



SoftwarePolish

Rick Groszkiewicz
2974 Nestle Creek Drive
Marietta, GA 30062-4857

Voice/fax (770) 971-8913
email: rickg@softwarepolish.com
<http://www.softwarepolish.com>

FALL 1997 EA-2 EXAM SOLUTIONS (Course P-365U)

Copyright © 1998 by
Rick Groszkiewicz FSA EA

Fall 1997 EA-2 Exam Solutions

These solutions use beginning of year amortization payments in setting up the Minimum Funding Standard Account. These solutions were prepared based on the law as in effect at June 30, 1997.

These solutions have been compared with those produced by other technical actuaries, and they represent my best understanding of the correct way to solve these problems. As usual, it seems easy to get an answer in the correct range as long as you are not actually taking the exam!

For problems involving the deductible limit you should use the following sequence of steps:

1. Calculate the normal cost plus limit adjustments with interest to the earlier of the end of the plan year or the end of the tax year.
2. Calculate the Full Funding Limitation under Section 404 with interest to the end of the plan year. If this is less than the result of step one, then you can skip to step four.
3. Calculate the absolute minimum amount necessary to produce a non-negative credit balance in the Minimum Funding Standard Account. This amount should never be based on the Alternative MFSA. This amount may be increased by the amount of any "includible employer contribution."
4. The maximum deductible limit is the greater of (1) and (3), but not greater than (2).
5. If the Unfunded Current Liability exceeds the final deductible limit and the plan has more than 100 participants, then the final deductible limit will be the UCL. This UCL limit is only available to non-multiemployer plans.

Revision History:

June 20, 2006	Clarified solution for problems 21, 22 and 36
December 3, 2003	Clarified solution for problem 25
January 7, 2003	Clarified solution for problem 4
June 18, 2002	Corrected solution for problem 42
May 9, 2002	Corrected solution for problem 48
January 10, 2001	Corrected solutions for problems 28 (page 2), 29, and 37
July 6, 2000	Corrected solutions for problems 22, 23, 25, 36, 40, 42 and 49
September 14, 1999	Corrected solutions for problems 25, 43, 46, 47 and 49
September 5, 1999	Corrected solutions for problem 44
November 17, 1998	Corrected solutions for problems 23, 28 (page 1), 33, 35, 46, and 48
November 2, 1998	Corrected solution for problem 40
October 26, 1998	Replaced solution for problem 40
October 19, 1998	Original solutions

Fall 1997 EA-2 Exam Solutions

Problem 1

TRUE

This question tests your knowledge of the volatility rule. Since the funded current liability percentage is less than 80%, and there are more than 100 employees, the plan is subject to the §412(l) additional funding charge.

If the funded current liability percentage is between 80% and 90%, then you would not be subject to the §412(l) additional funding charge if the funded current liability percentage is greater than or equal to 90% for two consecutive years of the prior three.

Answer is A

Fall 1997 EA-2 Exam Solutions

Problem 2

FALSE

The definition of a highly compensated employee in §414(q), effective after 1996, is not dependent on an employee being an officer:

- | | |
|-------------------|---|
| §414(q)(1)(A) | A 5% owner during the current or prior year, or |
| §414(q)(1)(B)(i) | An employee with compensation in excess of 80,000, and |
| §414(q)(1)(B)(ii) | If the employer elected this clause the prior year, was in the top-paid group in the prior year |

The top-paid group is the highest 20% of employees, ranked by compensation.

Answer is B

Fall 1997 EA-2 Exam Solutions

Problem 3

TRUE

1.401(a)(26)-2(b) states that a frozen defined benefit plan is considered to satisfy the minimum participation rule of IRC section 401(a)(26) automatically. It also states that the plan could satisfy 401(a)(26) for a plan year if it satisfies the prior benefit structure requirements of 1.401(a)(26)-3.

The reference to “not aggregated with any other plan ... for IRC sections 401(a)(4) or 410(b) is needed to satisfy the definition of “Plan” in 1.401(a)(26)-2(c).

See the IRS regulation 1.401(a)(26)-2(b) and (c)

Answer is A

Problem 4

Revised 01/07/03

FALSE

Code section 401(a)(3) requires a qualified trust to satisfy the minimum participation standards of section 410(b). Code section 401(a)(26) contains additional participation requirements. In general, a trust is not qualified unless the plan, on each day of the plan year, benefits the lesser of 50 employees, or 40% or more of the employees of the employer.

SBIPA added the requirement, effective after 1996, that the plan cover at least 2 employees (or 1 employee if there is only 1 employee covered).

Answer is B

NOTE: 401(a)(26)(A) refers to "all employees", but certain employees may be excluded. You should think of section 401(a)(26)(A) as applying to "all nonexcludable employees". 401(a)(26)(B) allows you to exclude from consideration any employees described in

- 410(b)(3) Collectively bargained, airline pilots, or non-resident aliens
- 410(b)(4)(A) Employees who do not meet the minimum age or service requirements for participation

Fall 1997 EA-2 Exam Solutions

Problem 5

TRUE

The assumptions used for the OBRA '87 current liability can be based on the valuation assumptions for mortality, and an interest rate within the range of 90% to 110% of the 4 year average of the 30 year Treasury rate.

If you use the interest rate at the top end of the range for the RPA '94 current liability, then you are allowed to use a higher rate for the OBRA '87 current liability. If you use an interest rate below the top end of the range for the RPA '94 current liability, then you would use the same interest rate for the OBRA '87 current liability

See Revenue Ruling 96-21, A-9, part (1)

Answer is A

Fall 1997 EA-2 Exam Solutions

Problem 6

FALSE

The assumptions used for the RPA '94 current liability can be based on the sex distinct IRS version of GAM 1983 mortality. For 1996, the interest rate must be within the range of 90% to 108% of the 4 year average of the 30 year Treasury rate.

Answer is B

Fall 1997 EA-2 Exam Solutions

Problem 7

FALSE

The unfunded current liability deductible limit is based on the RPA '94 current liability. The assumptions used for the RPA '94 current liability can be based on the sex distinct IRS version of GAM 1983 mortality. For 1997, the interest rate must be within the range of 90% to 107% of the 4 year average of the 30 year Treasury rate.

Answer is B

Fall 1997 EA-2 Exam Solutions

Problem 8

TRUE

ERISA section 3(14) defines the term “party in interest.” This list includes the items shown in the questions, as well as fiduciaries, owners of 50% or more of the voting stock (or profits or beneficial interest), as well as relatives of a party in interest, etc.

Answer is A

Fall 1997 EA-2 Exam Solutions

Problem 9

FALSE

§411(a)(4) defines the service used in calculating the vesting percentage. In §411(a)(4)(D), it specifies that service under §411(a)(6) may be ignored.

§411(a)(6)(D) defines “breaks in service” for nonvested participants. You can ignore the prior service when the number of consecutive one year breaks in service “equals or exceeds the greater of 5, or the aggregate number of years of service before such period.”

Answer is B

Fall 1997 EA-2 Exam Solutions

Problem 10

FALSE

RPA '94 added §412(c)(12) to the Internal Revenue Code. This requires that, for collectively bargained plans, the minimum funding requirement is determined based on the ultimate level of benefits. There is NO requirement that the current liability reflect any benefit increases that become effective beyond the end of the current plan year.

Answer is B

Fall 1997 EA-2 Exam Solutions

Problem 11

TRUE

This is a tiny detail from the 410(b) regulation on minimum coverage requirements.

See 1.410(b)-7(c)(1)

Answer is A

Fall 1997 EA-2 Exam Solutions

Problem 12

FALSE

This is a tiny detail from the 410(b) regulation on minimum coverage requirements. In section 1.410(b)-5(d)(2) it states that employee contributions are disregarded. In general, the calculations would exclude the post-tax deferrals, since they are employee contributions.

The pre-tax deferrals are considered employer contributions, and they would be included.

Answer is B

Fall 1997 EA-2 Exam Solutions

Problem 13

FALSE

There is an exception to the change made by SBJPA in the required distribution date:

- §401(a)(9)(C)(i) Required beginning date for distributions is April 1 of the calendar year following the later of the calendar year participant attains age 70 $\frac{1}{2}$ or the calendar year of retirement
- §401(a)(9)(C)(ii) For a 5% owner, required beginning date for distributions is April 1 of the calendar year following the calendar year participant attains age 70 $\frac{1}{2}$

Answer is B

Fall 1997 EA-2 Exam Solutions

Problem 14

TRUE

In general, plans who contribute the §404 Full Funding Limitation are exempt from the PBGC variable Rate Premium. The correct definition of the §404 Full Funding Limitation does not adjust the assets by the credit balance.

See the General Instructions, Part H, item 5.c(v) for the Schedule A to the PBGC-1 Form.

Answer is A

Fall 1997 EA-2 Exam Solutions

Problem 15

TRUE

Single employer DB plans with a funded current liability percentage (FCL%) for the prior year less than 100% are subject to the quarterly contribution requirement of §412(m). DB plans with more than 100 participants that are subject to the quarterly contribution requirement are also subject to the quarterly liquidity requirements.

See Q.1 and Q.7 of Revenue Ruling 95-31.

Answer is A

Fall 1997 EA-2 Exam Solutions

Problem 16

TRUE

This is a tiny detail in §412(l)(7)(D), which allows exclusion of a percentage of pre-participation service.

Answer is A

Fall 1997 EA-2 Exam Solutions

Problem 17

TRUE

This makes sense, and it is spelled out in the last sentence of §4975(a).

Answer is A

Fall 1997 EA-2 Exam Solutions

Problem 18

TRUE

This is covered under the spousal consent requirement in §417(a)(4)(A).

Answer is A

Fall 1997 EA-2 Exam Solutions

Problem 19

TRUE

This tests a tiny detail in ERISA regarding the notice of intent to terminate. For a standard termination, you do NOT have to send the notice to the PBGC. For a distress termination, you MUST notify the PBGC.

See ERISA §4041(a)(2)

Answer is A

Fall 1997 EA-2 Exam Solutions

Problem 20

FALSE

This was changed by OBRA '87. It is necessary for each member of the controlled group to meet the PBGC's distress criteria.

See the last sentence of ERISA §4041(c)(2)(B).

Answer is B

Fall 1997 EA-2 Exam Solutions

Problem 21 - Page 1

Revenue Procedure 95-51 contains the rules for setting up a new amortization base when there is a change in cost method. Section 5.01 of Revenue Procedure 95-51 specifies that certain bases must be maintained regardless of the funding method that is used. These bases include waivers, shortfall gains and losses, switchback from AMFSA, and the OBRA Full Funding credit base.

