MEANS

This example uses MEANS to analyze personnel data from Hubbard Consultants Inc. 1981 salaries are analyzed by sex, within departments and grades. The data are in an external file named AMEANS.DAT. The SPSS/PC commands in the command file named on the INCLUDE command are

```
DATA LIST FILE='AMEANS.DAT'
 /SALARY81 1-5 DEPT81 6 GRADE81 7-8 SEX 9.
VARIABLE LABELS SALARY81 'Yearly Salary in 1981'/
                DEPT81 'Department Code in 1981'/
                SEX "Employee's Sex".
VALUE LABELS DEPT81 1 'Admin' 2 'Project Directors'
             3 'Chicago Operations' 4 'St Louis Operations'
             SEX 1 'Male' 2 'Female'
COMPUTE GRADE81S=GRADE81.
RECODE GRADE81S (1 THRU 4=1) (5 THRU 7=2) (8 THRU 15=3) (ELSE=0).
VALUE LABELS GRADE81S 1 'Grades 1-4' 2 'Grades 5-7' 3 'Grades 8-15'
MISSING VALUE GRADE81S(0).
MEANS TABLES=SALARY81 BY DEPT81 BY GRADE81S BY SEX
 /OPTIONS=6,9,10,12.
FINISH.
```

- The DATA LIST command identifies the column locations of the four variables used in the analysis (see DATA LIST).
- The VARIABLE LABELS and VALUE LABELS commands complete the file definition (see VARIABLE LABELS and VALUE LABELS).
- The COMPUTE command creates the variable GRADE81S as a copy of GRADE81 (see COMPUTE).
- The RECODE command recodes the variable GRADE81S into three values which contain the 15 valid values of GRADE81. Other values of GRADE81S are recoded into the value 0 (see RECODE).
- The VALUE LABELS and MISSING VALUE commands provide dictionary definitions for the new variable GRADE81S (see VALUE LABELS and MISSING VALUE).
- The MEANS command specifies a three-way breakdown of salaries with SALARY81 as the dependent variable.
- Since no missing-value option is specified, MEANS deletes cases with missing values on a tablewide basis.
- The OPTIONS subcommand requests that group sums and variances be printed. OPTIONS are used to suppress printing of the independent variable names and values, so that the output will fit within the default width of 79 columns.

The display produced by MEANS is on the following page. The exact appearance of the printed display depends on the characters available on the printer used.

MEANS display.

Summaries of SALARY81 Yearly Salary in 1981
By levels of DEPT81 Department Code in 1981
GRADE81S
SEX Employee's Sex

Label	Sum	Mean	Std Dev	Variance	Cases
For Entire Population	2415384.00	15098.2125	8074.3872	65195729.2	160
Admin	590438.000	15537.8421	9810.5322	96248934.7	38
Grades 1-4	120922.000	10078.8333	1685.2658	2840120.7[illegible]	12
Male	111172.000	10106.5455	1764.2221	3112479.[illegible]	11
Female	9750.0000	9750.0000	0.0	0.0	1
Grades 5-7	179291.000	11952.7333	2019.7453	4079371.07	15
Male	13910.0000	13910.0000	0.0	0.0	1
Female	165381.000	11812.9286	2019.2662	4077435.92	14
Grades 8-15	290225.000	26384.0909	12759.5684	162806534	11
Male	170625.000	34125.0000	15498.1047	240191250	5
Female	119600.000	19933.3333	4858.3605	23603666.7	6
Project Directors	428804.000	15314.4285	8146.9522	66372830.5	28
Grades 1-4	181443.000	11340.5625	1999.6042	3993416.80	16
Male	105839.000	10583.9000	1143.2161	1306942.99	10
Female	75610.0000	12601.6667	2566.9469	6589216.27	6
Grades 5-7	38480.0000	12826.6667	2015.3494	4061633.33	3
Female	38480.0000	12826.6667	2015.3494	4061633.33	3
Grades 8-15	209975.000	23208.3333	10558.8272	111488831	9
Male	143365.000	28613.0000	11587.5159	134239795	5
Female	65810.0000	16452.5000	2953.7674	8724741.67	4
Chicago Operations	840294.000	14925.3016	7705.3167	59371905.9	63
Grades 1-4	169677.000	9922.1765	1536.2349	2360017.78	17
Male	20917.0000	10458.5000	836.5073	699744.500	2
Female	147780.000	9630.6667	1612.6409	2600610.67	15
Grades 5-7	197386.000	12334.7500	2190.5735	4798612.47	16
Male	40924.0000	13641.3333	3333.0827	11109440.3	3
Female	156462.000	12033.2308	1903.0008	3621412.19	13
Grades 8-15	574261.000	19142.0333	9294.0232	86378866.9	30
Male	142090.000	28418.0000	15620.5949	245881058	5
Female	432171.000	17286.8400	6471.7384	41883398.6	25
St Louis Operations	455859.000	14705.0968	6624.5319	43884422.6	31
Grades 1-4	66118.0000	9445.4286	680.5620	463164.619	7
Male	18395.0000	9197.5000	873.2769	762612.500	2
Female	47723.0000	9544.6000	679.0183	461065.800	5
Grades 5	160460.000	12340.0000	1925.6254	3708332.33	13
Male	38100.0000	11700.0000	1357.2398	1842100.00	3
Female	122320.000	12532.0000	2087.3897	4357195.56	10
Grades 8-15	229320.000	20847.2727	7667.4707	58790106.8	11
Male	21775.0000	21775.0000	0.0	0.0	1
Female	207545.000	20754.5000	8075.7134	65217145.9	10

Total Cases = 2[illegible]
Missing Cases = 118 OR 41.8 PCT.

ONEWAY

This example analyzes a 500-case sample from the 1980 General Social Survey. The variables are

- WELL—the respondent's score on a scale measuring sense of well-being. WELL is the dependent variable, computed from measures of happiness, health, life, helpfulness of others, trust of others, and satisfaction with city, hobbies, family life and friendships.
- EDUC—the respondent's education in six categories, where the original codes are years of education completed.

