

## PROGRAM ABSTRACTS

## 51981D (CONTD)

THIS PROGRAM IS A SUPPLEMENT TO PROGRAM 51800D. IT ALLOWS FASTER COMPUTATION THAN PROGRAM 51800D, IF  $f(x)$  IS PERIODIC AND HAS TWO SYMMETRIES, WHICH ALLOWS TO REDUCE THE INTEGRATION INTERVAL TO THE FOURTH PART OF PERIOD. THE USED METHOD IS ANALOGOUS TO MY PROGRAM 51800D. AN APPENDIX COMPUTES THE OPTIMAL REPRESENTATION OF THE GAUSS-LEGEND COEFFICIENTS WITHIN TEN DIGITS FOR  $K=4$ .

197PROGRAM STEPS  
BERND RUTHMAIER  
D-DURMERSHEIM.

## 51982D 67-SIMPLE OPEN FRAMES

THIS PROGRAM CALCULATES VERTICAL AND HORIZONTAL REACTIONS AND SUPPORT MOMENTS OF SIMPLE OPEN RECTANGULAR FRAMES UNDER HORIZONTAL AND VERTICAL DISTRIBUTED AND POINT LOADS AND TEMPERATURE LOAD AND ANY COMBINATION OF THEM.

295PROGRAM STEPS  
JIMMY PLATONIS  
GR-ATHENS.

## 51983D 67-5 LINEAR EQUATIONS IN 5 UNKNOWN

THIS PROGRAM ALLOWS THE USER TO SOLVE A SYSTEM OF FIVE LINEAR EQUATIONS IN FIVE UNKNOWN BY THE METHOD OF TRIANGULATION, ALSO NAMED "CHOLESKY'S METHOD" AND OFTEN USED FOR GREATER SYSTEMS WITH THE HELP OF A COMPUTER.

324PROGRAM STEPS  
DIDIER DE BRUYN  
B-BRUXELLES.

## 51984D 97-EIGEN SYSTEM OF A 3X3 REAL MATRIX

THE PROGRAM COMPUTES ALL EIGENVALUES AND ALL EIGENVECTORS OF A 3X3 REAL MATRIX. FIRST DOMINANT EIGENVECTOR AND CORRESPONDING EIGENVALUE ARE FOUND. THEN ZERO IS SUBSTITUTED TO THE EIGENVALUE AND PROCESS CONTINUES.

362PROGRAM STEPS  
BERNARD SIKET  
F-SAINT-CLOUD.

## 51985D 67-TEMPERATURE-PROBLEMS I

GIVEN A BODY AT A TEMPERATURE OF A DEGREE, PLACED OUTDOORS WHERE THE TEMPERATURE IS B DEGREE. IF AFTER T MINUTES THE TEMPERATURE OF THE BODY IS C DEGREE, THIS PROGRAM FINDS :  
A) HOW LONG IT WILL TAKE THE BODY TO REACH A TEMPERATURE OF O DEGREE.  
B) THE TEMPERATURE OF THE BODY AFTER T MINUTES.

055PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 51986D 67-TEMPERATURE PROBLEMS II

GIVEN A BODY AT AN UNKNOWN TEMPERATURE, PLACED IN A ROOM WHICH IS HELD AT A CONSTANT TEMPERATURE OF A DEGREE. IF AFTER T1 MINUTES THE TEMPERATURE OF THE BODY IS T DEGREE 1 AND AFTER T DEGREE 2 MINUTES T DEGREE 2, THIS PROGRAM COMPUTES THE UNKNOWN INITIAL TEMPERATURE.

053PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 51987D 67-A SPECIAL DISTRIBUTION

THIS PROGRAM COMPLETES THE NECESSARY M TO OBTAIN A ZERO-DIFFERENCE

## 51987D (CONTD)

BETWEEN SIN X AND DISTRIBUTION WITH A P ROUND-COFF.

060PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 51988D 67-BACTERIA-CULTURE-MODEL

PROGRAM CREATES A MODEL OF BACTERIA CULTURE TO COMPUTE THE NUMBER OF STRANDS AT ANY TIME IF IS GIVEN THE NUMBER OF STANDS AFTER TWO TIME INTERVALS.

048PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 51989D 67-THE HELLMANN POTENTIAL

THIS PROGRAM COMPUTES THE HELLMANN POTENTIAL FOR THE ISOLATED ALKALI ATOMS : NA, K, RB, CS.

099PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 51990D 67-THE P-M JUNCTION DIODE

PROGRAM COMPUTES THE INSTANTANEOUS PLATE RESISTANCE  $\tau_p$  AND THE DIFFERENTIAL PLATE RESISTANCE  $\tau_p$  IF IS GIVEN : THE TEMPERATURE IN DEGREE CC, THE INVERSE SATURATION CURRENT  $I_{CO}$  IN  $\mu A$  AND THE DIODE VOLTAGE DROP UP.

068PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 51991D 67-GEO-LOG CURVE FIT NO 3

PROGRAM COMPUTES THE COEFFICIENTS A, B, C AND D OF THE BEST FITTING CURVE  $Y=A+B \cos X+C \tan X+D \ln X$ . AFTER THE INPUT OF N DATA PAIRS (X,Y) YOU CAN ALSO COMPUTE THE EXPECTED Y FOR GIVEN X'S.

216PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 51992D 67-THE RESPONSE OF THE LCR NETWORK TO A RAMP VOLTAGE

THIS PROGRAM COMPUTES THE THREE POSSIBLE CASES (OVERDAMPED, CRITICALLY DAMPED OR DAMPED OSCILLATORY) OF A SERIE L-C-R CIRCUIT TO A RAMP VOLTAGE.

192PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 51993D 67-CURRENT IN A R-L NETWORK

THIS PROGRAM DETERMINES THE RESULTING CURRENT IN A R-L CIRCUIT IF THE SUPPLY IS SWITCHED ON AT  $t=0$  AT THE INSTANT WHEN THE SUPPLY VOLTAGE IS AT MAXIMUM.

066PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 51994D 67-THE RESPONSE OF A RL OR A LC CIRCUIT TO A RAMP VOLTAGE

THIS PROGRAM COMPUTES THE CURRENT RESPONSE OF A RL OR A LC SERIES CIRCUIT TO A RAMP VOLTAGE.

067PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 51995D 67-DIFFERENTIAL EQUATIONS 9

THIS PROGRAM SOLVES ORDINARY DIFFE-

## 51995D (CONTD)

ENTIAL EQUATIONS WITH THE MODIFIED SYSTEM OF PROGRAM NO 1777 BUT THE K'S ARE COMPUTED WITH A FORWARD - BACKWARD SYSTEM AND THE MEAN OF THE K'S BY THE METHOD OF A LINEAR REGRESSION.

116PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 51996D 67-DIFFERENTIAL EQUATIONS 10

THIS PROGRAM SOLVES ORDINARY DIFFERENTIAL EQUATIONS WITH THE MODIFIED SYSTEM OF PROGRAM NO 1777 BUT THE K'S ARE COMPUTED WITH A FORWARD - BACKWARD SYSTEM AND THE MEAN OF THE K'S BY THE METHOD OF EXPONENTIAL CURVE FITTING.

119PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 51997D 67-DIFFERENTIAL EQUATIONS 11

THIS PROGRAM SOLVES ORDINARY DIFFERENTIAL EQUATIONS WITH THE MODIFIED SYSTEM OF PROGRAM NO 1777 BUT THE K'S ARE COMPUTED WITH A FORWARD - BACKWARD SYSTEM AND THE MEAN OF THE K'S BY THE METHOD OF LOGARITHMIC CURVE FITTING.

118PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 51998D 67-DIFFERENTIAL EQUATIONS 12

THIS PROGRAM SOLVES ORDINARY DIFFERENTIAL EQUATIONS WITH THE MODIFIED SYSTEM OF PROGRAM NO 1777 BUT THE K'S ARE COMPUTED WITH A FORWARD - BACKWARD SYSTEM AND THE MEAN OF THE K'S BY THE METHOD OF POWER CURVE FITTING.

120PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 51999D 67-DIFFERENTIAL EQUATION 13

PROGRAM SOLVES ORDINARY DIFFERENTIAL EQUATIONS WITH THE ORIGINAL KUTTA METHOD.

066PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 52000D 67-OPTIMAL ESTIMATION OF A MULTI FIX

THE PROGRAM COMPUTES A FIX FROM TWO OR MORE OBSERVATIONS. STANDARD DEVIATION MAY BE COMPUTED. DATA DISPLAYED IN FORMAT DEGREES, MINUTES AND TENTHS OF MINUTES. (DD.MMM). FOR A RUNNING FIX THE ALTITUDES MUST BE CORRECTED FOR THE CHANGE IN POSITION BEFORE THEY ARE ENTERED. USE SIGHT REDUCTION 1,2 OR 3 WHICH HAVE AUTOMATIC SEILING CORRECTION.

140PROGRAM STEPS  
JAN ANDERSEN  
N-BERGEN.

## 52001D 67-FULLY ADJUSTABLE TIMER

A DATA PROGRAM CARD CREATES A 2 SECONDS STEP TIMER. THE ACCURACY IS CONTROLLED BY ONE REGISTER. AFTER 24 HOURS THE TIMER SKIPS TO ZERO AND STARTS AGAIN.

022PROGRAM STEPS  
ULRICH HAHN  
D-FLENSBURG.

## 52002D 67-SUMS OF THREE RECIPROCAL POWERS &amp; BERNOULLI NUMBERS

## PROGRAM ABSTRACTS

## 52002D (CONTD)

IN ONLY A CARD, THIS PROGRAM GIVES THREE SUMS OF RECIPROCAL POWERS, VIZ RIEMANN ZETA, ETA AND LAMBDA. BESIDES THESE MATTERS, IT FURNISHES THE BERNOULLI NUMBERS. NEGATIVE ARGUMENTS FOR ZETA FUNCTION ARE PROVIDED.

218PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 52003D 67-EULER NUMBERS AND STIRLING FACTORIAL

THIS PROGRAM GIVES EULER NUMBERS AND STIRLING FACTORIAL, BOTH FOR GREAT N. ACCURACY IS VERY GOOD. BESIDE THESE MATTERS, A SIGMA FUNCTION, BETA, IS PROVIDED.

224PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 52004D 67-TETRAGAMMA FUNCTION IN COMPLEX VARIABLE

THIS PROGRAM GIVES, IN COMPLEX VARIABLE AND WITH A GREAT ACCURACY, THE TETRAGAMMA FUNCTION.

202PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 52005D 67-PENTAGAMMA FUNCTION IN COMPLEX VARIABLE

THIS PROGRAM GIVES, IN COMPLEX VARIABLE AND WITH A GREAT ACCURACY THE PENTAGAMMA FUNCTION.

218PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 52006D 67-STURVE FUNCTIONS IN COMPLEX VARIABLE &amp; ORDER ANY INTEGER

THIS PROGRAM GIVES, IN COMPLEX VARIABLE, THE H AND L STURVE FUNCTIONS, ORDER ANY POSITIVE, ZERO OR NEGATIVE INTEGER. ACCURACY IS VERY GOOD, BECAUSE TERMS OF EXPANSION SERIES REACH A LIMIT DOWN TO  $10^{-20}$ .

132PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 52007D 67-BETA AND GAMMA FUNCTIONS IN COMPLEX VARIABLES IN ONE CARD

THIS PROGRAM OBTAINS, IN COMPLEX VARIABLE, THE BETA AND GAMMA FUNCTIONS WITH A GREAT ACCURACY. BESIDES THESE MATTERS, TWO AUXILIARY FUNCTIONS, AS LN R ARG AND EXPONENTIAL Z, ARE PROVIDED.

224PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 52008D 67-PSI (DIGAMMA) FUNCTION IN COMPLEX VARIABLE

THIS PROGRAM FURNISHES IN COMPLEX VARIABLE AND A GREAT ACCURACY, THE PSI OR DIGAMMA FUNCTION.

200PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 52009D 67-TRIGAMMA FUNCTION IN COMPLEX VARIABLE

THIS PROGRAM GIVES, IN COMPLEX VARIABLE AND WITH A GREAT ACCURACY, THE TRIGAMMA FUNCTION.

211PROGRAM STEPS  
FELIPE LANDA

## 52009D (CONTD)

E-CCORDOBA.

## 52010D 67-ROTARY MOTION SECOND ORDER DIFFERENTIAL EQUATION

THIS PROGRAM GIVES INTERCHANGEABLE SOLUTIONS OF SECOND ORDER DIFFERENTIAL EQUATION OF MOTION RELATING ANGULAR DISPLACEMENT, ELAPSED TIME MOMENT OF INERTIA, DAMPING AND SPRING CONSTANTS USING ITERATION FOR QUANTITIES NOT EXPLICITLY DEFINED. NATURAL ANGULAR FREQUENCY, DAMPING RATIO, AND DAMPED ANGULAR FREQUENCY MAY HAVE ASSIGNED VALUES DURING CALCULATION OF OTHER QUANTITIES. INITIAL CONDITIONS ARE DISPLACEMENT AT TIME ZERO AND ZERO ANGULAR VELOCITY.

223PROGRAM STEPS  
SIDNEY WALLACE ECKETT  
GB-ESSEX.

## 52011D 97-THERMAL PROCESS EVALUATION FOR CANNED FOODS.

GIVEN THE PENETRATION DATA OF A PREPARED FOOD RELATED TO ITS CAN SIZE AND GIVEN THE PROCESSING PARAMETERS I.E. RETORT TEMPERATURE AND INITIAL TEMPERATURE, THE PROGRAM CALCULATES THE STERILIZING VALUES F<sub>0</sub> AND B<sub>0</sub> BASED ON BALL'S FORMULA, TO OBTAIN A COMMERCIAL STERILE FINISHED PRODUCT.

203PROGRAM STEPS  
ERMINIO SANTI  
I-SANGUINETTO.

## 52012D 67-DEFINITE INTEGRAL SIMPSON

INTEGRATES FUNCTION \*X\* BETWEEN GIVEN LIMITS IN ONLY 50 STEPS.

050PROGRAM STEPS  
LAWRENCE B. HARTLEY  
GB-BRIERFIELD.

## 52013D 67-ECONOMETRICAL MODEL OF THE BELGIAN ECONOMY 2 (1969-1977)

WITH THIS PROGRAM YOU CAN COMPUTE THE GROSS INTERIOR PRODUCT ON REAL PRICES AFTER THE INPUT OF THE 9 SUB-ECONOMIES IN 10\*6 BELGIAN FRANCS (BETWEEN 1969 AND 1977). YOU CAN ALSO COMPUTE THE EXPECTED G.I.P. FOR THE NEXT YEARS (E.G. 1978 ETC...).

148PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 52014D 67-MONEY-MODEL FOR THE BELGIAN FRANC

THIS PROGRAM COMPUTES THE EXPECTED EVOLUTION OF THE BELGIAN FRANC IN THE RELATIONSHIP WITH THE TEN MOST IMPORTANT FOREIGN EXCHANGES RATES. THE BASIC MODEL IS CONSTRUCTED FOR THE RATES BETWEEN 1.12.77 AND 30.9.1978.

162PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 52015D 67-SPECIAL LOGARITHMIC CURVE FITTING

PROGRAM COMPUTES THE COEFFICIENTS P, A, B AND C OF THE BEST CURVE FITTING  $Y = PL * AX + BX ** 2 + CX ** 3$  AFTER THE INPUT OF N DATA PAIRS (X, Y). YOU CAN ALSO COMPUTE EXPECTED Y'S FOR GIVEN X'S.

211PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 52016D 67-DIFFERENTIAL EQUATIONS 14

## 52016D (CONTD)

PROGRAM SOLVES ORDINARY DIFFERENTIAL EQUATIONS WITH THE FOURTH ORDER RUNGE KUTTA WHICH ERROR IS MINIMIZED.

204PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 52017D 67-SOARING

USE YOUR SKILL TO PILOT YOUR GLIDER ACROSS-COUNTRY AROUND A TRIANGULAR COURSE. SELECT THE MOST SUITABLE TURNING POINTS WITH REGARD TO THE WEATHER CONDITIONS. IMPROVE YOUR CRUISING AND THERMAL CENTRING TECHNIQUES TO MAINTAIN A HIGH AVERAGE SPEED. GOOD JUDGEMENT IS NEEDED TO PHOTOGRAPH THE TURNING POINTS FROM THE CORRECT SECTOR. QUICK AND CORRECT DECISIONS ARE REQUIRED FOR A SUCCESSFUL FLIGHT.

392PROGRAM STEPS  
TONY NORRIE  
SEYCHELLES-VICTORIA.

## 52018D 67-REICHENBACH'S 3 VALUED LOGIC

ALL TEN OF REICHENBACH'S FUNCTIONS (INCLUDING LUKASIEWICZ'S THREE) FOR A THREE-VALUED LOGIC ARE AVAILABLE & WILL OPERATE ON THE CONTENTS OF STACK-REGISTERS Y AND X (OR X ONLY) -113 PROGRAM STEPS AVAILABLE FOR THE EVALUATION OF LENGTHY STATEMENTS.

111PROGRAM STEPS  
JIM R. KUTSCHERA  
D-MOERFELDEN-WALLDORF.

## 52019D 67-C(X), S(X), C1(X), S1(X) C2(X), S2(X), FRESNEL INTEGRALS &amp; INDEFIN.

THIS PROGRAM GIVES SIMULTANEOUSLY, BY COUPLE, ALL FRESNEL INTEGRALS, C(X) AND S(X); C1(X) AND S1(X); C2(X) AND S2(X). BESIDES PROGRAM TO CALCULATE INDEFINITE INTEGRALS OF C(X) AND S(X) IS PROVIDED.

207PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 52020D 67-ELLIPTICAL TRAJECTORY OF A SATELLITE 2-DIMENSIONAL.

THIS PROGRAM CALCULATES ALL THE DATES OF AN ELLIPTICAL TRAJECTORY EXCEPT THE VELOCITY AND THE ANGEL. YOU NEED THE MINIMUM AND MAXIMUM ALTITUDES OF THE TRAJECTORY. IT IS A SUPPLYING TO PROGRAM "2-DIMENSIONAL TRAJECTORY OF A SATELLITE".

202PROGRAM STEPS  
BERND STEINKUEHLER  
D-HERFORD.

## 52021D 67-2-DIMENSIONAL TRAJECTORY OF A SATELLITE

THIS PROGRAM CALCULATES THE 2-DIMENSIONAL ELLIPTICAL TRAJECTORY OF A SATELLITE. YOU NEED THE MINIMUM AND MAXIMUM ALTITUDES OF THE TRAJECTORY. THEN YOU ARE ABLE TO CALCULATE THE DATES OF THE SATELLITE. V(R); R(V); T; X(R); R(X); B(R); R(B).

212PROGRAM STEPS  
BERND STEINKUEHLER  
D-HERFORD.

## 52022D 67-ALPHA SHAPE FRAMES

THIS PROGRAM ON TWO CARDS, CALCULATES HORIZONTAL AND VERTICAL REACTION, TENSIONS AND MOMENTS OF SIMPLE FRAMES "ALPHA" SHAPE, UNDER DISTRIBUTED AND POINT LOADS.

## PROGRAM ABSTRACTS

## 52022D (CONTD)

448PROGRAM STEPS  
JIMMY PLATONIS  
GR-ATHENS.

## 52023D 97-67-SUN DECLINATION-EQUATION OF TIME DATA 1979 FOR PRGM 50856D

DATA, GIVEN ON THESE 2 CARDS ARE VALID FOR THE 1979 YEAR AND SHALL BE USED WITH PROGRAM 50856D- BY MEANS OF 2X2 POLYNOMIALS 8TH DEGREE IT PERMITS TO COMPUTE : 1ST SUN DECLINATION - 2ND EQUATION OF TIME, FOR A GIVEN DAY (MM.DD) AT A GIVEN HOUR EXPRESSED IN UNIVERSAL TIME (G.MT) IN SEXAGESIMAL MODE. THE COEFFICIENTS OF POLYNOMIALS HAVE BEEN OBTAINED BY MEANS OF PROGRAM 51226D FROM REAL VALUES OF SUN DECLINATION AND EQUATION OF TIME GIVEN BY SUN TABLES OF "CONNAISSANCE DES TEMPS"

000PROGRAM STEPS  
PIERRE RAYMOND  
F-MEUDON.

## 52024D 67-COMBINATORIAL ANALYSIS

THIS PROGRAM GIVES FOR ANY INTEGER FROM 0 TO INFINITE, FACTORIAL, BINOMIAL NUMBERS AND WITH CR WITHOUT REPETITION, COMBINATIONS AND VARIATIONS OF ANY KIND, AND TOTAL ACCURACY. YOU CAN CALCULATE IN A MOMENT FACTORIALS OF ORDER EVEN 10:80.

220PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 52025D 67-TRANSFORMATION FROM ROMAN NUMBERS INTO ARABIC NUMBERS

WITH THIS PROGRAM YOU CAN TRANSFORM A GIVEN ROMAN NUMBER INTO OUR USED SYSTEM OF ARABIC NUMBERS.

054PROGRAM STEPS  
REINHARD KLEINHAENTZ  
A-VIENNA.

## 52026D 67-TRANSFORMATION OF ARABIC NUMBERS INTO ROMAN NUMBERS

WITH THE PROGRAM YOU CAN TRANSFORM AN ARABIC NUMBER INTO A ROMAN NUMBER. FOR THE ROMAN NUMBERS A CODE USING ARABIC NUMBERS IS USED.

169PROGRAM STEPS  
REINHARD KLEINHAENTZ  
A-VIENNA.

## 52027D 97-67-GENERAL CIRCULAR DIAGRAM OF 3 PH ASYNCHRONOUS MOTOR

THIS PROGRAM ALLOWS 3 CARDS - BY MEANS OF THE GENERAL CIRCULAR DIAGRAM IT PERMITS TO DETERMINE THE ELECTRICAL AND MECHANICAL CHARACTERISTICS ACCORDING TO SPEED OF A 3 PHASE ASYNCHRONOUS MOTOR. THE USED METHOD WITH RESPECT OF THE STATOR WINDING RESISTANCE, IS DESCRIBED IN THE OLD FRENCH STANDARD NFC 51-100 (APRIL 1969) OF THE "UNION TECHNIQUE DE L'ELECTRICITE" IN PARIS, AND IS VALID FOR MOTORS OF RATED POWER UP TO 15KW.

565PROGRAM STEPS  
PIERRE RAYMOND  
F-MEUDON.

## 52028D 97-67-SIMPLIFIED CIRCULAR DIAGRAM OF 3 PH ASYNCHRONOUS MOTOR

THIS PROGRAM ALLOWS 3 CARDS - BY MEANS OF THE SIMPLIFIED CIRCULAR DIAGRAM IT PERMITS TO DETERMINE THE ELECTRICAL AND MECHANICAL CHARACTERISTICS ACCORDING TO SPEED OF A 3 PHASE ASYNCHRONOUS MOTOR. THE USED METHOD, WITHOUT RESPECT OF THE STATOR WINDING RESISTANCE, IS DES-

## 52028D (CONTD)

CRIBED IN THE OLD FRENCH STANDARD NFC 51-100 (APRIL 1969) OF THE "UNION TECHNIQUE DE L'ELECTRICITE" IN PARIS, AND IS VALID ONLY FOR MOTORS OF RATED POWER ABOVE 15KW.

512PROGRAM STEPS  
PIERRE RAYMOND  
F-MEUDON.

## 52029D 67-AMAZONSPLAY

THIS PLAY IS A TABLE GAME PLAYED ON A CHESS BOARD. YOU ARE PLAYING WITH A FIGURE CALLED "AMAZON". SHE CAN BEAT AS A QUEEN AND AS A KNIGHT. YOU PLAY WITH THE WHITE AMAZON AND THE CALCULATOR SETS THE BLACK AMAZON. WHITE BEGINS THIS PLAY. AT THE END OF THE PLAY THE CALCULATOR SHOWS THE WINNER IN THE DISPLAY.

186PROGRAM STEPS  
JOCHEN WIECHERN  
D-VISSELHCEVEDE.

## 52030D 97-XY-PLOTTER WITH 0.5% ACCURACY ALL Y-VALUES ARE PLOTTED XY-PLOTTER

THE Y-VALUE IS PLOTTED SIMILAR TO THE SCIENTIFIC NOTATION: THE LOCATION OF THE DECIMAL POINT IN A 11 FIGURES NUMBERS GIVES THE BASE NUMBER IN THE FIRST LINE. THE FRACTION PART OF THE BASE NUMBER IS ALSO PRINTED HERE FOR INCREASING TEN TIMES THE ACCURACY. THE FIRST LINE CONTAINS ALSO THE X-VALUE OR STEP NUMBER. THEN THE EXPONENT IS ADDED IN THE SECOND LINE, IF NECESSARY. AN Y-SCALE IS PRINTED TOO.

098PROGRAM STEPS  
JUERGEN LEHMKUHL  
D-MCESSINGEN.

## 52031D 97-4528 MONOSTABLE TIMING

THIS PROGRAM COMPUTES ONE OF THE THREE VARIABLES OF A MONOSTABLE TIMER CIRCUIT BUILT UP WITH A C-MOS INTEGRATED CIRCUIT 4528. THE THREE VARIABLES ARE : PULSE-TIME, C AND R OF THE CIRCUIT.

092PROGRAM STEPS  
ADALBERT LINDMEIER  
D-STEINACH.

## 52032D 67-FUNCTIONS OF THE MACHNUMBER

THE PROGRAM COMPUTES THE CRITICAL RELATIONS OF PRESSURE, TEMPERATURE AND DENSITY FOR GIVEN MACHNUMBER AND ISENTROPIC EXPONENT.

040PROGRAM STEPS  
DETLEF R. SCHMITT  
D-GITGERUNN.