The main point of this problem is that, even though you are changing to the Frozen Initial Liability method, you must set up an experience gain/loss amortization base at 01/01/97. This is based on the rule in Section 5.01(2). The calculation of the normal cost under the Aggregate method must satisfy the formulas that are applicable to all reasonable funding methods (see the regulations at §1.412(c)(3)-1):

$$\begin{aligned}\text{PV Future Normal costs} &= \text{PV Future Benefits} - \text{Actuarial Assets} \\ &\quad - (\text{O/S §412 amortization bases} - \text{credit balance} - \text{ARA})\end{aligned}$$

Except under the
Aggregate method

For cost methods with Unfunded Actuarial Liabilities, this can be restated as $\text{UAL} = \text{O/S 412 bases} - \text{credit balance} - \text{ARA}$. Since you do not have any 01/01/96 valuation results, use this relationship at 12/31/96 to determine the expected UAL.

$$\begin{aligned}\text{Unit Credit } e\text{UAL} &= 12-31-96 \text{ O/S bases} - \text{CB} - \text{ARA} \\ &= 300,000 + 5,000 - 20,000 - 0 \\ &= 285,000\end{aligned}$$

$$\begin{aligned}01/01/97 \text{ U.C. UAL} &= 250,000 = 400,000 - 150,000 \\ 01/01/97 \text{ Gain base} &= 35,000 = 285,000 - 250,000\end{aligned}$$

You must determine the new base such that the equation of balance is satisfied.

$$\begin{aligned}\text{Entry Age UAL} &= 400,000 = 550,000 - 150,000 \\ \text{Method change base} &= \text{Entry Age UAL} - \text{Unit credit UAL} \\ &= 400,000 - 250,000 \\ &= 150,000\end{aligned}$$

Now calculate the normal cost under the Frozen Initial Liability method:

$$\begin{aligned}\text{PVNC} &= \text{PVFB} - \text{AAV} - \text{O/S bases} + \text{CB} + \text{ARA} \\ &= \text{PVFB} - \text{AAV} - \text{UAL when the equation of balance is satisfied} \\ &= 900,000 - 150,000 - 400,000 \\ &= 350,000\end{aligned}$$

$$\begin{aligned}\text{PVE/E} &= 2,500,000 / 200,000 = 12.5000 \\ \text{NC} &= 350,000 / 12.50 \\ &= 28,000\end{aligned}$$

Fall 1997 EA-2 Exam Solutions

Problem 21 - Page 2

Revised 06/20/06

The amortization period for all cost method change amortization bases specified in Revenue Procedure 95-51 is 10 years:

Amortization base	Outstanding Base	Remaining years	Amortization
1-1-92 IAL base	300,000	25 = 30 - (97-92)	24,059
1-1-94 Loss base	5,000	2 = 5 - (97-94)	2,585
1-1-97 Gain base	-35,000	5 = 5 - (97-97)	-7,978
1-1-97 Method base	150,000	10 = 10 - (97-97)	19,959

1997 Minimum Funding Standard Account

Charges		Credits	
---------	--	---------	--

Normal Cost	28,000	Credit Balance	20,000
IAL amortization	24,059	Gain amortization	7,978
Loss amortization	2,585		
Method amortization	19,959	12/31 contrib	x
7% interest	5,222	7% interest	1,958
Total charges	79,825	Total credits	x + 29,936

The minimum contribution payable 12/31/97 is $79,825 - 29,936 = 49,889$.

Answer is C

NOTE:

Since you don't have the value of the Entry Age Normal Cost, you can't calculate the Full Funding Limitation.

Fall 1997 EA-2 Exam Solutions

Problem 22 - Page 1

Revised 06/20/06

Since the 1/1/95 funded current liability percentage is 100%, there were no required quarterly contributions for 1996. To calculate the required quarterly contribution for 1997, you must first calculate the required annual payment (RAP). This is the lesser of last year's minimum required contribution or 90% of this year's. These numbers are both interest adjusted to the first day of this plan year, and they both would not reflect any credit balance.

You are given the minimum contribution for both 1996 and 1997. At 01/01/97, this figure represents §412 NC + §412 amortizations - credit balance. Since you don't want to include any credit balance, you have to assume that the 01/01/96 credit balance is zero. Otherwise, you can't work the problem. Based on the 1996 contribution of 200,000, the 01/01/97 credit balance is 20,000.

$$\begin{aligned} 12/31/96 \text{ "MFSA excluding CB"} &= (\$412 \text{ NC} + \$412 \text{ amort} - 0) * 1.07 = 180,000 \\ 12/31/97 \text{ "MFSA excluding CB"} &= (\$412 \text{ NC} + \$412 \text{ amort} - 20,000) * 1.07 = 210,000 \\ 01/01/97 \text{ "MFSA excluding CB"} &= (\$412 \text{ NC} + \$412 \text{ amort}) = 216,262 \end{aligned}$$

$$\text{Lesser of 1996 or 90\% of 1997} = \text{Lesser of } (180,000 \text{ or } .90 * 216,262) = 180,000$$

The required quarterly installment is based on the applicable percentage multiplied by the RAP, which is $25\%(180,000) = 45,000$.

You may use the 01/01/97 credit balance like an employer contribution for a required quarterly installment, but only if the contribution that creates the credit balance is actually in the trust fund at the installment date. The problem states that the 1996 contribution was paid at 09/15/97, so you can apply the credit balance towards the 10/15/97 installment.

Date	Required	Amount Available	Overpayment (Underpayment)
03/15/97		50,000	50,000
04/15/97	45,000	$50,000 * [1 + (.07)*(1/12)]$ = 50,292	$50,292 - 45,000$ = 5,292
06/15/97		$5,292 * [1 + (.07)*(2/12)] + 50,000$ = 55,353	55,353
07/15/97	45,000	$55,353 * [1 + (.07)*(1/12)]$ = 55,676	$55,676 - 45,000$ = 10,676
10/15/97	45,000	$10,676 * [1 + (.07)*(3/12)]$ + $20,000 * [1 + (.07)*(9.5/12)]$ = 31,971	$31,971 - 45,000$ = (13,029)

The required payment at 10/15/97 to avoid an interest penalty is 13,029. Note that the credit balance accumulates with interest at the valuation rate from 01/01/97 to 10/15/97.

Answer is D

Fall 1997 EA-2 Exam Solutions

Problem 22 - Page 2

Revised 07/06/00

Compound interest is “harder”. Since the time period is less than one year, it produces a larger required payment:

Date	Required	Amount Available	Overpayment (Underpayment)
03/15/97		50,000	50,000
04/15/97	45,000	$50,000 * (1.07)^{1/12}$ = 50,283	$50,283 - 45,000$ = 5,283
06/15/97		$5,283 * (1.07)^{2/12} + 50,000$ = 55,343	55,343
07/15/97	45,000	$55,343 * (1.07)^{1/12}$ = 55,656	$55,656 - 45,000$ = 10,656
10/15/97	45,000	$10,656 * (1.07)^{3/12}$ + $20,000 * (1.07)^{9.5/12}$ = 31,938	$31,938 - 45,000$ = (13,062)

The resulting payment is in the same range, as it must be!

If you incorrectly brought the credit balance forward with interest from 01/01/97 to the 04/15/97 required contribution date, you will still get an answer in the same range. If you use compound interest, your answer would still be (13,062). Under the simple interest approach, the answer would be (13,005).

If there was an earlier underpayment prior to 10/15/97, then you would get an incorrect answer by applying interest on the 01/01/97 credit balance of 20,000 prior to the 09/15/97 payment date for the 1996 contribution.

Fall 1997 EA-2 Exam Solutions

Problem 23

Revised 07/06/00

With an individual type cost method, you would need the market value of assets to check the Full Funding Limitation. Since you have it, you should calculate the FFL values.

The problem asks for the deductible limit for 1997, which you calculate as normal cost plus limit adjustments. You are given the Loss base that was set up at 01/01/97, plus the net limit adjustment for all the other 404 bases.

$$\text{Limit adjustment} = 10,000 + 50,000 / \ddot{a}_{10|.07} = 16,653$$

$$\text{Deductible limit} = (40,000 + 16,653) * (1.07) = 60,619$$

The next step is to check the Full Funding Limitation under §404.

$$\begin{aligned}\text{\$404 "ERISA" FFL} &= (1+i)*(NC + AL - (\text{lesser MVA, AAV})) \\ &= 1.07 * (40,000 + 690,000 - 680,000) \\ &= 53,500\end{aligned}$$

$$\begin{aligned}\text{\$404 "OBRA" FFL} &= 1.50 (12/31 \text{ CL}) - (1+i)*(\text{lesser MVA, AAV}) \quad (\text{if no benefit payments}) \\ &= 1.50 * 800,000 - 1.07 * 680,000 \\ &= 472,400\end{aligned}$$

$$\begin{aligned}\text{\$404 "RPA94" FFL} &= .90 (12/31 \text{ CL}) - (1+i)*(AAV) \quad (\text{if no benefit payments}) \\ &= .90 * 800,000 - 1.07 * 700,000 \\ &= -0-\end{aligned}$$

Note that the end of year asset value (if any) should be used in calculating the OBRA and RPA '94 FFL. The reason is that any benefit payments during the year should be reflected at the valuation rate in the assets, and presumably are included in the end of year value. They would be accumulated at the current liability interest rate in the end of year current liability value.

The final §404 FFL value is the greater of the RPA '94 floor, and the lesser of the ERISA and OBRA FFL values, or 53,500. Since the §404 FFL applies, you don't need to calculate the §412 minimum contribution. The deductible limit is the FFL of 53,500.

Answer is B

You have no information on the participant count. You don't know if the plan sponsor is eligible for the deductible limit based on the Unfunded Current Liability, so you should ignore it (it would not apply, based on the EOY value of $800,000 - 1.07 * 700,000$, which is 51,000.)

Fall 1997 EA-2 Exam Solutions

Problem 24 - Page 1

This is a complicated PBGC guaranteed benefits question. It tests your knowledge of the five year phase-in for non-owners, as well as the handling of phase-ins for retired employees. Guaranteed benefits are based on the vested accrued benefits of the plan participants. In calculating the guaranteed benefit, remember that changes in vesting schedule, normal retirement age, early retirement reductions, and normal form of annuity payment are all considered as changes in benefit amount subject to the phase in rules.

If there was a change in normal form of benefits, you would have to normalize the benefits. Normalization is the process of converting benefits available under earlier sets of plan provisions to equivalent benefit amounts based on the plan provisions in effect at date of plan termination (DOPT). This is a necessary step, otherwise you would be comparing apples and oranges.

The changes in plan benefits at 01/01/93 and 01/01/95 are subject to phase-ins at the DOPT of 01/01/97. Based on item nine on page 84 of the PBGC study note, use the later of the adoption date and the effective date of the increase for phase-in purposes.

The PBGC maximum monthly guaranteed benefit (MGB) is defined as the lesser of the adjusted ERISA §4022(b) value, or the highest five year consecutive compensation. Smith's five year compensation is 31,000, or 2,583.33 / mo, which becomes the MGB. Hopefully, the fact that you are given compensation values, and this is a dollar per month benefit formula should have alerted you to check this.

The MGB should be adjusted based on a benefit commencement age at DOPT different from age 65. Smith is age 62 at DOPT, so the adjusted MGB is $.79 * 2,583.33 = 2,040.83$. Based on page 72 of the PBGC study note, it is correct to age adjust the MGB, even when it equals the highest five year compensation. If the form of benefit payment at DOPT is not a life annuity, the MGB would need to be adjusted for that as well.

Fall 1997 EA-2 Exam Solutions

Problem 24 - Page 2

	Smith: 5 year phase-ins
Date of birth	01/01/35
01/01/97 age	62
Date of hire	01/01/65
Date of retirement	12/31/96
Years of service	32
Substantial owner?	NO
Vesting percentage	100% based on §411 minimum vesting
01/01/80 Base plan benefit, original retirement benefit	$1,760 = 55 * 32$
Full years plan has been in effect	17
Phase-in	1,760
07/01/93 Base plan benefit	$1,920 = 60 * 32$
Guaranteeable benefit increase	$160 = 1,920 - 1,760$
Full years plan has been in effect	3
3 year phase-in	$96.00 = \text{Greater of } 60\% \text{ or } \$60/\text{mo.}$
01/01/95 Base plan benefit	$2,240 = 70 * 32$
Maximum Guaranteeable benefit	2,040.83
Guaranteeable benefit increase	$120.83 = 2,040.83 - 1,920.00$
Full years plan has been in effect	2
2 year phase-in	$48.33 = \text{Greater of } 40\% \text{ or } \$40/\text{mo.}$
Total guaranteed monthly benefit	$1,904.33 = 1,760.00 + 96.00 + 48.33$

When calculating the phase-ins, the percent is more valuable when the amount of the Guaranteeable benefit increase exceeds 100. If it is less than 100, then the fixed dollar amount is more valuable. At 100, they both produce the same result.

