payment /Period} &= \$1,004.62 - \$33.33 \\ &= \$971.29\end{aligned}$$

The after-tax analysis is calculated the same as was done in Section 3.5.1 (No ITC transferred) but a new interest rate or internal rate of return must be calculated because of the new payment per period. Recall the original payment was calculated with a 12% simple interest rate, but the new payment is less than the original, and in order to end up with a zero balance on the principal, a new simple interest rate must be computed.

Using the methodology for calculating the Internal Rate of Return in Section 3.2.2 of this chapter, the new simple interest rate can be found to be 9.758%.

Then, the after-tax analysis is as follows:

<u>Date of Payment</u>	<u>Interest /Payment</u>	<u>Principal /Payment</u>	<u>Total Payment</u>
5/12/83	\$112.03	\$727.34	\$971.29
8/12/83	226.21	245.08	971.29
<u>11/12/83</u>	<u>208.03</u>	<u>763.26</u>	<u>971.29</u>
Totals:	678.19	2,235.68	2,913.87
<u>Date of Payment</u>	<u>Maintenance /Period</u>	<u>Grand Total</u>	<u>Balance Due On Principal</u>
5/12/83	\$300	\$1,271.29	\$9,272.66
8/12/83	300	1,271.29	8,527.58
<u>11/12/83</u>	<u>300</u>	<u>1,271.29</u>	<u>7,764.32</u>
Totals:	900	3,813.87	

Tax Savings For Year 1983: \$1754.38

<u>Date of Payment</u>	<u>Interest /Payment</u>	<u>Principal /Payment</u>	<u>Total Payment</u>
------------------------	--------------------------	---------------------------	----------------------

2/12/84	\$189.41	\$781.88	\$971.29
5/12/84	170.34	800.95	971.29
8/12/84	150.80	820.49	971.29
<u>11/12/84</u>	<u>130.78</u>	<u>840.51</u>	<u>971.29</u>
Totals:	641.33	3,243.83	3,885.16

<u>Date of Payment</u>	<u>Maintenance /Period</u>	<u>Grand Total</u>	<u>Balance Due On Principal</u>
2/12/84	\$300	\$1,271.29	\$6,982.44
5/12/84	300	1,271.29	6,181.49
8/12/84	300	1,271.29	5,361.00
<u>11/12/84</u>	<u>300</u>	<u>1,271.29</u>	<u>4,520.49</u>
Totals:	1,200	5,085.16	

Tax Savings For Year 1984: \$2,339.17

<u>Date of Payment</u>	<u>Interest /Payment</u>	<u>Principal /Payment</u>	<u>Total Payment</u>
2/12/85	\$110.28	\$861.01	\$971.29
5/12/85	89.27	882.02	971.29
8/12/85	67.76	903.53	971.29
<u>11/12/85</u>	<u>45.71</u>	<u>925.58</u>	<u>971.29</u>
Totals:	313.02	3,572.14	3,885.16

<u>Date of Payment</u>	<u>Maintenance /Period</u>	<u>Grand Total</u>	<u>Balance Due On Principal</u>
2/12/85	\$300	\$1,271.29	\$3,659.48
5/12/85	300	1,271.29	2,777.46
8/12/85	300	1,271.29	1,873.93
<u>11/12/85</u>	<u>300</u>	<u>1,271.29</u>	<u>948.35</u>

Totals: 1,200 5,085.16

Tax Savings For Year 1985: \$2,339.17

<u>Date of Payment</u>	<u>Interest /Payment</u>	<u>Principal /Payment</u>	<u>Total Payment</u>
<u>2/12/86</u>	<u>23.13</u>	<u>948.16</u>	<u>971.29</u>
Totals:	23.13	948.16	971.29

<u>Date of Payment</u>	<u>Maintenance /Period</u>	<u>Grand Total</u>	<u>Balance Due On Principal</u>
<u>2/12/86</u>	<u>300</u>	<u>1,271.29</u>	<u>0.19</u>
Totals:	300	1,271.29	

Lease Present Worth at 2/12/83: \$7,248.16

3.6 RESULTS AND AREAS FOR FURTHER DEVELOPMENT

The following table of lease costs at $t=0$ (MARR = 12%) summarizes the after-tax analysis results for the examples illustrated in the Before-Tax Analysis of Selected Lease Plans (Section 3.3 of this report). The data used in Section 3.5 to calculate the after-tax analysis for the Uniform Payments Lease Plan has also been used for the plans summarized below.

