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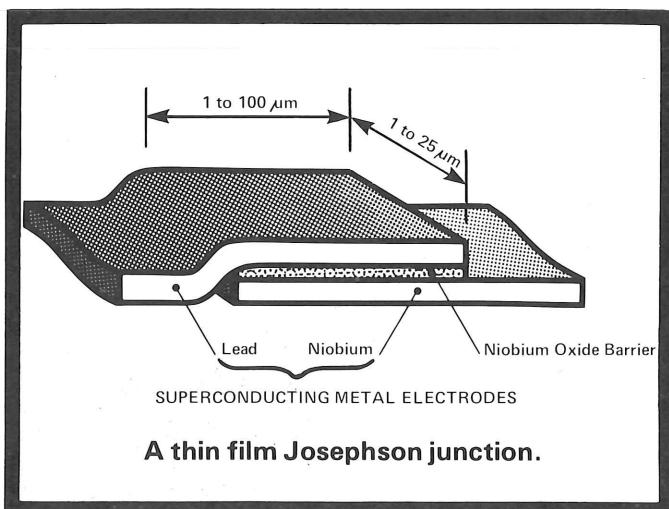


Josephson Junctions For Instrument Applications

Components using Josephson junctions offer new applications for test and measurement equipment. Within the next ten years, I believe, Josephson-effect technology will be commonly used in electrical standards equipment, high frequency gear, and large computer mainframes, and that will mean a large market for new test equipment. Even now, Josephson junctions are being designed into computers (at IBM), voltage standards (at Hewlett-Packard), microwave oscillators and mixers, magnetometers, parametric amplifiers, and a host of other instruments where the quantum mechanical precision and versatility of the device outweighs the cost of the refrigeration system (typically a couple of thousand dollars).

CONSTRUCTION

The junction consists of two superconducting metal electrodes separated by an oxide barrier 1.5 to 10 nanometers thick. The superconducting metals used are usually lead or niobium, which are superconducting at 4°K or -269°C. The barrier is made by oxidizing the surface of one of the electrodes.



The devices can be built using standard technologies in existing integrated circuit labs. Device size is limited only by the precision with which the oxide barrier can be grown.

PROPERTIES

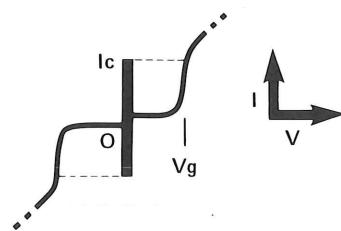
Superconducting electron pairs can pass through the barrier (a process called tunneling) thereby coupling the two electrodes. The Josephson junction exhibits several useful electrical properties. The properties include ultra-high sensitivity to magnetic fields, very low voltage switching, and voltage-to-frequency conversion related by

$$\text{frequency} = \text{voltage} \times (2e/h)$$

where e is the electronic charge and h is Planck's constant. The value of $2e/h$ is 484 MHz per microvolt. Junction voltages as high as 2 mV are possible, permitting operation in the terahertz region (10^{12}) for voltage standards, and for mixing, detection and oscillation devices. Josephson junctions have been used by the NBS to define the standard volt and by others to mix long wavelength infrared light.

SUPERCONDUCTING LOGIC

The digital properties are as interesting as the frequency domain properties. The oxide barrier Josephson junction has an I-V characteristic as shown below:



The junction can maintain a superconducting (zero voltage drop) current up to I_c (the critical current) at which point the junction switches to the finite voltage state.

The critical current, which ranges from microamps to milliamps, is controlled by barrier thickness and surface area. The gap voltage (V_g) is a function of the properties of the metal and the temperature. Since the critical current is strongly influenced by magnetic fields, the current controlled by one junction can be used to induce a field in others. That sensitivity to magnetic fields can be used as a basis for logic devices. At this time, IBM is making LSI logic using Josephson junctions, striplines and terminating resistors. They are developing systems with clock rates greater than a gigahertz.

—Keith Lofstrom
Monolithic Circuit Engineering
Ext. 6207, D.S. 50/316

On The Cover

Alessandro Volta
1745-1827

Alessandro Volta, professor of natural philosophy at the University of Pavia, developed the first battery which he called an electromotive apparatus. The battery, which he announced in 1800, was made of disks of brass and zinc separated with wet pasteboard. His struggle to define the concept of continuous current, as well as to develop the hardware to produce the current, was hampered by lack of nomenclature and units of measure.

Not having access to test and measurement equipment, Volta resorted to his own senses to indicate the relative magnitudes of the currents his battery produced. He applied both terminals of the battery to his tongue, to his eyes, or to his moistened hands. On occasion he saw stars. He also tried inserting one terminal in each ear... the effect, he said, was hard to describe. He refused to repeat the experiment. He lived to a ripe old age.

Metric Time

Herein we present a handy English-to-Metric time conversion table that demonstrates how much easier metric units are to use. This item first appeared in EDN's 2nd Annual April 1 Special issue (1977).

ENGLISH	METRIC
364.75 days (approx.)	1 year
30.416 days (approx.)	1 month
7 days	1 week
24 hours	1 day
60 minutes	1 hour
60 seconds	1 minute
1×10^{12} picoseconds	1 second

A Graphics Statistics Package

A package of routines for graphically displaying statistical analyses in APL on the Scientific Computer Center's Cyber system is now available. Use of the package is limited to 4015 and 4013 terminals, but the user is not limited to data entered in APL. Instead, the user may call CFILEREAD to access data in Cyber coded files.