Answer is B

Fall 1997 EA-2 Exam Solutions

Problem 25

Revised 12/03/03

For a benefit payable at Social Security Retirement Age (SSRA), the maximum permitted disparity is 0.75%. Since you will have employees with all three SSRA values, you should base your calculations on employees with SSRA=67, since that will produce the lowest benefits, and the smallest value of X.

You must derive the value of X that will not exceed the maximum permitted disparity (MPD) factors at each age, for all optional forms of benefit payment. You will have two formulas, one for the 10 year certain and life normal form, and one for the life annuity optional form. Let ERF_y denote the early retirement reduction factor at each age y:

$$\begin{array}{llll} \text{Normal form:} & X\% * (\text{service} < 35) * ERF_y & \leq & MPD_y * (\text{service} < 35) \\ \text{Life annuity form:} & X\% * (\text{service} < 35) * ERF_y * \text{Adj}\% & \leq & MPD_y * (\text{service} < 35) \end{array}$$

The lowest value of X is for the life annuity form. The resulting value of X will also satisfy the maximum permitted disparity requirement for the normal form:

$$\text{Life annuity form:} \quad X\% \leq MPD_y / (ERF_y * \text{Adj}\%)$$

Age	SSRA 67 MPD	Early Retirement Factor	Life Annuity Form	Adjusted MPD
	(1)	(2)	(3)	(1) / [(2)*(3)]
62	0.500	1.0000	1.050	0.4762
61	0.475	0.9333	1.047	0.4861
60	0.450	0.8667	1.044	0.4973
59	0.425	0.8000	1.041	0.5103
58	0.400	0.7333	1.038	0.5255
57	0.375	0.6667	1.035	0.5435
56	0.344	0.6000	1.032	0.5556
55	0.316	0.5333	1.029	0.5758

The worst case example is someone who retires at age 62, since this produces the smallest result (.4762). Since the plan formula uses the same value of X at all ages, this is the largest allowable value for X.

Answer is A

If the benefit formula accrued service beyond 35 years, you also would have to adjust the MPD on a pro-rata basis. The reason is that there is a cumulative permitted disparity limit, and the MPD is based on a maximum of 35 years of accruals. See 1.401(l)-5(c)(1), which defines the cumulative permitted disparity limit.

Fall 1997 EA-2 Exam Solutions

Problem 26 - Page 1

Most PBGC problems are strictly concerned with benefits in priority categories for asset allocation purposes, or with the definition of guaranteed benefits. In this problem, the participant has benefits in both Priority Category 3 and in Priority Category 4, which is unusual for exam questions. Priority Category 4 is defined based on the five year phase-in for non-owners. After you subtract the benefit in Priority Category 3, you will have the remaining benefit allocated to Priority Category 4.

The first part of the problem is calculation of the Priority Category 3 (PC3) benefit. Plan termination date (DOPT) is 07/01/97. Participants in PC3 are those who were (or could have been) in pay status at DOPT-3, or 07/01/94. The early retirement eligibility that is used is based on the plan provisions in effect at DOPT-3.

Priority Category 3 benefits are the lowest amount payable in the three years preceding DOPT, determined based on lowest level of plan benefits in effect for the five years preceding DOPT. There are no maximum benefit limits on PC3 benefits. For participants who were not in pay status at DOPT-3, the PC3 benefit is calculated as if they retired at DOPT-3:

	Smith: PC3 benefit
Date of birth	07/01/38
07/01/94 age	56
Date of hire	07/01/67
07/01/94 service	27
07/01/94 final average pay	53,000
01/01/75 plan Early retirement factor	$46\% = 1 - 9 * 6\%$
01/01/75 plan benefit, retirement at 07/01/94	$9,873.90 = 1.5\% * 53,000 * 27 * 46\%$, or 822.83 / mo

This problem tests your knowledge of the five year phase-in for non-owners, as well as the handling of phase-ins for retired employees. Guaranteed benefits are based on the vested accrued benefits of the plan participants. In calculating the guaranteed benefit, remember that changes in vesting schedule, normal retirement age, early retirement reductions, and normal form of annuity payment are all considered as changes in benefit amount that are subject to the phase in rules.

If there was a change in normal form of benefits, you would have to normalize the benefits. Normalization is the process of converting benefits available under earlier sets of plan provisions to equivalent benefit amounts based on the plan provisions in effect at date of plan termination (DOPT). This is a necessary step, otherwise you would be comparing apples and oranges.

Fall 1997 EA-2 Exam Solutions

Problem 26 - Page 2

The change in plan benefits at 07/01/93 is subject to phase-ins at the DOPT of 07/01/97. Based on item nine on page 84 of the PBGC study note, use the later of the adoption date and the effective date of the increase for phase-in purposes.

The PBGC maximum monthly guaranteed benefit (MGB) is defined as the lesser of the adjusted ERISA §4022(b) value, or the highest five year consecutive compensation. Smith's five year compensation is approximately 53,000, or 4,416.67 / mo, which exceeds the MGB of 2,761.36.

The MGB should be adjusted based on a benefit commencement age at DOPT different from age 65. Smith is age 59 at DOPT, so the adjusted MGB is $[1 - 7\% * 5 - 4\%]$ times 2,761.36, or 1,684.43. Based on page 72 of the PBGC study note, it is correct to age adjust the MGB, even when it equals the highest five year compensation. If the form of benefit payment at DOPT is not a life annuity, the MGB would need to be adjusted for that as well.

Smith: PC3+PC4 benefit - 5 year phase-ins	
Date of birth	07/01/38
07/01/97 age	59
Date of hire	07/01/67
07/01/97 service	30
07/01/97 final average pay	55,000
Vesting percentage	100% based on retirement
01/01/75 plan ERF	$64\% = 1 - 6 * 6\%$
01/01/75 plan vested accrued benefit, retirement at 07/01/97	$15,840 = 1.5\% * 55,000 * 30 * 64\%$, or 1,320 / mo
Full years plan has been in effect	22
Phase-in	1,320
07/01/93 plan ERF	100% due to 30 years of service
07/01/93 plan benefit, retirement at 07/01/97	$24,750 = 1.5\% * 55,000 * 30 * 100\%$, or 2,062.50 / mo
Maximum Guaranteeable benefit	1,684.43
Guaranteeable benefit increase	$364.43 = 1,684.43 - 1,320.00$
Full years plan has been in effect	4
4 year phase-in	$291.54 = \text{Greater of } 80\% \text{ or } \$80/\text{mo.}$
Total PC3+PC4 benefit	$1,611.54 = 1,320.00 + 291.54$

The benefit allocated to PC4 is 788.71, equals 1,611.54 minus the PC3 benefit of 822.83.

Answer is B

Fall 1997 EA-2 Exam Solutions

Problem 27

I. NOT VALID

See §1.412(c)(2)-1(b)(5)

The method must produce results that vary around the market value. It is not allowable “to produce a result which will be consistently above or below” fair market value.

II. NOT VALID

See §1.412(c)(2)-1(b)(6)

The method must include a corridor to guarantee that the actuarial asset value is not less than 80% of fair market value, and not greater than 120% of fair market value. The wording in the regulation is confusing, since it pre-dates the OBRA '87 change that eliminates the 85%/115% corridor except for multiemployer plans. Based on the general conditions of this exam, our plan is NOT a multiemployer plan.

III. VALID

See §1.412(c)(2)-1(b)(6)

The method must include a corridor to guarantee that the actuarial asset value is not less than 80% of fair market value, and not greater than 120% of fair market value. Since this method has a narrower corridor, it is acceptable.

Only III is valid

Answer is E

Fall 1997 EA-2 Exam Solutions

Problem 28 - Page 1

Revised 11/17/98

With an individual type cost method, you would need the market value of assets to check the Full Funding Limitation. Since you have it, you should calculate the FFL values.

The problem asks for the deductible limit for 1997, which you calculate as normal cost plus limit adjustments. You are told to use the fresh start alternative, which defines one limit adjustment for a single ten year amortization base that equals the Unfunded Actuarial Liability.

$$\text{Limit adjustment} = 50,000 / \ddot{a}_{10|.07} = 6,653$$

$$\text{Deductible limit} = (20,000 + 6,653) * (1.07) = 28,519$$

The next step is to check the Full Funding Limitation under §404.

$$\begin{aligned}\text{\$404 "ERISA" FFL} &= (1+i)*(NC + AL - (\text{lesser MVA, AAV})) \\ &= 1.07 * (20,000 + 500,000 - 450,000) \\ &= 74,900\end{aligned}$$

$$\begin{aligned}\text{\$404 "OBRA" FFL} &= 1.50 (12/31 \text{ CL}) - (1+i)*(\text{lesser MVA, AAV}) \quad (\text{if no benefit payments}) \\ &= 1.50 * 510,000 - 475,000 \\ &= 290,000\end{aligned}$$

$$\begin{aligned}\text{\$404 "RPA94" FFL} &= .90 (12/31 \text{ CL}) - (1+i)*(AAV) \quad (\text{if no benefit payments}) \\ &= .90 * 510,000 - 475,000 \\ &= -0-\end{aligned}$$

Note that the end of year asset value (if any) should be used in calculating the OBRA and RPA '94 FFL. The reason is that any benefit payments during the year should be reflected at the valuation rate in the assets, and presumably are included in the end of year value. They would be accumulated at the current liability interest rate in the end of year current liability value.

You have more than 100 participants. Since this is a multiemployer plan, the plan sponsor is not eligible for the deductible limit based on the Unfunded Current Liability, so you should ignore it.

The final §404 FFL value is the greater of the RPA '94 floor, and the lesser of the ERISA and OBRA FFL values, or 74,900. Since the §404 FFL does not apply, you need to at least think about calculating the §412 minimum contribution.

Fall 1997 EA-2 Exam Solutions

Problem 28 - Page 2

Revised 01/10/01

Section 7 of RR 81-213 defines a "Special G/L" calculation that establishes an amortization base that FORCES the theoretical equation of balance to hold. Section 7 of RR 81-213 states that you can do a special determination of the G/L only when an experience loss has occurred, and when there are no other amortization bases. The proposed regulation at §1.412(b)-1(f)(2)(ii) contains basically the same rule, except that it does not require a loss to have occurred.

Unit Credit is an individual cost method, and you normally would calculate the experience G/L each year. This year, you simply "back into" the amount of the base needed, and call that an experience loss base:

$$\begin{aligned}\text{Loss base} &= \text{UAL} + \text{credit balance} \\ &= 50,000 + 5,000 \\ &= 55,000\end{aligned}$$

With a loss base, it is possible that the minimum could exceed the normal cost plus limit adjustments. But that would be unlikely with a multiemployer plan, since the loss would be amortized over 15 years for the minimum, versus 10 years for the maximum:

Amortization base	Outstanding Base	Remaining years	Amortization
1-1-97 Loss base	55,000	15 = 15 - (97-97)	5,644

1997 Minimum Funding Standard Account

Charges		Credits	
Normal Cost	20,000	Credit Balance	5,000
Loss amortization	5,644	12/31 contrib	x
7% interest	1,795	7% interest	350
Total charges	27,439	Total credits	x + 5,350

The §412 minimum of 22,089 does not exceed the previously calculated deductible limit of 28,519.