	Uniform Payments	Skipped Payments	Accele- rated Payments	Uniform Plus Balloon Payments
Zero ITC Transfer	\$7,231.67	\$7,286.81	\$7,245.70	\$7,222.51
Full ITC Pass Thr- ough/In- come Re- porting	\$6,795.32	\$6,850.45	\$6,809.34	\$6,786.16
Partial ITC Pass Through No Inco- me Report	\$6,865.62	\$6,920.75	\$6,879.64	\$6,856.45
Payment Reduction ITC Pass Through	\$7,248.16	\$7,293.56	\$7,264.59	\$7,239.36

This table is included for illustrative purposes only. Conclusions on which of the Lease Plans is the best can not be drawn. In order to obtain such a conclusion the following additional points would have to be considered:

1. the lessee's cash outlay
2. the lessee's tax situation
3. the intrinsic characteristics of each individual plan. (For example, the Percentage of Time Balance Variation, the number and allocation of skipped payments, the Balloon Payment size, etc.).

The main areas available for additional development are:

- a) a further study on the Financial Lease Plans and the

Option to Purchase Plans.

- b) software development for the above
- c) investigation, through sensitivity analysis, of the lease plans in order to gain insight to the best lease plan for an individual lessee's needs.

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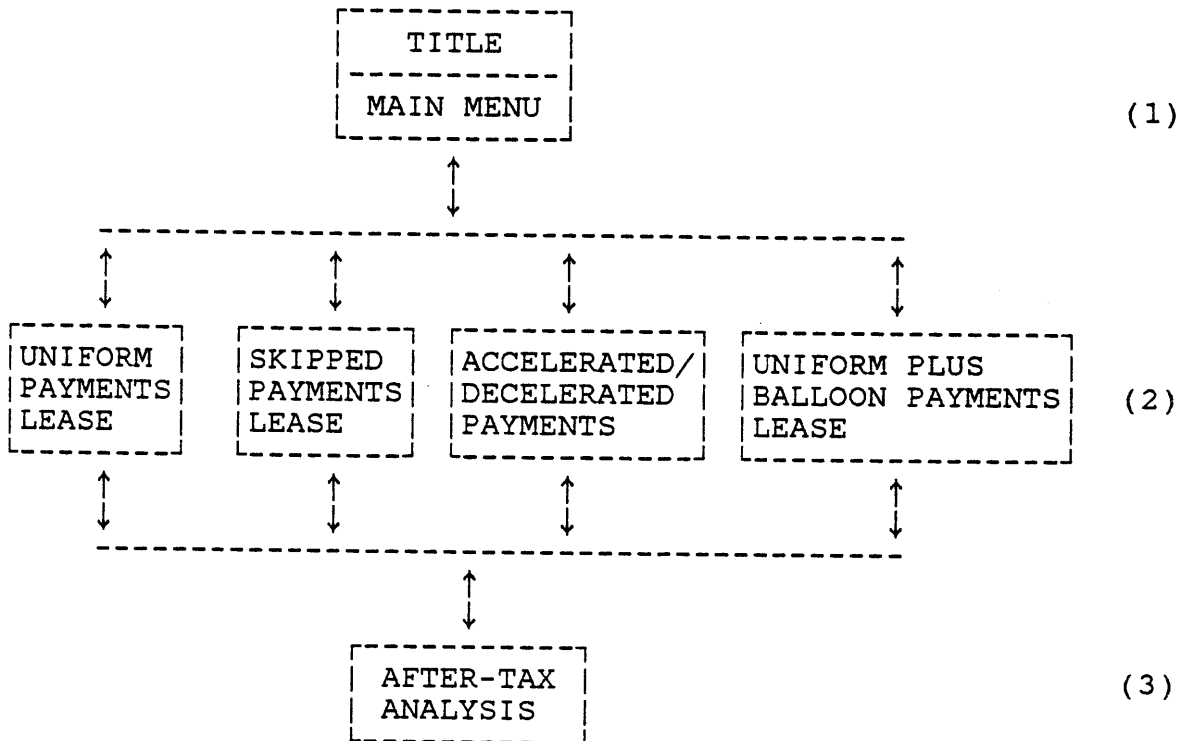
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Appendix A