John Rutis, Storage CRT Engineering, developed the package (the only graphics statistics package available) for his own work and for others in his area. The package includes eight routines:

RUNAV	a running average plot.
SCATTER	a scatter diagram.
GREG	graphic regression.
GSTREG	graphic stepwise regression.
PROB	probability plotting
CURVE	curve fitting.
VIEW	3-D view of a matrix.
G5	the graphics package used by the above routines.

There is a copy of the package description attached to this issue of **Engineering News**. If you have any questions give John a call on ext. 7558 or drop by 50-252.

APL

APL (A Programming Language) is a general purpose language used in applications that range from data processing, through design, and mathematical and scientific computation, to the teaching of mathematics. APL is very concise, requiring as few as 10% of the statements required by FORTRAN.

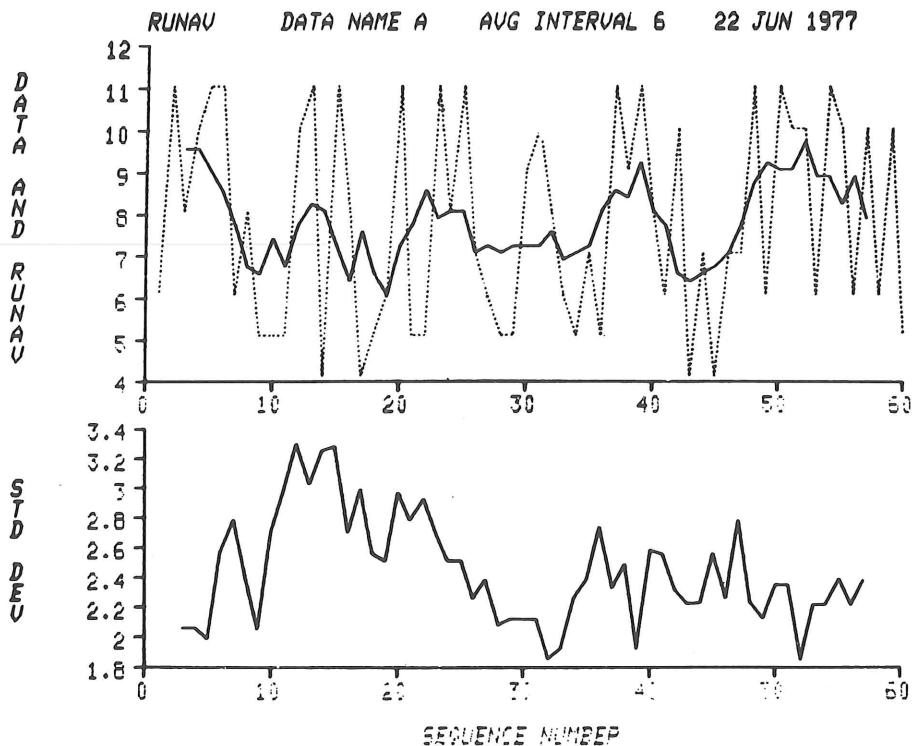
APL has a reputation for being an exclusively mathematical language. But, according to Kenneth Iverson (inventor of APL, and manager of IBM's APL Design Group), the reputation is wrong. "Ninety per cent of APL used, inside and outside IBM, is for commercial data processing. It's also used successfully by design engineers."

For more information about the development of APL, see the June 12, 1977 issue of **Electronic Design**, pages 52-55.

A

Graphics Statistics Package cont.

DATA	RUNNING AVERAGE	STANDARD DEVIATION
6.0026253		
11.0436102		
8.062257740	9.088163169	2.038792951
10.049076562	9.553163159	2.038792951
11.0436102	9.553163159	1.965653373
11.0436102	9.564106241	2.566573815
8.062257740	7.739963357	2.708311436
5.099019514	6.747956317	2.359772319
6.099019514	5.989022457	2.359772319
5.099019514	5.989022457	2.765736888
6.062257740	6.752566041	2.908504970
11.0436102	7.743623710	3.292554689
4.123105626	6.237495757	3.020593174
11.0436102	6.174844426	3.249848570
8.062257740	6.242261789	2.566573815
7.071067012	6.22265281	2.701691949
4.123105626	7.376311242	2.908504970
6.099019514	6.088264325	2.5616945629
11.0436102	6.991361205	2.304013138
6.099019514	7.245929057	2.359772319
5.099019514	7.245929057	2.708311436
11.0436102	5.566045308	2.923537473
8.062257740	7.903501104	2.693380451
11.0436102	8.067636273	2.599154267
7.071067012	8.07850275	2.599154267
6.099019514	7.242105387	2.379567216
5.099019514	7.076105351	2.076793211
9.0553905130	7.241306670	2.115366230
10.049076562	7.241306670	2.115366230
0.062257740	7.178001159	1.0520236594
6.099019514	6.919587123	1.921263573
7.071067012	7.076601765	2.267733819
5.099019514	7.241101207	2.379567216
11.0436102	6.053078374	2.326156582
9.0553905130	6.053078374	2.402156917
11.0436102	9.223516851	1.925770065
8.062257740	9.06775120	2.579066327
6.099019514	7.729971720	2.359772319
10.049076562	7.729971720	2.359772319
4.123105626	6.210164171	2.222113953
7.071067012	6.084001710	2.220721402
4.123105626	6.766750961	2.051693567
7.071067012	7.777407130	2.27734921
11.0436102	6.277042232	2.234000291
11.0436102	9.224650603	2.121303644
10.049076562	9.193333065	2.344229430
10.049076562	9.093333065	2.344229430
6.062257740	6.201000225	2.211000216
11.0436102	6.093410024	2.211000216
6.099019514	6.232210026	2.344229430
6.099019514	6.093410024	2.311000216
6.062257740	6.902381908	2.379760319
10.049076562	7.902381908	2.379760319
5.099019514		