Answer is B

Fall 1997 EA-2 Exam Solutions

Problem 29

Similar to 1994 #20

Revised 01/10/01

I. FALSE

The ratio percentage is defined under the regulations at §1.410(b)-9 as the percentage of non-highly compensated employees (NHCEs) who benefit under the plan divided by the percentage of highly compensated employees (HCEs) who benefit under the plan. The percentage of NHCEs who benefit under the plan equals the number of NHCEs in the plan divided by the total number of non-excludable NHCEs. The percentage of HCEs who benefit under the plan equals the number of HCEs in the plan divided by the total number of non-excludable HCEs. The ratio percentage is 66.67%:

	NHCEs	HCEs	Ratio
Total employees	5,000	300	
Excludable employees	200	50	
Non-Excludable employees	4,800	250	
Employees benefiting under both Plan A and Plan B	3,200	250	
Ratio	$3,200 / 4,800$ =66.67%	$250 / 250$ =100.00%	66.67%

II. FALSE

The average benefit percentage test is defined under the regulations at §1.410(b)-5 as the ratio of the actual benefit percentage (ABP) for non-highly compensated employees (NHCEs) who benefit under the plan divided by the ABP for highly compensated employees (HCEs) who benefit under the plan. The ABP for NHCEs equals the sum of benefit accrual rates for NHCEs in the plan divided by the total number of non-excludable NHCEs. The ABP for HCEs equals the sum of benefit accrual rates for HCEs in the plan divided by the total number of non-excludable HCEs. The average benefit percentage test gives 66.89%:

	NHCEs	HCEs	Ratio
Non-Excludable employees	4,800	250	
Sum of benefit accrual rates	$600 * 1.5\%$ $+ 2,600 * 2.0\%$	$50 * 1.5\%$ $+ 200 * 2.0\%$	
Ratio	$6,100\% / 4,800$ =1.27%	$475\% / 250$ =1.90%	66.89%

III. TRUE

The non-highly compensated concentration percentage is defined under the regulations at §1.410(b)-4(c)(4)(iii) as the ratio of total non-excludable NHCEs to total non-excludable employees, which is $4,800 / (4,800 + 250) = 95.05\%$.

Only item III is true.

Answer is E

Fall 1997 EA-2 Exam Solutions

Problem 30 - Page 1

The main point of this problem is that, you must use the equation of balance to determine the normal cost under the Frozen Initial Liability method. The calculation of the normal cost under the FIL method must satisfy the formulas that are applicable to all reasonable funding methods (see the regulations at §1.412(c)(3)-1):

$$\begin{aligned} \text{PV Future Normal costs} &= \text{PV Future Benefits} - \text{Actuarial Assets} \\ &\quad - (\text{O/S §412 amortization bases} - \text{credit balance} - \text{ARA}) \end{aligned}$$

Except under the Aggregate method

For cost methods with Unfunded Actuarial Liabilities, this can be restated as $\text{UAL} = \text{O/S §412 bases} - \text{credit balance} - \text{ARA}$. Now you must calculate the outstanding §412 bases, and the amortization amounts for the funding standard Account:

Amortization base	Original Base	Amortization	Remaining years	Outstanding base
1-1-93 IAL base	200,000	$15,063 = 200,000 / \ddot{a}_{30 .07}$	$26 = 30 - (97 - 93)$	190,599
1-1-95 Assump base	125,000	$16,633 = 125,000 / \ddot{a}_{10 .07}$	$8 = 10 - (97 - 95)$	106,272

$$\begin{aligned} \text{Frozen Initial UAL} &= 12-31-96 \text{ O/S bases} - \text{CB} - \text{ARA} \\ &= 190,599 + 106,272 - 10,000 - 5,000 \\ &= 281,872 \end{aligned}$$

Now calculate the normal cost under the Frozen Initial Liability method:

$$\begin{aligned} \text{PVNC} &= \text{PVFB} - \text{AAV} - \text{O/S bases} + \text{CB} + \text{ARA} \\ &= \text{PVFB} - \text{AAV} - \text{UAL when the equation of balance is satisfied} \\ &= 550,000 - 175,000 - 281,872 \\ &= 93,128 \end{aligned}$$

$$\begin{aligned} \text{PVL/L} &= 1,500,000 / 300,000 = 5.0000 \\ \text{NC} &= 93,128 / 5.0000 \\ &= 18,626 \end{aligned}$$

Fall 1997 EA-2 Exam Solutions

Problem 30 - Page 2

1997 Minimum Funding Standard Account			
Charges		Credits	
Normal Cost	18,626	Credit Balance	10,000
IAL amortization	15,063		
Assump amortization	16,633	12/31 contrib	x
7% interest	3,522	7% interest	700
Total charges	<u>53,844</u>	Total credits	<u>x + 10,700</u>

The minimum contribution payable 12/31/97 is $53,844 - 10,700 = 43,144$.

Answer is D

Fall 1997 EA-2 Exam Solutions

Problem 31 - Page 1

This problem is the first on the Transition Rule. For plans which elect the Transition Rule, the amount of the 412(l) additional funding charge is limited by a ceiling. The ceiling is the greater of the “target amount” and the value of the §412(l) additional funding charge calculated under the pre-GATT rules.

This problem is the first one in which you are given the expected benefit payments with interest under both the valuation and current liability assumptions. With the current liability normal cost, you must project the end of year assets and end of year current liability. This is necessary to calculate the target amount, as defined under Revenue Ruling 96-21:

$$\begin{aligned} \text{Target amount} = & [(1+i^{\text{CL}})(\text{NC}^{\text{CL}} + \text{AL}^{\text{CL}}) - \text{BP}(1 + i^{\text{CL}}/2)] * (\text{target } \%) \\ & - [(1+i)\{\text{AAV}-\text{CB} + \$412(\text{NC} + \text{charges}-\text{credits})\} - \text{BP}(1 + i/2)] \end{aligned}$$

The target % is defined in the code based on a schedule of increases which start with the 1995 funded current liability percentage. To calculate the target % at the end of 1997, first define T equal to the 1995 funded current liability percentage. Then apply this formula three years in a row:

$$T = T + \text{MIN}(3\%, 2\% + .1 (\text{MAX}(0, 85\% - T)))$$

In this problem, you are told that the applicable percentage is 9.00%. This represents the increase over the 1995 funded current liability percentage, which is

$$\begin{aligned} \text{1995 FCL\%} &= (\text{AAV}-\text{CB}) / \text{CL} \\ &= (2,500,000 - 200,000) / 4,800,000 \\ &= .4792 \end{aligned}$$

For plans with a 1995 FCL% less than 75%, the first year increase would be 3%. As long as the resulting value of T in the earlier formula is less than 75%, then each year's increase would be 3%. The target percentage at the end of 1997 is 9.00% + 47.92%, or 56.92%.

Fall 1997 EA-2 Exam Solutions

Problem 31 - Page 2

Now you should calculate the target amount based on the earlier formula:

Target amount = (EOY CL) * (Target %) - (EOY AAV)

EOY CL = 5,493,950 = $1.07 * (185,000 + 5,300,000) - 375,000$

EOY AAV = 2,975,320 = $1.08 * (3,000,000 - 150,000 + 229,000) - 350,000$

Target amount = 151,653 = $5,493,950 * .5692 - 2,975,320$

The Transition Rule value is the greater of 151,653, and the pre-GATT value of the additional §412(l) charge of zero, or 151,653. The final additional §412(l) charge value is the lesser of the Transition Rule value of 151,653, and the post-GATT additional §412(l) charge value of 250,000, or 151,653.

Answer is C

With no information about participant counts, assume that you should not pro-rate the additional §412(l) charge.

Fall 1997 EA-2 Exam Solutions

Problem 32

In some §404 problems, the hardest thing to get straight is which valuation corresponds to which tax year. Usually you are only given one set of valuation results, which is based on the correct valuation date.

The deductible limit for the taxable year ending 06/30/97 is based on the valuation for the plan year beginning in that tax year. The 01/01/97 valuation should be used to determine the deductible limit needed for the answer to this problem.

The first step should be to calculate the normal cost plus limit adjustments. You are told to do this calculation under the fresh start alternative, which requires you to calculate a single ten year amortization for the entire Unfunded Actuarial Liability.

The §404 UAL will equal the §412 UAL, since there are no non-deductible contributions. The §412 UAL can be calculated based on the equation of balance:

$$\begin{aligned}\text{UAL} &= \text{O/S } \$412 \text{ bases} - \text{credit balance} - \text{ARA} \\ &= (250,000 + 100,000 + 50,000) - 50,000 - 0 \\ &= 350,000\end{aligned}$$

The deductible limit is the normal cost plus limit adjustments brought forward with interest to the earlier of the end of the plan year, or the end of the tax year, which is 06/30/97:

$$\text{Limit adjustment} = (350,000) / \ddot{a}_{\overline{10}|.07} = 46,572$$

$$\text{Deductible limit} = (50,000 + 46,573) * (1.035) = 99,952$$

The second step is usually to check the Full Funding Limitation under §404. Since you have no market value of assets, you can't check the Full Funding Limitation.

The final step would normally be to calculate the minimum contribution. Since every §412 base has an amortization period of 10 or more years, you would not expect the minimum to exceed the previously calculated deductible limit. You have no information to either calculate the unfunded current liability, or to determine if you are eligible to use it.

Answer is A

This problem seems too short - the only point is whether you know how to calculate the deductible limit under the fresh start alternative.

Fall 1997 EA-2 Exam Solutions

Problem 33

Revised 11/17/98

This problem tests your knowledge of the method for adjusting assets and discounting contributions under the Alternative Rule for calculating the Variable Rate Premium on the PBGC-1 Form, Schedule A.

The liabilities have already been adjusted. The total value is

$$5,692,000 = 770,000 + 535,000 + 4,387,000$$

Since this is the 1997 PBGC premium calculation under the Alternative Rule, the determination date is 01/01/96. Under the Alternative Rule, you would use the asset value at 01/01/96, and reduce it by any included receivable contributions. Then you must add the discounted value of “contributions paid for plan years prior to the premium payment year ...” The interest rate used for discounting is the Required Interest Rate:

$$4,670,311 = (4,400,000 - 300,000) + 300,000*(1.0524)^{-5} + 300,000*(1.0524)^{-1.5}$$

The adjusted value of the unfunded benefits liability is the excess of the liabilities over the adjusted assets, “adjusted for the passage of time from the determination date ... to the last day of the 1996 plan year ...” The interest rate used for the adjustment is the Required Interest Rate:

$$1,075,225 = 1.0524 * (5,692,000 - 4,670,311)$$

The adjusted unfunded benefits liability must be rounded up to the next multiple of 1,000, which gives 1,076,000. The last step is to multiply the adjusted value of the unfunded benefits liability by .009:

$$9,684 = .009 * 1,076,000$$

Answer is D

Fall 1997 EA-2 Exam Solutions

Problem 34

Similar to 1995 #38

With the change in the salary scale, you will set up an assumption change base at 01/01/97. Since you have the Unfunded Actuarial Liability under the new assumptions, you can solve for the assumption change base using the equation of balance:

$$01/97 \text{ UAL} = \text{O/S } \$412 \text{ bases} - \text{CB} - \text{ARA}$$

You have to determine the outstanding amount of the IAL amortization base at 7%:

Amortization base	Original Base	Original years	Amortization	Remaining years	Outstanding base
1-1-76 IAL base	1,000,000	40	70,102	19 = 40 - (97-76)	775,264

$$\begin{aligned} 01/97 \text{ UAL} &= 775,264 + \text{ASSM} - \text{CB} - \text{ARA} \\ 800,000 &= 775,264 + \text{ASSM} - 50,000 \end{aligned}$$

$$\begin{aligned} \text{ASSM} &= 74,736 = 850,000 - 775,264 \\ \text{Amortization} &= 9,945 = 74,736 \div \ddot{a}_{\overline{10}|.07} \end{aligned}$$

Since you are given the credit balance at 12/31/97, you must solve for the normal cost at 01/01/97. This is a “cheap” trick!

