Software Calculation Procedures – DOS Version 3.1

RDA RESERVE MANAGEMENT SOFTWARE™

prepared by

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May 2, 2010

The basis of this document was originally prepared in 2002. It has now been revised and expanded to include additional detail and narrative, mostly from documents that have been prepared through the years since the program's inception in 1980. It is now the most complete explanation of the RDA RESERVE MANAGEMENT SOFTWARE™ calculation process to date.

There are two basic calculation processes identified as industry standards and used within the software: the cash-flow method and the component method.

The cash flow method develops a reserve-funding plan where contributions to the reserve fund are designed to offset the variable annual expenditures from the reserve fund. Different reserve funding plans are tested against the actual anticipated schedule of reserve expenses until the desired funding goal is achieved. This method sets up a "window" in which all future anticipated replacement costs are computed, based on the individual lives of the components under consideration (more on this later).

The component method develops a reserve-funding plan where the total contribution is based on the sum of contributions for individual components. The component method is the more conservative of the two funding options, and assures that the association will achieve and maintain an ideal level of reserves over time. This method also allows for computations on individual components in the analysis. The RDA Summary and RDA Projection Reports are based upon the component methodology and the fist set of calculations are based on this method. *Note that this method may not be in the best interest for associations that are severely undefunded.*

ALL PROGRAM CALCULATIONS ARE COMPLETED AS A SERIES OF STEPS AS FOLLOWS:

The first step the program performs in this process is subtracting, from the total accumulated reserves, any amounts for assets which have predetermined (fixed) reserve balances. The user can "fix" the accumulated reserve balance within the program on the individual asset's detail page. If by error these amounts total more than the amount of funds available, then the remaining assets are adjusted accordingly. While completing this task, the program also re-calculates the components age, remaining life, current cost and ideal level of reserves.

The second step is to identify the ideal level of reserves for each asset. This is accomplished by evaluating the component's age proportionate to its estimated useful life and current replacement cost. For example, an asset which is 3 years old, has a useful life of 5 years and current replacement cost of $500, should have accumulated approximately $300 in reserves. The equation is based on current replacement cost, and is a measure in time, independent of future inflationary or investment factors:

$$\text{Ideal Level of Reserves} = \frac{\text{Age of Component} \times \text{Current Replacement Cost}}{\text{Useful Life}}$$

The RDA RESERVE MANAGEMENT SOFTWARE™ program performs the above calculations to the very month the component was place-in-service. It also allows for the accumulation of the necessary reserves for the replacement to be available on the first day of the fiscal year it is scheduled to be replaced.

The program arranges all of the assets used in the study in ascending order by remaining life, and alphabetically within each grouping of remaining life items. These assets are then assigned their respective ideal level of reserves until the amount of funds available are depleted, or until all assets are appropriately funded. If any assets are assigned a zero remaining life (schedule for replacement this fiscal year), then the amount assigned equals the current replacement cost and funding begins for the

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next cycle of replacement. If there are insufficient funds available to accomplish this, then the software automatically adjust the zero remaining life item to 1 year and that asset assumes its new grouping position alphabetically in the final printed report.

If at the completion of this task there are additional moneys which have not been distributed, the remaining reserves are then assigned, in ascending order, to a level equal to, but not exceeding, the current replacement cost for each component. If there are sufficient moneys available to fund all assets at their current replacement cost levels, then any excess funds are designated as such and are not factored into any of the report computations. If at the end of this assignment process there are designated excess funds, they can be used to offset the monthly contribution requirements recommended, or used in any other manner the client may desire.

Having subtracted the fixed accumulated reserve components, the program then calculates a **contingency reserve** and subtracts that amount from the total remaining available reserves. The contingency calculation is actually quite simple. Consider the following example:

Beginning accumulated reserves: $100,000
Contingency percentage: 3%
Calculated monthly contribution before contingency is applied: $10,000 per year.