The convenience of using graphic displays of statistical information is dramatically shown in this comparison. The data on the left is also presented in the plots on the right. This is a simple example. Typically, plots represent reams of data in listing form.

Farm-Out Circuit Boards

NEW SERVICE

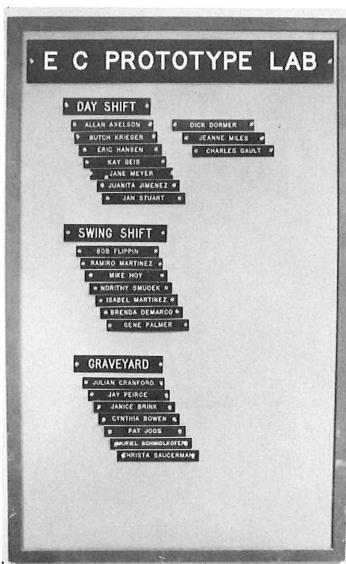
Etched Circuit Support has added a new farm-out service for circuit boards. All engineering circuit boards should now go through ECS which will process them in-house or will send them to one of several outside vendors whose work meets Tektronix standards.

STANDARDS

ECS is providing the new service for a couple of reasons. First, the farm-out will enable ECS to maintain its turn-around time commitments when the Etched Circuit Lab is operating at full capacity. Second, by having all farm-out circuit boards going through ECS to approved vendors, the quality of all boards will meet Tektronix standards. In the past, some farm-out boards not sent to approved vendors have failed to pass QC inspection, environmental tests, and cross-sectioning tests.

WHO TO CALL

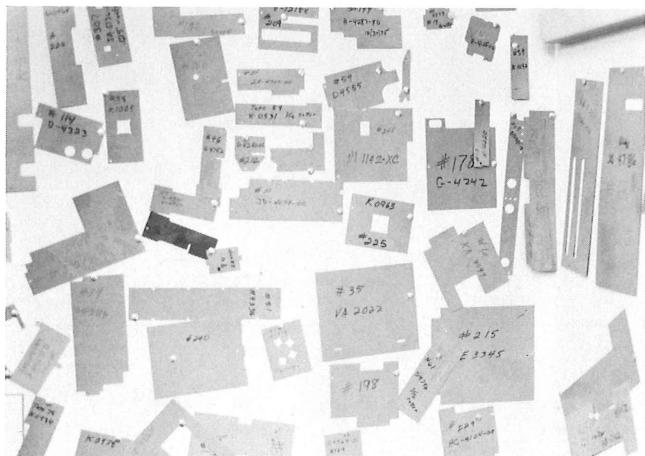
If you would like more information on the new service, contact Tino Ornelas on ext. 6236.



In-house, the people in the fab-lab (Etched Circuit Prototype Lab) work around the clock (in three shifts, that is).



Juanita Orozco aligning the front and back filmwork for a pc board.



A wall full of profiling templates the fab lab has used to outline pc boards (they're available for easy reference).



Jean Kennedy QC'ing pc board mock-ups brought in by designers.

GRAPHIC STATISTICS PACKAGE
IN APL ON CYBER

HEREIN IS DESCRIBED THE METHOD OF
ACCESSING THE PACKAGE AND A SET
OF DESCRIPTIONS OF EACH PORTION

BY JOHN RUTIS
STORAGE CRT ENGINEERING

I WISH TO THANK THOSE WHO HAVE GIVEN ME GREAT
HELP BY USING THIS PACKAGE AND GIVING ME MANY
VALUABLE SUGGESTIONS FOR ITS EXPANSION AND
IMPROVEMENT. FURTHER SUGGESTIONS ARE ALWAYS
WELCOME. JOHN RUTIS 50-252 X7558

THIS PACKAGE MAY BE USED BY ANYONE WHO HAS
ACCESS TO THE CYBER COMPUTER THROUGH A 4013 OR
4015 TERMINAL (TWO OF THE ROUTINES REQUIRE A
4015). YOU ARE NOT LIMITED TO USING DATA ENTERED
IN APL; USE <FILEREAD>, TO ACCESS DATA IN CYBER
CODED FILES. TO USE THIS PACKAGE SIGN ON THE
COMPUTER, THEN ENTER:

```
APL.TT-TYPE
***** TO EXIT APL TO THE SYSTEM ENTER: *
*SYST
*TO SIGN OFF ENTER:
*OFF
* DON'T FORGET THE PAREN <>
***** WHEN YOU GET A <CLEAR WS> MESSAGE ENTER:
```

)LOAD *APL1 STP?
YOU WILL THEN BE ASKED IF YOU NEED INSTRUCTIONS,
IF YOU ANSWER NO YOU ARE READY TO LOAD A ROUTINE,
IF YOU ANSWER YES THE FOLLOWING WILL BE PRINTED:

)LOAD *APL1 STP?
DO YOU NEED INSTRUCTIONS?