In this example we determine the degree to which sense of well-being differs across educational levels. The data are in an external file named AONE.DAT. The SPSS/PC commands in the command file named on the INCLUDE command are

```
DATA LIST FILE='AONE.DAT'
 / EDUC 1-2 HAPPY 3 HEALTH 4 LIFE 5 HELPFUL 6 TRUST 7 SATCITY 8
    SATHOBBY 9 SATFAM 10 SATFRND 11.
COUNT  X1=HAPPY HEALTH LIFE HELPFUL TRUST SATCITY SATHOBBY
           SATFAM SATFRND(1).
COUNT  X2=HAPPY HEALTH SATCITY SATHOBBY SATFAM SATFRND(2).
COUNT  X3=HEALTH HELPFUL TRUST (3).
COUNT  X4=SATCITY SATHOBBY SATFAM SATFRND(6).
COUNT  X5=HAPPY LIFE (3).
COUNT  X6=SATCITY SATHOBBY SATFAM SATFRND(7).
COMPUTE WELL=X1 + X2* .5 - X3* .5 - X4* .5 - X5 - X6.
VAR LABELS  WELL 'Sense of Well-Being Scale'.
COMPUTE EDUC6=EDUC.
RECODE  EDUC6 (0 THRU 8=1)(9,10,11=2)(12=3)(13,14,15=4)
          (16=5)(17,18,19,20=6).
VAR LABELS  EDUC6 'Education in 6 Categories'.
VALUE LABELS  EDUC6 1 'Grade School or Less' 2 'Some High School'
                    3 'High Sch Grad' 4 'Some College' 5 'College Grad'
                    6 'Grad Sch'.
ONEWAY  VARIABLES=WELL BY EDUC6 (1,6)
  POLYNOMIAL=2/
  CONTRAST= 2* -1, 2* 1/
  CONTRAST=2* 0,2* -1,2* 1/
  CONTRAST=2* -1,2* 0,2* 1/
  RANGES=SNK/
  RANGES=SCHEFFE(.01)/
  STATISTICS=ALL.
FINISH.
```

- The DATA LIST names the file that contains the data and gives the column locations of the variables in the analysis (see DATA LIST).
- The COUNT and COMPUTE commands create variable WELL by counting the number of "satisfied" responses for each variable on the scale and computing a weighted sum of these responses (see COUNT and COMPUTE).
- A copy of EDUC is created with COMPUTE and then recoded into six categories with RECODE (see COMPUTE and RECODE).
- The VARIABLE LABELS and VALUE LABELS commands assign labels to the new variables, WELL and EDUC6 (see VARIABLE LABELS and VALUE LABELS).
- The ONEWAY command names WELL as the dependent variable and EDUC6 as the independent variable. The minimum and maximum values for EDUC6 are 1 and 6.
- The POLYNOMIAL subcommand specifies second-order polynomial contrasts. The sum of squares using the unweighted polynomial contrasts is calculated because the analysis design is unbalanced. (See Figure A.)
- The CONTRAST subcommands request three different contrasts. (See Figure B.)
- The RANGES subcommands calculate multiple comparisons between means using the Student-Newman-Keuls and Scheffe tests. (See Figure C.)
- The STATISTICS subcommand requests all optional statistics. (See Figure D.)

The display produced by ONEWAY begins on the following page. The exact appearance of the printed display will depend on the printer used and the LENGTH and WIDTH that govern the display (see SET). This example uses the default settings.

A ONEWAY polynomial contrasts

- - - - - - - - - - - - - - - - O N E W A Y - - - - - - - - - - - - - - - -

Variable WELL Sense of Well-Being Scale
By Variable EDUC6 Education in 6 Categories

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	5	361.3217	72.2643	11.5255	.0000
Unweighted Linear Term	1	257.3422	257.3422	41.0 39	.0000
Weighted Linear Term	1	307.2051	307.2051	48.9 86	.0000
Deviation from Linear	4	54.1166	13.5291	2.1578	.0727
Unweighted Quad. Term	1	6.6073	6.6073	1.0538	.3051
Weighted Quad. Term	1	16.6406	16.6406	2.6540	.1039
Deviation from Quad.	3	37.4759	12.4920	1.9924	.1142
Within Groups	494	3097.3463	6.2699		
Total	499	3458.6680			

B ONEWAY contrasts

- - - - - - - - - - - - - - - - O N E W A Y - - - - - - - - - - - - - - - -

Variable WELL Sense of Well-Being Scale
By Variable EDUC6 Education in 6 Categories

Contrast Coefficient Matrix

	Grp 1	Grp 2	Grp 3	Grp 4	Grp 5	Grp 6
Contrast 1	-1.0	-1.0	1.0	1.0	0.0	0.0
Contrast 2	0.0	0.0	-1.0	-1.0	1.0	1.0
Contrast 3	-1.0	-1.0	0.0	0.0	1.0	1.0

Pooled Variance Estimate

	Value	S. Error	T Value	D.F.	T Prob.
Contrast 1	3.3207	0.5230	6.349	494.0	0.000
Contrast 2	1.1517	0.6613	1.742	494.0	0.082
Contrast 3	4.4724	0.6990	6.398	494.0	0.000

Separate Variance Estimate

	Value	S. Error	T Value	D.F.	T Prob.
Contrast 1	3.3207	0.5401	6.148	252.5	0.000
Contrast 2	1.1517	0.6108	1.886	123.2	0.062
Contrast 3	4.4724	0.6984	6.404	172.7	0.000

C ONEWAY multiple comparisons

```
- - - - - - - - - - - - - - - - O N E W A Y - - - - - - - - - - - - - - - -

     Variable  WELL       Sense of Well-Being Scale
  By Variable  EDUC6      Education in 6 Categories


Multiple Range Test


Student-Newman-Keuls Procedure
Ranges for the 0.050 level -

         2.81    3.34    3.65    3.88    4.05

The ranges above are table ranges.
The value actually compared with Mean(J)-Mean(I) is..
        1.7706 * Range * Sqrt(1/N(I) + 1/N(J))

  (*) Denotes pairs of groups significantly different at the 0.050 level

     Variable  WELL       Sense of Well-Being Scale
     (Continued)

                                 G G G G G G
                                 r r r r r r
                                 p p p p p p
     Mean        Group           1 2 3 4 5 6

     2.6462      Grp 1
     2.7737      Grp 2
     4.1796      Grp 3           * *
     4.5610      Grp 4           * *
     4.6625      Grp 5           * *
     5.2297      Grp 6           * *

- - - - - - - - - - - - - - - - O N E W A Y - - - - - - - - - - - - - - - -

     Variable  WELL       Sense of Well-Being Scale
  By Variable  EDUC6      Education in 6 Categories


Multiple Range Test


Scheffe Procedure
Ranges for the 0.010 level -

         5.53    5.53    5.53    5.53    5.53

The ranges above are table ranges.
The value actually compared with Mean(J)-Mean(I) is..
        1.7706 * Range * Sqrt(1/N(I) + 1/N(J))

  (*) Denotes pairs of groups significantly different at the 0.010 level

     Variable  WELL       Sense of Well-Being Scale
     (Continued)

                                 G G G G G G
                                 r r r r r r
                                 p p p p p p
     Mean        Group           1 2 3 4 5 6

     2.6462      Grp 1
     2.7737      Grp 2
     4.1796      Grp 3           * *
     4.5610      Grp 4           * *
     4.6625      Grp 5           * *
     5.2297      Grp 6           * *
```