1997 Minimum Funding Standard Account

Charges		Credits	
Normal Cost	NC	Credit Balance	50,000
IAL amortization	70,102		
Assump. amort.	9,945	07/01 contrib	150,000
7% interest	$5,603 + .07*NC$	7% interest	8,750
Total charges	$85,650 + 1.07*NC$	Total credits	208,750

The 7% interest is calculated as $.07*(50,000) + .07*(6/12)*(150,000)$. The final credit balance is

$$\begin{aligned} 75,000 &= 208,750 - (85,650 + 1.07*NC) \\ 75,000 &= 123,100 - 1.07*NC \\ NC &= (123,100 - 75,000) / 1.07 \\ &= 44,953 \end{aligned}$$

Answer is C

Fall 1997 EA-2 Exam Solutions

Problem 35

Revised 11/17/98

You are given the assumption change base at 01/01/97, but you must solve for the Initial Accrued Liability base. Since you have the Unfunded Actuarial Liability under the new assumptions, solve for the IAL base using the equation of balance:

$$01/97 \text{ UAL} = \text{O/S } \$412 \text{ bases} - \text{CB} - \text{ARA}$$

You have to determine the outstanding amount of the IAL amortization base at 7%:

Amortization base	Original Base	Original years	Amortization	Remaining years	Outstanding base
1-90 IAL base	X	30	$X / 13.2777$	$23 = 30 - (97-90)$	$X * .9084$
1-92 ASSM base	50,000	10	6,653	$5 = 10 - (97-92)$	29,189

$$01/97 \text{ UAL} = X * .9084 + 29,189 - 20,000 - 0$$

$$100,000 = X * .9084 + 9,189$$

$$X = 99,970 = 90,811 / .9084$$

$$\text{Amortization} = 7,529 = 99,970 \div \ddot{a}_{30|.07}$$

Now you can solve for the minimum contribution at 12/31/97 :

1997 Minimum Funding Standard Account			
Charges		Credits	
Normal Cost	120,000	Credit Balance	20,000
IAL amortization	7,529		
Assump amortization	6,653	12/31 contrib	x
7% interest	9,393	7% interest	1,400
Total charges	143,575	Total credits	x + 21,400

The minimum contribution payable 12/31/97 is $143,575 - 21,400 = 122,175$.

Answer is E

Fall 1997 EA-2 Exam Solutions

Problem 36 - Page 1

Revised 06/20/06

To calculate the required quarterly contribution for 1997, you must first calculate the required annual payment (RAP). This is the lesser of last year's minimum required contribution or 90% of this year's. These numbers are both interest adjusted to the first day of this plan year, and they both would not reflect any credit balance.

$$\begin{aligned} 12/31/96 \text{ "MFSA excluding CB"} &= (30,000 + 10,000) * 1.07 + 20,000 = 62,800 \\ 01/01/97 \text{ "MFSA excluding CB"} &= (45,000 + 15,000) * .90 = 54,000 \end{aligned}$$

$$\text{Lesser of the two} = 54,000$$

The required quarterly installment is based on the applicable percentage multiplied by the RAP, which is $25\%(54,000) = 13,500$.

With no credit balance at 01/01/95, and no contribution until 09/15/98, there will be four underpayments of equal amounts of 13,500, each with different periods of underpayment:

Date	Required	Amount Available	Overpayment (Underpayment)	Period of Underpayment
04/15/97	13,500	-0-	(13,500)	17 months
07/15/97	13,500	-0-	(13,500)	14 months
10/15/97	13,500	-0-	(13,500)	11 months
01/15/98	13,500	-0-	(13,500)	8 months
09/15/98	-0-	X	X-4*(13,500)	

The interest penalty is calculated based on the period of the underpayment, and is applied to the amount of the underpayment. Using simple interest, the interest penalty is calculated as follows:

$$\begin{aligned} 13,500 * [(1 + (.108)(17/12)) - (1 + (.07)(8.5/12))] &= 1,396 \\ 13,500 * [(1 + (.108)(14/12)) - (1 + (.07)(5.5/12))] &= 1,268 \\ 13,500 * [(1 + (.108)(11/12)) - (1 + (.07)(2.5/12))] &= 1,140 \\ 13,500 * [(1 + (.108)(08/12)) - (1 + (.07)(0/12))] &= \underline{972} \\ &4,776 \end{aligned}$$

When the underpayment period extends beyond the end of the plan year, interest at the valuation rate is only credited to the end of the plan year. The 175% of the F.M.R. continues to accrue to the date of payment.

Fall 1997 EA-2 Exam Solutions

Problem 36 - Page 2

Revised 07/06/00

1997 Minimum Funding Standard Account			
Charges		Credits	
Normal Cost	45,000	Credit Balance	-0-
Net amortization	15,000	12/31 contrib	x
7% interest	4,200	7% interest	-0-
412(m) penalty	4,776		
Total charges	68,976	Total credits	x

The minimum contribution payable at 09/15/98 is 68,976.

Answer is B

If you did not include the 20,000 412(l) AFC in the 12/31/96 "minimum requirement" when determining the required annual payment, you will get an answer of 67,985, which is in the wrong range.

Fall 1997 EA-2 Exam Solutions

Problem 37

Similar to 1996 #20

Revised 01/10/01

A 70% contribution decline occurs when 30% of “units in the high base year” exceeds the units in each year of the “three year testing period”. The “three year testing period” includes the year that the 70% decline occurs as the last year. The “units in the high base year” is the average of the two highest years in five years preceding the “three year testing period”.

You must calculate the various items to see when a 70% decline has occurred:

Assumed year	1993	1994
3 year testing period	1991-1993	1992-1994
Highest units in 3 year testing period	250,000	200,000
Highest testing / .30	833,333	666,667
Base years	1986-1990	1987-1991
Two years exceed the Highest testing / .30 ?	NO	YES
High base years		1988, 1989
Units in high base year		.5*(725,000 + 750,000) = 737,500
30% of units in high base year		221,250
70% decline occurred?	NO	YES

To calculate the partial withdrawal liability due to a 70% contribution decline,

- (1) Initial year of the three year testing period is considered as the year of withdrawal for calculation of employer share of UVB
- (2) The fraction to multiply the “complete withdrawal” liability by is

$$1.0 - \frac{\text{Base units for plan year following last year of three year testing period}}{\text{Average base units during 5 yr. period preceding three year testing period}}$$
$$= 1.0 - \frac{150,000}{20\% * (700,000 + 750,000 + 725,000 + 680,000 + 250,000)}$$

$$.7585 = 1 - 150 / 621$$

The partial withdrawal liability is calculated as $.7585 * 100,000 = 75,845$.

answer is E

NOTE: If you continue testing future years, 1995 and 1996 also satisfy the definition of the year of a 70% decline in contribution. The 1995 partial withdrawal liability value of 80,806 is also in answer range E. You don't have information for 1997, so you can't calculate the partial withdrawal liability value based on 1996.

Fall 1997 EA-2 Exam Solutions

Problem 38

Similar to 1994 #7

This is a multiemployer PBGC guaranteed benefits question. In general, benefit increases within the 60 months preceding DOPT are not guaranteed.

Since this plan has always paid the normal cost plus interest on the UAL, by definition it is not underfunded. For a multiemployer plan that is not "underfunded", the PBGC guarantees a \$5 per month benefit accrual rate plus 75% of the next \$15 per month of benefit accrual. For a multiemployer plan that is "underfunded", the PBGC guarantees a \$5 per month benefit accrual rate plus 65% of the next \$15 per month of benefit accrual.

The guaranteed benefit is based on the plan in effect five years before DOPT. Since the 01/01/92 amendment was not adopted until 01/01/93, the increase in benefits to \$30 is not guaranteed. The 01/01/87 plan is the "five year old" plan:

$$5.00 + 75\%(10.00) = 12.50 \text{ per month}$$

Number of Participants	Years of Service	Guaranteed Benefit	Total Guaranteed Benefits
10	20	12.50	2,500
20	10	12.50	2,500
			<u>5,000</u>

Answer is B

Fall 1997 EA-2 Exam Solutions

Problem 39 - Page 1

Similar to 1996 #13

With an individual cost method, there are two things to be aware of. One is that you should check the Full Funding Limitation if you have the market value of assets. The other is that you should check for experience gains or losses each year.

Since this is a brand new plan, the FFL is so large that it will not apply. You have to calculate the experience G/L during 1996. You must determine the expected UAL at 01/01/97, as well as the actual UAL at 01/01/97 before the plan amendment. The difference between those two values is the experience gain or loss base.

$$\begin{aligned}
 01/97 \text{ } _e\text{UAL} &= (1+i) * (NC_0 + UAL_0) - (\text{ contrib } + i) \\
 &= 1.07 * (100,000 + 438,000) - [1 + (3/12)*.07] * (155,000) \\
 &= 575,660 - 157,713 \\
 &= 417,948
 \end{aligned}$$

$$\begin{aligned}
 01/01/97 \text{ UAL} &= 869,000 - 158,000 = 711,000 \\
 \text{Old plan UAL} &= 711,000 - 215,000 = 496,000
 \end{aligned}$$

$$\begin{aligned}
 \text{Loss base} &= 496,000 - 417,948 = 78,053 \\
 \text{Amortization} &= 17,791 = 78,053 \div \ddot{a}_{\overline{5}|.07}
 \end{aligned}$$

$$\begin{aligned}
 \text{Plan change} &= 215,000 \text{ (given)} \\
 \text{Amortization} &= 16,193 = 215,000 \div \ddot{a}_{\overline{30}|.07}
 \end{aligned}$$

To determine the credit balance at 01/01/97, you have to determine the outstanding amount of the IAL amortization base at 7%:

$$01/97 \text{ } _e\text{UAL} = \text{O/S } \$412 \text{ bases} - \text{CB} - \text{ARA}$$

Amortization base	Original Base	Original years	Amortization	Remaining years	Outstanding base
01/96 IAL base	438,000	30	32,988	29 = 30 - (97-96)	433,463

$$\begin{aligned}
 01/97 \text{ } _e\text{UAL} &= 417,948 = 433,463 - \text{CB} - 0 \\
 01/97 \text{ CB} &= 15,415
 \end{aligned}$$

Fall 1997 EA-2 Exam Solutions

Problem 39 - Page 2

1997 Minimum Funding Standard Account			
Charges		Credits	
Normal Cost	151,000	Credit Balance	15,415
IAL Amort	32,988		
1996 Loss	17,791	12/31 contrib	x
Plan change	16,193		
7% interest	15,258	7% interest	1,079
Total charges	<u>233,229</u>	Total credits	<u>x + 16,494</u>

The minimum contribution at 12/31/97 is $233,229 - 16,494 = 216,735$.