## 52033D 67-OPTIMAL POLYGON FOR PARABOLA

FOR THE PARABOLA  $Y=XX^2$  AN OPTIMAL TCHEBYSHEFF APPROXIMATION POLYGON IS COMPUTED IN THE INTERVAL  $0 \leq X \leq 1$  IF YOU GIVE THE NUMBER N OF POLYGON SEGMENTS, THE RESULTED POLYGON HAS THE SMALLEST POSSIBLE (RELATIVE) MAXIMUM ERROR. (A>0). IF YOU ENTER THE ALLOWED ERROR BOUND E, YOU GET THE SMALLEST POSSIBLE N. A SPECIAL CONSIDERATION EXPANDS THE CONCEPT, IF A=0.

221PROGRAM STEPS  
BERND ROTHMAIER  
D-CURMERSHEIM.

## 52034D 67-DIFFERENTIAL EQUATIONS 15

PROGRAM SOLVES ORDINARY DIFFERENTIAL EQUATIONS WITH THE SPECIAL METHOD OF PROGRAM NO 1777, BUT THE MEANS OF THE K'S ARE COMPUTED CR WITH THE LINEAR REGRESSION OR WITH THE LOGARITHMIC REGRESSION, DEPENDING THE CORRELATION COEFFI-

## 52034D (CONTD)

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173PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 52035D 67-DIFFERENTIAL EQUATIONS 16

THIS PROGRAM SOLVES ORDINARY DIFFERENTIAL EQUATIONS WITH THE SPECIAL METHOD OF PROGRAM NO 1777, BUT THE MEAN OF THE K'S IS COMPLETED WITH THE MEAN-RESULT OF THE LINEAR AND LOGARITHMIC REGRESSION.

150PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 52036D 67-BASIC ARITHMETIC WITH FRACTIONS

PROGRAM ENABLES USER TO PERFORM THE FOUR BASIC ARITH. OPERATIONS (+-\*/) ON BOTH VULGAR AND PROPER FRACTIONS CHAIN OPERATION IS POSSIBLE. DIVISION BY GREATEST COMMON DIVISOR FOR RESULTING FRACTION IS AUTOMATIC. ONE RESULT MAY BE SAVED FOR LATER RE-USE.

156PROGRAM STEPS  
HANS FLORIAN HOYER  
D-STUTTGART.

## 52037D 67-GEOSTROPHIC WIND AND GRADIENT WIND

THIS PROGRAM COMPUTES THE GEOSTROPHIC WIND FOR THE CONSTANT LEVEL SURFACES AND FOR CONSTANT PRESSURE SURFACES WITH INTERVENTION IN THE FIRST CASE, IF DESIRED, OF THE AIR DENSITY. IT AFTERWARDS COMPUTES THE GRADIENT WIND IN CYCLONIC OR ANTICYCLONIC CIRCULATION. FINALLY, IT COMPUTES, IN THE INERTIAL MOVEMENT, THE RADIUS OF CURVATURE AND THE PERIOD.

167PROGRAM STEPS  
EUGENIC OLIVA  
E-MADRID.

## 52038D 97-COMPLETE PARLOUR HORSE RACING

A HORSE RACE IS RUN COMPLETELY AS A PARLOUR GAME; NOTHING MORE THAN AN HP-97 IS NEEDED. THE MACHINE ISSUES THE BETTING TICKETS, CALCULATES THE ODDS AND RUNS THE RACE THROUGH A PSEUDO-RANDOM NUMBER GENERATOR. PROVISION IS MADE FOR SIMPLE AND HANDICAP RACES; FOR SECURITY NUMBERING OF TICKETS AND FOR KEEPING COMPLETE RECORDS OF EACH RACE; BONUSES AS WELL AS FLAT OR FRACTIONAL TAKES ARE POSSIBLE.

222PROGRAM STEPS  
FERNANDO SADEK  
INDONESIA-JAKARTA.

## 52039D 67-HOUR ANGLE AND DECLINATION OF SUN

THE PROGRAM COMPUTES FOR GIVEN MEAN TIME THE HOUR ANGLE AND DECLINATION OF THE SUN. FURTHER IT COMPUTES THE SIDERAL TIME. THE NECESSARY DATA CARD DEPENDS ON LONGITUDE AND ZONE TIME OF THE CONSIDERED POINT OF EARTH. AS EXAMPLES WE WILL FOCUS OUR ATTENTION ON THE MERIDIANS OF GREENWICH AND BERLIN.

221PROGRAM STEPS  
MICHAEL KLEWS  
D-BERLIN.

## 52040D 67-THE TWO SPHERICAL FUNCTIONS OF LEGENDRE AND ASSOCIATED

THIS PROGRAM GIVES FIRST AND SECOND SPHERICAL LEGENDRE FUNCTIONS AND ASSOCIATED,  $P_n^m$  AND  $Q_n^m$  FOR ANY ARGUMENT BEING REAL AND ANY INTEGER AS PER ORDER OR DEGREE.

## PROGRAM ABSTRACTS

## 52040D (CONTD)

224PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 52041D 67-STANDARD ATMOSPHERE (SI)

THIS PROGRAM IS AN IMPROVED CONVERSION OF THE HP/65 AV1-11A TO THE SI (INTERNATIONAL SYSTEM OF UNITS) THAT HAS INPUTS, ALTITUDE OR PRESSURE. THE PROGRAM IS ADAPTED FOR USE WITH HP-97

210PROGRAM STEPS  
JOSE REYES ESTEBAN  
E-AVILES.

## 52042D 67-TAPERED COUPLING

THE PROGRAM COMPUTES VARIOUS DATAS FOR A TAPERED COUPLING. IF THE TORSIONAL MOMENT THAT IS NEEDED FOR THE CONSTRUCTION IS GIVEN, THE PROGRAM COMPUTES THE AXIAL FORCE NEEDED TO KEEP THE TWO PARTS TOGETHER, AND IF THE AXIAL FORCE IS GIVEN, THE PROGRAM COMPUTES THE MAXIMUM TORSIONAL MOMENT WITHOUT ANY RELATIVE MOVEMENT. THEN PROGRAM ALSO COMPUTES MAXIMUM TENSIONS IN THE TWO PARTS AND THE FORCE NEEDED TO SEPARATE THE TWO PARTS IF THE COUPLING IS SELF LOCKING.

220PROGRAM STEPS  
ERLING PEDERSEN  
S-GUETEBURG.

## 52043D 97-PASCAL'S TRIANGLE

THE PROGRAM COMPUTES THE FACTORS OF A BINOM WITH AN EXPONENT UP TO 69.

029PROGRAM STEPS  
CHRISTIAN LINSMEIER  
D-BALDHAM.

## 52044D 67-AUXILIARY REGISTER OPERATIONS

THIS PROGRAM REPLICATES THE NORMAL REGISTER OPERATIONS OF THE CALCULATOR FOR SEGMENTED REGISTERS. THE USER DEFINED-KEYS PROVIDE TEN INDIVIDUAL OPERATIONS ON FIVE DIGIT POSITIVE INTEGERS STORED IN THE UPPER AND LOWER HALVES OF THE PRIMARY AND SECONDARY REGISTERS. STORE RECALL, INTERCHANGE AND ARITHMETIC OPERATIONS ARE REPRESENTED. PERMITS REGISTER EXPANSION FOR LIMITED RANGE DATA.

112PROGRAM STEPS  
D.T. RANSOM  
GB-CHISLEHURST.

## 52045D 97-REGRESSION OF THREE INDEPENDANT VARIABLES

FOR N SETS OF DATA, THE PROGRAM FITS A MULTIPLE REGRESSION OF THE FORM  $T = AX + BY + CZ + D$  AND CALCULATES FISHER Z TO TEST THE SIGNIFICANCE OF THE MULTIPLE REGRESSION; THE NUMBER OF DEGREES OF FREEDOM IS GIVEN TO FACILITATE THE USE OF Z TABLES. PROGRAM WILL ALSO ESTIMATE T; GIVEN X,Y AND Z.

441PROGRAM STEPS  
FERNANDO SADEK  
INDONESIA-JAKARTA.

## 52046D 67-SQUARE ROOT TO 182 FIGURES.

THIS TWO CARDS PROGRAM IS DEVELOPED IN CO-OPERATION WITH R. BROECKX BELGIUM. INPUT CAN BE EITHER 8-DIGIT NUMBER >1. THE NUMBER OF FIG. OF THE ROOT CAN BE CHOSEN AS 8K. K BELONGS TO  $3 \leq K \leq 23$ . FROM THE FIRST CARD DESIGNED BY RB ARE UP TO 92 FIG. WITH KEAST ACQUIRED. THE OTHER CARD ALTERS THE REST TO MORE FIG. TYPICAL EXECUTION TIME 104 FIG.-10 MIN AND 184 - 30 MIN.

## 52046D (CONTD)

446PROGRAM STEPS  
KENT A WIGSTROM  
S-FLODA.

## 52047D 67-SQUARE ROOT OUT OF A 76-DIGIT NUMBER

PROGRAM COMPUTES SQUARE ROOT OUT OF A NUMBER >1 WITH UP TO 76 FIGURES TO 19, 38 OR 76 FIGURES. EXECUTION TIMES ARE 40 SEC., 3 MIN., RESPECTIVELY 10 MIN.

367PROGRAM STEPS  
KENT A WIGSTROM  
S-FLODA.

## 52048D 67-CUBIC ROOT OUT OF A 38 DIGIT NUMBER

PROGRAM COMPUTES THE CUBIC ROOT OUT OF A NUMBER >1 WITH UP TO 40 FIGURES TO 36 OR 72 FIGURES. EXECUTION TIMES ARE 5 MIN. RESP. 20 MIN.

378PROGRAM STEPS  
KENT A WIGSTROM  
S-FLODA.

## 52049D 67-LONG PRODUCTS AND SQUARES

A) PRODUCTS OF TWO POS INTEGERS, EACH HAVING UP TO 56 DIGITS OR THE SQUARE OF SUCH ONE. TIME <7 MIN.  
B) BY CHANGING A FEW STEPS IT IS POSSIBLE TO MULTIPLY TWO 80 FIG. INTEGERS WITH THE SAME ACCURACY AS THE LONGEST ONE < 8 MIN.  
C) IT IS ALSO POSSIBLE TO COMPUTE TWO 80 FIG. NUMBERS TO ALL FIGURES. TIME < 14 MIN. THIS METHOD IS SIMILAR TO PROGRAM 50675.

223PROGRAM STEPS  
KENT A WIGSTROM  
S-FLODA.

## 52050D 67-LEAST DIVISOR OF AN INTEGER PRIMES

THIS PROGRAM FINDS THE LEAST DIVISOR OF ANY INTEGER. IF THE LEAST DIVISOR IS THE NUMBER ITSELF, THE NUMBER IS OF COURSE A PRIME. THE PROGRAM IS VERY FAST; IT TAKES ABOUT 2 MINUTES TO FIND OUT THAT 200003 IS A PRIME. THE PROGRAM USES A TABLE OF PRIMES, WHICH IS STORED ON DATACARDS WITH 30 PRIMES ON EACH CARD. A TABLE OF PRIMES UP TO 10000 IS GIVEN. WITH THREE DATACARDS, YOU CAN CHECK NUMBERS UP TO 210000.

099PROGRAM STEPS  
BJCRN ENGSIG  
DK-ALLEROD.

## 52051D 67-CALCULATOR EXTENSION STATISTICS

THIS PROGRAM WORKS LIKE PROGRAM NO 51760D, BUT IT HAS OTHER FUNCTIONS ON IT. THESE ARE ALMOST THE SAME AS THE STATISTIC FUNCTIONS ON THE HP-92 INVESTOR: LINEAR REGRESSION, COEFFICIENT OF DETERMINATION, LINEAR ESTIMATE, PERCENT OF THE SUMMATIONS, PRINT/PAUSE SUMMATION REGISTERS, CLEAR SUMMATION REGISTERS, AND VARIANCE OF X- AND Y-DATA KEYS IN WITH THE SUMMATION KEYS. THE ERROR-DISPLAY OCCURS AND STACK AND LAST X CHANGES EXACTLY LIKE THEY DO FOR BUILD-IN FUNCTIONS.

224PROGRAM STEPS  
BJCRN ENGSIG  
DK-ALLEROD.

## 52052D 67-DEFINITE INTEGRAL 2 SIMPSON

INTEGRATES FUNCTION "X", BETWEEN GIVEN LIMITS, TO OBTAIN NET AREA UNDER CURVE AND VOLUME TRACED OUT BY THE WHOLE OF THE AREA UNDER THE

## 52052D (CONTD)

CURVE, BETWEEN THE GIVEN LIMITS, IN ONLY 57 STEPS.

057PROGRAM STEPS  
LAWRENCE B. HARTLEY  
GB-BRIERFIELD.

## 52053D 67-STRESS DISTRIBUTION IN CYLINDRICAL TANKS

THIS PROGRAM CALCULATES STRESS DISTRIBUTION IN A CYLINDRICAL TANK, WITH UNIFORM WALL THICKNESS AND BUILT-IN LOWER EDGE, SUBMITTED TO THE ACTION OF A LIQUID PRESSURE.

218PROGRAM STEPS  
JOSE AFONSC  
P-LISBONA.

## 52054D 67-EXTENDED FACTORIALS

THIS PROGRAM CALCULATES THE FACTORIAL OF N ( $1 \leq N \leq 100$ ) WITH ALL THE SIGNIFICANT DIGITS.

178PROGRAM STEPS  
FERNANDO DEL REY  
E-MADRID.

## 52055D 67-SOLUTION TO A SYSTEM OF LINEAR EQUATIONS

THIS PROGRAM CAN SOLVE ANY SYSTEM OF UP TO 7 LINEAR EQUATIONS, IF IT HAS A SINGLE SOLUTION, BY GAUSSIAN ELIMINATION. THIS IS A ONE CARD PROGRAM, COEFFICIENTS NEED TO BE ENTERED ONLY ONCE, AND NO EXTRA DATA CARD IS NEEDED.

224PROGRAM STEPS  
FERNANDO DEL REY  
E-MADRID.

## 52056D 67-INCOMPLETE ELLIPTIC INTEGRAL OF THE 1ST KIND &amp; FUNCTIONS

IT COMPUTES ANY ELLIP. FUNCTION RELATED TO THE INCOMPLETE ELLIP. INTEGRAL OF THE 1ST KIND  $U=F(K,PHI)$  I.E. FOR A GIVEN K,  $-1 \leq K \leq 1$ , IT WILL CALCULATE  $SN(U)$ ,  $CN(U)$ ,  $DN(U)$  & INVERSES, GIVEN U, CALCULATE PHI OR VICE VERSA. ACCURACY IS 8 DECIMALS OR BETTER. RUNNING TIME DOES NOT EXCEED 25 SEC. TYPICALLY 18. FURTHERMORE EVERY FUNCTION BEHAVES LIKE A BUILT-IN ONE (X IN LAST X, F(X) OVERWRITES X;Y,Z,T UNCHANGED), ALLOWING YOU TO USE RPN IN CALCULATIONS.

207PROGRAM STEPS  
VALENTIN ALBILLO  
E-MADRID.

## 52057D 67-MICROSTRIP AND STRIP-LINE CALCULATIONS.

THIS PROGRAM WILL SPEED THE DESIGN OF MICROSTRIP AND STRIP-LINE ELEMENTS, TWO TYPES OF LOW-LOSS TRANSMISSION LINES THAT ARE OFTEN USED AT MICROWAVE FREQUENCIES. WHEN GIVEN THE CHARACTERISTIC IMPEDANCE OF THE LINE, THE SUBSTRATE THICKNESS, THE CONDUCTOR THICKNESS AND THE DIELECTRIC CONSTANT OF THE MATERIAL SEPARATING THE CONDUCTORS THE PROGRAM DETERMINES THE WIDTH OF THE MICROSTRIP AND STRIP-LINE TRACE REQUIRED AND THE LINE'S VELOCITY FACTOR.

111PROGRAM STEPS  
KONSTANTY BUCFAL  
PL-WARSZAWA.

## 52058D 67-SEA BATTLE PERFECT

THIS GAME, YOU CAN PLAY AGAINST YOUR HP. THE HP AND YOU, SET 6 "SHIPS" ON A RECTANGULAR WITH 42 FIELDS. BY ASKING CODE-NUMBERS OF THE FIELDS IN PING-PONG SYSTEM YOU AND THE HP TRY TO GUESS THE POSI-



## PROGRAM ABSTRACTS

- 52058D (CONTD)**  
 TIONS OF THE SHIPS THAT WERE SET BY THE ENEMY-PLAYER. ATTENTION! THIS PROGRAM IS VERY TRICKY AND YOU HAVE TO BE A VERY GOOD PLAYER IF YOU WANT TO DEFEAT YOUR HP.  
 214PROGRAM STEPS  
 MARTIN LANDUA  
 D-FRANKFURT.
- 52059D 67-THREE-FOUR SQUARES THEOREM**  
 THIS PROGRAM GIVES US AN EXAMPLE OF FOUR INTEGERS WHICH THE SUM OF THE SQUARES IS A GIVEN INTEGER. (I.E.: A SOLUTION OF THE EQUATION  $N=A^2+B^2+C^2+D^2$  IN N)  
 223PROGRAM STEPS  
 RAYMUND GIRAUD  
 F-LEAS ANGLES.
- 52060D 97-COST OF TELEPHONE CALL (UK)**  
 PROGRAM CONTINUALLY UPDATES DISPLAY TO SHOW CURRENT COST OF TELEPHONE CALL. WORKS FOR ALL SELF-DIALLED CALLS AND OPERATOR CONNECTED INTERNATIONAL CALLS. PROGRAM USES A LOOP WITH PAUSE AND COUNTER AS A CLOCK, AND CAN EASILY BE MODIFIED FOR MOST COUNTRIES.  
 083PROGRAM STEPS  
 ROD HARRIS  
 GB-FARNHAM.
- 52061D 67-POINT OF NO-RETURN**  
 THE POINT OF NO-RETURN IS THE POINT ALONG THE TRACK FROM WHICH AN AIRCRAFT WILL JUST RETURN TO DEPARTURE OR TO ALTERNATE WITH EMPTY TANKS, WITH ALL ENGINES RUNNING OR IN CASE OF ENGINE FAILURE OCCURRING AT ANY TIME ALONG THE TRACK.  
 216PROGRAM STEPS  
 PIERRE TALMANT  
 F-PARIS.
- 52062D 67-ILS APPROACH**  
 DURING ILS APPROACH, PILOTS, WHILE MAINTAINING HEADING, SPEED AND A CERTAIN RATE OF DESCENT, MUST CHECK ELAPSED TIME BETWEEN BEACONS AND MARKERS AND HEIGHT OF PASSAGE OVER THESE POINTS, EVEN IF GLIDE SLOPE TRANSMITTER OR RECEIVER IS UNSERVICABLE.  
 098PROGRAM STEPS  
 PIERRE TALMANT  
 F-PARIS.
- 52063D 67-QUARTZ RESONATOR DEFLECTION**  
 PROGRAM COMPUTES DATAS ABOUT QUARTZ RESONATOR IN SHOCK CONDITIONS.  
 221PROGRAM STEPS  
 ALAIN BERGER  
 CH-BOUDRY.
- 52064D 67-MID-POINTS**  
 MID-POINT BETWEEN TWO SPECIFIED LANDMARKS IS THE POINT OF THE TRACK FROM WHICH AN AIRCRAFT WILL FLY THE SAME TIME TO ONE OF THEM OR THE OTHER. PROGRAM COMPUTES TIME AND DISTANCE FLOWN FROM DEPARTURE TO MID-POINT BETWEEN DEPARTURE AND ARRIVAL, DEPARTURE AND ALTERNATE OR ARRIVAL AND ALTERNATE, WITH ALL ENGINES RUNNING AND IN CASE OF ENGINE FAILURE.  
 187PROGRAM STEPS  
 PIERRE TALMANT  
 F-PARIS.
- 52065D 67-DISTANCES AND HEADINGS ON EARTH BETWEEN TWO POINTS**  
 KNOWING TWO POINTS ON EARTH BY THEIR LONGITUDE AND LATITUDE, THIS PROGRAM GIVES THE DISTANCE, THE HEADING FROM EITHER TO THE OTHER, IN NAUTICAL MILES, STATUTE MILES OR KILOMETERS WITH AN OPTION FOR STRAIGHT LINE DISTANCE IN KILOMETERS.  
 224PROGRAM STEPS  
 JOHN P. LEEURTON  
 B-LONCIN.
- 52066D 67-EVALUATING LOST HEAD FOR FLUID FLOW IN PIPES-SMOOTH PIPES**  
 THE DARCY-WEISBACH FORMULA IS THE BASIS FOR EVALUATING LOST HEAD. FRICTION FACTOR IS OBTAINED FROM BLASIUS EQUATION. THEREFORE IT IS NECESSARY FOR A DESIGNER TO KNOW REYNOLDS NUMBER AND THE SIZE OF A SURFACE IMPERFECTIONS.  
 074PROGRAM STEPS  
 BRANKO SPOLJARIC  
 YU-ZAGREB.
- 52067D 67-EVALUATING FLOW RATE FOR FLUID FLOW IN PIPES-SMOOTH PIPES**  
 FOR A GIVEN LOST HEAD, LENGTH, DIAMETER, KINEMATIC VISCOSITY AND THE SIZE OF THE SURFACE IMPERFECTIONS OF THE PIPE THIS PROGRAM WILL CALCULATE FLOW RATE. THE BASIC EQUATIONS FOR SOLVING THE PROBLEM ARE DARCY-WEISBACH FORMULA AND BLASIUS EQUATION.  
 123PROGRAM STEPS  
 BRANKO SPOLJARIC  
 YU-ZAGREB.
- 52068D 67-EVALUATING DIAMETER OF THE PIPE-SMOOTH PIPES**  
 FOR A GIVEN LOST HEAD, FLOW RATE, KINEMATIC VISCOSITY AND THE SIZE OF THE IMPERFECTIONS OF THE PIPE, DIAMETER IS OBTAINED. THE BASIC EQUATIONS ARE DARCY-WEISBACH FORMULA AND BLASIUS EQUATION.  
 149PROGRAM STEPS  
 BRANKO SPOLJARIC  
 YU-ZAGREB.
- 52069D 67-EVALUATING LOST HEAD FOR FLUID FLOW IN PIPES-ROUGH PIPES**  
 THE DARCY-WEISBACH FORMULA IS THE BASIS FOR EVALUATING LOST HEAD. FRICTION FACTOR IS OBTAINED FROM MODIFIED NIKURADSE EQUATION. THEREFORE IT IS NECESSARY FOR A DESIGNER TO KNOW REYNOLDS NUMBER THE SIZE OF THE SURFACE IMPERFECTIONS.  
 082PROGRAM STEPS  
 BRANKO SPOLJARIC  
 YU-ZAGREB.
- 52070D 67-EVALUATING FLOW RATE FOR FLUID FLOW IN PIPES-ROUGH PIPES**  
 FOR A GIVEN LOST HEAD, LENGTH, DIAMETER, KINEMATIC VISCOSITY AND THE SIZE OF THE SURFACE IMPERFECTIONS OF THE PIPE THIS PROGRAM CALCULATES FLOW RATE. THE BASIC EQUATIONS ARE DARCY-WEISBACH FORMULA AND MODIFIED NIKURADSE EQUATION.  
 082PROGRAM STEPS  
 BRANKO SPOLJARIC  
 YU-ZAGREB.
- 52071D 67-EVALUATING DIAMETER OF THE PIPE-ROUGH PIPES**  
 FOR A GIVEN LOST HEAD, FLOW RATE, KINEMATIC VISCOSITY AND THE SIZE OF THE IMPERFECTIONS OF THE PIPE, DIAMETER IS OBTAINED.
- 52071D (CONTD)**  
 155PROGRAM STEPS  
 BRANKO SPOLJARIC  
 YU-ZAGREB.
- 52072D 67-EVALUATING LOST HEAD FOR FLUID FLOW IN PIPES-RN<32.4E+05**  
 THE DARCY-WEISBACH FORMULA IS THE BASIS FOR EVALUATING LOST HEAD. FRICTION FACTOR IS CALCULATED BY USING OF FOLLOWING EQUATION :  $F=0.032+(1.221/RN^{0.237})$ . THE SIZE OF THE SURFACE AND FLOW RATE ARE ONLY INPUTS.  
 084PROGRAM STEPS  
 BRANKO SPOLJARIC  
 YU-ZAGREB.
- 52073D 67-EVALUATING FLOW RATE FOR FLUID FLOW IN PIPES-RN<32.4E+05**  
 IF A LOST HEAD, DIAMETER, LENGTH, KINEMATIC VISCOSITY AND THE SIZE OF SURFACE IMPERFECTIONS OF THE PIPE ARE GIVEN, PROGRAM WILL CALCULATE FLOW RATE. THE BASIC EQUATIONS ARE DARCY-WEISBACH FORMULA AND FOLLOWING EQUATION (FOR FRICTION FACTOR) :  $F=0.032+(1.221/RN^{0.237})$ .  
 131PROGRAM STEPS  
 BRANKO SPOLJARIC  
 YU-ZAGREB.
- 52074D 67-EVALUATING DIAMETER OF THE PIPE-RN<32.4E+05**  
 FOR A GIVEN LOST HEAD, FLOW RATE, KINEMATIC VISCOSITY AND THE SIZE OF THE IMPERFECTIONS OF THE PIPE, DIAMETER IS OBTAINED.  
 157PROGRAM STEPS  
 BRANKO SPOLJARIC  
 YU-ZAGREB.
- 52075D 67-EVALUATING LOST HEAD FOR FLUID FLOW IN PIPES-NIKURADSE**  
 THE DARCY-WEISBACH FORMULA IS THE BASIS FOR EVALUATING LOST HEAD. FRICTION FACTOR IS OBTAINED FROM NIKURADSE EQUATION. THEREFORE IT IS NECESSARY FOR A DESIGNER TO KNOW REYNOLDS NUMBER AND THE SIZE OF THE SURFACE IMPERFECTIONS.  
 082PROGRAM STEPS  
 BRANKO SPOLJARIC  
 YU-ZAGREB.
- 52076D 67-EVALUATING FLOW RATE FOR FLUID FLOW IN PIPES-NIKURADSE**  
 FOR A GIVEN LOST HEAD, LENGTH, DIAMETER, KINEMATIC VISCOSITY AND THE SIZE OF THE SURFACE IMPERFECTIONS PROGRAM CALCULATES FLOW RATE. THE BASIC EQUATIONS ARE DARCY-WEISBACH FORMULA AND NIKURADSE EQUATION.  
 082PROGRAM STEPS  
 BRANKO SPOLJARIC  
 YU-ZAGREB.
- 52077D 67-EVALUATING DIAMETER OF THE PIPE-NIKURADSE**  
 IF LOST HEAD, FLOW RATE, KINEMATIC VISCOSITY AND THE SIZE OF THE IMPERFECTIONS OF THE PIPE ARE GIVEN, PROGRAM WILL CALCULATE DIAMETER OF THE PIPE. THE BASIC EQUATIONS ARE DARCY-WEISBACH FORMULA AND NIKURADSE EQUATION.  
 155PROGRAM STEPS  
 BRANKO SPOLJARIC  
 YU-ZAGREB.
- 52078D 67-COMPLEX OPERATIONAL STACK**  
 THE COMPLEX STACK WORKS LIKE THE NORMAL STACK WITH THE FOLLOWING FUNCTIONS : ENTER, ADD, SUBTRACT,

## PROGRAM ABSTRACTS

## 52078D (CONTD)

MULTIPLY, DIVIDE, E POWER Z1, LN (Z1), EXCHANGE Z1 AND Z2, Z2 POWER Z1, RECIPROCAL OF Z1, LAST Z, ABS(Z1), ROLL DOWN STACK, SQUARE ROOT OF Z1. STACKLIFT IS CONTROLLED BY FLAG 3.