First, 3% of $100,000 is deducted, but not exactly the way you would think. If you simply took 3% of $100,000 it would be $3,000. $100,000 - $3,000 = $97,000. In the report you would arrive at a sub total of $97,000 and then logically want to add 3% to that or $2,910 (3% of $97,000 = $2,910). The resulting sum is $99,910 and not $100,000. The correct equation is:

$$\text{Contingency \$ amount} = \frac{\text{beginning accumulated reserves x contingency\%}}{100 + \text{contingency \%}}$$

In the example above this would be $100,000 x 3 / (100 + 3) or $2,912.62

$100,000 - $2,912.62 = $97,087.38, therefore, $97,087.38 + (3% of $97,087.38) = $100,000

As far as the contingency for the monthly contribution that is very straight forward. In the example, the resulting contribution for all assets was $10,000. Therefore the contingency is simply 3% of $10,000 or $300 resulting in a total contribution of $10,300 per month as calculated at the end of this section.

Now that the fixed reserves and contingency reserves have been deducted, the program begins assigning reserve beginning balances to each of the components by remaining life order before the actual future contribution calculations are completed. As previously indicated, the program proceeds with the assets in remaining life order and then alphabetically. Assigning the reserves in this manner defers the make-up period for any underfunding over the longest remaining life of all the assets under consideration, thereby minimizing the impact of deficiency. For example, if the report indicates an underfunding of $50,000, this underfunding will be assigned to components with the longest remaining life possible in order to give more time to "replenish" the account. If the $50,000 underfunding were to be assigned to short remaining life items, the impact would be immediately felt. If the program finishes this loop and still has excess reserves, it then assigns the remaining reserves, from beginning of file, to a level equal to the cost to replace the component.

At this point we have already assigned the reserve balance for the zero remaining life components equal to the current replacement cost levels. If after completing the above distribution there are still funds left over (in other words, all of the components have been assigned reserves to their current replacement cost levels) then the program assigns reserve equal to the second replacement for the zero life components (in other words, the amount equal to the current replacement cost and next replacement).

Now that all assets have been assigned beginning reserve balances, the program then calculates the required moneys necessary in order to have sufficient funds available when it comes time to replace the

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component. The member contribution is the actual moneys that will be required to be set aside. The interest contribution is the monthly interest that will be earned on average for the current year based upon the beginning assigned reserve balance and monthly contributions for the year, net of taxes.

Note: There are two sets of calculations that are used. The first set is when the remaining life of an item is zero and calculations are completed for the next cycle of replacement. This set uses the “useful life” in the calculations. The second set is when the remaining life of an item is 1 year or greater. This set uses the “remaining life” in the calculations.

Next we calculate the interest for the individual component that will be eared monthly on average for the current year.

CASH FLOW CALCULATIONS:

The cash flow method develops a reserve-funding plan where contributions to the reserve fund are designed to offset the variable annual expenditures from the reserve fund. Different reserve funding plans are tested against the actual anticipated schedule of reserve expenses until the desired funding goal is achieved. This method sets up a “window” in which all future anticipated replacement costs are computed, based on the individual lives of the components under consideration. The following module “CashFlow” is used to calculate the minimum amount that an association can set aside without running out of money or below a specified minimum balance. The program opens all necessary files and begins a loop, testing contribution amounts until the desired minimum amount is determined.

The “Cash Flow Specific” method is identical to the “Cash Flow Minimum” method except the user inputs the contribution dollar amount and the program calculates and displays the results of the “projections” should that amount be set aside. The “Cash Flow Specific” calculation process can be used to obtain desired results for “full funding” – “baseline funding” – “threshold funding” or “statutuary funding” levels as desired.