D ONEWAY statistics

Group	Count	Mean	Standard Deviation	Standard Error	95 Pct Conf Int for Mean		
Grp 1	65	2.6462	2.7539	.3416	1.9638	To	3.3285
Grp 2	95	2.7737	2.8674	.2942	2.1896	To	3.3578
Grp 3	181	4.1796	2.4220	.1800	3.8243	To	4.5348
Grp 4	82	4.5610	2.1450	.2369	4.0897	To	5.0323
Grp 5	40	4.6625	2.3490	.3714	3.9113	To	5.4137
Grp 6	37	5.2297	2.3291	.3829	4.4532	To	6.0063
Total	500	3.8920	2.6327	.1177	3.6607	To	4.1233
Fixed Effects Model			2.5040	.1120	3.6720	To	4.1120
Random Effects Model				.4492	2.7374	To	5.0466

Random Effects Model - Estimate of Between Component Variance 0.8491

Group	Minimum	Maximum
Grp 1	-4.0000	8.5000
Grp 2	-5.0000	8.5000
Grp 3	-4.0000	9.0000
Grp 4	-.5000	9.0000
Grp 5	-1.0000	8.0000
Grp 6	-1.5000	9.0000
Total	-5.0000	9.0000

Tests for Homogeneity of Variances

Cochrans C = Max. Variance/Sum(Variances) = .2209, P = .093 (Approx.)
Bartlett-Box F = 1.905, P = .090
Maximum Variance / Minimum Variance 1.787

Example 1: An Overlay Plot

Overlay plots are useful when several variables represent the same type of measurement, or the same variable is measured at different times. This example overlays two time series: marriage and divorce rates, 1900–1981. The data are drawn from the 1983 *Information Please Almanac*. Rates are specified for five-year periods for 1900–1940 and annually after 1943. The variables are

- MARRATE—Marriage rate per 1,000 population, excluding armed forces overseas.
- DIVRATE—Divorce rate (including annulments) per 1,000 population. (The rates for 1941-1946 include armed forces overseas.)

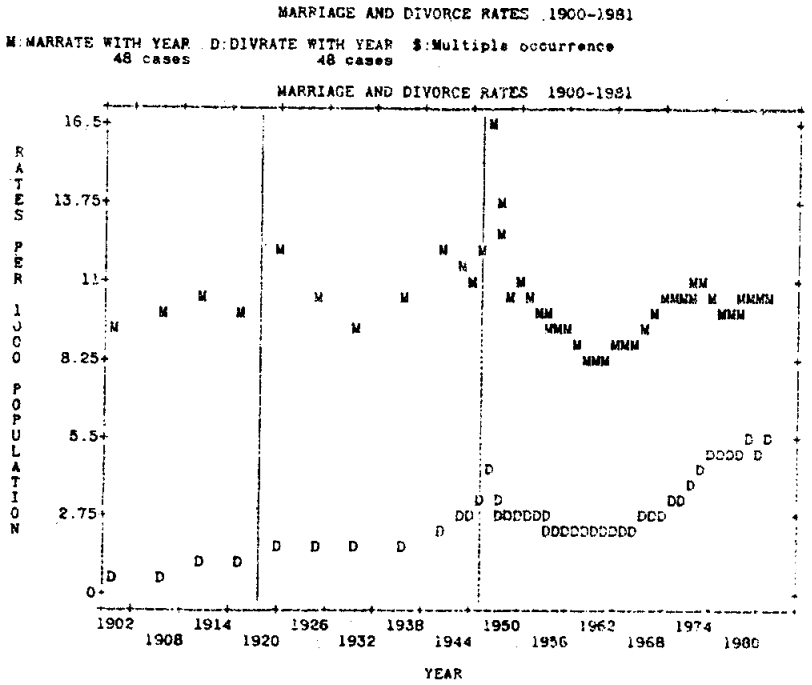
The data are in an external file named APLOT1.DAT. The SPSS PC commands in the command file named on the INCLUDE command are

```
DATA LIST FILE='APLOT1.DAT'
          / YEAR 1-4 MARRATE 6-9 (1) DIVRATE 11-13 (1).
PLOT SYMBOLS='MD'/
     VSIZE=30 /HSIZE=70/
     FORMAT=OVERLAY/
     TITLE 'MARRIAGE AND DIVORCE RATES  1900-1981'/
     VERTICAL='RATES PER 1000 POPULATION'/
     HORIZONTAL='YEAR' REFERENCE (1918,1945) MIN (1900) MAX (1983)/
     PLOT=MARRATE DIVRATE WITH YEAR.
FINISH.
```

- The DATA LIST command defines the variables to be used in the overlay plot.
- The PLOT subcommand, placed last within the PLOT command, requests two bivariate plots, marriage rate by year and divorce rate by year.
- The SYMBOLS subcommand specifies the symbol M for the plot of marriage rate with year. The divorce rate by year plot is represented by the symbol D.
- The VSIZE and HSIZE subcommands establish the plot frame size of 30 lines high and 70 columns wide.
- The FORMAT subcommand requests an overlay plot of the variables specified on the PLOT subcommand.
- The VERTICAL subcommand supplies a label for the vertical axis.
- The HORIZONTAL subcommand supplies a label for the horizontal axis. The REFERENCE keyword requests reference lines to be drawn at the dates on which World War I and World War II ended. These lines point out the time period following the wars in which a sharp increase in marriage and divorce rates occurred. The MIN and MAX keywords specify the horizontal scale. SPSS PC automatically divides the scale into equal-width intervals.