203PROGRAM STEPS  
ULRICH HAHN  
D-KIEL.

## 52079D 67-PHOTOMACROGRAPHY WITH CLOSE UP LENS

THIS PROGRAM IS AUTOMATIC FOR 24X36 WITH 50 MM (OR DIFFERENT) AND FOR 6X6 WITH 80 MM (OR DIFFERENT). INPUT LENGTH OF SUBJECT (OR MAGNIFICATION), YOUR HP-67 CALCULATES THE POWER OF CLOSE UP LENS AND THE DISTANCE CLOSE UP LENS/ SUBJECT. INPUT THE NECESSARY DEPTH OF FIELD (OR APERTURE), HP-67 CALCULATES THE DEPTH OF FIELD (TOTAL, FORWARD THE SUBJECT, BACK THE SUBJECT) AND THE NECESSARY APERTURE.

222PROGRAM STEPS  
JEAN REIBEL  
F-FONTENAY AUX ROSES.

## 52080D 67-PROPAGATION IN THE SOLID

THIS PROGRAM CALCULATES THE SPEED OF THE SOUND OR THE MODULE OF YOUNG OR THE MASS BY VOLUME UNITY OF THE SOLID X, FOR TWO VALUES INPUT.

060PROGRAM STEPS  
CHRISTIAN ROBERT COURNOT  
F-BX-CAUDERAN.

## 52081D 67-BRINELL-VICKERS

THIS PROGRAM CALCULATES HARDNESS BRINELL AND VICKERS.

048PROGRAM STEPS  
CHRISTIAN ROBERT COURNOT  
F-BX-CAUDERAN.

## 52082D 67-MUTUAL CAPACITANCE OF SCREENED PAIRS OR QUADS

KNOWING FOUR OF THESE PARAMETERS : 1) CONDUCTOR DIAMETER, 2) INSULATED DIAMETER, 3) PERMITTIVITY RELATIVE, OF INSULATION MATERIAL, 4) MUTUAL CAPACITANCE, 5) RATIO BETWEEN DIAMETER UNDER SCREEN AND INSULATED DIAMETER, YOU CAN CALCULATE THE FIFTH VARIABLE YOU DO NOT KNOW. IF YOU CALCULATE THE INSULATE DIAMETER HP GIVES ALSO THE THICKNESS OF INSULATION.

124PROGRAM STEPS  
ENZO NOSEDA  
I-COMO.

## 52083D 67-PARABOLAS THROUGH FOUR GIVEN POINTS

GIVEN THE COORDINATES OF FOUR POINTS IN AN ORTHONORMAL BASE, THIS PROGRAM COMPUTES THE COEFFICIENTS OF PARABOLA'S EQUATION CONTAINING THESE POINTS, EVEN IF ONE OF THE PARABOLAS IS DECOMPOSED INTO TWO PARALLEL LINES.

224PROGRAM STEPS  
ALI AMRAQUI  
MOROCCO-CASABLANCA.

## 52084D 67-EXACT SOLUTION OF RATIONAL LINEAR SYSTEM IN 3 UNKNOWN.

GIVING A LINEAR SYSTEM IN THREE UNKNOWN IN WHICH ALL COEFFICIENTS ARE INTEGERS, THIS PROGRAM GIVES THE EXACT SOLUTION. THE THREE UNKNOWN ARE GIVEN IN THREE RATIONAL FRACTIONS WHICH HAVE A SAME INTEGER DENOMINATOR AND INTEGER NUMERATOR

111PROGRAM STEPS

## 52084D (CCNTD)

ALI AMRAQUI  
MOROCCO-CASABLANCA.

## 52085D 67-CONIC'S CLASSIFICATION

THIS PROGRAM GIVES THE KIND OF A CONIC GIVEN BY ITS PUNCTUAL EQUATION.

110PROGRAM STEPS  
ALI AMRAQUI  
MOROCCO-CASABLANCA.

## 52086D 67-CONIC THROUGH FIVE LINES/PARABOLA THROUGH FOUR LINES

THIS PROGRAM GIVES THE COEFFICIENTS OF PUNCTUAL EQUATION OF CONIC TANGENT AT FIVE GIVEN LINES OR EQUATION OF PARABOLA TANGENT AT FOUR GIVEN LINES.

223PROGRAM STEPS  
ALI AMRAQUI  
MOROCCO-CASABLANCA.

## 52087D 97-DOUBLE MATCH

A GAME FOR ONE OR TWO PLAYERS. HIDDEN ON A MATRIX OF 36 SQUARES ARE EIGHTEEN PAIRS OF NUMBERS. EACH PLAYER REVEALS TWO SQUARES IN TURN ENDEAVOURING TO SELECT A MATCHED PAIR. ADVANTAGE IS GAINED BY REMEMBERING THE LOCATIONS OF UNMATCHED PAIR. POINT SCORING IS AUTOMATIC. THIS IS A TWO CARD PROGRAM. THE FIRST SETS UP THE PLAYING BOARD IN ONE OF 862 POSSIBLE WAYS. THE SECOND IS USED FOR PLAYING THE GAME.

407PROGRAM STEPS  
PETER F. CRAWLEY  
GB-PORSMOUTH.

## 52088D 67-BS 5500 DESIGN OF SPHERE OR DISHED HEAD-EXTERNAL PRESSURE

THE PROGRAM WILL DESIGN A SPHERE OR A HEMISPHERICAL, TORISPHERICAL OR SEMI-ELLIPSOIDAL DISHED HEAD FOR A PRESSURE VESSEL SUBJECT TO EXTERNAL PRESSURE. IN ACCORDANCE WITH THE METHOD GIVEN IN BS 5500:1976 WITH REVISIONS TO APRIL 1978.

224PROGRAM STEPS  
LESLIE A. TIMPERLEY  
GB-MANCHESTER.

## 52089D 67-BS 5500 CYLINDRICAL VESSEL INTERNAL PRESSURE DESIGN

THIS PROGRAM WILL COMPUTE THE REQUIRED THICKNESS OF CYLINDRICAL SHELL WITH DOMED ENDS, FOR INTERNAL PRESSURE, IN ACCORDANCE WITH THE FORMULAE GIVEN IN BS 5500:1976. THE PROGRAM OUTPUTS VALUES FOR A SAMPLE WORKING FORM INCLUDED. THE TEST PRESSURE IS ALSO COMPUTED AND THE STRESSES AT TEST CHECKED AGAINST NINETY PERCENT YIELD STRESS.

206PROGRAM STEPS  
LESLIE A. TIMPERLEY  
GB-MANCHESTER.

## 52090D 67-PRESS VESSEL BS 5500 CYLINDER EXTERNAL PRESSURE DESIGN

THIS PROGRAM WILL DESIGN A CYLINDRICAL PRESSURE VESSEL FOR EXTERNAL PRESSURE TO THE BRITISH STANDARD BS 5500:1976 PRESSURE VESSEL CODE. THE PROGRAM WILL ALSO SIZE FLAT BAR STIFFENING RINGS TO THE METHOD "A" GIVEN IN THE CODE.

434PROGRAM STEPS  
LESLIE A. TIMPERLEY  
GB-MANCHESTER.

## 52091D 67-AIR POLLUTION

## 52091D (CONTD)

THE PROGRAM DETERMINES THE MAXIMUM GROUND LEVEL CONCENTRATION (OR ANY OTHER RELATED PARAMETER) OF A POLLUTANT PRECIPITABLY EMITTED FROM A GIVEN CHIMNEY, IN METRIC UNITS, UNDER AVERAGE CONDITIONS. EMPIRICAL MODIFICATIONS ADDED TO THE ASME (AMERICAN SOCIETY OF MECHANICAL ENGINEERS) DIFFUSION MODEL AND TO HOLLAND'S EQUATION, PROVIDE THE SIMPLIFIED EQUATIONS OF PROGRAM. RESULTS ARE IN FAIR AGREEMENT WITH EXPERIENCE.

186PROGRAM STEPS  
GIUSEPPE LIGATO  
I-CUSANO MILANING.

## 52092D 67-FRACTION OPERATIONS

PROGRAM CAN ADD, SUBTRACT, MULTIPLY AND DIVIDE TWO FRACTIONS; TAKE THE INVERSE OF A FRACTION AND RAISE A FRACTION INTO AN INTEGER POWER. RESULT IS ALWAYS A FRACTION. OPERATIONS CAN ALSO BE PERFORMED WITH NEGATIVE FRACTIONS. THE RESULT IS ALWAYS REDUCED.

135PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

## 52093D 67-FACTORIALS PERMUTATIONS AND COMBINATIONS EXTENDED RANGE

THIS PROGRAM CALCULATES FACTORIALS, PERMUTATIONS AND COMBINATIONS OF WHICH THE RESULTS COULD NORMALLY NOT BE DISPLAYED BY THE CALCULATOR.

111PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

## 52094D 67-10-LEVEL STACK

THIS PROGRAM GIVES YOU THE POWER OF A STACK WITH TEN REGISTERS. WITH THE STACK YOU CAN PERFORM EVERY OPERATION OF YOUR HP-67/97 IF YOU SIMPLY PUSH A SUFFIX KEY AFTER EVERY OPERATION.

090PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

## 52095D 67-STATICS OF SINGLE FIELD BEAM, ANY END CONDITIONS, ANY LOAD.

GIVEN A STRAIGHT UNIFORM BAR WITH ANY COMBINATION OF FIXED, SIMPLE SUPPORTED OR FREE ENDS AND ANY LOADING, THIS PROGRAM WILL CALCULATE THE TWO UNKNOWN PARAMETERS AT THE LEFT END, AND AFTER THAT CALCULATE MOMENT AND DEFLECTION IN 5 POINTS SPECIFIED BY THE USER.

221PROGRAM STEPS  
HANS FLORIAN HOYER  
D-STUTTGART.

## 52096D 67-REINFORCED RECTANGULAR SECTION COMPR. AND BENDING DIN 1045

GIVEN A RECTANGULAR CONCRETE SECTION WITH COMPRESSION AND BENDING LOADING, THE PROGRAM CALCULATES  $K_M$ -VALUE ACCORDING TO DIN 1045 AND FINDS AREA OF NECESSARY REINFORCEMENT.

223PROGRAM STEPS  
HANS FLORIAN HOYER  
D-STUTTGART.

## 52097D 67-INFLUENCE LINE OF MOMENTS IN A CROSS BEAMS SET

SIMPLY SUPPORTED ON ITS CONTOUR AND MOMENTS IN AN UNIFORMED LOADED CROSS-BEAMS SET (BEAMS CAN'T TAKE TORSION). ENTERS: SPANS  $L_X$ - $L_Y$  NUMBERS OF BEAMS  $N_X$ - $N_Y$  RIGIDITIES  $EI_X$ - $EI_Y$ . PROGRAM 2 GIVES MOMENTS

## PROGRAM ABSTRACTS

## 52097D (CONTD)

IN EACH CROSSING ENTERS POSITION OF UNIT LOAD X-Y. PROGRAM GIVES MOMENT IN EACH CROSSING.

224PROGRAM STEPS  
PIERRE SILVAN  
F-CHAMBERY.

## 52098D 67-RANDOM PERMUTATIONS

THIS PROGRAM PICKS OUT M RANDOM PERMUTATIONS OF THE NUMBERS 1 TO N FOR  $N \leq 21$  AND DISPLAYS (HP-67: PRINTS) THEM.

080PROGRAM STEPS  
STEFAN TRUEK  
D-KELTERN.

## 52099D 67-SUBMARINE DESTROYER WAR

THE PLAYER USES A DESTROYER AND TRIES TO DESTROY AN ENEMY SUBMARINE WHICH CAN SEND THE DESTROYER TO THE BOTTOM WITH TORPEDOS. TO LOCATE AND TO DESTROY THE SUBMARINE, THE DESTROYER IS EQUIPPED WITH A SONAR AND DEPTH CHARGES. WHEN THE SUBMARINE SHOOTS A TORPEDO, THE PLAYER IS ABLE TO MOVE THE DESTROYER TO TRY TO ESCAPE. BE SURE THAT IF THE DESTROYER DOES NOT MOVE, THE TORPEDO WILL ALWAYS HIT ITS TARGET.

323PROGRAM STEPS  
JEAN-PIERRE ABRASSART  
D-WALLDORF.

## 52100D 67-GOMPERTZ CURVE FIT

THE GOMPERTZ CURVE FITS A SET OF DATA POINTS  $(1, Y(1)), (2, Y(2)), \dots, (N, Y(N))$ . THE DATA POINTS MUST BE DIVIDED INTO 3 GROUPS, EACH HAVING N OBSERVATIONS. THE X'S SHOULD BE EQUALLY SPACED AND YI SHOULD BE GREATER THAN ZERO. THE GOMPERTZ CURVE OFTEN APPLIES WHERE EXPONENTIAL OR POWER CURVES FAIL TO CORRELATE.

179PROGRAM STEPS  
ROBERT E.V. KOENE  
NL-LISSE.

## 52101D 67-VALVE FLOWCOEFFICIENT FOR MASCO-NEILAN CONTROL VALVES

THIS PROGRAM CALCULATES THE VALVE FLOWCOEFFICIENT -CV- FOR MASCO-NEILAN CONTROLVALVES (LIQUID, GAS AND STEAM SERVICE). THE USED FORMULAS ALSO APPLY TO OTHER TYPES, AS LONG AS THE CRITICAL FLOW FACTOR CF (PRESSURE RECOVERY RATIO) CAN BE DETERMINED.

559PROGRAM STEPS  
ROBERT E.V. KOENE  
NL-LISSE.

## 52102D 67-MEMORY GAME

YOU HAVE 12 PAIRS OF NUMBERS HIDDEN IN THE 24 REGISTERS OF YOUR CALCULATOR - YOU MUST DISCOVER THEM - THE 12 PAIRS MAY BE CHANGED AT ANY TIME. YOU CAN PLAY ALSO WITH ANOTHER PLAYER.

223PROGRAM STEPS  
LUIGI POMINI  
I-CASTELLANZA.

## 52103D 67-FIRE RESISTANCE OF TIMBER BEAMS

FOR A SIMPLE SUPPORTED RECTANGULAR TIMBER BEAM (NADELHOLZ, BR, SCH.H. GKL 1,11) WITH GIVEN LOAD, A TIME IS CALCULATED, WHEN THE BURNING SECTION WILL FAIL BECAUSE OF SHEAR, BENDING OR LATERAL BUCKLING. (DIN 4102).

159PROGRAM STEPS  
HANS FLORIAN HOYER  
D-STUTTGART.

## 52104D 67-OPTIMAL RECTANGULAR LAMINATED TIMBER SECTION

FOR GIVEN DISTRIBUTED LOAD, SPAN AND MATERIAL CONSTANTS OF A SIMPLE SUPPORTED TIMBER BEAM THE SECTION WITH MINIMAL AREA IS FOUND, SO THAT BENDING STRESS, DEFLECTION AND SAFETY AGAINST LATERAL BUCKLING ARE EQUAL OR BETTER THAN ALLOWABLE. (CIN)

221PROGRAM STEPS  
HANS FLORIAN HOYER  
D-STUTTGART.

## 52105D 67-QUICK STORING, ORDERING AND RECALLING

WITH ONE KEY YOU STORE N NUMBERS,  $N \leq 24$ . THEN THEY WILL BE ORDERED IN A SHORT TIME (5 MIN. 10 SEC. IF 14 NUMBERS ARE ALL IN FALSE ORDER). AT LAST THE NUMBER AND CONTENTS OF R, TILL RN ARE SHOWN IN MAX. 75 SEC. (IF  $N=24$ ).

058PROGRAM STEPS  
HANS AUDEM  
NL-BRECA.

## 52106D 67-BANK ACCOUNTS (OR STOCKS) DAILY BALANCE COMPUTATION

ENTERING EVERY CREDIT OR DEBIT OPERATION AND ITS DATE, PROGRAM COMPUTES BALANCES OF UP TO 10 BANKS ACCOUNTS CODED 0 TO 9 (UP TO 20 IF DATES NOT REQUIRED) AND TOTAL BALANCE. RESULTS ARE STORED IN PRIMARY AND SECONDARY REGISTERS AND REGISTERED ON A DATA MAGNETIC CARD. PROGRAM CAN BE USED FOR ANY NUMBER OF GROUPS OF 10 (OR 20) ACCOUNTS. SUFFICIENT PROGRAM STEPS ARE AVAILABLE FOR (USER) COMPLEMENTARY ACTUALISING PROGRAM.

038PROGRAM STEPS  
ANDRE RIVIERE  
F-BOURG-LA-REINE.

## 52107D 67-DERIVATION OF DEGREE N

THIS PROGRAM COMPUTES ANY DERIVATION OF A CONTINUOUS FUNCTION.

073PROGRAM STEPS  
HENNING LEGELL  
D-EUTIN.

## 52108D 67-INTEGRALS OVER A TRIANGLE

GIVEN THE COORDINATES OF THE VERTICES OF A TRIANGLE IN THE PLANE, THE PROGRAM COMPUTES A FIRST VALUE OF THE INTEGRAL OF A FUNCTION OF 2 VARIABLES OVER THE TRIANGLE. ANOTHER ROUTINE THEN PARTITIONES THE TRIANGLE INTO 4 SUBTRIANGLES AND A SECOND VALUE IS OBTAINED. FINALLY RICHARDSON EXTRAPOLATION GIVES A STILL MORE ACCURATE VALUE OF THE INTEGRAL.

165PROGRAM STEPS  
GUIDO PETZ  
S-SCLNA.

## 52109D 67-POLYNOMIAL EVALUATION

THE PROGRAM EVALUATES AUTOMATICALLY POLYNOMIALS WITH REAL COEFFICIENTS AND REAL ARGUMENTS UP TO DEGREE 23, WITH REAL COEFF. AND COMPLEX ARGUMENTS UP TO DEGREE 19, WITH COMPLEX COEFFICIENTS AND COMPLEX ARGUMENTS UP TO DEGREE 9. MANUALLY ONE CAN EVALUATE POLYNOMIALS OF ANY DEGREE (COMPLEX ARGUMENTS AND COEFF.)

183PROGRAM STEPS  
GUIDO PETZ  
S-SCLNA.

## 52110D 67-2 SIMULTANEOUS NONLINEAR EQUATIONS

## 52110D (CONTD)

THE PROGRAM SOLVES 2 SIMULTANEOUS NONLINEAR EQUATIONS BY STEFFENSEN'S METHOD. WHEN NO INITIAL GUESS, SUFFICIENTLY NEAR THE SOLUTIONS, IS KNOWN, AN EMBEDDINGTECHNIC CAN BE EMPLOYED FOR SOLVING THE EQUATIONS.

137PROGRAM STEPS  
GUIDO PETZ  
S-SCLNA.

## 52111D 67-RANDOMWALK ON THE N-CUBE

THE PROGRAM SIMULATES THE RANDOMWALK OF A PARTICLE ON A N-DIMENSIONAL CUBE, STARTING ON THE VERTEX WITH COORDINATES  $(-1, -1, \dots, -1)$  AND STOPPING WHEN THE PARTICLE REACHES  $(1, 1, \dots, 1)$ . EVEN A GIVEN NUMBER OF SIMULATIONS CAN BE PERFORMED AUTOMATICALLY  $2 < N \leq 21$ . FOR SEVERAL SIMULATIONS:  $2 < N \leq 18$ .

100PROGRAM STEPS  
GUIDO PETZ  
S-SCLNA.

## 52112D 67-PALINDROMIC NUMBERS

THE PROGRAM REVERSES THE ORDER OF THE DIGITS OF AN INTEGER AND TESTS WHETHER THE OLD NUMBER EQUALS THE NEW ONE. IF NOT, THE SUM OF THE INTEGERS IS COMPUTED AND REVERSED AGAIN AND SO ON UNTIL THE NUMBER BECOMES A PALINDROMIC ONE. THE NUMBER OF ADDITIONS IS COUNTED.

117PROGRAM STEPS  
GUIDO PETZ  
S-SCLNA.

## 52113D 67-PRIMES

PROGRAM CAN FIND ALL PRIMES STARTING FROM ZERO, STARTING FROM A GIVEN NUMBER AND IN AN INTERVAL. IT ALSO DETERMINES WHETHER A GIVEN NUMBER IS A PRIME OR NOT. THE EXECUTION IS MUCH FASTER THAN WITH NORMAL PROGRAMS.

114PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

52114D 97-BINOMIAL FORMULAE  $(A+B)^N$  OR  $(A-B)^N$ 

THIS PROGRAM COMPUTES THE VALUE OF THE TERMS (BINOMIAL COEFFICIENTS AND EXPONENTS FOR "A" AND "B", IF "N" IS KNOWN), THE NUMERICAL VALUE OF THE TERMS, IF VALUES OF "A", "B" AND "N" ARE KNOWN, AND THE SUM OF ALL TERMS FOR  $N \leq 65$ . IT IS ALSO POSSIBLE TO COMPUTE THE VALUE OF AN INDIVIDUAL TERM  $M \leq (N+1)$ .

175PROGRAM STEPS  
ALEXANDER NIESSEN  
D-EITCRF.

## 52115D 67-ONEWAY ANAVAR AND T-TEST BETWEEN MEANS FOR PRODUCT MATRICE

BASED ON DATA ENTERED USING PROGRAM 51545D, THIS PROGRAM TESTS THE HYPOTHESIS THAT VARIABLES ARE ISSUED FROM THE SAME POPULATION. USER SPECIFIES THE NUMBERS OF THE VARIABLES TO BE TESTED; IF THERE ARE ONLY TWO, A T TEST FOR DIFFERENCE BETWEEN MEANS IS PERFORMED; IF 3 OR 4 VARIABLES ARE SPECIFIED, THE PROGRAM SWITCHES AUTOMATICALLY TO A ONE WAY ANALYSIS OF VARIANCE. ANY SUBJECT OF THE ORIGINAL DATA MAY BE SPECIFIED.

217PROGRAM STEPS  
AVIGOR LUTTINGER  
F-FONTAINEBLEAU.

## 52116D 67-DESCRIPTIVE STATISTICS FOR PRO-

## PROGRAM ABSTRACTS

52116D (CONTD)

## 000000 DUCT MATRICE

BASED ON DATA ENTERED USING PROGRAM 51945D, THIS PROGRAM COMPUTES THE MEAN, STD DEVIATION, STD ERROR OF THE MEAN AND CONFIDENCE INTERVAL AT THE 95% LEVEL FOR EACH VARIABLE IN THE MATRICE. IT ALSO COMPUTES THE CORRELATION COEFFICIENTS AND THEIR CORRESPONDING T VALUES BETWEEN THE VARIABLES PRINTING THE UPPER TRIANGLE OF THE CORRELATION MATRIX. THE SAME STATISTICS MAY BE COMPUTED FOR VALUES ENTERED VIA THE "SIGMA PLUS" KEY.

211PROGRAM STEPS  
AVIGOUR LUTTINGER  
F-FONTAINEBLEAU.

52117D 67-TWO LINEAR EQUATIONS (CRAMER)

SPECIFICATIONS :  
FIRST STORE 6 NUMBERS INTO 6 REGISTERS. THEN START AND WITHOUT FURTHER INTERFERENCE X,Y AND THE DETERMINANT WILL APPEAR WITHIN 10 SECONDS.

073PROGRAM STEPS  
AUSEMS HANS  
NL-BREDA.

52118D 67-TWO LINEAR EQUATIONS (INVERSE MATRIX)

SPECIFICATIONS :  
FIRST STORE 6 NUMBERS INTO 6 REGISTERS THEN START AND WITHOUT FURTHER INTERFERENCE X,Y AND THE DETERMINANT WILL APPEAR WITHIN 6 SECONDS.

074PROGRAM STEPS  
AUSEMS HANS  
NL-BREDA.

52119D 67-TWO LINEAR EQUATIONS (GAUSS)

SPECIFICATIONS:  
FIRST STORE 6 NUMBERS INTO 6 REGISTERS THEN START AND WITHOUT FURTHER INTERFERENCE X,Y AND THE DETERMINANT WILL APPEAR WITHIN 4 SECONDS.

084PROGRAM STEPS  
AUSEMS HANS  
NL-BREDA.