FUTURE PROJECTIONS REPORT CALCULATIONS:

The following is an explanation of how the "Future Projections Report" is calculated using the component calculation method:

The overall parameters assigned to a report include a provision for:

- Inflation, compounded annually
- Annual contribution increase
- Interest earned net of taxes, compounded monthly
- A contingency provision
- The year for which the report is prepared
- A beginning reserve balance

Additionally, the following key elements apply to the individual components included within the report:

- The date the item was initially constructed or placed into service or last replaced
- The typical useful life of that item
- An adjustment factor to the useful life for the current cycle of replacement
- The current cost to replace the item

The purpose of a reserve study is to determine, for any given component, what would be necessary in order to gather sufficient funds for its replacement at the time it will require replacement. The future projections report outlines what would take place over time, given the above assumptions, for all of the components considered in the report.

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The report outlines for each year, a beginning reserve balance, annual contributions necessary, interest earned net of taxes, expenditures anticipated, and what we expect the ending reserve balance to be as a result. In each of the following years you simply complete the same calculations you did for the first year, for the next year! Adjusting for changes, considering the following:

- The new beginning reserve balance for the second year is equal to the ending balance for the prior year.
- The replacement costs for all components considered is increased by the inflationary rate
- The remaining life of a given component is reduced by one year as it is one year older
- If the remaining life of the component last year was 0, then we anticipate that it was replaced and the new remaining life becomes the assigned useful life, in order to begin a new cycle of funding for that component
- If there was an "adjustment" to the useful life for the first cycle of replacement it is ignored for all subsequent years as the "adjustment" only applies to the first year
- If the item was designated "One Time Replacement," it is ignored in subsequent years as it was replaced and no longer under future consideration

The manner in which the program completes the above task is to create a new temporary copy of the entire report and physically altered it each year:

- The beginning reserve fund balance is updated
- The year assigned to the report is increased by one year
- New placed in service dates are assigned for all components that were "replaced" and for those components "not replaced" no adjustment is made
- If an item previously was assigned an "adjustment to the useful life," in subsequent years, the adjustment is reset to zero
- The replacement costs for each component is increased by the rate of inflation
- If an item was designated with a "fixed" reserve starting point, it is added to the number of last year's contribution and that number becomes the new "fixed" reserve amount for the following year
- If an item was designated with a "fixed" reserve contribution it is left as designated
- If an item is designated as "One Time Replacement" it is tested to see if it was replaced, and if so, it is ignored for all future cycles of replacement

Once these adjustments are made, the program simply reruns the report sending the data to temporary file which is created to store all of the "projection" information. Once all the projections are complete, this file becomes the source for the actual printed report.

<u>The following is an example of the projections for two sample assets:</u>

Association parameters
Inflation, Increase, Interest, Taxes, Contingency are all 0%
Beginning Reserve Fund balance is $1,000
Budget Year is 1/1/2005 through 12/31/2005

Asset Parameters
<u>Asset 1</u>
Placed in Service is 1/2003
Useful life is 10 years
Current Cost is $10,000

<u>Asset 2</u>
Placed in Service is 1/2001

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Useful life is 5 years
Current cost is $5,000

<u>Calculations for Year 0 (Current Year):</u>

Accumulated Reserve Distributions

Asset 1 is 2 years old and has a 10 year useful life and 8 year remaining life
Ideal reserves would be 2/10ths of 10,000 or 2,000

Asset 2 is 4 years old and has a 5 year useful life and a 1 year remaining life
Ideal reserves would be 4/5ths of 5,000 or 4,000

The total available accumulated reserves is 1,000
Since Asset 2 has the shortest remaining reserves it gets all of the 1,000

Calculations:

Asset 1: has 8 years to accumulate 10,000 or a calculation of 1,250 per year
Asset 2: has 1 year to accumulate the remaining 4,000 or a calculation of 4,000
Results: a contribution level of 5,250
The program shows a projected end of year balance to be 6,250 since it started with 1,000
The program shows an ideal end-of-year balance of 8,000 see calculations for **Year 1** since the end of the year and beginning of the next year are the same point in time

<u>Calculations for Year 1:</u>

Accumulated Reserve Distributions

Asset 1 is 3 years old and has a 10 year useful life and 7 year remaining life
Ideal reserves would be 3/10ths of 10,000 or 3,000