The PLOT display produced by this job follows. The exact appearance of the printed display will depend on the characters available on the printer used.

An overlay plot



ample 2: A Regression Plot

Regression plots print a set of basic regression statistics below your plot and mark the regression-line intercepts on each axis. The statistics include the correlation coefficient, slope and intercept values, standard errors, and significance level.

This example examines the relationship of beginning salary to current salary as a first step in an analysis of salary differentials between race and sex groups. The data are drawn from bank employees hired between 1969 and 1971. The variables are

- SALBEG—annual starting salary of bank employees.
- SALNOW—current annual salary.

The data are in an external file named APLOT2.DAT. The SPSS/PC commands in the command file named on the INCLUDE command are

```
DATA LIST FILE='APLOT2.DAT'
          SALNOW 1-5 SALBEG 6-10.
PLOT   HSIZE=35 VSIZE=40/
       CUTPOINTS=EVERY (4)/
       SYMBOLS='+X*'/
       TITLE='SALARY REGRESSION'/
       VERTICAL='CURRENT ANNUAL SALARY'/
       HORIZONTAL= 'ANNUAL STARTING SALARY'/
       FORMAT=REGRESSION/
       PLOT=SALNOW WITH SALBEG.
FINISH.
```

- The DATA LIST command defines the variables to be used in the regression plot.
- The PLOT subcommand, the last specification on the PLOT command, names the variables to be plotted.
- The HSIZE subcommand requests a horizontal size of 35 print positions. VSIZE requests a vertical size of 40.

- The CUTPOINTS subcommand requests that each successive symbol represent accumulated frequency intervals of 4.
- The SYMBOLS subcommand defines the symbols to be plotted in accordance with the frequency cutpoints specified on the CUTPOINTS command. Thus, the symbol + represents positions with 4 or fewer cases; X, positions with 5 to 8 cases; and positions with 9 or more cases.
- The TITLE subcommand supplies a plot title. Note that the title is less than 35 print positions because of the HSIZE specification.
- The VERTICAL subcommand supplies an extended label for the vertical axis. The HORIZONTAL subcommand supplies an extended label for the horizontal axis.
- The FORMAT subcommand requests a regression plot. The following display shows the regression statistics generated by the FORMAT subcommand. The regression intercepts for the regression of SALNOW on SALBEG are printed on the top and bottom horizontal axis lines.

The display produced by the above commands is shown below. The exact appearance of the printed display will depend on the characters available on the printer used.

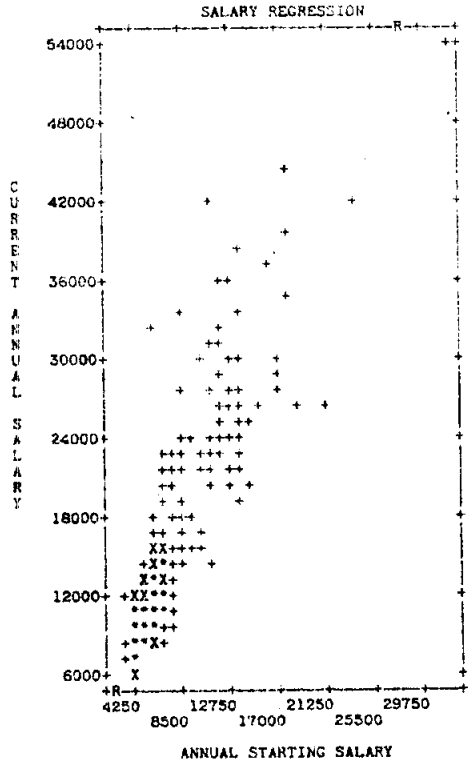
Regression plot

```
Frequencies and symbols used (not applicable for control or overlay plots)

          4 - +
          8 - X
         12 - *

                    SALARY REGRESSION

474 cases plotted. Regression statistics of SALNOW on SALBEG:
Correlation  .88012 R Squared  .77461  S.E. of Est 3246.14226 Sig.  .0000
Intercept(S.E.)  771.28230(355.47192)  Slope(S.E.)  1.90945(  .04741)
```



REGRESSION

The example attempts to predict the average aggregate personal savings rate of a country as a function of the age distribution of the population, the average level of real per capita disposable income, and the average percentage growth rate of real per capita disposable income. The data are 50 cases taken from an example in Belsley, Kuh, and Welsch (1980).

The variables are

- COUNTRY—the country in question.
- SAVINGS—the average aggregate personal savings rate in a country over the period 1960–1970.
- POP15—the average percentage of the population under 15 years of age over the period 1960–1970.
- POP75—the average percentage of the population over 75 years of age over the period 1960–1970.
- INCOME—the average level of real per capita disposable income in a country over the period 1960–1970, measured in United States dollars.
- GROWTH—the average percentage growth rate of INCOME over the period 1960–1970.

The data are in an external file named AREG.DAT. The SPSS PC commands in the command file named on the INCLUDE command are

```
DATA LIST FILE='AREG.DAT'
 /  COUNTRY 1-8(A) SAVINGS POP15 POP75
    INCOME GROWTH 11-60.
VAR LABELS      SAVINGS 'Avg Agg Personal Savings Rate'
                POP15 'Avg % Pop Under 15 Years Old'
                POP75 'Avg % Pop Over 75 Years Old'
                INCOME 'Avg Level Real Per-Cap Disposable Inc'
                GROWTH 'Avg % Growth Rate of DPI'.
REGRESSION  VARIABLES=SAVINGS TO GROWTH/DEP=SAVINGS/ENTER/
            RESID=DEFAULT SIZE(SMALL) ID(COUNTRY)
            SCATTERPLOT (*RES,*PRE)/PARTIALPLOT.
FINISH.
```

- The DATA LIST command names the file that contains the data, names the variables, and gives their column locations.
- The VAR LABELS command assigns labels to the variables (see VARIABLE LABELS).
- The REGRESSION command requests a direct-entry regression analysis with variable SAVINGS as the dependent variable.
- The RESIDUALS subcommand requests the default residual results. In addition, the SIZE(SMALL) keyword overrides the default plot sizes so that small plots are displayed. The ID(COUNTRY) keyword specifies that the values for variable COUNTRY are to be used to label outlier plots. Figure A shows the residual statistics and outlier plots. Figure B displays the histogram of the standardized residual and the normal probability plot.
- The SCATTERPLOT subcommand requests a plot of the residuals against the predicted values. Since *RES is specified first, it is plotted along the vertical axis (see Figure C).