52120D 67-TWO LINEAR EQUATIONS (GAUSS-JORDAN)

SPECIFICATIONS :  
FIRST STORE 6 NUMBERS INTO 6 REGISTERS THEN START AND WITHOUT FURTHER INTERFERENCE X,Y AND THE DETERMINANT WILL APPEAR WITHIN 5 SECONDS. IF NO SINGLE SOLUTION, RECALL THE ALTERED INPUT FOR COMPLETING INFORMATION.

109PROGRAM STEPS  
HANS AUSEMS  
NL-BREDA.

52121D 67-THREE LINEAR EQUATIONS (CRAMER)

SPECIFICATIONS :  
FIRST STORE 12 NUMBERS INTO 12 REGISTERS THEN START AND WITHOUT FURTHER INTERFERENCE X,Y,Z AND THE DETERMINANT WILL APPEAR WITHIN 27 SECONDS.

134PROGRAM STEPS  
HANS AUSEMS  
NL-BREDA.

52122D 67-THREE LINEAR EQUATIONS (INVERSE MATRIX)

SPECIFICATIONS :  
FIRST STORE 12 NUMBERS INTO 12 REGISTERS THEN START AND WITHOUT FURTHER INTERFERENCE X,Y,Z AND THE DETERMINANT WILL APPEAR WITHIN 15 SECONDS.

52122D (CONTD)

150PROGRAM STEPS  
HANS AUSEMS  
NL-BREDA.

52123D 67-THREE LINEAR EQUATIONS (GAUSS)

SPECIFICATIONS :  
FIRST STORE 12 NUMBERS INTO 12 REGISTERS THEN START AND WITHOUT FURTHER INTERFERENCE X,Y,Z AND THE DETERMINANT WILL APPEAR WITHIN 13 SECONDS.

176PROGRAM STEPS  
HANS AUSEMS  
NL-BREDA.

52124D 67-THREE LINEAR EQUATIONS (GAUSS-JORDAN)

SPECIFICATIONS :  
FIRST STORE 12 NUMBERS INTO 12 REGISTERS THEN START AND WITHOUT FURTHER INTERFERENCE X,Y,Z AND THE DETERMINANT WILL APPEAR WITHIN 31 SECONDS. IF NO SINGLE SOLUTION, RECALL THE ALTERED INPUT FOR COMPLETING INFORMATION.

222PROGRAM STEPS  
HANS AUSEMS  
NL-BREDA.

52125D 67-FOUR LINEAR EQUATIONS (CRAMER)

SPECIFICATIONS :  
FIRST STORE 20 NUMBERS INTO 20 REGISTERS THEN START AND WITHOUT FURTHER INTERFERENCE. BUT TO LENGTHEN THE PROGRAM, X,Y,Z,T AND THE DETERMINANT WILL APPEAR WITHIN 100 SECONDS.

312PROGRAM STEPS  
HANS AUSEMS  
NL-BREDA.

52126D 67-FOUR LINEAR EQUATIONS (GAUSS)

SPECIFICATIONS :  
FIRST STORE 20 NUMBERS INTO 20 REGISTERS THEN START AND WITHOUT FURTHER INTERFERENCE BUT TO LENGTHEN THE PROGRAM, X,Y,Z,T AND THE DETERMINANT WILL APPEAR WITHIN 31 SECONDS.

300PROGRAM STEPS  
HANS AUSEMS  
NL-BREDA.

52127D 67-FOUR LINEAR EQUATIONS (GAUSS-JORDAN)

SPECIFICATIONS :  
FIRST STORE 20 NUMBERS INTO 20 REGISTERS THEN START AND WITHOUT FURTHER INTERFERENCE BUT TO LENGTHEN THE PROGRAM, X,Y,Z,T AND THE DETERMINANT WILL APPEAR WITHIN 83 SECONDS IF NO SINGLE SOLUTION RECALLS THE ALTERED INPUT FOR COMPLETING INFORMATION.

422PROGRAM STEPS  
HANS AUSEMS  
NL-BREDA.

52128D 67-FIVE HOMOGENEOUS LINEAR EQUATIONS (GAUSS-JORDAN)

SPECIFICATIONS :  
FIRST STORE 25 NUMBERS INTO 25 REGISTERS THEN START AND WITHOUT FURTHER INTERFERENCE BUT TO LENGTHEN THE PROGRAM, THE DETERMINANT APPEARS WITHIN 145 SECONDS. (IF ZERO RECALLS THE ALTERED INPUT FOR COMPLETING INFORMATION).

715PROGRAM STEPS  
HANS AUSEMS  
NL-BREDA.

52129D 67-MINIMUM QUARTZ RESISTANCE DETECTION

52129D (CONTD)

PROGRAM GIVES MINIMUM RESISTANCE AND CORRESPONDING FREQUENCY (FS) OF A QUARTZ CRISTAL WITH 10\*\*-3 MZ ACCURACY.

146PROGRAM STEPS  
ALAIN BERGER  
CH-BOUCRY.

52130D 67-MINIMUM QUARTZ PHASE DETECTION

THIS PROGRAM GIVES MINIMUM PHASES AND CORRESPONDING FREQUENCY (FR) OF A QUARTZ CRISTAL WITH 10\*\*-3 HZ ACCURACY.

174PROGRAM STEPS  
ALAIN BERGER  
CH-BOUCRY.

52131D 97-CONVERSION OF LATITUDE &amp; LONGITUDE TO NATIONAL GRID NG 1

THIS PROGRAM COMPUTES NATURAL GRID REFERENCES FROM LATITUDE & LONGITUDE INPUT EITHER IN DECIMAL DEGREES OR D.M.S, ALSO THE MERIDIONAL ARE BETWEEN 2 LATITUDES, USING THE PUBLISHED EQUATIONS & CONSTANTS FOR THE BRITISH GRID. IT REPLACES (WITH PROGRAMS NG2, NG3) THE PUBLISHED PROJECTION TABLES AND IS ACCURATE TO 1MM.

222PROGRAM STEPS  
DAVID ARTHUR HATCHER  
GB-LONDON.

52132D 97-NATIONAL GRID CONVERGENCE SCALE FACTOR &amp; (T-T) NG3

FOLLOWING PROGRAM NG2 (CR WITH GRID REFERENCES AS INPUT, PROGRAM COMPUTES THE CONVERGENCE (C) & LOCAL SCALE FACTOR (F) OF A POINT. EQUATIONS ARE DERIVED FROM THE PUBLISHED EQUATIONS AND ARE AS ACCURATE AS THE PROJECTION TABLES. TRUE BEARING CORRECTION FACTOR IS COMPUTED FOR MANUAL USE. THE DATA REQUIRED IS THE SAME AS FOR NG1 AND NG2. A TABLE OF GRID LETTERS AND NUMBERS IS PROVIDED.

224PROGRAM STEPS  
DAVID ARTHUR HATCHER  
GB-LONDON.

52133D 97-CONVERSION OF NATIONAL GRID CO-ORDINATES TO LAT &amp; LONG NG2

THIS PROGRAM COMPUTES LATITUDE AND LONGITUDE (FROM GREENWICH) IN D.M.S AND D.DD GIVEN THE FULL GRID REFERENCE. ACCURACY IS TO 1MM EQUIV. IF REQUIRED. ALL EQUATIONS DERIVED FROM THE PUBLISHED HANDBOOK, SO THIS PROGRAM (WITH PROGRAMS NG1 AND NG3) REPLACES THE PROJECTION TABLES. A TABLE OF GRID LETTERS AND EQUIVALENT NUMBERS IS INCLUDED. A PAUSE ROUTINE CALLS THE SECOND CARD AND TRANSFERS FLAG STATUS.

336PROGRAM STEPS  
DAVID ARTHUR HATCHER  
GB-LONDON.

52134D 97-GRAPHICAL OUTPUT OF DATA SERIES

THIS PROGRAM FINDS A GRAPHICAL OUTPUT FOR ALL NON-FUNCTION DATA SERIES, FOR TWO CASES :  
1) DATA SERIES IS LIMITED UP TO 23 DATA.  
2) UNLIMITED DATA SEQUENCE (MORE THAN 23 DATA).  
GRAPHICAL OUTPUT CONSISTS IN 10 PRINT POSITIONS. THE PRINTED VALUES OF THE DATA INPUT ARE REPRESENTED BY (8) ON TOP OF A COLUMN OF 1'S.

135PROGRAM STEPS  
MICHAEL TARNUSKI  
D-WIESBADEN.



## PROGRAM ABSTRACTS

## 521350 67-LIFTING CONDENSATION LEVEL

THIS PROGRAM COMPUTES THE PRESSURE AND THE TEMPERATURE OF THE LIFTING CONDENSATION LEVEL WHEN A PARCEL OF AIR IS LIFTED ADIABATICALLY TO ITS SATURATION WITH THE POTENTIAL TEMPERATURE AND THE MIXING-RATIO REMAINING CONSTANT.

213PROGRAM STEPS  
EUGENIU OLIVA  
E-MADRID.

## 521360 67-REAL LIFE GOLF

YOU PLAY A GAME OF GOLF ON MAPS DRAWN ON GRAPHIC PAPER TAKEN EITHER FROM REAL LIFE OR INVENTED. AS IN REALITY YOU CANNOT PREDICT EXACTLY WHERE THE BALL WILL GO, EXCEPT WHEN USING THE PUTTER ON GREEN. CFTIONALLY WIND MAKES IT EVEN HARDER FOR YOU. SELECT ONE OF 8 CLUBS, TAKE WIND DIRECTION AND STRENGTH INTO CONSIDERATION AND ENTER A COURSE, HOPING THAT THE BALL WILL AVOID ALL OBSTACLES. BALL IN HOLE AND SCORE IS SHOWN. THIS GAME IS COMPLETELY DIFFERENT FROM EARLIER GOLF GAME.

224PROGRAM STEPS  
GOERAN THOERNBLAD  
S-BROMMA.

## 521370 67-FIRE RESISTANCE OF TIMBER COLUMNS

FOR GIVEN MATERIAL QUALITY, BUCKLING LENGTH AND COMPRESSIONAL FORCE, THE FAILURE TIME OF THE BURNING SECTION IS CALCULATED.

115PROGRAM STEPS  
HANS FLURIAN HOYER  
D-STUTTGART.

## 521380 67-DEFINITE INTEGRAL 3 SIMPSON

WITH A CONTINUOUS AREA BETWEEN THE GIVEN LIMITS THE PROGRAM APPROXIMATES :

- 1) THE AREA UNDER THE CURVE.
- 2) THE VOLUME TRACED OUT BY THAT AREA, REVOLVED.
- 3) THE CENTROIDS OF THAT AREA... USING "SIMPSONS RULE".

071PROGRAM STEPS  
LAWRENCE B. HARTLEY  
GB-BRIERFIELD.

## 521390 67-MARINE NAVIGATION WITH TERRESTRIAL ORIENTATION

ASSUMING FLAT EARTH GEOMETRY, THE PROGRAM SOLVES FIVE FUNDAMENTAL PROBLEMS IN SHORE NAVIGATION USING TERRESTRIAL ORIENTATION. DETERMINATION OF : 1) DISTANCE FROM HORIZON ANGLE AND HEIGHT, 2) POSITION FROM DISTANCE, AZIMUTH AND CO-ORDINATES OF MARK, 3) POSITION AND DISTANCE FROM CO-ORDINATES OF MARK, COURSE AND TWO SUCCESSIVE AZIMUTHS 4) POSITION AND DISTANCE FROM CO-ORDINATES OF TWO AND 5) OF THREE MARKS AND THE CORRESPONDING ANGLES.

223PROGRAM STEPS  
KLAUS WILHELM  
D-NORTHEIM.

## 521400 97-APPLIC OF POLYNOM APPROXIM. COMPLETE PRGM 512270

THIS PROGRAM ALLOWS 2 CARDS NUMBERED 8 AND 9 AND FOLLOWS THE 7 CARDS NUMBERED FROM 1 TO 7 PROGRAM 512270. FOR DISCRETE VALUES Y OF A TABLE CORRESPONDING TO VALUES OF A VARIABLE X IN ARITHMETICAL PROGRESSION THE PROGRAM 51226 HAS PERMITTED TO REPLACE THE Y VALUES BY A POLYNOMIAL P(X) AND TO WRITE A DATA CARD FOR STORAGE IN PRIMARY REGISTERS OF THE POLYNOMIAL COEFFICIENTS. THESE CARDS NO 8 AND 9 PERMIT TO SOLVE DIFFERENTIAL EQUATIONS (1ST AND 2ND ORDER) WHERE

## 521400 (CONTD)

P(X) IS INCLUDED.

251PROGRAM STEPS  
PIERRE RAYMOND  
F-MEUDON.

## 521410 97-SPECIFIC GRAVITY FOR AIR

THIS PROGRAM COMPUTES IN RELATION WITH ATMOSPHERIC HUMIDITY THE SPECIFIC GRAVITY.

194PROGRAM STEPS  
KURT MANTAU  
D-BERGISCH GLADBACH.

## 521420 67-EQUATIONS OF MOTION

FROM THE 5 VALUES LENGTH S; TIME T; VELOCITY V; ACCELERATION B AND STARTING VELOCITY VC, YOU NEED 3 TO CALCULATE THE TWO OTHER. THE STARTING VELOCITY OR THE ACCELERATION MAY BE ALSO NULL. IF TWO RESULTS EXIST, YOU GOT THEM.

224PROGRAM STEPS  
HORST VOELZ  
D-BERLIN.

## 521430 67-WHEATESTONE BRIDGE WITH LOAD

THIS PROGRAM CALCULATES FROM THE 5 RESISTORS OF THE WHEATE STONE BRIDGE FOLLOWING PARAMETERS : INPUT OUTPUT-RESISTOR, TRANSMISSION RESISTOR; INPUT-OUTPUT-CURRENT, OUTPUT VOLTAGE AND TRANSMISSION FACTOR

100PROGRAM STEPS  
HORST VOELZ  
D-BERLIN.

## 521440 67-RIPPLE VOLTAGE

THIS PROGRAM CALCULATES RIPPLE VOLTAGE AT 50 C/S FOR RECTIFYING CIRCUITS AND ALSO FOR FILTERING CIRCUITS.

060PROGRAM STEPS  
HORST VOELZ  
D-BERLIN.

## 521450 67-INFORMATION ENTROPY

THIS PROGRAM CALCULATES SHANNON-ALPHA AND BONGARD-ENTROPY FOR INFORMATION THEORY

112PROGRAM STEPS  
HORST VOELZ  
D-BERLIN.

## 521460 67-HISTOGRAM

YOU CAN BUILD UP TO 20 CLASSES WITH INTEGER, EQUAL OR LOGARITHMIC DISTANCE. THE NUMBERS OF THE INPUT VALUES IN EACH CLASS ARE COUNTED.

111PROGRAM STEPS  
HORST VOELZ  
D-BERLIN.

## 521470 67-MASTERMIND 136

WITH THIS PROGRAM YOU CAN PLAY 136 DIFFERENT KINDS OF MASTERMIND BECAUSE :

- 1) YOU CHOOSE THE NUMBER OF "ROWS" (NUMBER OF DIGITS) 1-9
- 2) YOU CHOOSE THE NUMBER OF "COLUMNS" (MAXIMUM OF DIGITS 1-9
- 3) YOU DECIDE WHETHER ALL THE "COLORS" (DIGITS) IN THE HIDDEN CODE (NUMBER) MUST BE DIFFERENT OR NOT.

224PROGRAM STEPS  
FLEMING SCANNERUP  
DK-HELLERUP.

## 521480 67-DISTRIBUTION OF MANDATES BY D'HONDT'S METHOD.

## 521480 (CONTD)

THIS PROGRAM DETERMINES THE DISTRIBUTION OF MANDATES IN A PARLIAMENT BY D'HONDT'S METHOD. IT CONSIDERS UP TO 4 PARTIES. THE PROGRAM CAN BE USED IN EACH PROPORTIONAL ELECTION SYSTEM. ON SIDE 2 OF THE CARD THE VALUES CAN BE STORED.

106PROGRAM STEPS  
RALPH DIETER  
D-WEINSTADT.

## 521490 67-FOLLOWING LEGS OF GREAT CIRCLE NAVIGATION.

KNOWING TWO POINTS, GIVES : DISTANCE, TRUE TRACK AT DEPARTURE AND ARRIVAL, VERTEX COORDINATES. GIVING THEN LONGITUDE OR DISTANCE OF ANY POINT OF THIS GREAT CIRCLE, COMPUTES ITS LATITUDE, ALL CORRECTIONS APPLIED BY THE PROGRAM. PREPARES THE CALCULATOR FOR NEXT LEG. MAKES INERTIAL NAVIGATION MONITORING EASY.

224PROGRAM STEPS  
ANDRE FOURNERAT  
F-YERRES.

## 521500 67-BINARY ARITHMETIC

PROGRAM PACKAGE TO PERFORM BINARY ARITHMETIC ON THE HP67 CALCULATOR. THE PACKAGE INCLUDES THE FOLLOWING FUNCTIONS : ADD, SUBTRACT, 2-COMPLEMENT, 1-COMPLEMENT, AND, OR ENCODE, DECODE. FUNCTIONS WORK ON EITHER 8-BIT OR Y-BIT QUANTITIES.

222PROGRAM STEPS  
AUGUST-WILHELM JAGAN  
D-BUCHH./NORDHEIDE.

## 521510 67-STATE OF IDEAL GAS

GIVEN TWO STATES OF A GAS, PROGRAM CALCULATES PRESSURE, VOLUME, OR TEMPERATURE IN ONE OF THESE STATES. SINCE ABSOLUTE TEMPERATURE IS REQUIRED DEGREE C TO K IS PROVIDED.

097PROGRAM STEPS  
ALEX SLAETS  
B-MECHLEN.

## 521520 67-SIMPLE JACOBIAN AND NEVILLE'S THETA FUNCTIONS

ONLY A PROGRAM FOR SIMPLE JACOBIAN AND NEVILLE'S THETA FUNCTIONS. ITS EMPLOYMENT, AMONG OTHERS, ALLOWS TO OBTAIN JACOBIAN ELLIPTIC FUNCTIONS WITH VERY GOOD ACCURACY.

220PROGRAM STEPS  
FELIPE LANDA  
E-CCORDCBA.

## 521530 67-NEVILLE'S THETA FUNCTIONS INFINITE PRODUCT METHOD

WITH 4 NEVILLE'S THETA FUNCTIONS, WE CAN RAPIDLY OBTAIN EVERY JACOBIAN ELLIPTIC FUNCTIONS AND OTHER EMPLOYMENT. ACCURACY IS VERY GOOD AND PROGRAM IS SWIFT. EVERY ARGUMENTS, MODULUS AND PERIODS ARE STORED FOR FURTHER CALCULUS.

221PROGRAM STEPS  
FELIPE LANDA  
E-CCORDCBA.

## 521540 97-SAFETY PIPES FOR HEAT GENERATORS

THIS PROGRAM, IN ACCORDANCE WITH THE ITALIAN MINISTERIAL DECREE FIRST DECEMBER 1975, CALCULATES THE VIRTUAL LENGTH AND THE MAXIMUM ACCEPTABLE TERMIC POTENTIAL OF A SAFETY PIPE GIVEN THE ACTUAL LENGTH AND THE NUMBER OF BENDS FOR THE FOLLOWING INTERNAL DIAMETERS : MILLIMETERS 22.2, 27.9, 36.6, 42.5,



## PROGRAM ABSTRACTS

## 52154D (CONTD)

53.8, 69.6, 81.6.

222PROGRAM STEPS  
MARIO RIPPES  
I-SALERNO.52155D 67-SOLUTION TO  $F(X)=0$  BY REGULA  
FALSI

THIS PROGRAM GIVES YOU THE ROOT OF A FUNCTION BY A COMBINATION OF THE BISECTION METHOD WHICH CONVERGE SLOWLY BUT SURELY AND THE NEWTON-RAPHSON'S METHOD WHICH CONVERGE QUICKLY BUT WHEN YOU ARE NEAR THE SOLUTION. THIS PROGRAM RUNS EVEN QUICKER THAN "CALCULUS AND ROOTS OF  $F(X)$ " GIVEN IN THE STANDARD PAC.

055PROGRAM STEPS  
DIDIER DE BRUYN  
B-BRUSSELS.

## 52156D 67-SECTOR

THIS PROGRAM PERMITS ONE TO EIGHT PLAYERS TO PLAY SECTOR, THE OBJECT OF WHICH IS FOR EACH PLAYER TO MOVE A SHIP ON A PLAYING BOARD, LOCATE AN ENEMY SUBMARINE AND DESTROY IT. SECTOR EXISTS AS AN ELECTRONIC GAME, DISTRIBUTED BY PARKER BROTHERS.

223PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52157D 67-CLOCK PROBLEM

THIS PROGRAM CALCULATES THE TIMES BETWEEN 0 AND 12 HOURS, WHEN THE TWO HANDS OF A CLOCK MAKE A GIVEN ANGLE. IT ALSO FINDS THAT ANGLE, THE TIME BEING GIVEN.

076PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52158D 67-CUBIC SPLINE CURVE FITTING

THIS PROGRAM CALCULATES A CUBIC SPLINE CURVE THROUGH N GIVEN EQUIDISTANT POINTS ( $N=4,5,\dots,9$ ). ONCE FOUND, YOU CAN EITHER FIND INDIVIDUAL POINTS OF THE CURVE, OR HAVE A LIST OF COORDINATES OF SUCH POINTS WITH GIVEN GROWING OF X-VALUES BEING DISPLAYED (OR PRINTED). THE PROGRAM IS BOTH SHORTER AND FASTER THAN BRUCE MURDOCK'S SIMILAR PROGRAM 00315D, THOUGH THE METHOD RESTS THE SAME.

183PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52159D 67-DOG'S CURVE

GIVEN THE VELOCITIES OF A HARE AND OF A PURSUING DOG AND THE DISTANCE OF THE DOG TO THE RECTILINEAR PATH OF THE HARE, THIS PROGRAM CALCULATES THE DISTANCE, WHICH THE HARE CAN RUN BEFORE IT IS CAUGHT. MOREOVER, THE DOG'S CURVE CAN BE PLOTTED POINT BY POINT, TOGETHER WITH THE POSITION OF THE HARE AND THE TIME WHICH HAS ELAPSED.

112PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52160D 67-POKER PROBABILITIES

THIS PROGRAM GIVES THE PROBABILITIES AND FREQUENCIES FOR DIFFERENT POKER HANDS FROM A 4N-CARD-DECK ( $N=5,6,\dots,13$ ).

112PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52161D 67-PROBABILITIES OF CARD DISTRIBUTIONS

A SET OF 13 CARDS FROM A DECK OF 52 CARDS BEING COMPOSED OF A,B,C AND D CARDS OF DIFFERENT SUITS, THIS PROGRAM CALCULATES THE PROBABILITY FOR THE DISTRIBUTION (A,B,C,D). IT CAN ALSO GIVE YOU A COMPLETE LIST OF DISTRIBUTIONS AND CORRESPONDING PROBABILITIES.

152PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52162D 67-MONTE CARLO EXTENDED

AS IN GÖRAN THORNBLOD'S EXCELLENT PROGRAM 50542 ON THE SAME SUBJECT, TWO PLAYERS CAN PLAY ROULETTE AGAINST HP, ACTING AS BANK AND CRUPIER. SIMPLIFICATIONS ALLOW BOTH PLAYERS TO PLAY ON PAIRS OF NUMBERS TOO, EITHER VERTICAL OR HORIZONTAL. THIS POSSIBILITY WAS ABSENT IN THE PREVIOUS PROGRAM.

219PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.52163D 67-EQUATIONS OF DEGREE 5 AND 10  
HAVING ROOTS XI AND XIXJ RESP.

GIVEN A POLYNOMIAL EQUATION OF DEGREE 5 WITH ROOTS XI, THIS PROGRAM FINDS THE CORRESPONDING EQUATION OF DEGREE 10 WITH ROOTS XIXJ. SUBROUTINES PROVIDE IN FINDING THE (REAL) ROOTS OF THE FIRST EQUATION AND TESTING THEIR PRODUCTS AS ROOTS OF THE SECOND ONE.

224PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.52164D 67 EQUATIONS OF DEGREE 4 AND 6  
HAVING ROOTS XI AND XIXJ RESP.

GIVEN A POLYNOMIAL EQUATION OF DEGREE 4 WITH ROOTS XI, THIS PROGRAM FINDS THE CORRESPONDING EQUATION OF DEGREE 6 WITH ROOTS XIXJ. SUBROUTINES PROVIDE IN FINDING THE (REAL) ROOTS OF THE FIRST EQUATION AND TESTING THEIR PRODUCTS AS ROOTS OF THE SECOND ONE.

120PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52165D 67-LINEAR SYSTEMS

THIS ONE-CARD PROGRAM SOLVES LINEAR SYSTEMS  $N \times N$  WITH REAL COEFFICIENTS FOR  $N=2,3,\dots,10$ , USING N DATA-CARDS. COEFFICIENTS HAVE TO BE KEYED IN ONLY ONCE.

219PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52166D 67-DETERMINANTS

THIS ONE CARD PROGRAM CALCULATES ANY DETERMINANT  $N \times N$  ( $N=2,3,\dots,11$ ), USING N DATA-CARDS. ELEMENTS HAVE TO BE KEYED IN ONLY ONCE.

152PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.52167D 97-67 6 OFF 49 GENERATION OF 8X6  
LOTTERY NUMBERS

THIS PROGRAM GENERATES FOR 8 LOTTERY GAMES 6 RANDOM LOTTERY NUMBERS FOR EACH WITHOUT REPETITION FOR YOUR LOTTO FORM. THE PROGRAM NEEDS APPROXIMATELY 8 MINUTES CALCULATION TIME. THE PROGRAM PRINTS ALL DATA IN GAME SEQUENCE.

## 52167D (CONTD)

187PROGRAM STEPS  
ALEXANDER NIESSEN  
D-EITGRF.52168D 97-67 6 OFF 49 STORING OF DRAWN  
LOTTERY NUMBERS.