SAMPLE RUN

The following block diagram shows the basic structure of the leasing software:



In the above diagram, the first part of the software, (1), simply gives the title blocks for the software and then provides a menu with four leasing plans the user may select. Once a leasing plan is selected, the program goes to the appropriate before-income tax analysis subroutine, item (2) in the previous diagram. At the completion of the before-tax

analysis, a screen display provides the user with four choices. For example, if the user had completed the analysis for the Uniform Payments Lease Plan, the choices would be:

1. Obtain the after-tax analysis
2. Continue with uniform lease
3. Go to main menu
4. End this session

If option 1 were selected, program control transfers to the after-tax analysis subroutine (common for all lease plans) as shown in item (3) in the previous schematic. If option 2 is selected, program control remains in the before-tax analysis subroutine for the Uniform Payments Plan but returns to a screen display asking the user what input data he (or she) wishes to change. Option 3 results in the main menu being displayed so that another lease plan may be chosen. Option 4 results in an exit from the leasing program.

For the after-tax analysis subroutine, once the results have been obtained, a screen display will provide the user the following four choices:

1. Continue with after-tax analysis
2. Continue with the lease plan previously used
3. Go to main menu
4. End this session

Selecting option 1 returns the user to the portion of the after-tax analysis program which permits the user to change the input data. Option 2 returns program control to the before-tax analysis subroutine for the particular lease plan of concern. Option 3 and 4 are as defined previously.

A complete sample run of the leasing software is shown next. In the following samplerunn, the screen number (<scr.#>), has been supplied by the author in order to indicate to the user what will appear in the screen as the program is run. In addition, all the variables the user needs to input have been underlined.

<scr.1>

```
*****
*                                     *
*  MICROCOMPUTER SOFTWARE           *
*                                     *
*          FOR THE                  *
*                                     *
*  LEASING INDUSTRY                *
*                                     *
*****
```

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BY

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<scr.2>

MAIN MENU

1. UNIFORM LEASE
2. SKIPPED LEASE
3. ACCELERATED/DECELERATED LEASE
4. UNIFORM PAYMENTS + BALLOON PAYMENT
5. END OF SESSION

ENTER NUMBER OF SELECTION: 3

<scr.3>

ACCELERATED/DECELARATED PAYMENTS

<scr.4>

CASE III
ACCELERATED/DECELERATED PAYMENTS
CASH FLOW PROFILE

- GIVEN PRESENT VALUE, INTEREST RATE,
LEASE TERM, & PERCENT OF TIME BALANCE
PAID; FIND PAYMENTS

PRESS <RETURN> TO CONTINUE

<scr.5>

TYPE OF PAYMENTS TO BE MADE:

1. MONTHLY
2. QUARTERLY
3. SEMIANNUALLY
4. ANNUALLY

ENTER NUMBER OF SELECTION: 2

<scr.6>

ENTER SIMPLE RATE PER YEAR (%): 12
--

<scr.7>

LEASE TERM

1. NO. OF YEARS (INTEGER)

2. NO. OF QUARTERS (INTEGER)

ENTER NUMBER OF SELECTION: 1
-

ENTER NUMBER OF YEARS: 3
-

<scr.8>

ENTER EQUIPMENT COST: \$20000

<scr.9>

ENTER RESIDUAL (%): 0
-

<scr.10>

ENTER ESTIMATED MAINTENANCE FOR YR.#1:
\$1200

<scr.11>

ENTER ESTIMATED MAINTENANCE FOR YR.#2:
\$1200

<scr.12>

ENTER ESTIMATED MAINTENANCE FOR YR.#3:
\$1200

<scr. 13>

ENTER THE PERCENT OF TIME BALANCE PAID
FOR YEAR NO. 1: 50
--

<scr. 14>

ENTER THE PERCENT OF TIME BALANCE PAID
FOR YEAR NO. 2: 33
--

<scr. 14>

ENTER THE PERCENT OF TIME BALANCE PAID
FOR YEAR NO. 3: 17
--

<scr.16>

1. TYPE OF PAYMENTS: QUARTERLY
2. TYPE OF INTEREST RATE: SIMPLE
ANNUAL INTEREST RATE: 12%
3. LEASE TERM: 3 YEARS
OR 12 QUARTERS
4. EQUIPMENT COST: \$20000
5. RESIDUAL: 0%
6. MAINTENANCE CHARGES: YR.#1:\$1200
YR.#2:\$1200 YR.#3:\$1200
7. TIME BALANCE PAID: YR.#1: 50%
YR.#2: 33% YR.#3: 17%