The display produced by REGRESSION begins on the facing page. The exact appearance of the printed display depends on the printer used and the LENGTH and WIDTH that govern the display (see SET). This example uses the default settings.

A REGRESSION residual statistics and outliers

Residuals Statistics:

	MIN	MAX	MEAN	STD DEV	N
*PRED	5.5874	15.8185	9.6710	2.6066	50
*RESID	-8.2422	9.7509	.0000	3.6441	50
*ZPRED	-1.5666	2.3584	-.0000	1.0000	50
*ZRESID	-2.1675	2.5642	.0000	.9583	50

Total Cases = 50

Durbin-Watson Test = 1.68579

Outliers - Standardized Residual

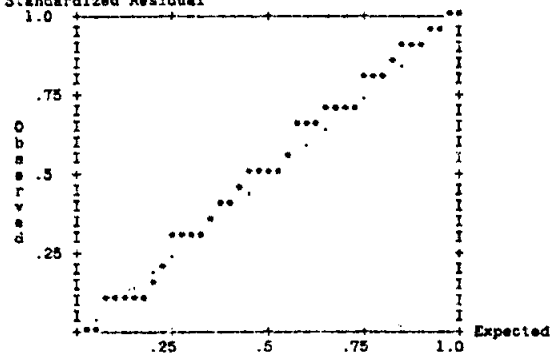
Case #	COUNTRY	*ZRESID
50	Zambia	2.56423
7	Chile	-2.16749
36	Philippi	1.75534
35	Peru	1.71969
18	Iceland	-1.63321
34	Paraguay	-1.61093
24	Korea	-1.60598
10	Denmark	1.42014
23	Japan	1.38990
9	Costa Ri	1.34776

B REGRESSION histograms and normal probability plots

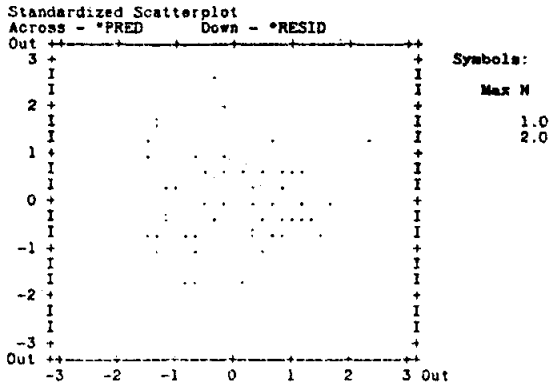
Histogram - Standardized Residual

```
NExp N      (* = 1 Cases,    . : = Normal Curve)
0  .04   Out
0  .08  3.00
1  .20  2.67 *
0  .45  2.33
0  .91  2.00 .
2 1.67  1.67 *:
3 2.74  1.33 **:
3 4.03  1.00 ***.
7 5.31   .67 ****:**
4 6.26   .33 **** .
6 6.62  0.0  ******.
8 6.26  -.33 *****:**
9 5.31  -.67 ****:****
3 4.03 -1.00 ***.
0 2.74 -1.33  .
3 1.67 -1.67 *:*
0  .91 -2.00 .
1  .45 -2.33 *
0  .20 -2.67
0  .08 -3.00
0  .04   Out
```

Normal Probability (P-P) Plot
Standardized Residual



C REGRESSION fit against residual plots



Example 1: Report with Summaries

This example produces a report which summarizes information from a retail company's personnel file. It reports summary statistics for employees in each division of the company within each store. The variables are

- AGE—age of employee in years.
- TENURE—length of employment at the company in months.
- JTENURE—length of employment in job grade in months.
- SALARY—annual salary in dollars.

The data are in an external file named AREPORT.DAT. The SPSS/PC commands in the file named on the INCLUDE command are

```
SET DISK=ON.
DATA LIST FILE= AREPORT.DAT'
   AGE 4-8 TENURE 13-16 JTENURE 21-24 SALARY 25-29
    STORE 30 DIVISION 31.
VALUE LABELS DIVISION  1  'CARPETING'  2  'APPLIANCES'  3  'FURNITURE'
              4  'HARDWARD'/STORE 1 'SUBURBAN' 2 'DOWNTOWN'
SORT CASES  BY STORE DIVISION.
REPORT FORMAT=MARGINS(1,72) LENGTH(1,22) BRKSPACE(-1)/
  VARIABLES=AGE ' ' 'Age' (3)
            TENURE(9) 'Tenure in' 'Company ' (OFFSET(2))
            JTENURE(9) 'Tenure in' 'Grade  ' (OFFSET(2))
            SPACE(DUMMY)' '(2)
            SALARY 'Annual' 'Salary' (7)/
  TITLE='Chicago Home Furnishing'/
  LFOOTNOTE='Tenure measured in months'/
  BREAK=STORE 'BRANCH' 'STORE' (LABEL)(8)
    SUMMARY=MEAN 'AVERAGE:' (AGE TENURE(1) JTENURE(1) SALARY(0)) (2)/
    SUMMARY=VALIDN '  Count:' (2)(AGE)/
  BREAK=DIVISION 'Product' 'Division' (LABEL) (10) (SKIP(0))/
    SUMMARY=MEAN (AGE TENURE(1) JTENURE(1) SALARY(0)).
FINISH.
```

- The SET command directs the output listing to disk (see SET).
- The DATA LIST command assigns variable names and gives column locations for the variables in the analysis (see DATA LIST).
- The VALUE LABELS command defines labels for the break variables. These labels will be displayed in upper case (see VALUE LABELS).
- The SORT CASES command sorts the file into the major and minor breaks required for REPORT (see SORT CASES).
- The FORMAT subcommand sets the left margin at column 1 and right margin at column 72; the top of the report on the first line and the last line of the page on line 22; and the break-group label on the first line of summary statistics.
- The VARIABLES subcommand defines five columns in the body of the report. AGE, TENURE, JTENURE, and SALARY are SPSS/PC variables while SPACE defines a dummy column for spacing purposes. The OFFSET keyword indents the summary statistics for TENURE and JTENURE under the column head. Upper- and lower-case column titles are defined for all columns.
- The TITLE subcommand defines a one-line centered title.
- The LFOOTNOTE subcommand defines a one-line left-justified footnote.
- The first BREAK subcommand defines the major break in this two-break report. Variable STORE breaks the file into two categories: the downtown store and the suburban store. Value labels for STORE are printed in the break column.
- The first two SUMMARY subcommands print two lines of summary statistics for each store. The first SUMMARY subcommand computes means for AGE, TENURE, JTENURE, and SALARY. The second SUMMARY subcommand computes the number of employees in each store.
- The second BREAK subcommand breaks the file into divisions within each store. The SKIP specification suppresses blank lines between the summary for each division.
- The last SUMMARY subcommand computes means for AGE, TENURE, JTENURE, and SALARY for each division.