THIS PROGRAM STORES THE WEEKLY DRAWN RANDOM LOTTERY NUMBERS FROM THE GERMAN LOTTERY 6 OF 49 ON DATA CARDS. THE PROGRAM CAN BE USED AS A MEMORY BUT IT IS ABSOLUTELY NECESSARY TO HAVE IT, IF YOU WANT TO USE THE PROGRAM "6 OF 49 EVALUATION OF DRAWN LOTTERY NUMBERS".

134PROGRAM STEPS  
ALEXANDER NIESSEN  
D-EITGRF.

## PROGRAM ABSTRACTS

**52169D 67-67- 6 OFF 49 EVALUATION OF  
DRAWN LOTTERY NUMBERS**

THIS PROGRAM EVALUATE WHETHER THE SEED LOTTERY NUMBERS ARE EQUAL WITH THE WEEKLY DRAWN NUMBERS. WORKING WITH THIS PROGRAM IT IS NECESSARY TO HAVE PROGRAMS "6 OFF 49 STORING OF DRAWED LOTTERY NUMBERS" AND "6 OFF 49 GENERATION OF 8X6 LOTTERY NUMBERS" AVAILABLE.

207PROGRAM STEPS  
ALEXANDER NIESSEN  
D-EITCKF.

**52170D 67-MASTER-MIND WITH DOUBLE CODE**

THIS PROGRAM PLAY WITH YOU A MASTER MIND GAME WHERE YOU HAVE TO FOUND A CODE OF 2 PARTS, EACH WITH 4 NUMBERS. IN EACH PART THE NUMBERS ARE ONLY IN A SINGLE TIME, BUT IN THE OTHER PART THE NUMBERS COULD BE THERE ALSO.

208PROGRAM STEPS  
JUNGE RAINER  
D-URBERACH-ROEDERMARK.

**52171D 67-SYMMETRIC COMPONENTS OF AN UN-  
SYMMETRIC SHORT CIRCUIT**

THIS PROGRAM COMPUTES THE SYMMETRIC COMPONENTS OF AN UNSYMMETRIC SHORT CIRCUIT IN A 3-PHASE-SYSTEM. BY KNOWING THE SHORT CURRENT IN THE 3 PHASES THE PROGRAM FOUND THE COMPONENTS OF THE 1-2-0-SYSTEM IN POLAR OR RECTANGULAR FORM.

135PROGRAM STEPS  
JUNGE RAINER  
D-URBERACH-ROEDERMARK.

**52172D 67-FACTORIALS INDICATION**

$N1/N2$  IS COMPUTED FOR EVER POSITIVE INTEGER LESS THAN  $10^{**}10$  AND  $N1, N2$  ARE NOT ZERO AND  $N1$  IS NOT 1. PROGRAM IS VALID FOR  $N2 > N1$ . THE RESULT IS GIVEN IN ABOUT 15 SEC AND TO TOTAL OF TEN FIGURES.  
I.E.  $10^{**}6/10^{**}3 = 2.05 \times 10^{**}5563141$

110PROGRAM STEPS  
KENT A WIGSTROM  
S-FLUDA.

**52173D 67-FACTORIALS TO 140 FIG.**

FACTORIALS  $N1/N2$  THERE  $N1 > N2$  AND  $N1 < (10^{**}10 - 10^{**}5)$  WILL BE COMPUTED TO 10K FIG THERE K BELONGS TO 2, 14 TYPICAL EXECUTION TIMES 200/1000 WITH 100 FIG. TAKES 19 MIN. AND 1000/ WITH 140 FIG ABOUT 6.5 HOURS.

222PROGRAM STEPS  
KENT A WIGSTROM  
S-FLUDA.

**52174D 67-POWERS OF NUMBER TO 215 FIG.**

$Y^{**}X < 10^{**}214$  FOR  $10^{**}5 < Y < (10^{**}10 - 10^{**}5)$  CAN BE COMPUTED. FOR  $Y < 10^{**}5$  IS # 51416D APPLICABLE. COMPUTATION TO THE FULL RANGE TAKES ABOUT 22 MIN AND TO 100 FIG ABOUT 4 MIN.

217PROGRAM STEPS  
KENT A WIGSTROM  
S-FLUDA.

**52175D 67-LOGIC FUNCTIONS**

PROGRAM PERFORMS THE LOGIC FUNCTIONS: AND, OR, NOT, EXOR FOR BINARY WORDS WITH VARIABLE LENGTH. THE STACK IS SAVED DURING OPERATIONS, SO YOU CAN WORK WITH BRACKETS AND CHAINED OPERATIONS.

112PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

**52176D 67-MULTIPLICATION OF NXN MATRIX  
WITH NX1 MATRIX (N<=12)**

THIS PROGRAM CAN MULTIPLY AN NXN MATRIX ( $1 \leq N \leq 12$ ) WITH A NX1 MATRIX THE ONLY SPECIAL THING IS THAT YOU MUST ENTER THE NX1 MATRIX FIRST.

096PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

**52177D 67-POWER SERIES OPERATIONS**

GIVEN A FORMAL POWER SERIES  $P(X) = 1 + A_1X + A_2X^2 + \dots$ , THIS PROGRAM COMPUTES THE COEFFICIENTS  $B_K$ ,  $K=1..N$ , OF  $Q(X) = 1 + B_1X + \dots$  FOR  $Q = P^{**}ALPHA$ ,  $Q = \exp(P-1)$ ,  $Q = 1 + \log(P)$ . IF THE  $A_K$  ARE GIVEN BY A FORMULA (LBL A, MAX. 94 STEPS),  $NMAX=19$ ; IF THE  $A_K$  ARE GIVEN BY VALUES,  $NMAX=9$ . METHOD: RECURRENCE RELATIONS. SPEED  $N=9$ : 2 MIN,  $N=19$ : 8 MIN, IF LBL A IS FAST. THE REVERSION  $Y=Q(Y)$  OF  $X=P(X)$  CAN ALSO BE COMPUTED; SPEED:  $N=9$ : 7 MIN,  $N=19$ : 50 MIN.

130PROGRAM STEPS  
WOLFGANG SEEWALD  
CH-ZUERICH.

**52178D 67-SYMMETRICAL LINEAR REGRESSION**

THIS PROGRAM FITS A STRAIGHT LINE TO A GIVEN SET OF DATA POINTS, SO THAT: CASE I. THE SUM OF THE SQUARED VERTICAL DISTANCES OF THE POINTS TO THE LINE IS A MINIMUM (THE WELL-KNOWN "LINEAR REGRESSION"). CASE II. THE SUM OF THE SQUARED HORIZONTAL DISTANCES IS A MINIMUM (L.R. WITH X AND Y INTERCHANGED). CASE III. THE SUM OF THE SQUARED EUCLIDEAN DISTANCES IS A MINIMUM ("SYMMETRICAL" L.R.).

218PROGRAM STEPS  
WOLFGANG SEEWALD  
CH-ZUERICH.

**52179D 67-PRODUCT OF TWO SUMS OF FOUR  
SQUARES**

THE PRODUCT OF TWO SUMS OF FOUR SQUARES CAN ITSELF BE REPRESENTED AS A SUM OF FOUR SQUARES. THIS PROGRAM IS SIMILAR TO 51013D, BUT GIVES ALL 96 SOLUTIONS INSTEAD OF 24 ONLY.

179PROGRAM STEPS  
WOLFGANG SEEWALD  
CH-ZUERICH.

**52180D 67-MULTIPLICATION OF LARGE NUMBERS**

THIS PROGRAM MULTIPLIES TWO INTEGERS X AND Y. IF X HAS 10M DIGITS, Y MAY HAVE UP TO 100-10 DIGITS ( $M=1,2,3,4$  OR 5). IT IS COMPARATIVELY FAST: THE MULTIPLICATION OF A 30-DIGIT NUMBER AND A 70-DIGIT NUMBER TAKES 95 SECONDS.

224PROGRAM STEPS  
WOLFGANG SEEWALD  
CH-ZUERICH.

**52181D 67-TWO-POINT TAYLOR SERIES**

GIVEN THE FIRST N COEFFICIENTS OF THE TWO TAYLOR EXPANSIONS AT THE POINTS 0 AND 1 OF AN ANALYTIC FUNCTION, THIS PROGRAM COMPUTES THE FIRST 2N COEFFICIENTS OF THE "TWO-POINT TAYLOR SERIES"  $F(Z) = (C_0 + C_1Z) + (C_2 + C_3Z)(Z-1) + (C_4 + C_5Z)(Z-1)^2 + \dots$  BY A RECURRENCE FORMULA FROM RUTISHAUSER.

156PROGRAM STEPS  
WOLFGANG SEEWALD  
CH-ZUERICH.

**52182D 67-COMPUTATION OF LINEAR MULTI-STEP  
METHODS****52182D (CONTD)**

GIVEN A POLYNOMIAL ALPHA (Z) OF DEGREE  $K \leq 19$  THAT SATISFIES A STABILITY CONDITION, THIS PROGRAM COMPUTES A POLYNOMIAL BETA (Z) OF DEGREE  $M \leq K$  SO THAT THE MULTI-STEP METHOD FOR SOLVING DIFFERENTIAL EQUATIONS, BASED ON THE COEFFICIENTS OF ALPHA (Z) AND BETA (Z), HAS ORDER  $P \geq M+1$ .

180PROGRAM STEPS  
WOLFGANG SEEWALD  
CH-ZUERICH.

**52183D 67-ADAMS-BASHFORTH AND ADAMS-MOULTON  
METHODS**

THIS PROGRAM IMPLEMENTS THE ADAMS-BASHFORTH AND ADAMS-MOULTON METHODS FOR  $K=1,2,3,4,5$  (I.E., ORDER 1..5 FOR A-BASHFORTH, 2..6 FOR A-MOULTON) TO SOLVE A SINGLE FIRST-ORDER ORDINARY DIFFERENTIAL EQUATION. THE COEFFICIENTS OF THE METHODS ARE STORED ON DATA CARDS. AS A PREDICTOR FOR THE ADAMS-MOULTON METHOD, THE ADAMS-BASHFORTH METHOD IS USED. 79 PROGRAM STEPS ARE AVAILABLE FOR THE FUNCTION F.

145PROGRAM STEPS  
WOLFGANG SEEWALD  
CH-ZUERICH.

**52184D 67-MOEBIUS TRANSFORMATIONS**

THIS PROGRAM HANDLES WITH MOEBIUS TRANSFORMATIONS  $W=F(Z)=(AZ+B)/(CZ+D)$ , GIVEN BY FOUR COMPLEX NUMBERS A,B,C,D. THE FOLLOWING OPERATIONS ARE AVAILABLE, BASED ON TWO MOEBIUS TRANSFORMATIONS F,G: INPUT F, INPUT G, OUTPUT F, EXCHANGE F AND G;  $F=F \circ G$ ,  $F=G \circ F$ ;  $F=F^{-1}$ ; COMPUTE  $W=F(Z)$  FOR ARBITRARY COMPLEX Z; COMPUTE Z FROM  $W=F(Z)$  FOR COMPLEX W

216PROGRAM STEPS  
WOLFGANG SEEWALD  
CH-ZUERICH.

**52185D 67-MOEBIUS TRANSFORMATION FROM  
THREE GIVEN FUNCTION VALUES**

GIVEN TWO TRIPLES OF DISTINCT NUMBERS  $(Z1, Z2, Z3)$ ,  $(W1, W2, W3)$  IN THE COMPACTIFIED COMPLEX PLANE (I.E. COMPLEX OR INFINITY), THIS PROGRAM COMPUTES A MOEBIUS TRANSFORMATION  $W=F(Z)=(AZ+B)/(CZ+D)$  THAT SATISFIES  $F(Z1)=W1$  ( $i=1,2,3$ ). PROGRAM 52184D CAN BE USED TO EVALUATE THE FOUND MOEBIUS TRANSFORMATION FOR ARBITRARY COMPLEX Z.

213PROGRAM STEPS  
WOLFGANG SEEWALD  
CH-ZUERICH.

**52186D 67-FOUR SIDE OPEN FRAMES.**

THIS PROGRAM COMPUTES, ON TWO CARDS THE HORIZONTAL AND VERTICAL REACTIONS AND ELBOW MOMENTS OF FOUR-SIDED SIMPLE OPEN FRAMES UNDER ALL POSSIBLE LOADING CONDITIONS. ALSO, WITH A THIRD CARD, SOLVES FOR SPECIAL CASES OF THE SAME FRAMES.

642PROGRAM STEPS  
JIMMY PLATONIS  
GR-ATHENS.

**52187D 67-TILE AREA ESTIMATION**

GIVEN A TILE BY ITS DIMENSIONS WE CALCULATE BY THIS PROGRAM THE NECESSARY NUMBER AND AREA OF TILES TO COVER A GIVEN SURFACE. WE CAN ALSO OBTAIN THE TOTALLY REQUIRED TILES TO COVER A NUMBER OF GIVEN SURFACES BY A SPECIAL SUBROUTINE. WE CAN ESTIMATE THE AREA DIMENSIONS FOR AN INTEGRAL NUMBER OF TILES (NO WASTE).

109PROGRAM STEPS  
JIMMY PLATONIS

## PROGRAM ABSTRACTS

## 52187D (CONTD)

GR-ATHENS.

## 52188D 67-WYE-DELTA TRANSFORMATION

GIVEN THREE OHM-RESISTANCES IN WYE-CONNECTION, THE PROGRAM COMPUTES THE APPROPRIATE RESISTANCE IN DELTA CONNECTION AND REVERSE.

057PROGRAM STEPS  
ROBERT EMBRECHTS  
B-RIJKEVORSEL.

## 52189D 97-CONTINUED FRACTION EXPANSION OF TRANSFER FUNCTION F(S)

THE CONTINUED FRACTION OF A N-TH ORDER ( $N \leq 9$ ) LINEAR RATIONAL TRANSFER FUNCTION  $F(S)$  AT  $S = 0$  IS COMPUTED. THE ORDER AND THE COEFFICIENTS OF THE NUMERATOR AND DENOMINATOR POLYNOMIALS OF  $F(S)$  HAVE TO BE INPUT. THE OUTPUT CONSISTS OF THE COEFFICIENTS OF THE CONTINUED FRACTION OF  $F(S)$ , WHICH CAN BE USED FOR THE DESIGN OF A LINEAR NETWORK REPRESENTING THE TRANSFER FUNCTION OR FOR APPROXIMATION OF  $F(S)$  BY A MODEL OF LOWER ORDER.

186PROGRAM STEPS  
FRANK DUESSCHLOTT  
D-PADERBORN.

## 52190D 97-LANDSCAPE PERSPECTIVES FROM MAPS WITH GRID &amp; CONTOURS-NG4

INPUT GRID REFERENCE & HEIGHT OF VIEWPOINT (OBSERVING STATION) & SIMILAR DETAILS FOR SELECTED POINTS OF THE TERRAIN POSSIBLY IN VIEW. PROGRAM COMPUTES PANORAMIC CO-ORDINATES REFERRED TO GRID NORTH AS AZIMUTH AND THE TANGENT PLANE AT THE OBSERVATION POINT AS ALTITUDE, ALSO THE DISTANCE. ACCOUNT IS TAKEN OF CURVATURE. USEFUL FOR BOTH OLDER 1 ETC MAPS (HEIGHTS IN FEET) OR METRIC MAPS.

112PROGRAM STEPS  
DAVID ARTHUR HATCHER  
GB-LONDON.

## 52191D 97-OSCILLATIONS COMPOSITION

THIS PROGRAM PLOTS THE GRAPH OF A VIBRATION WHICH IS COMPOSED BY UP TO 09 SINE OSCILLATIONS, EACH OSCILLATION BEING DEFINED BY ITS PERIOD OR FREQUENCY, AMPLITUDE AND PHASE ANGLE. IT IS ALSO ABLE TO COMPUTE A VIBRATION COMPOSED BY A FUNDAMENTAL OSCILLATION AND ITS HARMONICS.

172PROGRAM STEPS  
MICHEL SIQUET  
B-PLANCENOIT.

## 52192D 97-SYMMETRIC TRI-DIAGONAL MATRIX EQUATIONS 3-8 UNKNOWN

THE PROGRAM SOLVES A SYSTEM OF N NON-HOMOGENEOUS EQUATIONS IN N UNKNOWN FOR VALUES OF N FROM 1 TO 8 IN THE CASE OF A SYMMETRIC TRI-DIAGONAL MATRIX. FOR N EQUATIONS THE NUMBER OF DATA ENTRIES IS  $3N-1$ . A DATA ENTRY SUB-PROGRAM IS INCLUDED WHICH PROVIDES FOR DATA TO BE ENTERED ON "PAUSE". THE PROGRAM DETERMINES THE ORDER N OF THE PROBLEM SUBMITTED BY COUNTING DATA ENTRY.

046PROGRAM STEPS  
WILLIAM PRICE BROWN  
N.I.R.-PORTAFERRY.

## 52193D 97-DENSITY &amp; THERMAL EXPANSION FROM HYDROSTATIC WEIGHTS.

HYDROSTATIC WEIGHTS ARE EVALUATED TO CALCULATE DENSITY (IN THE CASE OF SOLIDS ALSO VOLUME) AND OPTICALLY VOLUMETRIC THERMAL EXPANSION RELATIVE TO A REFERENCE DENSITY. CORRECTION FOR ATMOSPHERIC BUOYANCY

## 52193D (CONTD)

AND TEMPERATURE VARIANCE IS PROVIDED. SERIES CAN BE EVALUATED FOR MEAN AND STANDARD DEVIATION.

210PROGRAM STEPS  
ED. CALLAHAN  
D-DUESSELDORF.

## 52194D 67-HIGH-LOW

YOU OR YOUR CALCULATOR THINK OF A SECRET NUMBER BETWEEN 1 AND 1023. THE OTHER HAS TO DISCOVER THIS NUMBER IN AS FEW GUESSES AS POSSIBLE.

109PROGRAM STEPS  
JAN VUERINCKX  
B-AAKSCHUT.

## 52195D 67-MAGNETIC INDUCTION CURVE

THE PROGRAM IS A MATHEMATIC DESCRIPTION OF THE MAGNETIC INDUCTION CURVE. YOU CAN COMPUTE THE MAGNETIC INDUCTION IF YOU KNOW THE MAGNETIC FIELD INTENSITY AND REVERSE.

151PROGRAM STEPS  
REINHARD KLEINHAENTZ  
A-VIENNA.

## 52196D 67-LOHMANN-RUECHTI PROCESS

LOHMANN-RUECHTI PROCESS CONCERNS A CUMULATIVE PHENOMENA OF INDUSTRIAL SELF-FINANCING INDUCED BY AN APPROPRIATE POLICY OF DEPRECIATION ANNUITIES WHEN TIME OF DEPRECIATION IS FAIRLY SHORT. (PRACTICALLY  $T \leq 9$ )

159PROGRAM STEPS  
ALBERT BUISRAYON  
F-LE BEAUSSET.

## 52197D 67-TRUE RECTANGULAR RANDOM NUMBERS

PROGRAM GIVES TRUE RECTANGULAR RANDOM NUMBERS THAT IS THEY REPRESENT SUCCESSIVE DRAWS FROM A POPULATION OF NUMBERS IN WHICH EACH DIGIT, ZERO THROUGH NINE, APPEARS WITH EQUAL FREQUENCY.

180PROGRAM STEPS  
ALBERT BUISRAYON  
F-LE BEAUSSET.

## 52198D 97-STAR-POLYGON TRANSFORMATION WITH LOADED STARPOINT.

PROGRAM TRANSFORMS A N-ARMED STAR INTO A EQUIVALENT POLYGON WITH STARPOINT ELIMINATED. THE STARPOINT MAY BE LOADED WITH AN ADMITTANCE OR A CURRENT, INDIFFERENCE WITH SOME OTHER PROGRAMS.

171PROGRAM STEPS  
VICTOR DE CAUTER  
B-EDEGEM

## 52199D 67-KOLMOGOROU-SMIRNOV TEST

THE KOLMOGOROU-SMIRNOV TEST IS A TEST OF GOODNESS OF FIT. IT IS CONCERNED WITH THE DEGREE OF AGREEMENT BETWEEN THE DISTRIBUTION OF A SET OF SAMPLE VALUES AND NORMAL DISTRIBUTION. IT DETERMINES WHETHER THE SCORES IN THE SAMPLE CAN REASONABLY BE THOUGHT TO HAVE COME FROM A POPULATION HAVING THE THEORETICAL DISTRIBUTION.

224PROGRAM STEPS  
GERARD BEAUSIRE  
B-BRUXELLES.

## 52200D 67-DAY OF WEEK

THIS PROGRAM WORKS FOR ANY DATE FROM JANUARY 1ST, 1500 TO DECEMBER 31ST, 2699. GIVEN A DATE, THE PROGRAM WILL FIND THE DAY OF THE

## 52200D (CONTD)

WEEK, TAKING INTO ACCOUNT THE FACT THAT THE YEAR COULD BE NORMAL OR LEAP BY THE CHOICE OF THE CORRESPONDING DATA CARD.

045PROGRAM STEPS  
CLAUDE COLLE  
F-MONTPELLIER.

## 52201D 67-EPHEMERIS TRANSIT

THIS PROGRAM COMPUTES FOR ANY PLACE IN THE WORLD THE SEMI-ARC, THE TIME OF TRANSIT, THE RISING AND SETTING TIME OF ANY PLANET OF THE SOLAR SYSTEM, USING THE LONGITUDE AND LATITUDE OF THE USER'S PLACE, THE DECLINATION OF THE PLANET OF THE DAY THE OBSERVATION TAKES PLACE, AND "THE ASTRONOMICAL EPHEMERIS" FROM H.M.S.O. OR ANY OTHER ALMANAC GIVING TRANSIT TIME AND DECLINATION FOR GREENWICH.

071PROGRAM STEPS  
CLAUDE COLLE  
F-MONTPELLIER.

## 52202D 67-EXPOSURE TIME FOR ASTROPHOTOGRAPHY

THIS PROGRAM COMPUTES THE EXPOSURE TIME TO TAKE A PHOTOGRAPH OF A CELESTIAL BODY USING A REFLEX CAMERA AND A TELESCOPE. IT COMPUTES ALSO THE MAGNIFICATION OF THE TELESCOPE ACCORDING TO THE EYEPIECE USED, THE SIZE OF THE MOON'S IMAGE, THE SYSTEM FOCAL LENGTH, THE EYEPIECE FOCAL LENGTH, THE FOCAL LENGTH OF THE CAMERA LENS, THE TELESCOPE APERTURE, THE SPEED OF THE FILM USED AND THE BRIGHTNESS VALUE OF THE CELESTIAL BODY TO BE PHOTOGRAPHED.

080PROGRAM STEPS  
CLAUDE COLLE  
F-MONTPELLIER.

## 52203D 67-GAUSSIAN METHODS FOR INTEGRATION

THIS PROGRAM CALCULATES THE INTEGRAL OF  $F(X)$  OVER A FINITE OR INFINITE INTERVAL. FIVE DIFFERENT GAUSSIAN METHODS CAN BE USED: LEGENDRE (10 POINTS), LOBATTO (10 POINTS) AND CHEBYCHEV (9 POINTS) FOR FINITE INTERVALS; LAGUERRE (7 POINTS) AND HERMITE (10 POINTS) FOR INFINITE INTERVALS. PROGRAM IS STORED IN ONE CARD AND CONSTANTS FOR ALL FIVE METHODS IN TWO OTHER CARDS. YOU CAN EASILY TRY DIFFERENT METHODS TO COMPARE RESULTS.

129PROGRAM STEPS  
FERNANDO DEL REY  
E-MADRID.

## 52204D 67-INTERPOLATING POLYNOMIALS

GIVEN A SET OF  $N+1$  EQUISPACED POINTS ( $N \leq 20$ ), THIS PROGRAM CALCULATES THE POLYNOMIAL OF DEGREE N PASSING THROUGH ALL  $N+1$  POINTS. NEWTON-GREGORY FORWARD METHOD FOR EQUISPACED POINTS IS USED. PROJECTIONS OF Y VALUES CAN BE MADE WITH THE CALCULATED POLYNOMIAL. AN AUTOMATIC DATA ENTRY ROUTINE IS INCLUDED.

112PROGRAM STEPS  
FERNANDO DEL REY  
E-MADRID.

52205D 67-REAL AND/OR COMPLEX ROOTS OF  $F(Z)=0$ 

GIVEN AN INITIAL APPROXIMATION, PROGRAM WILL FIND A ROOT (REAL OR COMPLEX) OF  $F(Z)=0$ , BY MEANS OF A COMPLEX VERSION OF THE NEWTON'S METHOD;  $F(Z)$  IS NOT RESTRICTED TO BE A POLYNOMIAL, IT CAN BE ANY USER'S DEFINED FUNCTION. FOR THE PURPOSE OF DEFINING  $F(Z)$ , THE FOLLOWING



## PROGRAM ABSTRACTS

## 52205D (CONTD)

SUBROUTINES (FOR REAL OR COMPLEX ARGUMENTS) ARE ACCESSIBLE EITHER FROM KEYBOARD OR PROGRAM: SIN(Z), ARCSIN(Z), EXP(Z), LN(Z),+,\*,/,:, Z1 RAISED TO Z2, PLUS 2 COMPLEX STORAGE REGISTERS, 50 STEPS & 15 REGISTERS LEFT TO DEFINE F(Z).

174PROGRAM STEPS  
VALENTIN ALBILLO  
E-MADRID.