YES STP IS A GRAPHIC STATISTICS PACKAGE. IT CONTAINS SEVERAL
SEPARATE ROUTINES WHICH MAY BE LOADED ONE AT A TIME. THEY ARE:

```
'RUNAV, A RUNNING AVERAGE PLOT
<SCATTER, A SCATTER DIAGRAM
<REG, GRAPHIC REGRESSION
<GSTREG, GRAPHIC STEPWISE REGRESSION
<PROB, PROBABILITY PLOTTING
<CURVE, CURVE FITTING
<VIEW, 3-D VIEW OF A MATRIX
<GS, GRAPHICS PACKAGE USED BY ABOVE
```

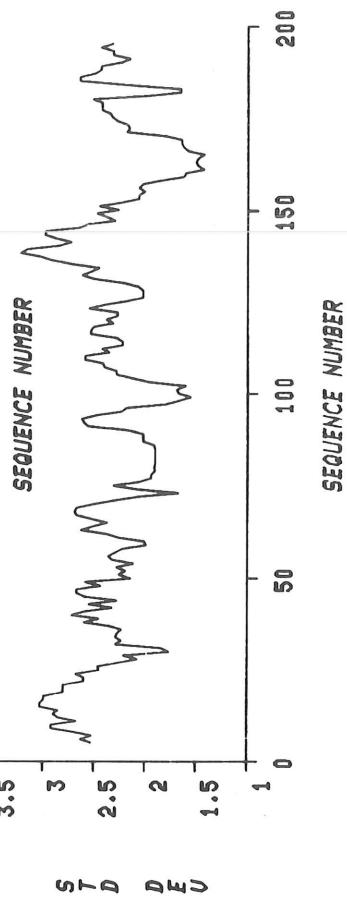
EACH PACKAGE MAY BE LOADED THUS:
LOAD 'SCATTER' (SEE ALSO <LOADHOW>)
BE SURE TO INCLUDE THE QUOTES (UPPER CASE K)
THERE IS A THOROUGH 'DESCRIBE' FUNCTION WITH EACH PACKAGE;
AFTER YOU HAVE LOADED IT JUST ENTER <DESCRIBE>.
IF YOU HAVE DATA IN CYBER CODED FILES THAT YOU WISH TO
USE WITH THESE PACKAGES SEE <CFILEREADHOW>.
BE SURE TO READ <PROTECTHOW> AND ALL THE OTHER 'HOW'S'
TO SEE WHAT 'HOW'S' ARE AVAILABLE ENTER <HOW>

LOADED
LOAD 'RUNAU'

DESCRIBE
RUNAU IS AN INTERACTIVE PROGRAM. ENTER A VECTOR
OF VALUES IN THE ORDER YOU DESIRE (YOU MAY ALSO
SPECIFY A ROW OR COLUMN OF A MATRIX) WHEN THE
PROGRAM REQUESTS IT.

EXAMPLE:

X<1200> (This is a dummy vector of 200 integers
between 1 and 8.)



RUNAU
ENTER DATA SET NAME
X
ENTER AVERAGING INTERVAL DESIRED
Q:
10
(your entry)
(computer response)
(your entry)
(computer)
(computer)
(your entry)

At this point the plots will begin. enter carriage
return to see them.

LOAD 'SCATTER'

LOADED
DESCRIBE
SCATTER IS AN INTERACTIVE PROGRAM. COPY YOUR DATA
MATRIX INTO THIS WORKSPACE. ENTER 'SCATTER', AND
RESPOND TO THE REQUESTS. COLUMNS OF THE MATRIX ARE
VARIATES, ROWS ARE OBSERVATIONS. THE TWO LINES
IN THE PLOT ARE THE LINEAR LEAST SQUARES FITS ON
EACH AXIS.

EXAMPLE:

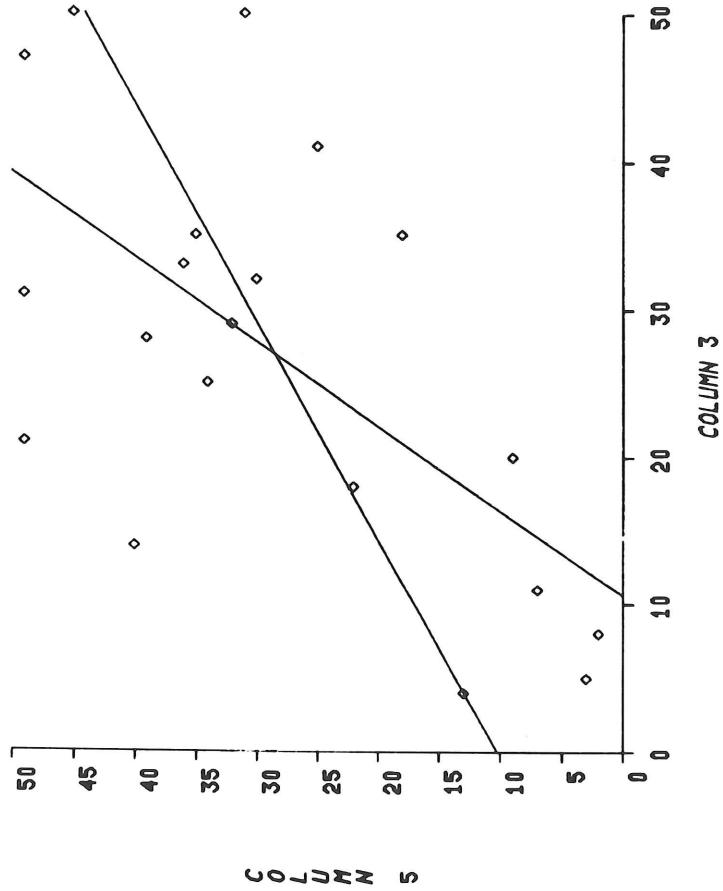
X<20 10 7200 50 (This is a dummy matrix with 10
columns and 20 rows of integers
between 1 and 50)