Asset 2 is 5 years old and has a 5 year useful life and a 0 year remaining life
Ideal reserves would be 5/5ths of 5,000 or 5,000

The total available accumulated reserves is 6,250 so Asset 2 gets replaced leaving a beginning reserve balance of 1,250

Asset 2 is now funding for the second cycle of replacement and now is
0 years old and has a 5 year useful life and a 5 year remaining life
Ideal reserves would be 0/5ths of 5,000 or 0

Since the program funds reserves to their ideal level only, even though it has the shortest remaining life it gets none of the 1,250 and it now goes Asset 1

Calculations:

Asset 1: has 7 years to accumulate 8,750 or a calculation of 1,250 per year
Asset 2: has 5 years to accumulate 5,000 or a calculation of 1,000 per year
Results: a contribution level of 2,250
The program shows a projected end of year balance to be 3,500 since it started with 1,250
The program shows an ideal end-of-year balance of 5,000 see calculations for **Year 2** since the end of the year and beginning of the next year are the same point in time

<u>Calculations for Year 2:</u>

Accumulated Reserve Distributions

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Asset 1 is 4 years old and has a 10 year useful life and 6 year remaining life
Ideal reserves would be 4/10ths of 10,000 or 4,000

Asset 2 is 1 year old and has a 5 year useful life and a 4 year remaining life
Ideal reserves would be 1/5ths of 5,000 or 1,000

The total available accumulated reserves is 3,500 so since Asset 2 now has the shortest remaining life it gets its ideal level of reserves or 1,000 and Asset 2 gets the remaining balance of 2,500

Calculations:

Asset 1: has 6 years to accumulate 7,500 or a calculation of 1,250 per year
Asset 2: has 4 years to accumulate the remaining 4,000 or a calculation of 1,000 per year
Results: a contribution level of 2,250
The program shows a projected end of year balance to be 5,750 since it started with 3,500

Please Note that this is just the same principles applied for every year. The program code simply loops through this process for as many years you choose to project.

Component Method Calculations
Monthly Contribution Verification Using a Financial Calculator

To verify that the RDA software is working correctly, you can simply perform the following steps on any financial calculator:

> First, you enter into the financial calculator the beginning accumulated reserves for any single component as the "Present Value" on the calculator.
> Next, you set the compounding period to 12 (12 months in a year).
> Next, you set the net interest rate after taxes divided by 12 months (monthly compounding again).
> Next, enter the RDA program's monthly contribution calculation as the monthly payment to reserves.
> Last, you simply calculate the Future Value (the amount of accumulated reserves at the end of the first year).

You do this each year for the remaining life of the component making the following adjustments:

- the ending reserve balance at the end of each year becomes the new beginning reserve figure
- the monthly contribution is increased by the percentage used in the program
- you run these steps for the number of years until replacement

The ending result will be equal to the calculated future replacement cost of the component, compounded annually, by the inflationary rate used and by the number of years left until replacement (remaining life).

The code and it's principle will work on any financial calculator. The following program is designed for the popular HP-12C financial calculator:

1) n = 12; 12 month compounding period
   i = net interest rate divided by 12
   PV = beginning accumulated reserves (enter as negative)
   PMT = initial monthly contribution (enter as negative)
   ST0 1 = % increase in contribution each year

2) pressing R/S will = accumulated reserves at end of year 1

3) pressing R/S twice again = accumulated reserves at end of year 2

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4) pressing R/S twice again = accumulated reserves at end of year 3, etc.

Continue pressing R/S twice to the number of years equal to the remaining life of the component. The resulting number will equal the future replacement cost of the component within a few dollars at most as the program rounds the resulting calculations to two decimal places.

The actual HP programming code for the above routine is first entered as follows:

```
FV
FV
R/S
CHS
PV
RCL
PMT
RCL
1
%
+
PMT
g
GTO
00
```

Be sure when using the HP program that you reset to the beginning of the program for testing each new component by pressing g GTO 00.

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