The display produced by REPORT is on the next page.

A summary report

Chicago Home Furnishing

BRANCH STORE	Product Division	Age	Tenure in Company	Tenure in Grade	Annual Salary
SUBURBAN	CARPETING	40	2.4	2.4	20869
	APPLIANCES	35	2.3	2.3	16105
	FURNITURE	38	2.4	2.4	18821
	HARDWARD	35	2.3	2.4	15234
	AVERAGE:	36	2.3	2.4	17011
	Count:	97			
DOWNTOWN	CARPETING	37	2.3	2.4	14207
	APPLIANCES	37	2.3	2.4	14130
	FURNITURE	38	2.3	2.4	14403
	HARDWARD	37	2.3	2.4	14469
	AVERAGE:	37	2.3	2.4	14307
	Count:	153			

Tenure measured in months

Example 2: Report Using List This example produces a report using data from the October 1980 issue of Runner's *World* magazine. It lists the top-rated shoes in the survey, organized by manufacturer. Measures used by the raters to determine an overall evaluation for each shoe are reported. The data are in an external file named AREPT.DAT. The SPSS/PC commands in the file named on the INCLUDE command are

```
SET DISK=ON WIDTH-132 LENGTH=45.
DATA LIST FILE='AREPT.DAT'
          /TYPE 1 MAKER 2-3 QUALITY 5-9
             REARIMP FORE1MP FLEX SOLEWEAR 10-29
             REARCONT SOLETRAC 3140 WEIGHT 4246 LASTYEAR 48
             PREFER 50-53 STARS 55 NAME 57-72 IA).
VALUE LABELS MAKER 1 'ADIDAS' 2 'AUTRY' 3 'BROOKFIELD' 4 'BROOKS'
              5 'CONVERSE' 6 'REEBOK' 7 'NEW BALANCE' 8 'PUMA'
              3 'OSAG'
              10 'PONY' 11 'ETONIC' 12 'NIKE' 13 'SAUCONY'
              14 'WILSON-BATA' 15 'VOL SHOE CORP'
              16 'SPECS INTERNATIONAL' 17 'POWER SPORT'
              18 'THOM MCAN JOX' 19 'REGAL SHOES' 20 'SHOE CORP'
              21 'ASICS' 22 'INTL FOOTWEAR' 23 'EB SPORT INTL'
              24 'VAN DOREN'/
             TYPE 1 'MALE' 2 'FEMALE'/
             STARS 6 '******' 5 '*****'/.
FORMATS QUALITY (F5.3)/REARIMP FOREIMP SOLEWEAR (F3.1)/
              FLEX SOLETRAC (F3.2)/REARCONT (F3.1)/ WEIGHT (F3.1)/
              PREFER (F4.3).
SELECT IF     (STARS GE 5).
SORT CASES     MAKER STARS(D).
REPORT FORMAT-LIST MISSING ' ' BRKSRAGE/T,)/
              VARIABLES=TYPE(LABEL)(6)' ' 'TYPE'
              NAME(16)'    'SHOE'
              STARS(LABEL)(6)' ' 'RATING'
              SEP1(DUMMY)(1)' '
              REARIMP(8)'SEARFOOT' 'IMPACT'
              FOREIMP(8)'FOREFOOT' 'IMPACT'
              FLEX(6)'FLEXI-' 'BILITY'
              SOLEWEAR(4)'SOLE' 'WEAR'
              REARCONT(8)'REARFOOT' ' CONTROL'
              SOLETRAC(8)'SOLE' 'TRACTION'
              WEIGHT(6)' ' 'WEIGHT'
              LASTYEAR(5)'1979' 'STARS'
              PREFER(10)'READER' 'PREFERENCE'/
              TITLE='RATINGS OF TRAINING SHOES'
                   "RUNNER'S WORLD MAGAZINE - OCTOBER. 1980"/
              LFOOTNOTE='****** HIGHLY RECOMMENDED
                '***** RECOMMENDED'/
              RFOOTNOTE=' ' 'PAGE )PAGE'/
              BREAK=MAKER(LABEL)'MANUFACTURER'(12).
FINISH.
```

- The SET command sends the listing file to disk. Because of the many variables, the WIDTH is set to 132 columns, the maximum. and the LENGTH to 45 lines (see SET).

- The DATA LIST command assigns variable names and gives column locations for the variables in the analysis (see DATA LIST).
- The VALUE LABELS command supplies value labels for the manufacturer, type of shoe, and rating. These labels are used in the report (see VALUE LABELS).
- The FORMATS command overrides the default print formats. Decimals are not supplied on the DATA LIST command (since they are already in the data), so the default print formats for the numeric variables are 0. These print formats are overridden by FORMATS to include decimal positions for the noninteger values (see FORMATS).
- The SELECT IF command selects shoes with the top two ratings (see SELECT IF).
- The SORT CASES command sorts cases in descending order of ranking for each manufacturer. They are sorted by manufacturer so that the report can group them by manufacturer. They are sorted by descending order of ranking so that the top-rated shoes for the manufacturer are listed first (see SORT).
- In REPORT, the FORMAT subcommand specifies a case listing and places the first case for each break on the same line as the break value. The MISSING keyword prints a blank in place of the period for variables with missing values.
- The VARIABLES subcommand names all the variables to be listed as well as a dummy column (SEP1) to separate the measures from the rating. Value labels are printed in place of values for variables TYPE and STAR.
- The TITLE subcommand prints a two-line centered title.
- The LFOOTNOTE subcommand prints a two-line left-justified footnote.
- The RFOOTNOTE subcommand prints a two-line right-justified footnote. The first line is blank; the second line uses the special keyword)PAGE to print page numbers.
- The BREAK subcommand groups the shoes by manufacturer, prints the manufacturers' names (which were supplied on the VALUE LABELS command) and restricts the break column to 12 characters.