## ● 52206D 67-A CHESS GAME

THIS IS A PROGRAM CHESS GAME BETWEEN YOU AND HP-67/97. THE CALCULATOR WILL PLAY A SUITABLE CLEVER CHESS WITH ALL ITS 16 WHITE CHESSMEN AGAINST YOUR BLACK KING ALONE. STARTING FROM THE ORDINARY ARRANGEMENT OF THE PIECES AS FOR A GAME, CALCULATOR'S AIM IS TO PLAY AND CHECKMATE IN A MAXIMUM OF 6 MOVES. THIS IS, SHOULD YOU PLAY IN SUCH A WAY AS TO AVOID BEING CHECKMATED IN SIX MOVES OR LESS, YOU WILL BE CONSIDERED THE WINNER, AS YOU WILL IF YOU CAN FORCE A STALEMATED POSITION OTHERWISE, HP WILL TRIUMPH.

208PROGRAM STEPS  
VALENTIN ALBILLO  
E-MADRID.

## ● 52207D 67-MINIMAX POLYNOMIAL APPROXIMATION OF DEGREE 3

GIVEN 5 POINTS (X,Y), THE PROGRAM FINDS A 3RD DEGREE POLYNOMIAL THAT MISSES THEM ALL BY EQUAL AMOUNTS OF ALTERNATING SIGNS. THE MINIMUM ERROR IS ALSO COMPUTED, AND PROJECTIONS OF Y VALUES CAN BE PERFORMED. AN ITERATIVE PROCESS WHICH CAN BE USED TO DETERMINE A SEQUENCE OF SUCCESSIVE IMPROVEMENTS TO AN INITIAL APPROXIMATION IS INDICATED, PERMITTING THE DETERMINATION OF AN APPROXIMATION TO A GIVEN F(X) ARBITRARILY CLOSE TO THE OPTIMUM ONE. ALL DATA ARE SAVED BY THE PROGRAM FULLY DOCUMENTED.

221PROGRAM STEPS  
VALENTIN ALBILLO  
E-MADRID.

## ● 52208D 67-REAL ROOTS OF F(X)=0 : 4 DIFFERENT METHODS

THIS PROGRAM HAS BEEN WRITTEN TO SOLVE ANY KIND OF EQUATION IN THE LEAST POSSIBLE AMOUNT OF TIME; IT INCLUDES 4 METHODS: A FAST ITERATIVE METHOD, A QUADRATIC NEWTON'S METHOD, A CUBIC CHEBYSHEV'S METHOD (THE ERROR OF THE IMPROVED APPROXIMATION IS PROPORTIONAL TO THE CUBE OF THE PREVIOUS ONE), AND A PARTIAL NEWTON'S METHOD OF VARIABLE SPEED, PLUS AN AUTOMATIC PLOTTING SUBROUTINE TO HELP YOU LOCATE THE ROOTS. 80 STEPS & 22 REGISTERS LEFT TO DEFINE F(X). FULLY DOCUMENTED.

144PROGRAM STEPS  
VALENTIN ALBILLO  
E-MADRID.

## 52209D 67-"JASS"/SCOREKEEPER

FOR EITHER 67 OR 97 USE, THIS PROGRAM CALCULATES THE SCORE OF BOTH TEAMS, UPDATE THEM SEPARATELY AND KEEPS TRACK OF THE TOTAL RESULT. IT COMPUTES ALSO AT ANY TIME MISSING POINTS. PROGRAM TAKES INTO ACCOUNT SPECIAL EVENTS, SUCH AS "WYSS", "MATCH" OR "STUECK". ERROR CORRECTION IS PROVIDED AS WELL AS AUTOMATIC CLEAR FOR A NEW GAME.

224PROGRAM STEPS  
MARK MAURUN  
CH-FRIBOURG.

## 52210D 67-PHOTO FLASH EXPOSURE-1: GUIDE NUMBERS &amp; CONVERSIONS.

## 52210D (CONTD)

GUIDE NUMBERS ARE CONVENIENT FOR FIGURING FLASH PHOTOGRAPHY EXPOSURES. THIS PROGRAM CALCULATES GUIDE NUMBERS FROM BEAM CANDLE POWER SECOND (ELECTRONIC FLASH, FLASH CUBES ETC.) OR LUMEN-SEC. (FLASH BULBS) OUTPUT AND FILM SPEED OR OUTPUT FROM GUIDE NO. ETC., ALSO INDICATES EXPOSURE (F-STOP) AT DIFFERENT DISTANCES AND RECALCULATES GUIDE NUMBERS FOR DIFFERENT ASA FILM SPEEDS AND FOR METERS AND FEET

173PROGRAM STEPS  
L. ANDREW MANNHEIM  
GB-RICHMOND.

## 52211D 67-PHOTO FLASH EXPOSURE-2: MULTIPLE FLASH

FLASH EXPOSURE DETERMINATION BECOMES DIFFICULT WHEN YOU HAVE SEVERAL FLASH SOURCES OF DIFFERENT POWER, AT DIFFERENT DISTANCES AND ANGLES LIGHTING THE SAME SUBJECT. THIS PROGRAM THEREFORE COMPUTES THE CORRECT F-STOP (LENS APERTURE) SETTING WITH UP TO 5 FLASH SOURCES; YOU ONLY INPUT THE GUIDE NUMBER, DISTANCE AND LIGHTING ANGLE FOR EACH. ALSO INCLUDED IS F-STOP ADJUSTMENT FOR DIFFERENT FILM SPEEDS IN ASA OR DIN AND A METERS/FEET INTERCONVERSION.

087PROGRAM STEPS  
L. ANDREW MANNHEIM  
GB-RICHMOND.

## 52212D 67-BINOCULAR PARAMETERS

FOR A PAIR OF BINOCULARS THE PROGRAM CALCULATES THE MAGNIFICATION, OBJECTIVE DIAMETER, PUPIL DIAMETER AND TWILIGHT FACTOR IF ANY TWO OF THESE PARAMETERS ARE KNOWN. IT ALSO CALCULATES THE LIGHT TRANSMITTING POWER FROM THE PUPIL DIAMETER.

151PROGRAM STEPS  
GB-L. ANDREW MANNHEIM  
GB-RICHMOND.

## 52213D 67-VELOCITY CONVERSIONS

THIS PROGRAM CONVERTS ANY ONE OF VARIOUS VELOCITY UNITS-KM/H, MPH, FEET/SECOND, FEET/MIN., METERS/SECOND, METERS/MIN, INCHES/SECOND AND CM/SECOND - INTO ANY ONE OR ALL OF THE OTHERS. IT ALSO CALCULATES THE LINEAR SPEED AT THE CIRCUMFERENCE OF A ROTATING BODY (E.G. WHEEL) FROM THE RPM SPEED AND RADIUS, OR RPM FROM RADIUS AND LINEAR SPEED AT CIRCUMFERENCE.

209PROGRAM STEPS  
L. ANDREW MANNHEIM  
GB-RICHMOND.

## 52214D 67-PRESSURE AND STRESS CONVERSIONS-1: NORMAL PRESSURES

NUMEROUS PRESSURE AND STRESS MEASURING UNITS EVOLVED OVER THE YEARS IN DIFFERENT FIELDS PRESENT A CONFUSING ARRAY. THIS PROGRAM UNRAVELS THEM BY CONVERTING ANY ONE OF N/CM\*\*2, KP/CM\*\*2, PSI, STD. ATMOSPHERE, METERS HEIGHT OF H2O, BAR, MILLIBAR, INCHES AND MM OF MERCURY AND FEET OF WATER HEAD INTO ANY OR ALL OF THE OTHERS. A SIMILAR PROGRAM-PRESSURE/STRESS CONVERSIONS 2-HANDLES VERY LOW AND VERY HIGH PRESSURES.

218PROGRAM STEPS  
L. ANDREW MANNHEIM  
GB-RICHMOND.

## 52215D 67-PRESSURE &amp; STRESS CONVERSIONS-2: V. LOW &amp; V. HIGH PRESSURES

TO UNRAVEL NUMEROUS PRESSURE AND

## 52215D (CONTD)

STRESS MEASURING UNITS EVOLVED OVER THE YEARS IN VARIOUS FIELDS, THIS PROGRAM CONVERTS ANY ONE OF N/CM\*\*2, MILLIBAR, TORR, DYNES/CM\*\*2, MMH2O, PASCAL (N/M\*\*2), LBF/FT\*\*2, TONS (LONG)/IN.\*\*2, TONS (SHORT,US)/IN.\*\*2, AND TONNES/CM\*\*2 INTO ANY OR ALL OF THE OTHERS. A SIMILAR PROGRAM - PRESSURE/STRESS CONVERSIONS 1 - HANDLES PRESSURE UNITS DESIGNED FOR NORMAL RANGES.

215PROGRAM STEPS  
L. ANDREW MANNHEIM  
GB-RICHMOND.

## 52216D 67-MULTIPLE 2-VARIABLE INTERCHANGEABLE SOL. CONTROL LOGIC

THIS SKELETON PROGRAM CONTAINS ALL THE CONTROL LOGIC FOR A SEQUENCE OF MULTI-WAY 2-VARIABLE FUNCTIONS OF THE GENERAL FORM A=F(B)=F(C)=F(D)=F(E) AND SO ON, WITH INTERCHANGEABLE SOLUTIONS, WHERE ANY ONE OF A, B, C ETC. CAN BE EVALUATED FROM ANY ONE OF THE OTHERS. USER ONLY HAS TO INSERT ACTUAL FUNCTION KEY-STROKES TO COMPLETE PROGRAM. TWO VERSIONS FOR FUNCTIONS INSERTED AS LABELS OR ADDED AS SUBROUTINES, ACCOMMODATING UP TO 10 AND 7 VARIABLES RESPECTIVELY. (INCLUDING A 86 STEPS VERSION)

116PROGRAM STEPS  
L. ANDREW MANNHEIM  
GB-RICHMOND.

## 52217D 67-GEL FILTRATION G-25

ON INPUT OF VES AND H, PROGRAM CALCULATES COLUMN PARAM. VO, VT, VI. THIS DONE, ON INPUT OF VE, CALCULATION OF VE/VO, R, VE/VT, KD, DAV. ON OPTIMAL INPUT OF VS, CALCULATION OF DF. VES=ELUTION VOLUME STANDARD. H=BED HEIGHT. VO=VOID VOLUME. VT=TOTAL VOLUME. VI=INNER VOLUME. VE=ELUTION VOL SAMPLE. VE/VO=RELAT. ELUT. VOL. KD=PARTITION COEFF. KAV=PART. COEFF. LIQUID/GEL. VS=SAMPLE VOL. DF=DILUTION FACTOR.

054PROGRAM STEPS  
JOHAN DECAT  
B-GENT.

## 52218D 67-RUSSIAN PEASANT ALGORITHM

PROGRAM USES THE "RUSSIAN PEASANT ALGORITHM" TO MULTIPLY 2 INTEGERS. I.E. IT ONLY USES DIVIS. AND MULT. BY 2 AND ADDIT. IT ALSO SORTS THE INPUT TO GET THE RESULT THE QUICKEST.

028PROGRAM STEPS  
JOHAN DECAT  
B-GENT.

## 52219D 67-8 FUNCTIONS AND DISTRIBUTIONS

FUNCTION VALUES ARE PROVIDED FOR :  
1) THE INCOMPLETE GAMMA FUNCTION AND THE DERIVATIVE.  
2) THE CHI-SQUARE DISTRIBUTION AND DENSITY FUNCTION.  
3) THE NORMAL DISTRIBUTION AND DENSITY FUNCTION FOR REAL VALUES OF MU AND SIGMA.  
4) THE ERROR FUNCTION AND THE DERIVATIVE.  
THE COMMON SERIES EXPANSION USED, IS MINIMIZED TO 12 LINES AND ALSO INDIRECT BRANCHING IS USED IN ORDER TO CUT DOWN THE RUN-TIME.

195PROGRAM STEPS  
SOREN VIDEBAK NIELSEN  
DK-STROER.

## 52220D 97-SPACE HUNT

TRY TO FIND THE FIVE HIDDEN ENEMY-SPACE SHIPS AND DESTROY THEM. THEY ARE HIDDEN IN NINE DIFFERENT GALAXIES AND PERHAPS BEHIND A STAR. YOU CAN GO FROM ONE GALAXY TO ANOTHER.

## PROGRAM ABSTRACTS

## 52220D (CONTD)

BUT IF YOU MOVE OVER TWO GALAXIES WITHOUT SHOOTING SOME DOWN, A NEW ENEMYSHIP WILL APPEAR. UNFORTUNATELY YOU MIGHT GET SURROUNDED, DO NOT WORRY, YOU CAN HANDLE THEM. USE THE "PHASER" TO DEMATERIALIZE THEM.

224PROGRAM STEPS  
LENNART JUHANSSON  
S-V. FROELUNDA.

## 52221D 67-ZETA FUNCTION FIRST AND SECOND ELLIPTIC INTEGRALS AND AMPLITUDE

THIS COMPACT PROGRAM, IN ONLY A CARD, ALLOWS TO OBTAIN, WITH PERFECT ACCURACY, EVERY FUNCTION OF THE "PROGRAM TITLE". MOREOVER, WITH AMPLITUDE OF UPSILON, ALL JACOBIAN ELLIPTIC FUNCTIONS.

224PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 52222D 67-COMPUTATION AND DISPLAY MANAGEMENT OF TWO VARIABLE FUNCTIONS

PROGRAM PROVIDES LOGICAL ARCHITECTURE TO COMPUTE AND PRINT TWO VARIABLE FUNCTIONS WITHIN ANY INTERVAL AT FIXED LINEAR INCREMENTS. USER DEFINED FUNCTIONS CAN EXTEND UP TO 135 PROGRAM STEPS, 17 REGISTERS AND 12 LABELS.

089PROGRAM STEPS  
PIERRE GRANIER  
F-VANVES

## 52223D 67-WATER LINE PLANE-NAVAL ARCHITECTURE

COMPUTES THE AREA, THE LONGITUDINAL POSITION OF THE CENTER OF GRAVITY, AND THE LONGITUDINAL AND TRANSVERSAL MOMENTS OF INERTIA OF THE BOAT'S WATER LINE PLANE

101PROGRAM STEPS  
ROBERT FREDERIC MENZI  
CH-GENEVA.

## 52224D 67-HULL VOLUMETRY-CENTER OF BUOYANCY-NAVAL ARCHITECTURE

COMPUTES THE VOLUME OF THE HULL AND THE LONGITUDINAL POSITION OF THE CENTER OF BUOYANCY, FOR UNEQUALLY SPACED STATIONS.

063PROGRAM STEPS  
ROBERT FREDERIC MENZI  
CH-GENEVA.

## 52225D 67-E TO 215 SIGNIFICANT FIGURES

THIS PROGRAM CALCULATES THE FIRST 215 DIGITS OF E (THE BASE OF NATURAL LOGARITHMS). IT TAKES ABOUT 3 HOURS.

106PROGRAM STEPS  
STEFAN TRCEK  
U-PFORZHEIM.

## 52226D 97-COX-ANTOINE CURVE FITTING

FOR A SET OF EXPERIMENTAL OR TABULAR DATA POINTS (TEMPERATURE, VAPOR PRESSURE), THIS PROGRAM FITS THE DATA TO THE COX-ANTOINE EQUATION IN  $P=A-B/(T+C)$  BY THE LEAST SQUARES METHOD.  $P=F(T)$  AND  $T=F(P)$  MAY BE CALCULATED BASED ON THE FIT.

200PROGRAM STEPS  
OVE TUBEN VILSTRUP  
DK-SUNDERBORG.

## 52227D 97-THREE DIMENSIONAL

FOR A SET OF DATA POINTS (X,Y,Z) THIS PROGRAM FITS A LINEAR EQUATION OF THE FORM  $Z=A+BX+CY$  BY THE LEAST SQUARES METHOD. THE PROGRAM IS BASICALLY THE SAME AS ST1-13A (00113D), BUT THE ROUTINES FOR INPUTTING THE DATA POINTS IS CHANGED, SO THAT INPUT TIME PER SET IS REDUCED FROM 10 TO 2 SECS.

167PROGRAM STEPS  
OVE TUBEN VILSTRUP  
DK-SUNDERBORG.

## 52228D 97-STRONG BY WEAK PH TITRATION

THIS PROGRAM COMPUTES PH TITRATION CURVE WHEN A STRONG ACID OR BASE IS TITRATED BY WEAK BASE OR ACID. VALID FOR DILUTE SOLUTION.

091PROGRAM STEPS  
MICHEL SIQUET  
B-PLANCENOT.

## 52229D 67-TRIDIAGONAL SYSTEMS (N&lt;=12)

THIS PROGRAM FINDS THE SOLUTION OF A SYSTEM OF N EQUATIONS WITH N UNKNOWN (3<=N<=12), IF THE COEFFICIENT MATRIX A IS TRIDIAGONAL (A(I,J)=0 WHEN J>I+1 OR J<I-1). COEFFICIENTS HAVE TO BE ENTERED ONLY ONCE AND ZERO COEFFICIENTS NEED NOT BE ENTERED. SOLUTION IS CALCULATED VERY FAST (25 SECONDS FOR 12X12). THIS KIND OF SYSTEMS APPEARS IN MANY PROBLEMS: CUBIC SPLINE INTERPOLATION, FINITE DIFFERENCES, ETC...

133PROGRAM STEPS  
FERNANDO DEL REY  
E-MADRID.

## 52230D 67-RATIONAL APPROXIMATION OF 2ND/2ND DEGREE

GIVEN 5 DATA POINTS (X,Y) (NOT NECESSARILY EQUALLY SPACED) PROGRAM WILL FIND A RATIONAL APPROXIMATION OF THE FORM  $Y(X)=A0X+A1X+A2/X+A3X+B1X+B2$  (THIS IS, THE RATIO OF TWO 2ND DEGREE POLYNOMIALS) THAT PASSES THROUGH ALL 5 POINTS. THIS IS VERY USEFUL IF F(X) HAS POLES AND/OR TENDS TO A FINITE LIMIT WHEN X TENDS TO INFINITE. DATA POINTS ARE SAVED BY THE PROGRAM AND PROJECTIONS OF Y VALUES CAN BE PERFORMED. RUNNING TIME DOES NOT EXCEED 13 SECONDS. 7 PAGES OF DOCUMENTATION.

215PROGRAM STEPS  
VALENTIN ALBILLO  
E-MADRID.

## 52231D 67-CLOCK WITH ALARM AND CALENDAR

WITH THIS PROGRAM YOUR HP IS AN ALARM CLOCK, WITH A CALENDAR. IT IS ALSO A CHRONO AND A TIMER. AT 12 HOURS AM, THE DATE AND THE DAY OF WEEK CHANGE.

223PROGRAM STEPS  
JEAN REIBEL  
F-FONTENAY AUX ROSES.

## 52232D 97-NETWORK, CRITICAL PATH

PROGRAM FINDS CRITICAL PATH, EITHER MAXIM OR MINIMUM, IN AN ACYCLIC NETWORK OF MAXIMUM 23 NODES.

170PROGRAM STEPS  
BAKT UNKENHUT  
E-ALICANTE.

## 52233D 97-DURBIN-WATSON TEST OF AUTOCORRELATION

DW STATISTIC TESTS WHETHER RESIDUALS OF REGRESSION ARE AUTOCORRELATED. GIVEN EQUATION, R\*\*2 AND BASIC VALUES OF REGRESSION, DW. COEFFICIENT IS COMPUTED. EQUATION MAY HAVE UP TO FOUR INDEPENDENT VARIABLES. ORIGINAL VALUES CAN OPTIONALLY BE LOADED BY DATA CARD(S).

121PROGRAM STEPS

## 52233D (CONTD)

PETER PESCHEL  
D-ESSEN.

## 52234D 67-TAPE COUNTER POSITION TO TIME CONVERSIONS

PROGRAM CONVERTS TAPE COUNTER POSITIONS TO TIME AND VICE VERSA.

153PROGRAM STEPS  
WALTER LUTZ  
U-FRANKFURT.

## 52235D 97-MULTI-PLANE MOTION OF ROSTRUM CAMERA

TO CALCULATE CO-ORDINATES FOR ZOMM, NORTH/SOUTH, EAST/WEST, AND ROTATION ON ROSTRUM CAMERA. MOVING TO A LINEAR LAW. ANY REQUIRED ACCELERATION/DECELERATION.

206PROGRAM STEPS  
ALLAN WOODS  
LANARK-DOUGLAS.

## 52236D 97-PRIME NUMBERS' LIST

GIVEN A NUMBER N, THIS PROGRAM PRINTS WITH A GREAT RAPIDITY A LIST OF PRIME NUMBERS SINCE N; IT IS A FAST PROGRAM WHICH HAS ONLY ONE LIMITATION: N MUST BE <OR=2.10\*\*9. THIS PROGRAM IS ESPECIALLY FOR THE HP-97.

212PROGRAM STEPS  
PASCAL FAIVRE  
CH-DELEMONT.

## 52237D 97-INTEGRATION WITH NEWTON-COTES, ORDER 3

THIS PROGRAM (ONE OF A SUITE) ESTIMATES THE VALUE OF AN INTEGRAL OVER A FINITE RANGE USING THE NEWTON-COTES' (ORDER 3) FORMULA, WHICH IS MORE PRECISE THAN SIMPSON' METHOD (GENERALLY). THE RESULTS ARE EXACT FOR POLYNOMIALS UP TO 3RD DEGREE. THIS PROGRAM IS RATHER FAST. 169 STEPS ARE AVAILABLE FOR THE F(X)'S SUBROUTINE.

055PROGRAM STEPS  
PASCAL FAIVRE  
CH-DELEMONT.

## 52238D 67-FIBONACCI NUMBERS TO F480

A) PROGRAM GIVES AN INDICATION OF THE SIZE OF THE FIBONACCI NUMBER <10\*\*8. I.E F 10\*\*5 = 2,597 X 10\*\*20898.  
B) COMPUTES FI NO TO ALL FIGURES FOR N<=480 TYPICAL EXECUTION TIMES F100 (21 FIG) 3.5 MIN F480 (100F16) 75 MIN.

223PROGRAM STEPS  
KENT A WIGSTROM  
S-FLUDA.

## 52239D 97-INTEGRATION WITH NEWTON-COTES, ORDER 7

THIS PROGRAM (ONE OF A SUITE) ESTIMATES THE VALUE OF AN INTEGRAL OVER A FINITE RANGE USING THE NEWTON-COTES' (ORDER 7) FORMULA, WHICH IS A LOT MORE PRECISE THAN SIMPSON' METHOD. THE RESULTS ARE EXACT FOR POLYNOMIALS UP TO 7TH DEGREE. THIS PROGRAM IS RATHER FAST. 136 STEPS ARE AVAILABLE FOR THE F(X)'S SUBROUTINE.

088PROGRAM STEPS  
PASCAL FAIVRE  
CH-DELEMONT.

## 52240D 67-CURVE FITTING

PROGRAM FITS A SET OF SIX DATA POINTS TO THE POWER CURVE FIT  $Y=A \cdot X^M + B \cdot X^N + C$ , WHERE THE



## PROGRAM ABSTRACTS

## 52240D (CONTD)

COEFFICIENTS A,B,C AND THE EXPONENTS M, N ARE OPTIMIZED AND COMPUTED USING THE LEAST SQUARES METHOD IN SEVERAL CYCLES.

224PROGRAM STEPS  
JOSE MARIA DEL RIO IGLESIA  
E-BARCELONA.

## 52241D 67-GAUSS-LAGUERRE QUADRATURE

PROGRAM COMPUTES QUADRATURES FROM  $X=A$  AND INFINITE UPPER BOUND BY THE GAUSS-LAGUERRE METHOD. THE INTEGRAND SHOULD HAVE THE FORM  $F(X)/E^{XX}$ . THE ORDER OF COMPUTATION IS ONLY LIMITED BY THE NUMBER OF USED CARDS IF SEQUENCE COEFFICIENT CARDS ARE NECESSARY, THE PROGRAM SHOWS THE NUMBER OF NEXT CARD AND FINALLY THE RESULT. AVAILABLE ARE THE K VALUES 9,10,20,28,32.

056PROGRAM STEPS  
BERND RUTHMAIER  
D-DURMEKSHEIM.

## 52242D 67-GAUSS-HERMITE QUADRATURE

PROGRAM COMPUTES QUADRATURES OVER FUNCTIONS OF THE TYPE  $F(X)/E^{XX^2}$  OVER ALL REAL X. THE ORDER OF THE COMPUTATION IS ONLY LIMITED BY THE NUMBER OF USED COEFFICIENT CARDS. IF A SEQUENCE COEFFICIENT CARD IS NECESSARY, THE PROGRAM SHOWS ITS NUMBER AND FINALLY THE RESULT. AVAILABLE ARE THE K VALUES K=18,20,32,48.

067PROGRAM STEPS  
BERND RUTHMAIER  
D-DURMEKSHEIM 2

## 52243D 97-BELGIAN INCOME TAX 1979

THIS PROGRAM CALCULATES THE TAX THAT MUST BE PAID (IN BELGIAN FRANCS) WHEN THE NET-INCOME (IN THE YEAR 1978) AND THE NUMBER OF FAMILY PARTS IS GIVEN. THE PROGRAM USES NO PRINT INSTRUCTIONS SO IT CAN ALSO BE USED FOR THE 67.

308PROGRAM STEPS  
PETER DE WILDE  
B-MELLE.

## 52244D 97-FINDING THE AVERAGE THE MEDIAN THE MODE(S) OF A SET OF DATA.

A SET OF REAL NUMBERS (UP TO 25 VALUES) RANDOMLY GIVEN IS STORED IN THE CALCULATOR REGISTERS. THE PROGRAM SORTS THE NUMBERS IN A PRESENT ORDER, PRINTING AT THE END, THEIR AVERAGE AND MEDIAN VALUES. ADDITIONALLY, IF AMONG THE DATA THERE ARE ANY MODES, THE PROGRAM GIVES AN INDICATION WHERE AND WHICH THEY ARE.

163PROGRAM STEPS  
ERMINIO SANTI  
I-SANGUINETTO.

## 52245D 67-BEST FIT RECTANGLE

PROGRAM COMPUTES BEST FIT RECTANGLE FOR FOUR GIVEN COORDINATE POINTS IN THE X/Y PLANE. VERTICES, SLOPES OF SIDES AND INTERCEPTS ON THE X/Y AXES CAN BE RECALLED.