Answer is C

Problem 40 - Page 1

Revised 07/06/00

This is a difficult problem on maximum offset allowance (MOA) plans. The safe harbor rules under §401(l) require that the MOA be defined as the lesser of [0.75% (as adjusted under §1.401(l)-3(d) and §1.401(l)-3(e), if necessary), or .50 times the gross benefit percentage times a ratio]. The ratio (limited to 1.0) equals the average annual compensation divided by [final average compensation (FAC), limited to the offset level]. See below for definitions of these terms.

§1.401(l)-3(d) contains the requirements for the offset level. The offset level in the plan is the lesser of employee's covered compensation or FAC, which satisfies §1.401(l)-3(d)(3).

§1.401(l)-3(e) contains the adjustments for benefit commencement prior to the Social Security Retirement Age. Problem 25 shows part of the table of varying factors which represent the adjustment in the .75% below SSRA.

Since you were not given the complicated table with adjusted values of .75% based on §1.401(l) (for retirement at other than SSRA), you were probably supposed to assume you could ignore that part of the safe harbor definition. It did not have any impact in this problem.

Additional definitions in the §401(l) regulation:

- The offset level is a limit on the amount of each employee's FAC taken into account to calculate the offset under the plan.
- Covered compensation is the average of earnings (limited to the taxable wage base) for the 35 year period that ends with the last day of the calendar year that the employee will attain SSRA.
- §1.401(a)(4)-3(e)(2) defines average annual compensation as an average of 414(s) compensation over at least three consecutive 12 month periods (but not longer than the employment period). In general, this should match the compensation definition used for the gross benefit.
- FAC is the average of 414(s) compensation (limited to the social security taxable wage base) over the three consecutive year period ending with or within the plan year (but not longer than the employment period).

In the given plan, the gross benefit percentage is 1.0%, and the offset percentage is .50%. The offset is defined based on FAC, and the offset level is covered compensation. For both participants, half of the gross benefit accrual (times the ratio) is less than the adjusted .75%.

Fall 1997 EA-2 Exam Solutions

Problem 40 - Page 2

Revised 07/06/00

The simplest way to view this type of problem is that the MOA can't exceed 50% of the gross benefit portion. I believe this is a bit of an oversimplification when compared to the definitions shown on the preceding page. This final result matches my previous (much longer) method of solution:

	Smith	Brown
Date of birth	01/01/31	01/01/57
Social Security Retirement age	65	67
01/01/97 age	66	40
Date of hire	01/01/91	01/01/90
Years of service	6	7
"Gross" benefit percent under plan	1.00%	1.00%
FAC (5 years)	35,000	55,000
"Gross" benefit under plan	$35,000 * (1.0\%) * 6.0$ = 2,100	$55,000 * (1.0\%) * 7.0$ = 3,850
Average annual compensation - 5 years	35,000	55,000
FAC	40,000	60,000
1996 covered compensation	27,000	62,700
FAC < covered compensation	27,000	60,000
Offset benefit percent under plan	0.5000%	0.5000%
Preliminary offset benefit under plan: [FAC < CC] * offset % * service	$27,000 * (.5000\%) * 6.0$ = 810	$60,000 * (.5000\%) * 7.0$ = 2,100
Final offset, limited to half of gross	810	1,925
Final benefit, gross minus limited offset	1,290	1,925

The sum of the annual accrued benefits is $1,290 + 1,925 = 3,215$

Answer is D

Fall 1997 EA-2 Exam Solutions

Problem 41 - Page 1

In some §404 problems, the hardest thing to get straight is which valuation corresponds to which tax year. Usually you are only given one set of valuation results, which is based on the correct valuation date.

The deductible limit for the taxable year ending 04/30/98 is based on the valuation for the plan year beginning in that tax year. The 07/01/97 valuation should be used to determine the deductible limit needed for the answer to this problem.

The first step should be to calculate the normal cost plus limit adjustments. The ten year amortization bases include the initial accrued liability, the plan amendment, and both experience losses.

The deductible limit is the normal cost plus limit adjustments brought forward with interest to the earlier of the end of the plan year, or the end of the tax year, which is 04/30/98:

$$\text{Limit adjustment} = (135,000 + 25,000 + 7,000 + 85,000) / \ddot{a}_{\overline{10}|.07} = 33,532$$

$$\text{Deductible limit} = (45,000 + 33,532) * [1 + (10/12) * .07] = 83,113$$

The second step is usually to check the Full Funding Limitation under §404. Since you have no market value of assets, you can't check the Full Funding Limitation.

With experience losses, and a credit balance of zero, it is possible that the minimum contribution would exceed 83,113. You must determine the §412 amortizations to complete the Minimum Funding Standard Account:

$$\text{IAL amortization} = 135,000 / \ddot{a}_{\overline{30}|.07} = 10,167$$

$$\text{Amendment amortization} = 7,000 / \ddot{a}_{\overline{30}|.07} = 527$$

$$\text{1994 Loss amortization} = 25,000 / \ddot{a}_{\overline{5}|.07} = 5,698$$

$$\text{1996 Loss amortization} = 85,000 / \ddot{a}_{\overline{5}|.07} = 19,374$$

Fall 1997 EA-2 Exam Solutions

Problem 41 - Page 2

1997 Minimum Funding Standard Account			
Charges		Credits	
Normal Cost	45,000	Credit Balance	-0-
IAL amortization	10,167		
Amend. amortization	527	06/30 minimum	x
94 loss amortization	5,698		
96 loss amortization	19,374		
7% interest	5,654	7% interest	-0-
Total charges	86,421	Total credits	x

The minimum contribution is 86,421, which produces the final deductible limit. Since the actual contribution at 06/30/98 of 95,000 exceeds the deductible limit, there is a nondeductible contribution of $95,000 - 86,421 = 8,579$.

Answer is A

Fall 1997 EA-2 Exam Solutions

Problem 42 - Page 1

Revised 06/18/02

For plans which elect the Optional Rule, the amount of the §412(l) additional funding charge (AFC) should be the greater of the values calculated under the post-GATT and pre-GATT rules. This problem gives you all the values needed to calculate the Deficit Reduction Contribution (DRC) and the §412(l) AFC under both sets of rules.

The first step is calculation of the Gateway test, to see if the plan is subject to §412(l). It would be TOO easy if the plan passed the Gateway test!

$$\text{Gateway \%} = \text{AAV} / (\text{RPA CL at highest rate}) = 1,200,000 / 2,100,000 = 57.14\%$$

Since the percentage is less than 80%, the plan is definitely subject to §412(l). In this problem, you are told there are no unpredictable contingent events.

OBRA 87 rules

The MFSA charges should be increased by the Unpredictable Contingent Event amount plus the excess, if any, of the DRC over the §412(b) amortization charges and credits, excluding the normal cost, and excluding amortization of G/L, assumption changes, and cost method changes. The DRC is defined as the sum of the unfunded old liability amount (UOLA) and the unfunded new liability amount (UNLA), without adding the current liability normal cost.

The unfunded new liability (UNL) is the excess of the unfunded current liability (UCL) over the remaining portion of the unfunded old liability (UOL) plus any unpredictable contingent event liability. The unfunded current liability is defined as the excess of the current liability over the actuarial asset value, reduced by the credit balance.

$$\begin{aligned}\text{UCL} &= \text{CL} - (\text{AAV} - \text{CB}) \\ &= 1,800,000 - (1,200,000 - 100,000) \\ &= 700,000 \\ \text{UOL} &= 350,000 \text{ (given)} \\ \text{UNL} &= \text{UCL} - \text{UOL} - \text{UCEL} \\ &= 700,000 - 350,000 - 0 = 350,000\end{aligned}$$

The UOLA equals the amortization of the remaining portion of the unfunded old liability (UOL) over a period that was 18 years at 1-1-89, at the 7.25% rate:

01/01/97 UOL	Remaining years	UOLA
350,000	10 = 18 - (97-89)	47,002

Fall 1997 EA-2 Exam Solutions

Problem 42 - Page 2

The UNLA is defined as the unfunded new liability times the applicable percentage, which is 30% - 25% (FCL% - 35%) under OBRA 87. In this problem, you must calculate this percentage.

$$\begin{aligned}\text{FCL\%} &= (\text{AAV} - \text{CB}) / \text{CL} \\ &= (1,200,000 - 100,000) / 1,800,000 = 61.11\%\end{aligned}$$

$$\begin{aligned}\text{APP\%} &= .30 - .25 [.6111 - .35] \\ &= 23.47\%\end{aligned}$$

$$\begin{aligned}\text{UNLA} &= 350,000 * 23.47\% = 82,153 \\ \text{DRC} &= \text{UOLA} + \text{UNLA} \\ \text{DRC} &= 47,002 + 82,153 = 129,155\end{aligned}$$

You must subtract the §412 amortization charge for the IAL from the DRC to calculate the additional §412(l) charge. This §412(l) charge should be limited to the UCL of 700,000. Then you must bring the §412(l) charge forward to the end of the year with interest at the current liability rate:

$$\begin{aligned}01/01/97 \text{ §412(l) charge} &= 129,155 - 70,000 = 59,155 \\ 12/31/97 \text{ §412(l) charge} &= 1.0725 * 59,155 = 63,443\end{aligned}$$

Post-GATT rules

The MFSA charges should be increased by the Unpredictable Contingent Event amount plus the excess, if any, of the DRC over the §412(b) normal cost plus all amortization charges and credits. The DRC is defined as the sum of the unfunded old liability amount (UOLA), the unfunded new liability amount (UNLA), and current liability normal cost.

The unfunded new liability (UNL) is the excess of the unfunded current liability (UCL) over the remaining portion of the unfunded old liability (UOL) plus any unpredictable contingent event liability. The unfunded current liability is defined as the excess of the current liability over the actuarial asset value, reduced by the credit balance.

$$\begin{aligned}\text{UCL} &= \text{CL} - (\text{AAV} - \text{CB}) \\ &= 2,100,000 - (1,200,000 - 100,000) \\ &= 1,000,000 \\ \text{UOL} &= 750,000 \text{ (given)} \\ \text{UNL} &= \text{UCL} - \text{UOL} - \text{UCEL} \\ &= 1,000,000 - 750,000 - 0 = 250,000\end{aligned}$$

Fall 1997 EA-2 Exam Solutions

Problem 42 - Page 3

The UOLA equals the amortization of the remaining portion of the unfunded old liability (UOL) over a period that was 18 years at 1-1-89, at the 7.25% rate:

01/01/97 UOL	Remaining years	UOLA
750,000	10 = 18 - (97-89)	100,718

The UNLA is defined as the unfunded new liability times the applicable percentage, which is 30% - 40% (FCL% - 60%) under RPA 94. In this problem, you must calculate this percentage.

$$\begin{aligned}\text{FCL\%} &= (\text{AAV} - \text{CB}) / \text{CL} \\ &= (1,200,000 - 100,000) / 2,100,000 = 52.38\%\end{aligned}$$

$$\text{APP\%} = .30 - .40 [.5238 - .60]$$

Since the FCL% is less than 60%, the APP% is limited to 30%.

$$\begin{aligned}\text{UNLA} &= 250,000 * 30.00\% &= 75,000 \\ \text{DRC} &= \text{UOLA} + \text{UNLA} + \text{CLNC} \\ \text{DRC} &= 100,718 + 75,000 + 110,000 &= 285,718\end{aligned}$$

You must subtract the §412 normal cost plus all amortization charges from the DRC to calculate the additional §412(l) charge. Then you must bring the §412(l) charge forward to the end of the year with interest at the current liability rate.

$$\begin{aligned}\text{01/01/97 §412(l) charge} &= 285,718 - (150,000 + 90,000) = 45,718 \\ \text{12/31/97 §412(l) charge} &= 1.0725 * 45,718 = 49,033\end{aligned}$$

Based on Revenue Ruling 96-21, this end of year §412(l) charge should be limited to the end of year UCL. For the sake of speed in working problems, you can simply look at the UCL at the start of the year and see that it will not be anywhere near the magnitude of the §412(l) charge.