SCATTER (your entry)
WHEN YOU WISH TO END THE PROGRAM ENTER END
AFTER THE GRAPH HAS BEEN DRAWN; TO CONTINUE (computer)
ENTER CARriage RETURN ONLY.

ENTER MATRIX
X
THE MATRIX HAS 10 COLUMNS
ENTER X AND Y AXIS COLUMN NUMBERS
Q: 3 5

At this point the plot will begin, enter carriage
return to see it.

SCATTER MATRIX-X 12 NOV 1976 COR COEFF 0.623



LOADED

DESCRIBE

GREG IS AN INTERACTIVE PROGRAM. COPY YOUR DATA MATRIX INTO THIS WORKSPACE, ENTER 'GREG', AND RESPOND TO THE REQUESTS. COLUMNS OF THE MATRIX ARE VARTATES, ROWS ARE OBSERVATIONS. MISSING DATA ARE REPRESENTED BY 1E9.

THREE GRAPHS AND A LIST OF PRINTED STATISTICS ARE OUTPUTTED. A SCATTER PLOT OF THE TWO COLUMNS CHOSEN WITH THE LEAST SQUARES FIT AND THE 95% CONFIDENCE LIMITS OF THE LEAST SQUARES FIT IS THE FIRST. SECOND THE RESIDUALS PLOTTED AGAINST THE FITTED LINE, THIRD THE RESIDUALS PLOTTED AGAINST THE CUMULATIVE DISTRIBUTION OF THE RESIDUALS. THE LATTER TWO PLOTS ARE USED TO FIND OUTLYING, UNREASONABLE POINTS (SEE EDITING EQUATIONS IN DATA BY DANIEL AND WOOD).

EXAMPLE:

X=20 10^7200^750

(This is a dummy matrix with 10 columns and 20 rows of integers between 1 and 50)

(your entry)

GREG

WHEN YOU WISH TO END THE PROGRAM ENTER END
AFTER THE GRAPH HAS BEEN DRAWN; TO CONTINUE
ENTER CARRIAGE RETURN ONLY.

ENTER MATRIX

X

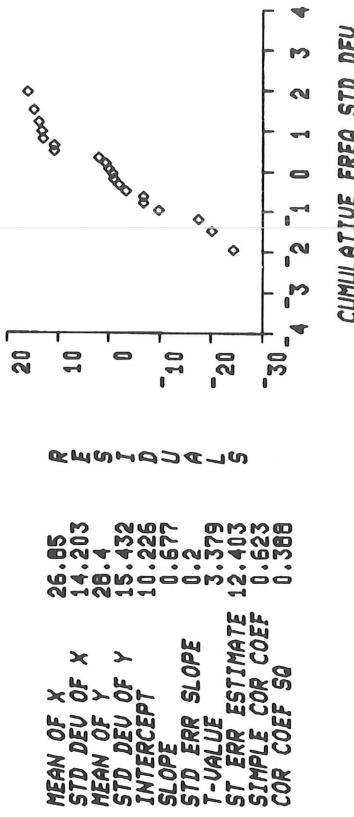
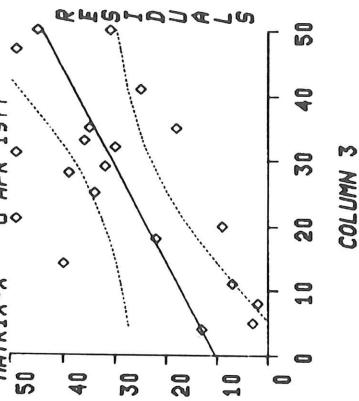
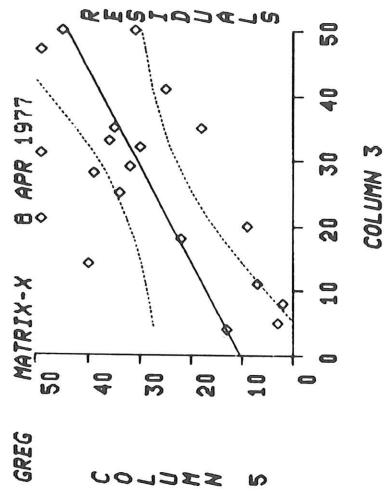
THE MATRIX HAS 10 COLUMNS