The report produced by these commands is shown below and on the following page.

rt on running-shoe data—page 1

RATINGS OF TRAINING SHOES
RUNNER'S WORLD MAGAZINE - OCTOBER, 1980

MANUFACTURER	TYPE	SHOE	RATING	REARFOOT IMPACT	FOREFOOT IMPACT	FLEXI-BILITY	SOLE WEAR	REARFOOT CONTROL	SOLE TRACTION	WEIGHT	1979 STARS	LEADER PREFERENCE
BALCONY	MALE	TCB4	******	9.3	15.1	1.56	6.5	5.2	.85	278.0	0	.028
	MALE	HORNET 84	******	9.9	13.1	2.65	7.6	3.0	.68	265.0	4	.097
	FEMALE	MS TRAINER	******	10.2	13.3	1.58	6.4	22.4	.86	237.7	5	.053
	MALE	JAZZ	*****	8.9	12.7	2.04	7.6	-7.0	.64	270.8	0	
	MALE	TRAINER 80	*****	10.5	14.5	2.18	4.1	11.5	.02	307.6	5	.232
	FEMALE	JAZZ	*****	9.0	12.2	1.86	6.1	-7.5	.63	223.0	0	.013
	FEMALE	TC 84	*****	9.3	14.6	1.46	7.5	1.3	.77	231.1	0	
	FEMALE	MS HORNET	*****	9.8	13.2	2.59	6.4	6.5	.67	224.0	4	.046
NIKE	MALE	DAYBREAK	******	10.8	15.4	2.17	3.7	7.8	.54	304.2	5	.602
	MALE	YANKEE	*****	10.9	13.7	1.93	2.0	9.8	.66	276.6	0	
	FEMALE	LIBERATOR	*****	10.6	14.7	2.20	5.8	6.5	.52	254.2	5	.503
ETONIC	MALE	ECLIPSE TRAINER	******	10.0	12.9	1.65	10.0	-2.6	.51	237.4	0	
	FEMALE	ECLIPSE TRAINER	******	9.6	12.8	1.78	10.0	1.4	.57	204.1	0	
	MALE	STABILIZER	*****	10.3	15.5	2.25	1.2	-.6	.53	283.1	4	.232
	MALE	STREETFIGHTER	*****	10.8	15.5	2.28	1.4	-.4	.61	266.1	4	.222
	FEMALE	STREETFIGHTER	*****	10.7	15.5	1.66	.7	-7.7	.70	214.1	4	.344
	FEMALE	STABILIZER	*****	10.8	14.4	2.09	2.6	-6.9	.67	235.3	4	.298
PONY	MALE	TARGA FLEX	******	9.6	14.3	1.32	2.5	-22.7	.86	253.0	3	
	MALE	SHADOW	*****	9.9	13.8	1.53	2.5	-17.9	.77	270.2	0	
	FEMALE	LADY SHADOW	*****	10.6	17.4	.91	3.0	-7.1	.90	211.8	0	
OSAG	MALE	FAST RIDER	*****	10.5	14.0	2.48	4.9	1.9	.66	296.7	5	.025
	FEMALE	KT-26	*****	10.7	17.3	1.66	5.5	8.1	.60	223.1	2	
NEW BALANCE	MALE	420	*****	9.8	14.8	2.09	1.8	-17.7	.46	267.9	0	.516
	MALE	620	*****	12.0	14.6	2.73	1.1	-3.5	.41	242.0	5	.475
	FEMALE	420	*****	9.9	13.9	1.94	1.6	-.7	.48	219.3	0	.411
REEBOK	MALE	AZTEC	******	10.9	12.6	2.07	2.5	3.7	.65	260.8	5	.065
	MALE	SHADOW I	*****	10.7	13.1	1.79	1.9	-8.7	.63	253.0	0	
	FEMALE	SHADOW III	*****	10.2	12.9	1.63	2.4	-24.6	.66	212.8	0	
	FEMALE	AZTEC PRINCESS	*****	10.2	12.8	2.18	5.9	-20.3	.70	221.3	5	.033

****** HIGHLY RECOMMENDED
***** RECOMMENDED

PAGE 1

Report on running-shoe data—page 2

RATINGS OF TRAINING SHOES
RUNNER'S WORLD MAGAZINE - OCTOBER, 1980

MANUFACTURER	TYPE	SHOE	RATING	REARFOOT IMPACT	FOREFOOT IMPACT	FLEXI-BILITY	SOLE WEAR	REARFOOT CONTROL	SOLE TRACTION	WEIGHT	1979 STARS	READER PREFERENCE
CONVERSE	MALE	ARIZONA 84	*****	10.1	13.6	1.90	6.6	-5.1	.55	302.9	4	.006
	FEMALE	WORLD CLASS 84	*****	9.4	14.0	2.19	4.3	-.3	.65	234.7	3	.020
BROOKS	MALE	VANTAGE	******	8.3	11.0	1.33	10.0	-13	.58	232.4	8	.831
	MALE	VANTAGE SUPREME	******	8.5	10.9	1.31	10.0	-16.5	.58	239.1	8	
	MALE	HUGGER GT	******	8.5	11.2	1.32	9.4	-11.7	.60	234.5	8	.488
	MALE	NIGHTHAWK	******	8.7	13.5	1.57	3.1	-8.6	.45	216.7	0	
	MALE	SUPER VILLANOVA	******	10.0	14.1	1.07	10.0	14.4	.61	238.7	5	.153
	FEMALE	VANTAGE	******	8.1	11.0	1.27	10:0	-13.1	.58	199.9	5	.563
	FEMALE	HUGGER GT	******	8.2	11.1	1.28	10:0	-12.7	.60	203.8	0	.126
	FEMALE	VANTAGE SUPREME	******	8.2	11.1	1.34	10.0	.6	.62	201.4	3	.205
	FEMALE	SUPER VILLANOVA	******	9.0	13.4	1.01	10.0	11.9	.62	195.1	5	.298
	FEMALE	NIGHTHAWK	*****	8.6	13.1	1.54	2.4	-9.3	.45	189.0	0	
BROOKFIELD	MALE	COLT	*****	12.4	17.4	2.31	3.5	21.5	1.13	289.3	4	
AUTRY	MALE	MACH III	*****	8.7	13.0	2.13	3.0	-37.6	.66	250.2	4	
	MALE	NEW JET	*****	9.1	14.5	1.88	4.0	-37.9	.69	242.4	4	
	MALE	CONCORDE	*****	9.2	13.2	2.41	2.0	-33.9	.61	261.7	5	.023
	FEMALE	CLOUD 9	*****	9.4	17.6	1.79	2.3	-27.3	.63	198.6	3	
ADIDAS	MALE	TRX TRAINER	*****	10.5	16.8	2.07	2.1	-.6	.72	309.0	5	.143
	MALE	MARATHON TRAINER	*****	13.0	17.2	2.75	10.0	14.5	.63	302.3	5	.315
	FEMALE	MARATHON TRAINER	*****	11.7	16.5	2.14	10.0	17.5	.58	243.6	5	.298