224PROGRAM STEPS  
D.T. KANSUM  
GB-KENT.

## 52246D 67-ACID/BASE-AND METALCOMPLEX-EQUILIBRIUM.

PROGRAM CALCULATES EQUILIBRIUM CONCENTRATIONS OF METALCOMPLEXES AND LIGANDPROTONATIONS WITH GIVEN STABILITY CONSTANTS AND PK VALUES.

222PROGRAM STEPS

## 52246D (CONTD)

URS BEKNER  
CH-BAUDEN.

## 52247D 67-MULTIFACTORIAL DESIGN

THIS PROGRAM COMPUTES THE EFFECTS OF UP TO 7 FACTORS ACCORDING TO PLACKETT AND BURMAN AND TESTS THE SIGNIFICANCE OF THE EFFECTS.

194PROGRAM STEPS  
MANFRED SOEFFTGE  
D-WEINHEIM.

## 52248D 67-COBALT-60 CENTRAL RAY DOSE CALCULATIONS

BASED UPON A PRESCRIBED TUMOR DOSE GIVEN OVER SOME GIVEN TREATMENT PERIOD IN SO MANY FRACTIONS PER WEEK, THIS PROGRAM CALCULATES THE DAILY TREATMENT TIME IN MINUTES AND SECONDS AS WELL AS DAILY GIVEN DOSE

166PROGRAM STEPS  
DUN WREDE  
SA-RIYADH.

## 52249D 97-MULTIPLE LINEAR REGRESSION 20R3 INDEPENDENT VARIABLES

GIVES LEAST SQUARES FIT OF  $A+BX+CY+DZ$  TO A SET OF  $(X,Y,Z,T)$  OR  $(X,Y,T)$  DATA. AFTER FITTING THE EQUATION THE CORRELATION COEFFICIENT  $R^{**2}$  MAY BE CALCULATED AND ALSO T ESTIMATED FOR GIVEN  $(X,Y,Z)$  OR  $(X,Y)$  IF  $Z=0$ . HAS SEVERAL ADVANTAGES OVER 00162D, THESE INCLUDE MUCH QUICKER ENTRY OF DATA AND THE OPTION TO SPECIFY A=0 BEFORE SOLVING FOR B,C AND D. THE SOLUTION IS BY GAUSSIAN ELIMINATION.

413PROGRAM STEPS  
MICHAEL CABLE  
GB-SHEFFIELD.

## 52250D 67-THE TWO KUMMER'S CONFLUENT HYPERGEOMETRIC FUNCTIONS

THIS PROGRAM GIVES THE TWO "M AND U KUMMER'S CONFLUENT HYPERGEOMETRIC FUNCTIONS" A ROUTINE FOR GAMMA FUNCTION WITH REAL ARGUMENT IS PROVIDED. MANY A FUNCTION CAN BE OBTAINED WITH KUMMER FUNCTIONS. AN ANNEX WITH APPLICATIONS IS UNITED.

224PROGRAM STEPS  
FELIPE LANDA  
E-CORDUBA.

## 52251D 67-GAUSSIAN HYPERGEOMETRIC AND M-KUMMER'S CONFLUENT FUNCTIONS

THESE TWO FUNCTIONS ARE GIVEN. EVERY PARAMETER AND ARGUMENT CAN BE REAL COMPLEX NUMBERS. AN ANNEX WITH APPLICATIONS IS UNITED AND FOUR AUXILIARY ROUTINES ARE PROVIDED : GAMMA FUNCTION OF REAL ARGUMENT, MULTIPLICATION AND DIVISION BETWEEN COMPLEX NUMBERS AND EXPONENTIAL IX.

224PROGRAM STEPS  
FELIPE LANDA  
E-CORDUBA.

52252D 67-ALL FIGURES OF N-FACTORIAL WITH  $N \leq 141$ 

KEY N BEFORE START,  $0 < N \leq 141$ . THEN PROGRAM WILL STOP AT N-FACTORIAL AND WILL GIVE ALL FIGURES (76 HOURS IF  $N=141$ ) IT TAKES MANY PROGRAM STEPS TO MAKE THE RIGHT STOP IF  $N=137$  TO 141

224PROGRAM STEPS  
HANS AUSEM  
NL-BREDA.

52253D 67-ALL FIGURES OF N-FACTORIAL WITH  $N \leq 123$ 

## 52253D (CONTD)

KEY N BEFORE START,  $0 < N \leq 123$  WITH A YOU WILL GET ALL FIGURES OF N-FACTORIAL (1 HOUR 17 MIN. IF  $N=123$ ) WITH B YOU WILL GET ONLY THE FIRST FIGURES AND THE EXPONENT,  $N \geq 0$  (10 MIN. 10 SEC. IF  $N=521$ )

195PROGRAM STEPS  
HANS AUSEM  
NL-BREDA.

## 52254D 67-CONICAL HELICAL SPRING DESIGN

THIS PROGRAM COMPUTES ALL DATA REQUIRED TO DESIGN CONICAL HELICAL SPRINGS OF ROUND WIRE IN THE PROPORTIONAL AND IN THE UNPROPORTIONAL RANGE.

376PROGRAM STEPS  
KONRAD SCHARRER  
D-MONHEIM-BAUMBERG.

## 52255D 67-METHODS-TIME MEASUREMENT (MTM) STATISTICS

THE PROGRAM PROVIDES, FROM A STATISTIC MODEL, THE CONDITIONS ON WHICH THE USE OF MTM IS BASED. THE MTM-SYSTEMS: MTM1, MTM2, MTM3 AND MTM4 ARE INCORPORATED IN THE PROGRAM. INVOLVED VARIABLES ARE : THE MTM-SYSTEM NUMBER 0 THROUGH 4, THE TIME-ELEMENT, THE ELEMENT FREQUENCY, THE DEVIATION ON THE ELEMENT, THE ELIMINATION TIME, THE CYCLE FREQUENCY AND THE DEVIATION ON THE ELIMINATION TIME. INTERCHANGEABLE SOLUTIONS ARE PROVIDED, SO WHEN ANY SIX VARIABLES ARE GIVEN, THE REMAINING ONE MAY BE CALCULATED

172PROGRAM STEPS  
SOREN VIDEBEK NIELSEN  
DK-STURER.

## 52256D 67-WOEHLER-LINES

STATISTICAL ANALYSIS OF FATIGUE STRENGTH VALUES FOR FINITE LIFE (WOEHLER-TEST). S-N DIAGRAM (STRESS-CYCLE DIAGRAM) IS CALCULATED AND CAN BE DRAWN.

354PROGRAM STEPS  
FRANZ SAGMUELLER  
A-HOHENBERG.

## 52257D 67-THE AMAZON GAME

SPACE DOES NOT PERMIT A FULL DESCRIPTION HERE. THE GAME IS PLAYED ON A CHESSBOARD INVOLVING SOME MARKERS AND TWO PIECES - THE AMAZONS - WHICH CAN ATTACK LIKE A QUEEN AND A KNIGHT. TAKING ONE AMAZON EACH YOU AND THE CALCULATOR MAKE ALTERNATE MOVES BY PUTTING THE AMAZON ON UNTHREATENED UNMARKED SQUARES AND LEAVING THE MARKERS ON PREVIOUSLY OCCUPIED SQUARES. WHOEVER RUNS OUT OF MOVES FIRST LOSES THE GAME.

202PROGRAM STEPS  
ALEXANDER GRUZA  
GB-LONDON.

## 52258D 67-INCOME PROPERTY PROJECTION ANALYSIS BEFORE TAXES

MAKE A PROJECTION FOR X YEARS INCOME PROPERTY ANALYSIS (BEFORE ANY TAXATION), KNOWING THE FOLLOWING VARIABLES : GROSS INCOME, EXPENSES (CHARGES), LOAN AMOUNT, PERIODIC LOAN PAYMENT, AMOUNT OF EQUITY, PERIODIC INTEREST LOAN RATE, EXPECTED INFLATION RATE. THIS PROGRAM IS PROGRAMMED TO GIVE A 10 YEAR PROJECTION. HOWEVER, IT MAY BE STOPPED AT ANY TIME OR GIVE A PROJECTION OF MORE THAN 10 YEARS.

189PROGRAM STEPS  
CHRISTIAN H. MARYSSAEL  
B-BRUSSELS.

## PROGRAM ABSTRACTS

## 52259D 67-PROPERTY RESALE AFTER X YEARS

THIS PROGRAM FOLLOWS THE PROGRAM "INCOME PROPERTY PROJECTION ANALYSIS BEFORE TAXES". IT GIVES THE PROFIT ON A RESALE OF A PROPERTY AFTER A CERTAIN NUMBER OF YEARS, THE YEARLY RETURN AVERAGE YIELD (SIMPLE INTEREST AND COMPOUNDED INTEREST), INCLUDING THE CASH FLOWS RECEIVED DURING THE OWNERSHIP OF THE PROPERTY.

118PROGRAM STEPS  
CHRISTIAN H. MARYSSAEL  
B-BRUSSELS.

## 52260D 67-TELEPHONE : TIME &amp; CHARGES INTERNATIONAL CALLS FROM BELGIUM

PROGRAM USES A TEN SECOND LOOP TO TIME A TELEPHONE CALL (INTERNATIONAL CALL, FROM BELGIUM OR ANY COUNTRY USING THIS SYSTEM OF TELEPHONE CHARGES). THE LOOP PAUSES FIRST TO DISPLAY TENS OF SECONDS, THEN FIVE PAUSES DISPLAY MINUTE ONE IS INTO LEFT OF DECIMAL POINT AND CHARGE IN FRANCS TO THE RIGHT. IT MAY STOCK ASUB-TOTAL OF ALL INTERNATIONAL CALLS ON A DATA CARD.

119PROGRAM STEPS  
CHRISTIAN H. MARYSSAEL  
B-BRUSSELS.

## 52261D 97-DENSITY &amp; THERMAL EXPANSION FROM PYKNOMETER WEIGHTS

PYKNOMETER WEIGHTS ARE EVALUATED TO CALCULATE DENSITY (IN THE CASE OF SOLIDS ALSO VOLUME) AND OPTIONALLY VOLUMETRIC THERMAL EXPANSION RELATIVE TO A REFERENCE DENSITY. CORRECTION FOR ATMOSPHERIC BUOYANCY AND TEMPERATURE VARIANCE IS PROVIDED. SERIES CAN BE EVALUATED FOR MEAN AND STANDARD DEVIATION (COROLLARY TO PROGRAM 52193D).

223PROGRAM STEPS  
ED. CALLAHAN  
D-DUESSELDORF.

## 52262D 67-CHAPQ 10

UP TO 10 PLAYERS CAN PLAY THIS GAME OF POKER DICE. AT THE BEGINNING, EACH PLAYER HAS 3 COUNTERS. THE GAME IS DIVIDED IN PARTIAL GAMES BETWEEN TWO CONSECUTIVE PLAYERS. EACH PLAYER MUST, WHEN IT IS HIS TURN AND AFTER HAVING ROLLED THE DICE UNDER THE CHAPQ (HAT) OR HAVING MADE THE CHAPQ PARTIALLY BETTER, OUTBLUFF THE PREVIOUS PLAYER. HIS BLUFF MAY BE CALLED BY THE NEXT PLAYER IN THE GAME LUSES THE GAME.

223PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52263D 67-EQUAL BIRTHDAYS

THIS PROGRAM CALCULATES THE PROBABILITY THAT IN A GROUP OF N PERSONS TAKEN RANDOMLY, AT LEAST TWO HAVE THE SAME BIRTHDAY. YOU CAN TAKE A YEAR OF EITHER 365 OR 366 DAYS. A SUBROUTINE ALLOWS YOU TO MAKE THE NECESSARY DATA-CARD.

104PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52264D 67-B-BLACKJACK

IN THIS BLACK-JACK-GAME, AGAINST MAC ACTING AS BANK, CARDS ARE DEALT FROM A QUASI REAL DECK OF 52 CARDS AND NO NEW DECK IS ALLOWED BEFORE THE LAST CARD OF THE FIRST DECK HAS BEEN USED. ANOTHER INNOVATION IS THE 7 CARDS-RULE AND THE FACT THAT KING, QUEEN AND VALET ARE SHOWN AS

## 52264D (CONTD)

13,12,11, BUT COUNTED AS 3,2,1 ACCORDING TO THE B-RULES. AN ACE COUNTS FOR 1 OR 11 AND THE PROGRAM TAKES THE MORE PROFITABLE SCORE FOR BOTH PLAYERS.

224PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52265D 67-FOUR MARRIED COUPLES BEFORE A RIVER

FOUR MARRIED COUPLES HAVE TO CROSS A RIVER WITH A BOAT THAT CAN HOLD ONE OR TWO PERSONS. ONLY THE MEN CAN ROW. IN THE MIDDLE OF THE RIVER IS AN ISLAND. NO MAN WANTS HIS WIFE TO BE NEAR ANOTHER MAN, WHILE HE HIMSELF IS ABSENT. YOUR HP CAN SHOW YOU HOW THE COUPLES NEVERTHELESS CAN GET TO THE OTHER SIDE.

181PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52266D 67-SMALL FACTORS FOR LARGE INTEGERS

THIS PROGRAM FINDS ALL FACTORS SMALLER THAN 1000, FOR GIVEN INTEGERS WITH UP TO 73 DIGITS.

194PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52267D 67-PAIRS OF PRIMES WITH GIVEN DIFFERENCE

THIS PROGRAM GIVES A LIST OF PAIRS OF PRIMES WITH GIVEN DIFFERENCE, STARTING FROM A GIVEN LIMIT.

135PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

52268D 67-PAIRS OF PRIMES AND  $2P+1$ 

THIS PROGRAM GIVES A LIST OF PAIRS OF PRIMES ( $P$ ,  $2P+1$ ), STARTING FROM A GIVEN LIMIT.

131PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52269D 67-MOEBIUS TRANSFORMATION

GIVEN 4 COMPLEX NUMBERS  $A, B, C, D$ , THIS PROGRAM FINDS THE IMAGE OR THE ORIGINAL OF A GIVEN COMPLEX NUMBER  $Z$  IN THE COMPLEX PLANE, BY THE MOEBIUS TRANSFORMATION  $Z = (AZ+B):(CZ+D)$ .

111PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52270D 67-BEST CONIC WITH GIVEN CENTER THROUGH GIVEN POINTS

THIS PROGRAM FINDS THE BEST ELLIPSE OR HYPERBOLA WITH CENTER IN THE ORIGIN, THROUGH AN ARBITRARY NUMBER OF GIVEN POINTS.

192PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52271D 67-BEST CONIC WITH GIVEN FOCUS THROUGH GIVEN POINTS

THIS PROGRAM FINDS THE BEST CONIC (ELLIPSE OR HYPERBOLA) WITH FOCUS IN THE ORIGIN, THROUGH AN ARBITRARY NUMBER OF POINTS.

223PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52272D 67-BEST CONIC THROUGH GIVEN POINTS

THIS PROGRAM FINDS THE BEST CONIC THROUGH AN ARBITRARY NUMBER OF GIVEN POINTS.

384PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52273D 67-EULER'S INHERITANCE PROBLEM

GIVEN TWO INTEGERS  $A$  AND  $N$  ( $A > 0$ ,  $N > 1$ ), THE CONSECUTIVE HEIRS OF AN INHERITANCE, NUMBERED FROM 1 UP, EACH RECEIVE AS THEIR PART A SUM OF  $A$  TIMES THEIR SEQUENCE NUMBER, PLUS ONE  $N$ -TH OF THE REMAINING INHERITANCE. STRANGELY ENOUGH, THIS WAY OF DIVIDING THE INHERITANCE RESULTS IN EQUAL PARTS FOR EACH HEIR. CAN YOU FIND THE AMOUNT OF THE INHERITANCE, THE AMOUNT OF EACH PART, THE TWO COMPONENTS ( $1 \cdot A$  AND ONE  $N$ -TH OF THE REST) FOR EACH HEIR, AND THE NUMBER OF HEIRS ? YOUR HP CAN !

045PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52274D 67-OPTIMUM VESSEL SIZE

PROGRAM QUICKLY ESTIMATES, IN METRIC, SI OR ENGLISH UNITS, OPTIMUM SIZE (DIAMETER  $D$ , LENGTH  $L$ , THICKNESS, ETC...) FOR CYLINDRICAL PRESSURE VESSELS.

224PROGRAM STEPS  
GIUSEPPE LIGATO  
I-MILANING.

## 52275D 67-CHESS MOVE STORE

WITH THIS PROGRAM YOU CAN STORE, RECALL, CLEAR AND REPLACE UP TO 60 4-DIGIT CHESS MOVES PER CARD. THE NUMBER OF CARDS IS UNLIMITED. CALCULATOR LETS YOU KNOW WHEN NEW CARD IS NEEDED. PROPOSED BUT NOT OBLIGATORY CODE IS VERY EASY TO UNDERSTAND.

179PROGRAM STEPS  
BERTRAM FEUERBACHER  
D-PFORZHEIM

## 52276D 67-97-NEW TABULATOR

PROGRAM HELPS TO SUM UP TO 1 TO 25 DATA-FILES BY SHOWING YOU ALTERNATING THE NUMBER OF REGISTER (FILE) FROM 1 TO A CHOSEN NUMBER (MAX. 25) YOU CAN PRINT OUT SUMS.

090PROGRAM STEPS  
FRITZ MAREK  
A-EISENTRATTEN.

52277D 97-CRITICAL DESATURATION IN  $N_2$  TIME FOR TISSUES

THIS PROGRAM CALCULATES FOR FOUR TISSUES OF 120, 60, 30 AND 7 MINUTES PERIOD, THE TIME TO HAVE SPENT AT A DEPTH  $D+DD$  TO DESATURATE NITROGEN AT  $D$  DEPTH, AND THE MINIMUM TIME TO HAVE SPENT AT  $D+DD$  TO NEED A DECOMPRESSION STOP IF THE TISSUES ARE TO RETURN AT THE SURFACE LEVEL. THAT, WHEN YOU SCUBA DIVE, RESPIRATING AIR.

126PROGRAM STEPS  
MICHEL SIQUET  
B-PLANCENOIT.

## 52278D 67-DEFINITE INTEGRAL 4 SIMPSON

WITH A CONTINUOUS AREA BETWEEN THE GIVEN LIMITS THE PROGRAM APPROXIMATES :

1. THE AREA UNDER THE CURVE.
2. THE VOLUME TRACED OUT BY THAT AREA, REVOLVED.
3. THE CENTROIDS OF THAT AREA.
4. THE CENTER OF GRAVITY OF THE VOLUME TRACED OUT... USING

## PROGRAM ABSTRACTS

## 522780 (CONTD)

## "SIMPSONS RULE"

077PROGRAM STEPS  
LAWRENCE B. HARTLEY  
GB-BRIERFIELD.

## 522790 67-AIRY FUNCTIONS, DERIVATIVES AND INTEGRALS WITH COMPLEX VARIABLE

THIS PROGRAM GIVES  $Ai(Z)$  AND  $Bi(Z)$ , DERIVATIVES AND INTEGRALS FOR ANY REAL OR COMPLEX ARGUMENT.

202PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 522800 67-A-HOE-A

THIS IS AN OLD AFRICAN GAME IN WHICH TWO PLAYERS TRY TO TAKE AS MUCH SHELLS AS POSSIBLE. AT THE START YOU AND THE HP HAVE BOTH SIX PILES OF FOUR SHELLS. TO MOVE THE SHELLS TAKE THEM OUT OF A PILE AND DEAL ONE BY ONE IN A COUNTERCLOCK MANNER. TO TAKE THE SHELLS TRY TO STOP IN YOURS (OR HIS) PILE NUMBER ONE.

222PROGRAM STEPS  
HERMAN PEETERS  
B-BOECHOUT.

## 522810 67-INTEGERS SOLUTIONS AND CONTINUED FRACTIONS

THIS PROGRAM WILL CONVERT FRACTIONS (OR DECIMAL FORMS) TO CONTINUED FRACTIONS AND THE REVERSE. IT GIVES YOU SUCCESSIVE APPROXIMATIONS. THE PROGRAM CAN SOLVE ONE (OR TWO) LINEAR EQUATION(S) IN TWO (OR THREE) UNKNOWN(S) WITH INTEGER SOLUTIONS. THERE IS ALSO A LABEL TO FIND THE G.C.D.

224PROGRAM STEPS  
HERMAN PEETERS  
B-BOECHOUT.

## 522820 67-CONTINUOUS BEAMS SUPPORT MOMENTS

THIS PROGRAM IS AN EXTENSION OF 519340 AND CALCULATES THE EFFECT OF AN APPLIED MOMENT AT ANY SUPPORT ON THE OTHER SUPPORTS OF A CONTINUOUS BEAM. THE MAXIMUM NUMBER OF SPANS IS NOT TO EXCEED 9.

187PROGRAM STEPS  
AGHA MUNIR SHERWANI  
U.A.E.-SHARJAH.

## 522830 67-CORRELATION PROBLEMS

THE PROGRAM COMPUTES THE CORRELATIONS COEFFICIENT OF A SAMPLE OF A BIVARIATE NORMAL POPULATION, FURTHERMORE A CONFIDENCE INTERVAL FOR THE CORRELATION COEFFICIENT OF THE POPULATION CAN BE OBTAINED.

214PROGRAM STEPS  
GUIDO PETZ  
S-SOLNA.

## 522840 67-VARIATIONS ON QUEEN GAME

SIMILAR TO QUEEN GAME YOU AND MAC MUST MOVE A CHESSMAN TO THE LOWER LEFT HAND CORNER OF THE BOARD. SIZE (NXN N = 99999). THERE ARE TWO INDEPENDENT CARDS. YOUR CHESSMAN IS A COMBINATION OF: KING AND HORSE (KNIGHT) KING AND BISHOP - KING AND CASTLE - KING AND HORSE AND CASTLE OR KING AND HORSE AND BISHOP. THE MACHINE IS A MASTER PLAYER SO IT IS DIFFICULT TO BEAT IT.

399PROGRAM STEPS  
HERMAN PEETERS  
B-BOECHOUT.

## 522850 67-POLYNOMIAL SET UP

## 522850 (CONTD)

THIS PROGRAM FACILITATES DATA ENTRY FOR PROGRAM MA1-06 "POLYNOMIAL SOLUTIONS". NOW THE USER CAN LOAD ALL THE EQUATION'S COEFFICIENTS, REGARDLESS OF THE RULE : LEADING COEFFICIENT MUST BE 1.

094PROGRAM STEPS  
JIMMY PLATONIS  
GR-ATHENS.

## 522860 67-SCHWARZSCHILD CORRECTION 2

PROGRAM CALCULATES CORRECT EXPOSURE TIME IN THE REGION WHERE THERE IS NO MORE A LINEAR RELATIONSHIP BETWEEN EXPOSURE TIME, INTENSITY OF LIGHT (I.E. FOR EXP. TIMES > 1S), DUE TO THE SCHWARZSCHILD EFFECT. PROGRAM DESIGNED FOR AGFACOLOR CT 18.

012PROGRAM STEPS  
JULIAN DECAT  
B-GENT.

## 522870 67-DIRECT REDUCTION LOAN-SINKING FUND ANNUITIES AND COMPOUND AMOUNTS

THIS PROGRAM SOLVES A LOT OF PROBLEMS OF LOANS, MORTGAGES, SAVINGS AND LEASES, WHEN PAYMENTS ARE MADE AT THE END OR BEGINNING OF COMPOUNDING PERIODS. IT GIVES ALSO THE CONSTANT RATE, REMAINING BALANCE AT ANY TIME, IT SOLVES BALLOON MORTGAGES. IT ALSO CALCULATES ALL VARIABLES IN COMPOUND INTEREST SITUATION. IN ONE PROGRAM AND ONE MAGNETIC CARD, IT SOLVES ALL THE PROBLEMS SOLVED BY THE THREE PROGRAMS WRITTEN ABOVE.

223PROGRAM STEPS  
CHRISTIAN H. MAKYSSAEL  
B-BRUSSELS.

## 522880 67-EXACT SOLUTION OF RATIONAL LINEAR SYSTEM IN 4 UNKNOWN

GIVING A LINEAR SYSTEM IN 1,2,3 OR 4 UNKNOWN IN WHICH ALL COEFFICIENTS ARE INTEGERS, THE PROGRAM GIVES THE EXACT SOLUTION : EACH UNKNOWN IS GIVEN IN A RATIONAL FRACTION.

187PROGRAM STEPS  
ALI AMKADUI  
MOROCCO-CASABLANCA.

## 522890 97-TURNING CLOTHOIDE

THE TURNING CLOTHOIDE CONSISTS OF TWO SIMPLE CLOTHOIDS OF OPPOSITE DIRECTIONS. THE PARAMETER OF EACH SIMPLE CLOTHOIDE IS PRESUMED TO BE KNOWN, AS WELL AS THE RADIUS OF THE CIRCULAR ARC AT THE END OF EACH SIMPLE CLOTHOIDE. THE PROGRAM COMPUTES THE PRINCIPAL ELEMENTS OF THE TURNING CLOTHOIDE.

219PROGRAM STEPS  
CHRISTIAN SCHLEIFER  
D-HAMBURG.

## 522900 67-RELATIONSHIP BETWEEN STOCK, AVERAGE AND PRICE

FOR TEN ARTICLES BY CARD, COMPUTES PERCENTAGE VALUE BETWEEN STOCK AND AVERAGE. LIST THEM AND PRICES. SUM (AND STORE IN REGISTER E) STOCK OR AVERAGE. MULTIPLY STOCK BY PRICE FOR EACH ARTICLE AND SUM THEM (IN REGISTER E). A MERGE MODE IS POSSIBLE FOR IMPUTE VARIOUS CARDS IN ACCUMULATIVE SUM OR MULTIPLICATION. ALSO STORES AND LIST VALUES FOR STOCK, AVERAGE AND PRICE.