ENTER THE X AND Y COLUMN NUMBERS

D:

3 5

(Enter carriage return to see result)



MEAN OF X	26.05
STD DEV OF X	14.203
MEAN OF Y	26.4
STD DEV OF Y	15.432
INTERCEPT	10.226
SLOPE	0.677
STD ERR SLOPE	0.2
T-VALUE	3.379
STD ERR ESTIMATE	12.403
SIMPLE COR COEF	0.623
COR COEF SQ	0.388

LOADED GSTREG

DESCRIBE

GSTREG IS AN INTERACTIVE PROGRAM. COPY YOUR DATA MATRIX INTO THIS WORKSPACE, ENTER 'GSTREG', AND RESPOND TO THE REQUESTS. COLUMNS OF THE MATRIX ARE VARIATES, ROWS ARE OBSERVATIONS. MISSING DATA ARE REPRESENTED BY 1E9.

TWO GRAPHS AND A LIST OF PRINTED STATISTICS ARE OUTPUTTED. THE FIRST GRAPH IS OF THE RESIDUALS PLOTTED AGAINST THE FITTED LINE, AND THE SECOND IS OF THE RESIDUALS PLOTTED AGAINST THE CUMULATIVE DISTRIBUTION OF THE RESIDUALS. THE TWO GRAPHS ARE USED TO FIND OUTLYING UNREASONABLE POINTS (SEE ELLING EQUATIONS TO DATA BY DANIEL AND HODD).

EXAMPLE:

X=20 10 12000 750 (This is a dummy matrix with 10 columns and 20 rows of integers between 1 and 50)

(your entry)

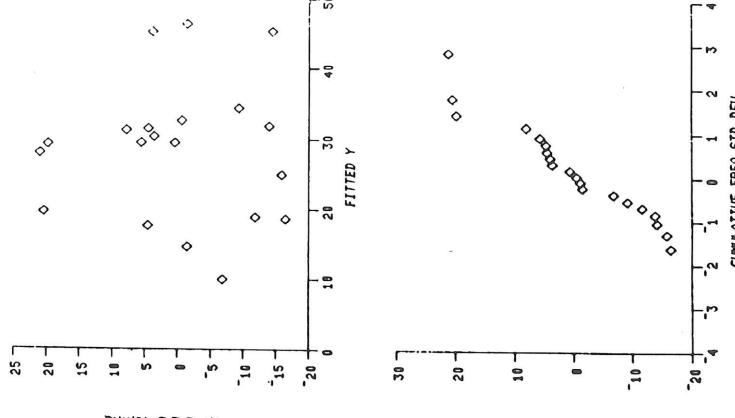
GSTREG
WHEN YOU WISH TO END THE PROGRAM ENTER END
AFTER THE GRAPH HAS BEEN DRAWN; TO CONTINUE
ENTER CARRAGE RETURN ONLY.

X
THE MATRIX HAS 10 COLUMNS
ENTER THE COLUMN NUMBER OF THE DEPENDENT VARIABLE
D: 5
ENTER THE COLUMN NOS. OF THE INDEPENDENT VARIABLES
D: 3 6 7 8

(Enter carriage return to see result)

GSTREG MATRIX X 8 APR 1977

COL. NO.	COEF.	ST. ERR.	T-VALUE	PROPORTION OF CONTRIBUTION
5	16.53412	0.00000	0.00000	0.00000
3	-0.64659	0.28989	-2.2532	0.38006
7	-0.03424	0.21679	-0.38568	0.0571
8	-0.17310	0.25337	-0.6714	0.0359
6	-0.01588	0.21030	-0.07357	0.0027
DEGREES FREEDOM	SUM SQ.	MEAN SQ.	F-VALUE	
REG.	REC.	REG.	REC.	
0	4.00000	1915.57669	476.39467	2.72826
D.F.-ERR.	S.S.-ERR.	M.S.-ERR.	M.S.-ERR.	LOG CORR. TOL.
15.00000	2619.22131	174.61457	0.00000	
D.F.-TOTAL	S.S.TOTAL	STD. ERR. EST.	COR.COEFF. SD.	
19.00000	4524.80000	13.21414	0.42114	



```

)COPY *APL1 RANDOM UNIFORM NNORMAL NLLOGISTIC
AA+NNORMAL 200 Generates 200 random numbers
BB+NLLOGISTIC 200 In a normal distribution
generates 200 random nos.
in a logistic distribution

PROB
ENTER DATA FILES YOU WISH TO GRAPH
AA
BB

```

ENTER THE NUMBER OF THE SCALE YOU WISH TO USE

- 1 LOG NORMAL
- 2 LIN NORMAL
- 3 LOG EXTREME
- 4 LIN EXTREME

AN 'I' AFTER THE NUMBER INVERTS THE ORDER OF THE DATA

2

(Carriage return for graph)