****** HIGHLY RECOMMENDED
***** RECOMMENDED

PAGE 2

T-TEST

This example uses T-TEST to analyze 1979 prices and earnings in 45 cities around the world, compiled by the Union Bank of Switzerland. The variables are

- WORLD—the economic class of the country in which the city is located. The 45 cities are divided into three groups: cities in economically developed nations such as the United States and most European nations; cities in nations that are members of the Organization for Petroleum Exporting Countries (OPEC); and cities in underdeveloped countries. These groups are coded from 1 to 3 and are labeled 1ST WORLD, PETRO WORLD, and 3RD WORLD, respectively.
- NTCPRI—the city's net price level, based on more than 100 goods and services weighted by consumer habits. NTCPRI is expressed as the percentage above or below that of Zurich, where Zurich equals 100%.
- NTCSAL—the city's net salary level, calculated from average net hourly earnings in 12 occupations. NTCSAL is expressed as a percentage above or below that of Zurich, where Zurich equals 100%.
- NTCPUR—the city's net purchasing power level, calculated as the ratio of labor expended (measured in number of working hours) to the cost of more than 100 goods and services, weighted by consumer habits. NTCPUR is expressed as a percentage above or below that of Zurich, where Zurich equals 100%.
- WCLOTHES—the cost of medium-priced women's clothes, expressed as the percentage above or below that of Zurich, where Zurich equals 100%.
- MCLOTHES—the cost of medium-priced men's clothes, expressed as the percentage above or below that of Zurich, where Zurich equals 100%.

This example compares mean price, salary and purchasing power for cities grouped by economic class. It also compares the mean costs of women's and men's clothes. The data are in an external file named ATTEST.DAT. The SPSS/PC commands in the command file specified on the INCLUDE command are

```
DATA LIST FILE='ATTEST.DAT'
 /NTCPRI 9-11 NTCSAL 20-22 NTCPUR 31-33 WCLOTHES 42-44
    MCLOTHES 53-55 WORLD 66.
VARIABLE LABELS NTCPRI 'Net Price Level'
                NTCSAL 'Net Salary Level'
                NTCPUR 'Net Purchasing Level'
                WCLOTHES "Medium-Priced Woman's Clothes"
                MCLOTHES "Medium-Priced Men's Clothes".
T-TEST GROUPS=WORLD(1,3)/VARIABLES=NTCPRI NTCSAL NTCPUR
       PAIRS=WCLOTHES MCLOTHES/NTCPRI WITH NTCPUR NTCSAL.
FINISH.
```

- The DATA LIST command assigns variable names and gives the column locations of the variables to be analyzed (see DATA LIST).
- The VARIABLE LABELS command completes the data definition of these variables (see VARIABLE LABELS).
- The T-TEST command requests an independent-samples test and a paired-samples test. For the independent-samples test, the variable WORLD specifies a grouping criterion that compares cities in first-world countries to cities in third-world countries. Cities in petro-world countries are not included.
- By default, the display is formatted within 79 columns.

The results produced by T-TEST are on the next page. The exact appearance of the printed display depends on the characters available on the printer used.

T-TEST display

Independent samples of WORLD

Group 1: WORLD EQ 1 Group 2: WORLD EQ 3

t-test for: NTCPRI Net Price Level

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	25	83.8400	13.309	2.662
Group 2	13	67.3077	14.773	4.097

	Pooled Variance Estimate			Separate Variance Estimate		
F Value	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
1.23	0.637	3.50	36	0.001	3.38	22.28	0.003

Independent samples of WORLD

Group 1: WORLD EQ 1 Group 2: WORLD EQ 3

t-test for: NTCSAL Net Salary Level

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	25	64.4000	19.026	3.805
Group 2	12	25.6667	13.241	3.822

	Pooled Variance Estimate			Separate Variance Estimate		
F Value	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
2.06	0.210	6.33	35	0.000	7.18	30.07	0.000

Independent samples of WORLD

Group 1: WORLD EQ 1 Group 2 WORLD EQ 3

t-test for: NTCPUR Net Purchasing Level

	Number of Cases	Mean	Standard Deviation	Standard Error
Group 1	25	76.7600	21.491	4.298
Group 2	12	31.9167	17.573	5.073

	Pooled Variance Estimate			Separate Variance Estimate		
F Value	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.	t Value	Degrees of Freedom	2-Tail Prob.
1.50	0.493	6.28	35	0.000	6.74	26.26	0.000

Paired samples t-test: WCLOTHES Medium-Priced Woman's Clothes
MCLOTHES Medium-Priced Men's Clothes

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
WCLOTHES	45	80.7111	30.195	4.501
MCLOTHES	45	87.0444	26.192	3.905

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
-6.3333	17.916	2.671	0.807	0.000	-2.37	44	0.022

Paired samples t-test: NTCPRI Net Price Level
NTCPUR Net Purchasing Level

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
NTCPRI	44	82.1591	19.773	2.981
NTCPUR	44	58.7045	28.806	4.343

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
23.4545	33.310	5.022	0.098	0.528	4.67	43	0.000

Paired samples t-test: NTCPRI Net Price Level
NTCSAL Net Salary Level

Variable	Number of Cases	Mean	Standard Deviation	Standard Error
NTCPRI	44	82.1591	19.773	2.981
NTCSAL	44	50.3409	24.295	3.663

(Difference) Mean	Standard Deviation	Standard Error	2-Tail Corr.	Prob.	t Value	Degrees of Freedom	2-Tail Prob.
31.8182	22.753	3.430	0.482	0.001	9.28	43	0.000