DO YOU WISH TO MAKE ANY CHANGES? (Y/N) N

<scr.17>

COMPUTING

<scr.18>

1. TYPE OF PAYMENTS: QUARTERLY

2. TYPE OF INTEREST RATE: SIMPLE
ANNUAL INTEREST RATE: 12%
3. LEASE TERM: 3 YEARS
OR 12 QUARTERS
4. EQUIPMENT COST: \$20000
5. RESIDUAL: 0%
6. MAINTENANCE CHARGES: YR.#1:\$1200
YR.#2:\$1200
YR.#3:\$1200
7. LEASE COST: \$2000
8. TOTAL INTEREST PAID: \$3207
9. TOTAL OF PAYMENTS: \$23207
10. EQUIVALENT ADD-ON RATE: 5.345%

PRESS <RETURN> TO CONTINUE

<scr.19>

YEAR NO. 1

PAYMENT NUMBER	PAYMENT /PERIOD	MAINTENANCE /PERIOD	TOTAL PAYMENT
-----	-----	-----	-----
1	2900.87	300	3200.87
2	2900.87	300	3200.87
3	2900.87	300	3200.87
4	2900.87	300	3200.87

PRESS <RETURN> TO CONTINUE

<scr.20>

YEAR NO. 2

PAYMENT NUMBER	PAYMENT /PERIOD	MAINTENANCE /PERIOD	TOTAL PAYMENT
-----	-----	-----	-----
5	1914.58	300	2264.58
6	1914.58	300	2264.58
7	1914.58	300	2264.58
8	1914.58	300	2264.58

PRESS <RETURN> TO CONTINUE

<scr.21>

YEAR NO. 3

PAYMENT NUMBER	PAYMENT /PERIOD	MAINTENANCE /PERIOD	TOTAL PAYMENT
-----	-----	-----	-----
9	986.3	300	1368.3
10	986.3	300	1368.3
11	986.3	300	1368.3
12	986.3	300	1368.3

PRESS <RETURN> TO CONTINUE

<scr.22>

DO YOU WISH TO GET A
HARDCOPY OF THE RESULTS? (Y/N) N

<scr.23>

DO YOU WISH TO . . . ?

1. OBTAIN AFTER-TAX ANALYSIS
2. CONTINUE WITH ACCELERATED/DECELERATED PAYMENTS
3. GO TO MAIN MENU
4. END THIS SESSION

ENTER YOUR SELECTION: 1

<scr.24>

AFTER-TAX ANALYSIS

<scr.25>

AFTER-TAX ANALYSIS

ENTER YOUR INCOME TAX RATE (%): 46
--(MM,DD,YY)
ENTER DATE OF LEASE: 1,12,83
-----(MM,DD,YY)
ENTER DATE OF FIRST PAYMENT: 4,12,83

<scr.26>

IS THE INVESTMENT TAX CREDIT TRANSFERRED
FROM LESSOR TO LESSEE? (Y/N) N
-

<scr.27>

ENTER MINIMUM ATTRACTIVE RATE OF RETURN
(MARR) (%): 10
--

<scr.28>

1. INCOME TAX RATE: 46%
2. DATE OF LEASE: 1/12/83
3. DATE OF FIRST PAYMENT: 4/12/83
4. INVESTMENT TAX CREDIT TRANSFERRED: N
5. MARR: 10%

DO YOU WISH TO MAKE ANY CHANGES? (Y/N) N
-

<scr.29>

DATE OF PAYMENT	PAYMENT /PERIOD	MAINTENANCE /PERIOD	TOTAL PAYMENT
-----	-----	-----	-----
4/12/83	2900.87	300	3200.87
7/12/83	2900.87	300	3200.87
10/12/83	2900.87	300	3200.87
-----	-----	-----	-----
TOTALS:	8702.61	1200	9602.61