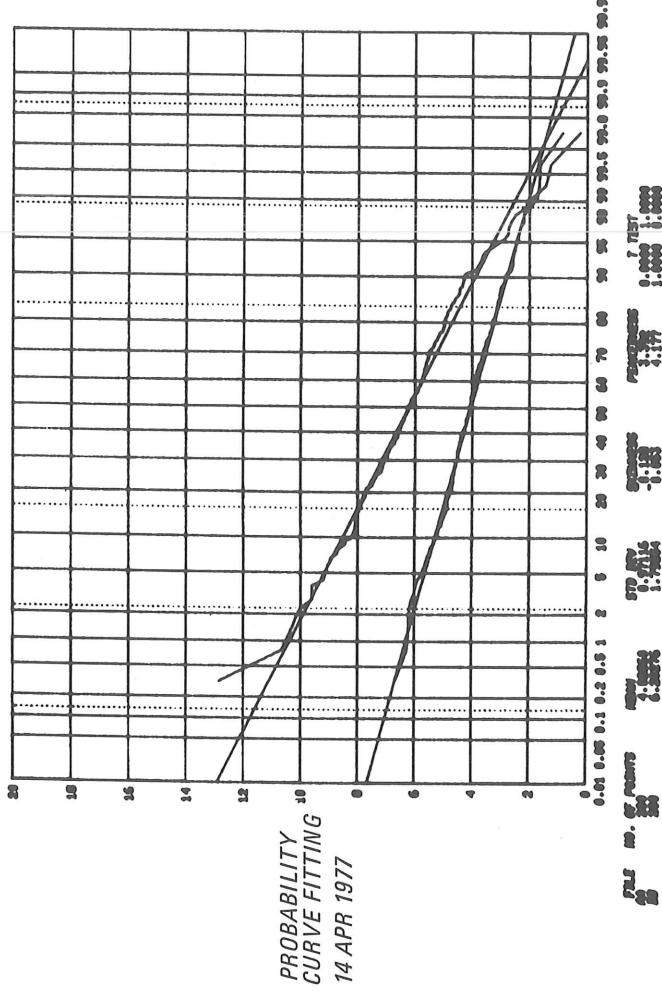
LOAD PROB!

LOADED

DESCRIBE
 PROB IS A PROGRAM WHICH DOES PROBABILITY PLOTS OF YOUR DATA. IT IS AN INTERACTIVE PROGRAM, JUST COPY YOUR DATA INTO THIS WORKSPACE AND ENTER 'PROB'. THE DATA MAY BE IN VECTORS OR A MATRIX. IF IT IS A MATRIX YOU MAY INDEX THE ROWS OR THE COLUMNS - THIS: MATRIX[1:12,1] OR MATRIX[1:5]. THE NAME AND INDEX MUST NOT EXCEED 12 CHARACTERS. YOU MAY DISPLAY UP TO 4 SETS OF DATA PER GRAPH. THE DATA IS NORMALLY ARRANGED SO THAT THE SLOPE IS NEGATIVE - FOR A POSITIVE SLOPE ENTER AN 'I', AFTER THE PLOT NUMBER YOU SELECT. TO INTERPRET THE GRAPHS SEE PROBABILITY CURVES FOR DECISION MAKING BY JAMES R. KING.

NOTE! THIS PROGRAM WILL ONLY WORK PROPERLY ON A 4015

(Enter carriage return for example)



LOADED

DESCRIBE

CURVE IS AN INTERACTIVE CURVE FITTING PROGRAM. IT HAS FIVE
CURVE FITTING OPTIONS: POLYNOMIAL, CHEBESHEV, SPLINE, FOURIER,
AND PERCENT. COPY YOUR VECTORS AND ENTER 'CURVE'.

FEATURES OF EACH TYPE:

POLYNOMIAL: REQUIRES X AND Y VECTORS WITH MEMBERS
CORRESPONDING. DETERMINES COEFFICIENTS OF ANY ORDER
FROM 1 TO N-1.

CHEBESHEV: SAME AS POLYNOMIAL EXCEPT ORDER
CANNOT BE LESS THAN 3. (PERCENT IS A MODIFIED CHEBESHEV
IN WHICH THE MAX PERCENT OF THE RESIDUALS IS MINIMIZED.)

SPLINE: DOES A CUBIC SPLINE FIT TO CORRESPONDING X AND Y
VECTORS. REQUIRES ONLY Y VECTOR OF EQUALLY SPACED POINTS
OF A CYCLIC CURVE. THE NUMBER OF COEFFICIENTS FOR THE
FITTED CURVE MAY BE LIMITED IN TWO DIFFERENT WAYS FOR
SMOOTHING.

INPUT FEATURES: YOU MAY REQUEST THAT THE CURVE BE FITTED TO
ANY POINTS ON THE X AXIS YOU WISH. IF YOU HAVE NO SPECIFIC
DESIRE THE PROGRAM WILL CHOOSE POINTS FOR YOU. IF YOU WISH
TO FIT THE GIVEN X POINTS JUST REENTER THE X VECTOR WHEN
ASKED FOR THE 'X' VECTOR. IF YOU WISH A DIFFERENT SET OF
POINTS YOU MUST HAVE A VECTOR OF THOSE POINTS READY. IF YOU
DON'T HAVE YOUR VECTORS READY IN ANOTHER WORKSPACE BUT MUST
ENTER THEM YOU MAY USE THE PROGRAM 'ENTERDATA', JUST ENTER
'ENTERDATA'.

(To continue the 'describe' enter a carriage return)

OUTPUT FEATURES:

GRAPH: THERE ARE FIVE OPTIONS IN THE GRAPH FEATURE: FIT, RESID,
DERIV, COEF, AND CURVES.

FIT: DRAWS A GRAPH OF THE FITTED CURVE WITH THE POINTS OF
ORIGINAL DATA.