With more than 150 plan participants, you don't pro-rate the additional §412(l) charge. The final 12/31/97 §412(l) charge is the greater of the OBRA 87 and the RPA 94 definitions, or 63,443.

Answer is D

Problem 43 - Page 1

Revised 09/14/99

§404(a)(7)(A) of the IRC defines the overall deduction limitation for combinations of DB and DC plans. The limit is the greater of 25% of compensation, or the amount paid to the DB plans, not to exceed the minimum contribution requirement for the DB plan under §412. If the actual deduction for a year was equal to the unfunded current liability, the deduction limitation would be no less than that amount.

DB PLAN

First you should calculate the deductible limit for the DB plan. There are no calculations necessary, since you are given all the values.

Normal cost plus limit adjustments	475,000
§404 ERISA full funding limitation	720,000
§404 OBRA full funding limitation	850,000
§404 RPA full funding limitation	410,000

The Full Funding Limitation does not apply. The deductible limit will be the greater of the normal cost plus limit adjustments, or the minimum under §412. This is still the Normal cost plus limit adjustments of 475,000. The final comparison is to the unfunded current liability of 500,000, since this is a non-multiemployer plan with more than 100 participants. The final deductible limit is 500,000.

DC PLAN

The profit sharing plan has a separate deduction limitation of 15% of taxable compensation. The maximum amount that could be contributed to the profit sharing plan is 15% of 1,600,000, which gives 240,000.

OVERALL DB/DC

The overall deduction limitation is defined as the greater of 25% of taxable compensation, or the minimum contribution requirement for the DB plan. However, if the actual deduction for the DB plan is based on the unfunded current liability, then the overall deduction limitation is defined as the greater of 25% of taxable compensation, and the DB plan unfunded current liability.

25% taxable compensation	= .25(1,600,000) = 400,000
DB plan minimum	= 415,000
DB plan unfunded current liability	= 500,000

The overall DB/DC plan deduction limit is 500,000. The sum of the actual contributions for the two plans is $550,000 + 70,000 = 620,000$. Since this exceeds the overall combined limitation, 120,000 is the non-deductible contribution for both plans for 1997.

Answer is B

Fall 1997 EA-2 Exam Solutions

Problem 44 - Page 1

Revised 09/05/99

For 1997, earnings under §415 is defined as taxable compensation. Earnings under §415 is not subject to the §401(a)(17) limit of 150,000.

At 01/01/97

Age	55	Birth date	1/1/42
Service	17 years	Hire date	1/1/80
Participation	17 years	Effective date	1/1/79
		Normal retirement age	65
		Social Security Retirement age	66

$$\begin{aligned}\text{Accrued benefit at age 55} &= 80,000 * .10 * 17 \\ &= 136,000\end{aligned}$$

$$\text{Actuarial reduction from 65 to 55} = N_{65}^{(12)} / N_{55}^{(12)} \quad \text{at plan 6\% basis}$$

$$\begin{aligned}\text{Early retirement benefit at age 55} &= 136,000 * [2,159 / 5,040] \\ &= 58,259\end{aligned}$$

The §415(b)(1)(B) compensation limit is reduced when service is less than ten years.

$$\text{Age 55 100\% 3 year comp. §415 limit} = 80,000$$

Under §415(b)(1)(A), the dollar limit is reduced when participation is less than ten years.

$$\begin{aligned}\text{Social Security Retirement Age} &= 66 \text{ since born in 1942} \\ \text{§415 dollar limit during 1997} &= 125,000 \text{ at age 66} \\ \text{§415 dollar limit at age 65} &= 125,000 * .9333 \\ \text{§415 dollar limit at age 64} &= 125,000 * .8667 \\ \text{§415 dollar limit at age 63} &= 125,000 * .8000 \\ \text{§415 dollar limit at age 62} &= 125,000 * .7500 = 93,750\end{aligned}$$

§415(b)(2)(E)(i) says to use the greater of 5% and the interest rate specified in the plan to reduce the §415 dollar limit prior to age 62. The examples in Revenue Ruling 95-29 clarify that the §415 dollar limit is reduced using the lower of the factors calculated based on the mandated mortality and interest rate, and plan basis for optional forms. Based on the general conditions for this exam, in the absence of other information, you should assume that the basis for optional form conversions is the same as the funding assumptions.

Fall 1997 EA-2 Exam Solutions

Problem 44 - Page 2

In this problem, you are given the “N/N” factors both on the plan basis and on the mandated basis.

$$\begin{aligned}\text{Actuarial reduction from 62 to 55} &= N_{62}^{(12)} / N_{55}^{(12)} \\ \text{(mandated 5\% basis)} &= 5,567 / 9,393 = .5927\end{aligned}$$

$$\begin{aligned}\text{Actuarial reduction from 62 to 55} &= N_{62}^{(12)} / N_{55}^{(12)} \\ \text{(plan 6\% basis)} &= 2,836 / 5,040 = .5627\end{aligned}$$

$$\begin{aligned}\$415 \text{ dollar limit at age 55} &= 93,750 * \text{lesser of } [.5927, \text{ or } .5627] \\ &= 52,753\end{aligned}$$

Smith's benefit of 58,259 is limited to the lesser of 80,000 and 52,753, which equals 52,753.

Answer is A

Fall 1997 EA-2 Exam Solutions

Problem 45 - Page 1

IRC §414(l)(2) contains provisions for allocating assets to spun off plans when the assets exceed the present value of accrued benefits on a termination basis, and when the spun off plans are members of the same controlled group.

Since plan A's sponsor continues to maintain both plans B and C, they remain members of the same controlled group. The same is true for plans D, E, and F. There are two unrelated plan spinoff events that occur in this problem.

You must allocate the "applicable percentage" of the "excess assets" to each spun off plan. The "excess assets" equal the excess of the market value of assets over the present value of accrued benefits on a termination basis. For plan A, the excess assets equal $270,000 - 230,000 = 40,000$.

The "applicable percentage" is the ratio for a spun off plan to the total (for the original plan) of the excess, if any, of (I) the lesser of 150% of Current Liability or (normal cost plus accrued liability), over (II) the present value of accrued benefits on a termination basis. This problem gives you values at the end of the plan year, so the Accrued Liability figures include the normal cost.

	Description of item	Total Plan A	Plan B	Plan C
(1)	100% of current liability	170,000	110,000	60,000
(2)	Accrued liability (including NC)	260,000	170,000	90,000
(3)	Liability component of FFL, lesser of 150% CL or EAN AL	255,000	165,000	90,000
(4)	PV of AB on termination basis	230,000	150,000	80,000
(5)	Excess of (3) over (4)	25,000	15,000	10,000
(6)	Applicable percentage	100%	60%	40%
(7)	Allocated excess assets	40,000	24,000	16,000
(8)	Total allocated assets (4)+(7)	270,000	174,000	96,000

Fall 1997 EA-2 Exam Solutions

Problem 45 - Page 2

For plan D, the excess assets equal $210,000 - 180,000 = 30,000$.

	Description of item	Total Plan D	Plan E	Plan F
(1)	100% of current liability	140,000	78,000	62,000
(2)	Accrued liability (including NC)	195,000	108,000	87,000
(3)	Liability component of FFL, lesser of 150% CL or EAN AL	195,000	108,000	87,000
(4)	PV of AB on termination basis	180,000	100,000	80,000
(5)	Excess of (3) over (4)	15,000	8,000	7,000
(6)	Applicable percentage	100%	53%	47%
(7)	Allocated excess assets	30,000	16,000	14,000
(8)	Total allocated assets (4)+(7)	210,000	116,000	94,000

The sum of the market values allocated to Plan B and Plan E is $174,000 + 116,000$, which is 290,000.

Answer is B

Fall 1997 EA-2 Exam Solutions

Problem 46 - Page 1

Revised 09/14/99

With an individual type cost method, you would need the market value of assets to check the Full Funding Limitation. Since you have it, you should calculate the FFL values.

The problem asks for the deductible limit for 1997, which you calculate as normal cost plus limit adjustments. You need to use the equation of balance under 412 to determine the Initial Accrued Liability:

$$\text{Unfunded Actuarial Liability} = \text{O/S } \$412 \text{ amortization bases} - \text{credit balance} - \text{ARA}$$

Amortization base	Original Base	Amortization	Remaining years	Outstanding base
1-1-89 IAL base	IAL	$\text{IAL} / \ddot{a}_{\overline{30} .07}$	22 = 30-(97-89)	$\text{IAL} * .8914$
1-1-96 Gain base	12,000	$2,735 =$ $12,000 / \ddot{a}_{\overline{5} .07}$	4 = 5-(97-96)	9,913

$$80,000 = .8914 * \text{IAL} - 9,913 - 10,000 - 0$$

$$\text{IAL} = 112,088 = 99,913 / .8914$$

$$\text{Limit adjustment} = (112,088 - 12,000) / \ddot{a}_{\overline{10}|.07} = 13,318$$

$$\text{Deductible limit} = (30,000 + 13,318) * (1.07) = 46,350$$

The next step is to check the Full Funding Limitation under §404.

$$\begin{aligned} \text{\$404 "ERISA" FFL} &= (1+i) * (\text{NC} + \text{AL} - (\text{lesser MVA, AAV})) \\ &= 1.07 * (30,000 + 250,000 - 170,000) \\ &= 117,700 \end{aligned}$$

$$\begin{aligned} \text{\$404 "OBRA" FFL} &= 1.50 (12/31 \text{ CL}) - (1+i) * (\text{lesser MVA, AAV}) \quad (\text{if no benefit payments}) \\ &= 1.50 * 200,000 - 1.07 * 170,000 \\ &= 118,100 \end{aligned}$$

$$\begin{aligned} \text{\$404 "RPA94" FFL} &= .90 (12/31 \text{ CL}) - (1+i) * (\text{AAV}) \quad (\text{if no benefit payments}) \\ &= .90 * 235,000 - 1.07 * 170,000 \\ &= 29,600 \end{aligned}$$

Fall 1997 EA-2 Exam Solutions

Problem 46 - Page 2

Note that the end of year asset value (if any) should be used in calculating the OBRA and RPA '94 FFL. The reason is that any benefit payments during the year should be reflected at the valuation rate in the assets, and presumably are included in the end of year value. They would be accumulated at the current liability interest rate in the end of year current liability value.

The final §404 FFL value is the greater of the RPA '94 floor, and the lesser of the ERISA and OBRA FFL values, or 117,700. Since the §404 FFL does not apply, you need to at least think about calculating the §412 minimum contribution. With an experience gain, and a credit balance, the §412 minimum would not exceed the deductible limit of 46,350.

You have more than 100 participants. Since this is NOT a multiemployer plan, the plan sponsor is eligible for the deductible limit based on the Unfunded Current Liability:

$$\begin{aligned}\$404 \text{ UCL} &= 235,000 - 1.07 * 170,000 \\ &= 53,100\end{aligned}$$

Since this is larger than the previously calculated value of 46,350, the final deductible limit is 53,100.