TAX SAVINGS FOR YEAR 1983: \$4417.2

PRESS <RETURN> TO CONTINUE

<scr.30>

DATE OF PAYMENT	PAYMENT /PERIOD	MAINTENANCE /PERIOD	TOTAL PAYMENT
-----	-----	-----	-----
1/12/84	2900.87	300	3200.87
4/12/84	1914.58	350	2264.58
7/12/84	1914.58	350	2264.58
10/12/84	1914.58	350	2264.58
-----	-----	-----	-----
TOTALS:	8644.61	1350	9994.61

TAX SAVINGS FOR YEAR 1984: \$4597..52

PRESS <RETURN> TO CONTINUE

<scr.31>

DATE OF PAYMENT	PAYMENT /PERIOD	MAINTENANCE /PERIOD	TOTAL PAYMENT
-----	-----	-----	-----
1/12/85	1914.58	350	2264.58
4/12/85	986.3	400	1368.3
7/12/85	986.3	400	1368.3
10/12/85	986.3	400	1368.3
-----	-----	-----	-----
TOTALS:	4873.48	1550	6423.48

TAX SAVINGS FOR YEAR 1985: \$2954..8

PRESS <RETURN> TO CONTINUE

<scr.32>

DATE OF PAYMENT	PAYMENT /PERIOD	MAINTENANCE /PERIOD	TOTAL PAYMENT
-----	-----	-----	-----

1/12/86	986.3	400	1368.3
-----	-----	-----	-----
TOTALS:	968.3	400	1386.3

TAX SAVINGS FOR YEAR 1986: \$637.7

PRESS <RETURN> TO CONTINUE

<scr.33>

LEASE PRESENT WORTH AT 1/12/83: \$10182.5

PRESS <RETURN> TO CONTINUE

<scr.34>

DO YOU WISH TO GET A HARDCOPY OF THE
FULL AFTER-TAX ANALYSIS? (Y/N) N

<scr.35>

DO YOU WISH TO . . . ?

1. CONTINUE WITH AFTER-TAX ANALYSIS
2. CONTINUE WITH ACCELERATED/DECELERATED PAYMENTS
3. GO TO MAIN MENU
4. END THIS SESSION

ENTER YOUR SELECTION: 1

<scr.36>

1. INCOME TAX RATE: 46%
2. DATE OF LEASE: 1/12/83
3. DATE OF FIRST PAYMENT: 4/12/83
4. INVESTMENT TAX CREDIT TRANSFERRED: N
5. MARR: 10%

DO YOU WISH TO MAKE ANY CHANGES? (Y/N) Y

ENTER A NUMBER 1 THRU 5 OR 0 FOR ALL: 4

<scr.37>

IS THE INVESTMENT TAX CREDIT TRANSFERRED
FROM LESSOR TO LESSEE? (Y/N)?N

Y

1. FULL ITC WITH INCOME REPORTING
2. PARTIAL ITC WITH NO INCOME REPORTING
3. LESSEE PAYMENT REDUCTION

ENTER NUMBER OF SELECTION: ?0

1

<scr.38>

FULL ITC WITH INCOME REPORTING

ENTER ITC PASSED THROUGH (%): ?0

6

ENTER EQUIPMENT RECOVERY TERM (YRS): ?0

3

ENTER THE PERCENTAGE OF REPORTABLE
INCOME (%): ?0

50

--

ENTER EQUIPMENT FAIR MARKET VALUE: \$

?0

20000

<scr.39>

COMPUTING

<scr.40>

1. INCOME TAX RATE: 46%
2. DATE OF LEASE: 1/12/83
3. DATE OF FIRST PAYMENT: 4/12/83
4. INVESTMENT TAX CREDIT TRANSFERRED: Y
 FAIR MARKET VALUE: \$20000
 FULL ITC WITH INCOME REPORTING
 ITC PASSED THROUGH: 6%
 EQUIPMENT RECOVERY TERM: 3 YEARS
 REPORTABLE INCOME: 50%
5. MARR: 10%