RESID: DRAWS FIT ABOVE AND A GRAPH OF THE RESIDUALS.

DERIV: DRAWS FIT ABOVE AND GRAPHS OF THE FIRST AND SECOND
DERIVATIVES OF THE FITTED CURVE.

COEF: DRAWS A GRAPH OF THE COEFFICIENTS OF THE FITTED CURVE.
CURVES: DRAWS ALL OF THE ABOVE.

(To see an example enter carriage return)

ENTERDATA
ENTER 'NONE', IF YOU HAVE NO DATA TO ENTER
WHEN REQUESTED
ENTER X POINTS

D: LOAD 'CURVE'

DO YOU WISH TO ENTER ANOTHER BLOCK OF DATA ?

NO

ENTER Y POINTS

D: 100 25 50 5 10

DO YOU WISH TO ENTER ANOTHER BLOCK OF DATA ?

NO

ENTER Z POINTS

D: NONE

DO YOU WISH TO ENTER ANOTHER BLOCK OF DATA ?

NO

YOUR DATA IS NOW STORED IN X, Y, AND Z
CURVE: (To continue the example enter carriage return)

4 RESID
5 CURVES

D: CURVE

ENTER YOUR Y VECTOR

D: 5

ENTER YOUR X VECTOR (NA IF FOURIER FIT IS DESIRED) (Carriage return to continue)

D: X

ENTER YOUR X' VECTOR (NA IF YOU HAVE NONE)

D: NA

DO YOU WISH TO LIMIT THE NUMBER OF COEFFICIENTS?

YES

ENTER THE TYPE OF FIT YOU DESIRE

1 POLY

2 CHEB

3 PERCENT

4 SPLINE

D: 1

ENTER TITLE

EXAMPLE

ENTER ORDER DESIRED

D: 3

COMPUTATION HAS BEEN DONE, DO YOU WISH:
1 GRAPHS OR
2 PRINTED DATA ?

D: 1

ENTER THE TYPE OF GRAPHS YOU DESIRE

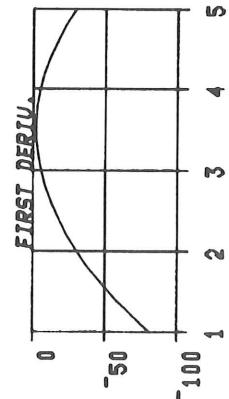
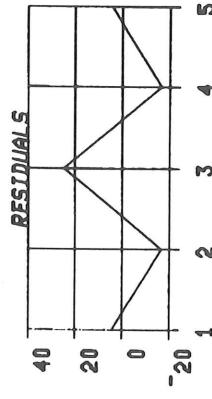
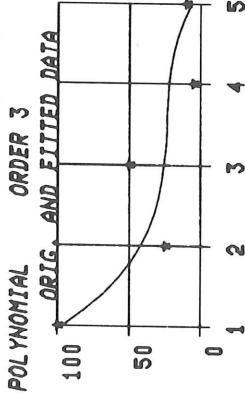
1 FIT

2 COEF

3 DERIV



CURVE TITLE - EXAMPLE 13:26 APR 8,1977



LOADED 'VIEW'

DESCRIBE

VIEW IS A PROGRAM WHICH ALLOWS YOU TO DISPLAY THE VALUES OF A MATRIX IN A THREE DIMENSIONAL REPRESENTATION. THE ROWS AND COLUMNS ARE A GRID ON AN UP-TILTED PLAIN AND THE VALUES OF THE MATRIX POINTS DISPLACE THE GRID POINTS VERTICALLY. THE GRID IS AUTO SCALED BUT THE SCALING OF THE MATRIX VALUES IS LEFT TO YOU. YOU MAY USE ANY VALUES YOU WISH, PLUS OR MINUS, BUT FOR BEST RESULTS USE VALUES BETWEEN 0 AND 150. ONLY YOU CAN DETERMINE WHAT IS BEST FOR YOUR APPLICATION.

SYNTAX:

N VIEW M

WHERE M IS THE MATRIX, AND N IS THE CORNER FROM WHICH YOU WISH TO VIEW IT:
1 TOP LEFT (DEFAULT CASE IF NO N GIVEN)

- 2 TOP RIGHT
- 3 BOTTOM LEFT
- 4 BOTTOM RIGHT

A SMOOTHED CURVE RESULTS IF YOU ADD S TO VIEW, THUS:
N VIEWS M
THIS TAKES MUCH MORE CPU TIME (APPROX 16 CPU SEC FOR A 10x10 MATRIX) SO A MESSAGE IS GIVEN BEFORE IT RUNS GIVING THE APPROX RUN TIME AND ASKING IF YOU WISH TO PROCEED. IF YOU HAVE A LARGE MATRIX YOU SHOULD RESET YOUR TIME LIMIT IN THE SYSTEM (SETTL NNNNN) OR YOU WILL GET A TIME LIMIT MESSAGE THAT WILL SPOIL YOUR DISPLAY.

LOADED 'G5'

DESCRIBE
G5 IS THE GRAPHICS PACKAGE USED BY THE FUNCTIONS IN THIS WORKSPACE. TO SEE HOW TO USE THIS PACKAGE SEE "APL1 GRAFPACK"



Maureen Key

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