Answer is D

Problem 47 - Page 1**Revised 09/14/99**

§404(a)(7)(A) of the IRC defines the overall deduction limitation for combinations of DB and DC plans. The limit is the greater of 25% of compensation, or the amount paid to the DB plans, not to exceed the minimum contribution requirement for the DB plan under §412. If the actual deduction for a year was equal to the unfunded current liability, the deduction limitation would be no less than that amount.

You are given the contributions to the DC plan, and you must calculate the maximum contribution to the DB plan which will be deductible.

DC PLAN

The profit sharing plan has a separate deduction limitation of 15% of taxable compensation. The maximum amount that could be contributed to the profit sharing plan is 15% of (2,700,000 less 180,000) which gives 378,000.

The total DC plan contribution is 50,000 + 180,000 + 75,000 or 305,000. This contribution is less than 378,000, and is deductible.

DB PLAN

The deductible limit will be the greater of the normal cost plus limit adjustments, or the minimum under §412. You need to determine the Initial Accrued Liability:

$$IAL = 995,826 = 75,000 * \ddot{a}_{\overline{30}|.07}$$

$$\text{Limit adjustment} = 995,826 / \ddot{a}_{\overline{10}|.07} = 132,508$$

$$\text{Deductible limit} = (200,000 + 132,508) * (1.07) = 355,783$$

You can't calculate the Full Funding Limitation without the market value of assets. It should be clear that the §412 minimum will not apply, since the IAL is amortized over 30 years, and you also have a credit balance. You should calculate the §412 minimum for the overall DB/DC limit:

$$\text{§412 minimum} = 272,850 = 1.07 * (200,000 + 75,000 - 20,000)$$

You have no information to calculate the deductible limit based on the unfunded current liability. In the absence of any overall DB/DC plan limit, the DB plan deductible limit is 355,783.

Fall 1997 EA-2 Exam Solutions

Problem 47 - Page 2

Revised 09/14/99

OVERALL DB/DC

The overall deduction limitation is defined as the greater of 25% of taxable compensation, or the minimum contribution requirement for the DB plan. However, if the actual deduction for the DB plan is based on the unfunded current liability, then the overall deduction limitation is defined as the greater of 25% of taxable compensation, and the DB plan unfunded current liability.

$$25\% \text{ taxable compensation} = .25(2,520,000) = 630,000$$

$$\text{DB plan minimum} = 272,850$$

The overall DB/DC plan deduction limit is 630,000. Since the contribution to the DC plan was 305,000, the maximum amount that could be paid to the DB plan without exceeding the overall DB/DC limit is $630,000 - 305,000 = 325,000$. Since this is less than the DB plan deductible limit, then you can safely assume the DB plan contribution at 12/31/97 is 325,000.

1997 Minimum Funding Standard Account

Charges		Credits	
----------------	--	----------------	--

Normal Cost	200,000	Credit Balance	20,000
IAL amortization	75,000	12/31 maximum	325,000
7% interest	19,250	7% interest	1,400
Total charges	294,250	Total credits	346,400

The 12/31/97 credit balance is $294,250 - 346,400 = 52,150$.

Answer is B

Fall 1997 EA-2 Exam Solutions

Problem 48

Revised 05/09/02

In general, the Top Heavy determination date is the last day of the preceding plan year. An exception to this is the first plan year, when the determination date is the last day of the first plan year. For this problem the determination date is 12/31/96.

However, based on questions T-24 and T-25 of the 1.416 regulation, the present value of accrued benefits for the DB plan (or accrued benefit for the DC plan) is calculated as of the valuation date in the 12 month period ending on the determination date. This problem is the first time this detail has been tested on the exam.

You should add together the present value of vested and non-vested accrued benefits and the account balances as of that date for all participants and the key employees. These amounts should include distributions within the five years preceding the determination date. The amounts should exclude values for terminated employees who have not been employed in the last 5 years, or values for former key employees.

If the ratio of key employee values to total values exceeds 60%, the plan is Top Heavy. If the ratio exceeds 90%, the plan is super Top Heavy.

A key employee includes anyone who satisfied the definition in the five years preceding the determination date. The definition of a key employee includes various employees as defined under 416(i)(1)(A). In this problem, the two employees Smith and Brown are identified as key employees.

The employee who terminated at 12/31/91 has not been employed in the five years preceding the determination date (1992 through 1996), and should be ignored. Their present value of benefits does not appear to be included in the present values as of the 01/01/96 valuation date.

The account balances for the key employees at 01/01/96 are

$$850,000 = 750,000 \text{ (Smith)} + 80,000 + 20,000 \text{ (Brown)}$$

The account balances for the non-key employees at 01/01/96 are

$$700,000 = 500,000 + 200,000$$

The Top heavy ratio is

$$54.84\% = 850 / (850 + 700)$$

Answer is C

Fall 1997 EA-2 Exam Solutions

Problem 49 - Page 1

Revised 09/14/99

This problem combines the complications of §415 with the complications of calculating benefits based on earned income. It sets a new standard for the difficulty of §415 problems!

For 1997, earnings under §415 is defined as taxable compensation. Earnings under §415 is not subject to the §401(a)(17) limit of 150,000.

At 01/01/2002

Age	45	Birth date	1/1/57
Service	20 years	Hire date	1/1/82
Participation	5 years	Effective date	1/1/97
SSRA	67	Normal retirement age	45

$$\begin{aligned}\text{Normal retirement benefit at age 45} &= 650 * 20 \\ &= 13,000\end{aligned}$$

Under §415(b), the dollar limit is reduced when participation is less than ten years.

$$\begin{aligned}\text{Social Security Retirement Age} &= 67 \text{ since born in 1957} \\ \text{\$415 dollar limit during 1997} &= 125,000 \text{ at SSRA} \\ \text{\$415 dollar limit at age 67} &= 125,000 * (5/10) \text{ reduced for participation svc} \\ &= 62,500 \\ \text{\$415 dollar limit at age 62} &= 62,500 * .70 \\ &= 43,750\end{aligned}$$

§415(b)(2)(E)(i) says to use the greater of 5% and the interest rate specified in the plan to reduce the §415 dollar limit prior to age 62. The examples in Revenue Ruling 95-29 clarify what is done in the absence of a specified interest and mortality rate in the plan document for optional form conversion. The §415 dollar limit is reduced using the lower of the factors calculated based on the mandated mortality and interest rate, and plan basis for optional forms. Based on the general conditions for this exam, in the absence of other information, you should assume that the basis for optional form conversions is the same as the funding assumptions.

Based on the definition of the pre-retirement death benefit, the correct factor definition for the actuarial reduction of the §415 dollar limit should use the ratio of the \ddot{a}_x instead of the ratio of the N_x factors. You are given various factors for \ddot{a}_x , but you have no idea of the interest rate and mortality used to calculate them!

Fall 1997 EA-2 Exam Solutions

Problem 49 - Page 2

Revised 07/06/00

Actuarial reduction from 62 to 45 = $(1.05)^{-17} * \ddot{a}_{62}^{(12)} / \ddot{a}_{45}^{(12)}$ at mandated 5% basis

Actuarial reduction from 62 to 45 = $(1.07)^{-17} * \ddot{a}_{62}^{(12)} / \ddot{a}_{45}^{(12)}$ at plan 7% basis

Lesser of two is the plan basis = $(1.07)^{-17} * 10.99 / 13.52$
= .2573

Based on the normal retirement age of 45, the plan basis has a reduction factor of 1.0. The final §415 dollar limit at age 45 using the lesser of the two factors is $.2573 * 43,750 = 11,258$. It appears as though the §415 dollar limit does limit the plan benefit.

The whole point of the problem is the definition of earnings. Earned income is defined in §401(c)(2)(A)(v) as net earnings after allowing for the deduction under §404 for plan contributions. The compensation definition under §415(c) also refers back to §401(c)(2).

The problem gives you the earned income before allowing for the deduction for plan contributions. Since 1997 is the first year of the plan, the net pensionable earnings are actually $30,000 - X$, where X is the minimum required contribution that is the answer to the problem.

Based on the answer ranges, you can assume that X should be in the neighborhood of 17,000 (bottom of the "A" answer range) to 32,000 (top of the "E" answer range). The highest value for the three year average earned income is 13,000.

The §415(b)(1)(B) compensation limit is reduced when service is less than ten years, which has no effect in this problem.

Age 45 100% 3 year comp. §415 limit = $30,000 - X = 13,000$ at the greatest

This is one of the few problems in recent memory where the 10,000 floor comes into play. If the 12/31/97 minimum contribution is 20,000 or more, then the §415 three year compensation limit will be less than 10,000, and the 10,000 floor will apply.

You should go ahead and determine the normal cost based on the assumption that the 10,000 floor applies. Then you can verify that you have the correct result.

Under the Individual Aggregate cost method, each participant's normal cost is calculated using the formulas for the Aggregate method:

$$\begin{aligned} \text{PVNC} &= \text{PVB} - \text{AAV} - (\text{O/S } §412 \text{ bases} - \text{CB}) \\ \text{NC} &= \text{PVE} / \text{Earnings} \end{aligned}$$

Fall 1997 EA-2 Exam Solutions

Problem 49 - Page 3

Since the plan was just established, the asset value, §412 bases and credit balance are all zero.

Date of birth	01/01/57
01/01/97 age	40
Projected benefit	10,000
PV future benefits	$[10,000 * 13.52 * (1.07)^{-5}]$
01/01 normal cost	$[10,000 * 13.52 * (1.07)^{-5} - 0]$

$$\frac{\ddot{a}_{5|\overline{.07}}}{5|\overline{.07}}$$
$$= 10,000 * 13.52 / 6.1533$$
$$= 21,972$$

The 12/31/97 minimum contribution is $1.07 * 21,972 = 23,510$.

Answer is C

Now consider the 100% 3 year compensation §415 limit. The value of $30,000 - X$ is 6,490, which clearly is less than the 10,000 floor and the §415 dollar limit. The conclusion is that the final retirement benefit should be the 10,000 floor, and the minimum calculated above is correct.

If you calculated the normal cost based on the §415 dollar limit of 11,258, the end of year minimum contribution is 26,468. The §415 compensation limit would be 3,532, and the 10,000 floor would apply. Then you would recalculate the normal cost and produce the 12/31/97 minimum of 23,510 shown above.

Fall 1997 EA-2 Exam Solutions

Problem 50

I. TRUE

There is no special requirement to count a participant with a QDRO as more than a single participant.

See Part G, Item 13(a).a(ii) of the PBGC-1 Form instructions.

II. FALSE

The notice is not required unless the plan is subject to the 412(l) additional funding charge. One detail of the DRC Exception Test is that you still must provide the notice if your plan has less than 101 participants, but would otherwise be subject to the 412(l) additional funding charge.

You are exempt from the notice requirement if you would be exempt from the 412(l) additional funding charge solely based on the funded current liability percentage (FCL%). You are exempt if the FCL% is 90% or more, or it is 80% or more this year, and the FCL% is greater than or equal to 90% for two consecutive years of the prior three.

See the regulation at ERISA section 4011.3(b)(1).

III. FALSE

This is a detail from the PBGC-1 Form instructions: "Each year's premium filing(s) and payment(s) must reflect and be based on a full 12-month plan year. You may not prorate the premium for the short plan year. When a change in plan year ... results in a duplicate or overlapping premium payment, you may request a refund."

See Part C, Item 4.b of the PBGC-1 Form instructions.

Only I is true

Answer is E