DO YOU WISH TO MAKE ANY CHANGES? (Y/N) N

<scr.41>

COMPUTING

<scr. 42>

DATE OF PAYMENT	PAYMENT /PERIOD	MAINTENANCE /PERIOD	TOTAL PAYMENT
-----	-----	-----	-----
4/12/83	2900.87	300	3200.87
7/12/83	2900.87	300	3200.87
10/12/83	2900.87	300	3200.87
-----	-----	-----	-----
TOTALS:	8702.61	1200	9602.61

ITC TAKEN IN YEAR 1983: \$1200
 TAX. INCOME FOR YEAR 1983: \$200
 TAX SAVINGS FOR YEAR 1983: \$5525.2

PRESS <RETURN> TO CONTINUE

<scr.43>

DATE OF PAYMENT	PAYMENT /PERIOD	MAINTENANCE /PERIOD	TOTAL PAYMENT
-----	-----	-----	-----
1/12/84	2900.87	300	3200.87
4/12/84	1914.58	350	2264.58
7/12/84	1914.58	350	2264.58

10/12/84	1914.58	350	2264.58

TOTALS:	8644.61	1350	9994.61

TAX. INCOME FOR YEAR 1984: \$200
TAX SAVINGS FOR YEAR 1984: \$4505.52

PRESS <RETURN> TO CONTINUE

<scr.44>

DATE OF PAYMENT	PAYMENT /PERIOD	MAINTENANCE /PERIOD	TOTAL PAYMENT

1/12/85	1914.58	350	2264.58
4/12/85	986.3	400	1368.3
7/12/85	986.3	400	1368.3
10/12/85	986.3	400	1368.3

TOTALS:	4873.48	1550	6423.48

TAX. INCOME FOR YEAR 1985: \$200
TAX SAVINGS FOR YEAR 1985: \$2862.8

PRESS <RETURN> TO CONTINUE

<scr.45>

DATE OF PAYMENT	PAYMENT /PERIOD	MAINTENANCE /PERIOD	TOTAL PAYMENT

1/12/86	986.3	400	1368.3

TOTALS:	968.3	400	1386.3

TAX SAVINGS FOR YEAR 1986: \$637.7

PRESS <RETURN> TO CONTINUE

<scr.46>

LEASE PRESENT WORTH AT 1/12/83: \$10182.5

PRESS <RETURN> TO CONTINUE

<scr.47>

DO YOU WISH TO GET A HARDCOPY OF THE
FULL AFTER-TAX ANALYSIS? (Y/N) N

<scr.48>

DO YOU WISH TO . . . ?

1. CONTINUE WITH AFTER-TAX ANALYSIS
2. CONTINUE WITH ACCELERATED/DECELERATED PAYMENTS
3. GO TO MAIN MENU
4. END THIS SESSION

ENTER YOUR SELECTION: 4

<scr.49>

GOOD BYE!

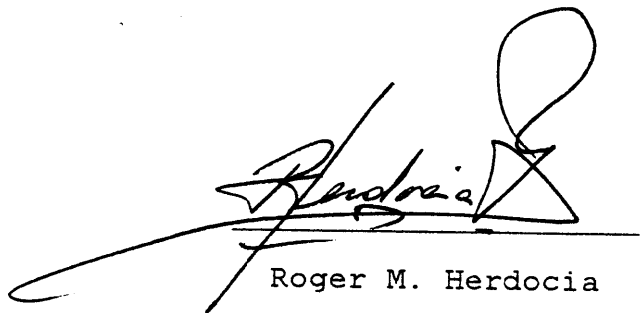
VITA

Roger M. Herdocia was born in Leon, Nicaragua on September 2, 1958. He graduated from Colegio Calasanz High School, in November, 1975.

He entered Virginia Polytechnic Institute and State University as a sophomore in September, 1978, after spending his freshman year in Miami-Dade Community College, Florida. He received a Bachelor of Science degree in Industrial Engineering and Operations Research in December, 1981.

In August, 1983, he received his Master of Engineering in Industrial Engineering and Operations Research (Manufacturing Engineering Option) from Virginia Polytechnic Institute and State University.

Mr. Herdocia is a member of the American Institute of Industrial Engineers, and the Society of Manufacturing Engineers.



Roger M. Herdocia