224PROGRAM STEPS  
JOSE FONT  
E-BARCELONA.

## 522910 67-BLACK BOX

## 522910 (CONTD)

YOU SEARCH FOUR "PLANETS" HIDDEN BY THE CALCULATOR IN THE HUNDRED CENTRAL SQUARES OF A 12X12 SQUARES BOARD. TO LOCATE THEM, YOU CAN SEND LASER RAYS HORIZONTALLY OR VERTICALLY CROSS THE BOARD : A RAY MAY BE ABSORBED OR DRIFTED BY THE PRESENCE OF A PLANET IN OR NEAR ITS WAY ; YOU MUST FIND WITH AS FEW RAYS AS POSSIBLE. AT THE END THE CALCULATOR SHOWS THE 2 COORDINATES OF EACH PLANET FOR YOU TO TEST YOUR HYPOTHESIS.

189PROGRAM STEPS  
JEAN-CLAUDE DUFORD  
F-METZ.

## 522920 67-INTERCEPTION

FROM WIND, SPEED OF INTERCEPTOR, TRACK & SPEED OF AIM, BEARING & DISTANCE BETWEEN THEM, COORDINATES OF STARTING POINT (OPTION) PROGRAM COMPUTES DATAS TO ACHIEVE INTERCEPTION (TRUE HDG, TIME, TRUE TRACK, GROUND SPEED, DISTANCE FLOWN, POSITION OF INTERCEPTION).

179PROGRAM STEPS  
PIERRE TALMANT  
F-PARIS.

## 522930 67-WEIBULL DISTRIBUTION

THIS PROGRAM CAN BE USED TO FIND :  
1) PARAMETERS A AND B THE WEIBULL DISTRIBUTION APPLIED TO ANALYSIS FOR FAILURE, WHEN INCREASING TIMES TO FAILURE ARE KNOWN;  
2) COEFFICIENT OF CORRELATION  
3) THE DENSITY FUNCTION;  
4) MTTF (MEAN TIME TO FAILURE)

217PROGRAM STEPS  
ARNALDO MUSA  
I-SESTO S. GIOVANNI.

## 522940 97-COLD STORAGE ROOM I

PROGRAM CALCULATES COLD STORAGE ROOM ABOVE 0 DEGREE HEAT BALANCE ACCORDING WITH ROOM TEMPERATURE, GOODS TEMPERATURE, DAILY STORAGE IN KGS, SPECIFIC HEAT AND ROOM EXTERNAL DIMENSIONS. PROGRAM DISPLAYS : SURFACE ISOLATION (M2); ROOM INTERNAL VOLUME (M3); OPERATING DATA COMPRESSOR CAPACITY IN KCAL/H FOR 15, 16, 17, 18 AND 19 HOURS PER DAY. THIS PROGRAM SELECTS ISOLATION THICKNESS AND HEAT AIR-CHANGE ACCORDING WITH INTERNAL TEMPERATURE; ALSO SELECTS HEAT FANS IN PERCENTAGE OF HEAT BALANCE.

222PROGRAM STEPS  
JUAN LUIS GARCIA LAGO  
E-MURCIA.

## 522950 97-FREEZE STORAGE ROOM II

PROGRAM CALCULATES FREEZE STORAGE ROOM (BELOW 0 DEGREE) HEAT BALANCE ACCORDING WITH ROOM TEMPERATURE, GOODS TEMPERATURE, DAILY STORAGE KGS, POSITIVE SPECIFIC HEAT, LATENT HEAT, NEGATIVE SPECIFIC HEAT AND ROOM EXTERNAL DIMENSIONS. PROGRAM DISPLAYS: ROOM INTERNAL VOLUME (M3) SURFACE ISOLATION (M2); OPERATING DATA COMPRESSOR CAPACITY IN KCAL/H FOR 16 AND 18 HOURS PER DAY. THIS PROGRAM SELECTS ISOLATION THICKNESS AND HEAT AIR-CHANGE ACCORDING WITH INTERNAL TEMPERATURE.

223PROGRAM STEPS  
JUAN LUIS GARCIA LAGO  
E-MURCIA.

## 522960 97-TCHEBYCHEFF POLYNOMIALS

THIS PROGRAM CALCULATES  $T_N(X)$  FOR A GIVEN X. IT DOES NOT USE AN ITERATIVE PROCESS SO EXECUTION TIME DOES NOT DEPEND ON N. IT ALSO FINDS THE

## PROGRAM ABSTRACTS

## 52296D (CONTD)

ROOTS OF TN - NTH ORDER TCHEBYCHEFF POLYNOMIAL - PROVIDES THE INFORMATION FOR A NEAR-OPTIMUM INTERPOLATION.

092PROGRAM STEPS  
BERNARD SIRET  
F-SAINT-CLOUD.

## 52297D 97-TRIANGLE SOLUTION

PROGRAM FINDS THE SIDES, THE RADIIUS OF THE OUTER CIRCLE AND OF THE INNER CIRCLE, THE AREA AND THE ANGLES OF A TRIANGLE, IF THE COORDINATES OF THE THREE POINTS IN A 2 DIMENSIONAL COORDINATE SYSTEM ARE GIVEN.

180PROGRAM STEPS  
MICHAEL TARNOWSKI  
D-WIESBADEN.

## 52298D 97-CURVE SOLUTION

PROGRAM FINDS 1) ARC OF CIRCLE, 2) AREA OF CIRCLE, 3) RADIUS, 4) ANGLE OF CENTRAL POINT AND MORE PARAMETERS OF THE CIRCLE SEGMENT, IF TWO PARAMETERS ARE GIVEN.

153PROGRAM STEPS  
MICHAEL TARNOWSKI  
D-WIESBADEN.

## 52299D 67-IMPROVED NUMBER TRANSFORMATION

THIS PROGRAM CONVERTS ANY INTEGER NUMBER, POSITIVE OR NEGATIVE WITH ANY BASE BETWEEN 1 AND 100, TO ANOTHER NUMBER WITH ANY BASE BETWEEN 1 AND 100. THE MOST COMMON BASES; BINARY (2), OCTAL (8), DECIMAL (10) AND HEXADECIMAL (16) ARE CONVERTED AUTOMATICALLY WITHOUT ENTERING THE BASES. THE CONVERTING TIME IS BETWEEN 5 AND 14 SECONDS.

108PROGRAM STEPS  
ALM GUNNAR  
S-FARSTA.

## 52300D 67-NON-PARAMETRIC RUN-TEST

YOU CAN TEST IF TWO SAMPLES COME FROM POPULATIONS HAVING THE SAME DISTRIBUTION. (ONE TREATMENT IS BETTER THAN ANOTHER). ARRANGE THE OBSERVATIONS OF THE TWO SAMPLES ACCORDING TO SIZE. YOU CAN ALSO TEST IF A SAMPLE IS DRAWN AT RANDOM FROM ONE POPULATION. THE PROGRAM CALCULATES THE DISTRIBUTION OF RUNS EXACT AND/OR WITH NORMAL APPROXIMATION.

224PROGRAM STEPS  
STEN SUNDBERG  
S-UREBRU.

## 52301D 67-TREND ANALYSIS

WITH THIS PROGRAM YOU CAN COMPUTE THE FOLLOWING OF A TREND WHEN IS GIVEN A NUMBER OF VALUES AND THE SPAN OF THE MOVING AVERAGE (SPAN MAX=22). BECAUSE THIS IS A SMALL PROGRAM, IT CAN BE USEFULL AS SUBROUTINE.

055PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 52302D 67-FAREY SEQUENCE

GIVEN A POSITIVE INTEGER N, THIS PROGRAM GIVES AN ORDERED LIST OF IRREDUCIBLE FRACTIONS FROM 0/1 TO 1/1, HAVING N AS HIGHEST DENOMINATOR.

046PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52303D 67-REVERSE WITH AUTOMATIC SOLUTION

GIVEN A POSITIVE INTEGER WITH NINE DIFFERENT DIGITS (NO ZERO), YOU MUST TRY TO GET THEM IN NATURAL ORDER BY REVERSING THE ORDER OF THE DIGITS IN CHOSEN LEFT PARTS OF THE NUMBER. YOU CAN TRY AND ACHIEVE THIS ALONE, OR YOU CAN LET MAC DO IT FOR YOU AUTOMATICALLY.

111PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52304D 67-FIBONIM

TWO PLAYERS (YOU AND MAC) ALTERNATIVELY TAKE A NUMBER OF OBJECTS FROM A GIVEN PILE, AT LEAST ONE, AND AT MOST TWICE THE PREVIOUS NUMBER TAKEN. THE FIRST PLAYER CAN TAKE ANY NUMBER OF OBJECTS, BUT NOT ALL. WINNER IS HE WHO TAKES LAST OBJECT. FALSE MOVES ARE REJECTED.

092PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52305D 67-HALVING A TRIANGLE

THROUGH A GIVEN POINT, ONE HAS TO DRAW A STRAIGHT LINE, CUTTING A GIVEN TRIANGLE INTO TWO PART, THE TRIANGULAR PART OF WHICH IS EXACTLY 1/2 (OR MORE GENERALLY 1/K) OF THE GIVEN TRIANGLE.

111PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52306D 67-BROCARD POINTS

GIVEN THE COORDINATES OF THE VERTICES OF A TRIANGLE IN AN ORTHONORMAL BASE, THIS PROGRAM FINDS THE SIDES, THE ANGLES, BROCARD'S ANGLE AND THE TWO BROCARD POINTS OF THE TRIANGLE.

187PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52307D 67-PLUCKER'S HYPERBOLAS

GIVEN THE EQUATION OF A CONIC IN AN ORTHONORMAL BASE, THIS PROGRAM FINDS THE EQUATIONS OF THE TWO HYPERBOLAS OF PLUCKER. SUBROUTINES PERMIT TO FIND ANY NUMBER OF POINTS EITHER FOR THE GIVEN CONIC, OR FOR THE TWO HYPERBOLAS.

217PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52308D 67-HYPERBOLA OF APOLLONIUS

GIVEN THE EQUATION OF A CONIC IN AN ORTHONORMAL BASE, THIS PROGRAM FINDS THE EQUATION OF THE HYPERBOLA OF APOLLONIUS FOR A GIVEN POINT. SUBROUTINES PERMIT TO FIND ANY NUMBER OF POINTS EITHER FOR THE GIVEN CONIC, OR FOR THE HYPERBOLA.

207PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52309D 67-CONIC TRANSFORMED BY HOMOMLOGY

GIVEN THE EQUATION OF A CONIC AND THE ELEMENTS OF A HOMOMLOGY (WITH THE ORIGIN AS CENTER), THIS PROGRAM FINDS THE EQUATION OF THE TRANSFORMED CONIC. SUBROUTINES PERMIT TO FIND POINTS OF THE GIVEN CONIC AND CORRESPONDING POINTS OF THE TRANSFORMED CONIC, OR TO FIND THE IMAGES OF GIVEN POINTS IN GENERAL.

187PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52310D 67-RECIPROCAL POLAR CONIC OF GIVEN CONIC FOR GIVEN BASE-CONIC

GIVEN A BASIC CONIC C AND A SECOND CONIC C', THIS PROGRAM FINDS THE RECIPROCAL POLAR CONIC OF C' WITH RESPECT TO C.

215PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52311D 67-STANDARD SUMMARY OF A PROPERTY OFFERING

INPUTING A PURCHASE PRICE OF A PROPERTY, DOWN PAYMENT, YEARLY INTEREST RATE AND TERM OF THE MORTGAGE, THIS PROGRAM GIVES THE FOLLOWING SCHEDULE: PERCENTAGE OF CASH DOWN REGARDING THE TOTAL PURCHASE PRICE AMOUNT, MORTGAGE AMOUNT, PERCENTAGE OF THE MORTGAGE REGARDING THE TOTAL PURCHASE PRICE AMOUNT, MONTHLY INTEREST RATE, TERM (MONTHS), CONSTANT REIMBURSEMENT RATE OF THE MORTGAGE (MONTHLY AND YEARLY), MONTHLY AND YEARLY PAYMENTS.

116PROGRAM STEPS  
CHRISTIAN H. MARYSSAEL  
B-BRUSSELS.

## 52312D 67-INTEGRATION BY EULER MAC/LAURIN METHOD

WITH THIS PROGRAM ONE CAN FIND RAPIDLY THE DEFINITE INTEGRAL OF A FUNCTION F(X) OF ONE REAL VARIABLE X ON A FINITE INTERVAL WITH VERY GOOD ACCURACY FOR LITTLE NUMBER OF SUMMATION STEPS. PROGRAM USES THE SO CALLED EULER/MAC LAURIN METHOD WHICH REQUIRES CALCULUS OF DERIVATIVE FUNCTION F'(X) AND EVENTUALLY F'''(X) WHEN HIGH ACCURACY IS REQUIRED.

141PROGRAM STEPS  
ALBERT LOUIS BOISRAYON  
F-LE BEAUSSET.

## 52313D 97-PROBABILITY INTEGRAL

THE VALUE OF THE PROBABILITY INTEGRAL IS USUALLY OBTAINED FROM TABLES. IT CAN, HOWEVER, READILY BE CALCULATED FROM A CONVERGENT INFINITE SERIES. THIS PROGRAM PERFORMS AN INFINITE SERIES CALCULATION, FOR ANY GIVEN X, AND DISPLAYS (IN PRINT, OR, IF WANTED, DURING A "PAUSE") THE VALUE OF THE SUMMED SERIES INCLUDING THE LAST TERM CALCULATED UP TO THAT MOMENT. THE CALCULATOR MAY BE INTERRUPTED AS SOON AS THE DESIRED PRECISION HAS BEEN REACHED.

048PROGRAM STEPS  
WALTER H. OETTINGER  
A-VIENNA.

## 52314D 97-SCREW THREADS (METRIC AND SO CALLED UNIFIED BRITISH-U.S)

GIVEN DIAMETER AND PITCH (OR "THREADS PER INCH") OF A SCREW THREAD (METRIC, OR "UNIFIED AND AMERICAN STANDARD"), PROGRAM WILL CALCULATE AND PRINT THREAD DEPTH (THEORETICAL AND ACTUAL), PITCH AND ROOT DIAMETERS, ROOT RADIUS, AND ROOT AND STRESS AREAS. OUTPUT MAY OPTIONALLY BE IN THE SAME SYSTEM OF MEASUREMENTS AS INPUT (METRIC OR IN INCHES) OR CONVERTED TO THE OTHER. PROGRAM ALSO HANDLES THE "NUMBERED" THREAD SIZES OF THE "UNIFIED AND AMERICAN STANDARD" SERIES.

223PROGRAM STEPS  
WALTER H. OETTINGER  
A-VIENNA.

## 52315D 67-SPHERICAL AND MODIFIED SPHERICAL BESSEL FUNCTIONS



## PROGRAM ABSTRACTS

## 52315D (CONTD)

THIS PROGRAM GIVES EVERY SPHERICAL OR MODIFIED SPHERICAL BESSEL FUNCTION, BEING 2 REAL OR COMPLEX VARIABLE AND N ZERO, NEGATIVE OR POSITIVE INTEGER.

224PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 52316D 67-PERSPECTIVE OF A DRAWING

FOR ANY POINT GIVEN BY COORDINATES X,Y,Z, IN A REFERENCE SYSTEM OF AXES CHOSEN BY THE USER, THE PROGRAM CALCULATES THE COORDINATES (U,V) OR (RHU,THETA) OF THE PERSPECTIVE OF THIS POINT. THE PROJECTION CAN BE CHOSEN CLASSICAL (ON A PLANE) OR SPHERICAL, (LIKE "FISH-EYE" OBJECTIVES IN PHOTOGRAPHY). POSITION OF THE WATCHER, DIRECTION OF THE SIGHT AND THE SCALE OF THE DRAWING CAN BE CHOSEN AND EASY CHANGED IF DESIRED.

090PROGRAM STEPS  
BENOIT LEMERCIER  
B-BRUSSELS.

## 52317D 67-FIVE HIDDEN PAWNS

ON A 9X9 GRID THE HP OR A HUMAN OPPONENT WILL HIDE FIVE PAWNS. YOUR POINT IS TO LOCATE THEM. BECAUSE EACH PAWN IS SURROUNDED BY FOUR WALLS, YOU CAN DETECT THEM BY SENDING A RAY INTO THE GRID. WHENEVER THE RAY REACHES THE WALLS IT WILL TURN OFF IF IT IS A CORNER OR IT WILL COME BACK TO THE INITIAL POSITION. THIS GAME IS ALSO KNOWN AS KO CODE.

224PROGRAM STEPS  
HERMAN PEETERS  
B-BOECHOUT.

## 52318D 97-CHROMATIC ABERRATION AS A PATH DIFFERENCE; PARAXIAL SPACE

THE PROGRAM DETERMINES THE PARAXIAL CHROMATIC ABERRATION OF AN OPTICAL SYSTEM AS A PATH DIFFERENCE. THE OUTPUT IS THE PATH DIFFERENCE CONTRIBUTION OF EACH SURFACE FOLLOWED BY THE TOTAL PATH DIFFERENCE FOR THE COMPLETE SYSTEM. THE SPECIFICATION OF THE SYSTEM MAY BE IN INCH OR MILLIMETERS UNITS AND THE OUTPUT IS GIVEN IN UNITS OF WAVE LENGTH.

126PROGRAM STEPS  
JAMES HOUGHTON  
GB-TETBURY.

## 52319D 67-SINK THE BATTLESHIP

YOU HAVE 30 SHOTS TO SINK DOWN THE ENEMY BATTLESHIP THAT IS MENACE TO THE CARGO SHIPS IN YOUR AREA. DETECTORS TELL YOU BY HOW MANY COORDINATE UNITS EACH SHOOT MISSES THE TARGET. AFTER FIVE MINOR HITS SHIP IS NOT DESTROYED AS IT IS IN SIMILAR GAMES BUT IS SENT TO NEARBY SUPPORT VESSEL WHERE IT IS REPAIRED AND IMMEDIATELY RETURNED TO ACTION. SHIP MAKES EVASIVE MANEUVERS EACH TIME YOU FIRE AT IT. FIVE LEVELS OF DIFFICULTY ARE PROVIDED: NOVICE, AMATEUR, TRAINEE, GRADUATE AND PROFESSIONAL.

221PROGRAM STEPS  
BRANKO SPOLJARIC  
YU-ZAGREB.

## 52320D 67-MICROPROCESSOR APPLICATIONS

THIS PROGRAM HELPS TO WORK WITH MICROCOMPUTERS SUCH AS KIM-1, SC-NK, APPLE, NASCOM ETC.. IF THE WORD LENGTH OF A MICROCOMPUTER IS GIVEN IT WILL CHANGE THE BINARY OR HEXADECIMAL CONTENTS OF THAT WORD IN DECIMAL OR VICE VERSA. IT WILL ALSO CONVERT BINARY TO HEXADECIMAL

## 52320D (CONTD)

NUMBER (AND VICE VERSA) AND INTERGERS IN ANY BASE ( $2 \leq B \leq 99$ ) TO BINARY OR HEXADECIMAL BASE. BINARY RESULTS COULD BE DISPLAYED AS 4-FOUR BIT OR 2-EIGHT BIT WORDS.

208PROGRAM STEPS  
BRANKO SPOLJARIC  
YU-ZAGREB.

## 52321D 67-COMPUTATION OF CONIC EQUATION FROM PARAMETERS

THIS PROGRAM COMPUTES THE EQUATION OF AN ELLIPSE OR HYPERBOLA, GIVEN THE COORDINATES OF THE CENTER, THE ANGLE TO THE X-AXIS ANGLE AND THE PARAMETER.

182PROGRAM STEPS  
WOLFGANG SEEWALD  
CH-ZUERICH.

## 52322D 67-POINTS AND STRAIGHT LINES IN THE PLANE

THIS PROGRAM COMPUTES THE INTERSECTION POINT OF 2 STRAIGHT LINES, THE CONNECTION LINE OF 2 POINTS, THE DISTANCE OF TWO POINTS OR OF A POINT AND A LINE, THE ANGLE BETWEEN 2 LINES, THE DISTANCE OF TWO PARALLEL LINES, THE LINE PARALLEL OR PERPENDICULAR TO A LINE AND THROUGH A POINT. THE POINTS AND STRAIGHT LINES BELONG TO THE 2 DIMENSIONAL PLANE.

223PROGRAM STEPS  
WOLFGANG SEEWALD  
CH-ZUERICH.

## 52323D 67-SUM OF FOUR SQUARES

THIS PROGRAM COMPUTES ALL REPRESENTATIONS AS A SUM OF FOUR SQUARES FOR ANY INTEGER  $N \leq 13381631$ . THE SOLUTIONS ARE RECORDED ON DATA CARDS (15 SOL. PER SIDE) AND CAN BE INSPECTED LATER. HENCE, THE HP-67 USER NEEDS NOT ALWAYS BE PRESENT DURING THE CALCULATION.

287PROGRAM STEPS  
WOLFGANG SEEWALD  
CH-ZUERICH.

## 52324D 67-TANGENTS TO A CONIC THROUGH A POINT

THIS PROGRAM COMPUTES THE TANGENTS TO A CONIC GIVEN BY ITS EQUATION THROUGH A POINT GIVEN BY ITS COORDINATES. BY INTERSECTING THE CONIC AND THE POLAR LINE OF THE POINT, THE (AT MOST 2) POINTS OF CONTACT ARE INVESTIGATED. THE POLAR LINES OF THESE POINTS ARE THE WANTED TANGENTS. PROGRAM 51897D IS NECESSARY FOR THE COMPUTATION OF INTERSECTION POINTS.

093PROGRAM STEPS  
WOLFGANG SEEWALD  
CH-ZUERICH.

## 52325D 67-HI-LO 10000

CALCULATOR GENERATES A RANDOM NUMBER WHICH YOU HAVE TO GUESS. CALCULATOR GIVES YOU CLUES BY TELLING YOU IF GUESS IS HIGH OR LOW. IF GUESS IS HIGH 1 IS DISPLAYED. IF GUESS IS LOW 1 IS DISPLAYED. IF GUESS IS CORRECT 0 IS FLASHED AND NUMBER OF GUESSES IS DISPLAYED. CALCULATOR CAN ALSO PLAY ITSELF. RANDOM NUMBER IS BETWEEN 0 AND 10000.

101PROGRAM STEPS  
BARRY GERALD FREEMAN  
GB-CHIGWELL.

## 52326D 67-BCD-CODER AND DECODER

THIS PROGRAM CAN CODE A NUMBER

## 52326D (CONTD)

(LESS THAN 10E10) IN THE 5 MOST USED BCD-CODES. THE CODES ON THIS PROGRAM ARE: 8-4-2-1-CODE; 4-2-2-1-CODE; 2-4-2-1-CODE; 5-4-2-1-CODE AND THE D'BRIEN II-CODE. PROGRAM ALSO DECODES A GIVEN BINARY CODED DECIMAL.

222PROGRAM STEPS  
JEAN SCHANNES  
L-BETTEMBOURG.

## 52327D 67-SURVIVAL:HALDANE'S METHOD (ANIMAL MARKING, BIRD BANDING)

CALCULATE MEANS ANNUAL SURVIVAL RATE WITH STANDARD DEVIATION OF MARKED ANIMALS FROM THE NUMBERS RECOVERED UNDER THE CONDITION THAT BOTH SURVIVAL AND RECOVERY RATE ARE INDEPENDENT OF AGE AND CALENDAR YEAR. RECENT MARKING YEARS (FROM WHICH STILL RECOVERIES ARE TO BE EXPECTED) ARE INCLUDED. MAXIMUM LIKELIHOOD ESTIMATION. NEWTON-RAPHSON ITERATIVE SOLUTION. DUE TO STORAGE IN PROGRAM STEPS LARGE SERIES CAN BE USED.

094PROGRAM STEPS  
ALBERT C. PERDECK  
NL-ARNHEM.

## 52328D 67-FIBONACCI NUMBERS TO F480

A) PROGRAM GIVES AN INDICATION OF THE SIZE OF THE FIBONACCI NUMBERS  $< 10^{**8}$  I.E.  $F_{10^{**5}} = 2,597 \times 10^{**20898}$   
C) COMPUTES F1 NO TO ALL FIGURES FOR  $N \leq 480$  TYPICAL EXECUTION TIMES F100 (21 FIG) 3.5 MIN F480 (100FIG) 75 MIN.

223PROGRAM STEPS  
KENT A WIGSTROM  
S-FLORA.

## 52329D 67-TRIANGLE AND CIRCLES

GIVEN TWO SIDES AND AN INCLUDED ANGLE OF A TRIANGLE, PROGRAM CALCULATES RADIUS AND SURFACE OF EXCLUDED AND INCLUDED CIRCLE. THE THREE INPUTS CAN BE CALCULATED FOR ANY TRIANGLE WITH A PROGRAM OF THE PROGRAM OF THE STANDARD PAC.

046PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

## 52330D 67-DATA SORTING (FAST VERSION)

PROGRAM CAN SORT DATA IN TWO WAYS: 1) IMMEDIATE SORTING AFTER INPUT 2) SORTING OF DATA STORED IN REGISTERS (ROUTINE PROVIDED TO STORE DATA). YOU CAN ALWAYS DELETE A NUMBER AND REVIEW ALL INPUTS SORTED. THIS PROGRAM RUNS TWICE AS FAST AS PROGRAM 51870D.

121PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

## 52331D 67-BIQUADRATIC EQUATION

PROGRAM GIVES ALL REAL AND / OR COMPLEX ROOTS OF AN EQUATION  $AX^{**4} + BX^{**2} + C = 0$  WITHOUT ITERATION.

094PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

## 52332D 67-MATRICES: ADDITION AND MULTIPLICATION WITH A NUMBER

GIVEN TWO MXN MATRICES (A AND B) AND TWO REAL NUMBERS (K AND L), PROGRAM COMPUTES  $KA + LB$ . PROGRAM CAN ALSO COMPUTE PRODUCT OF A MATRIX WITH A REAL NUMBER AND ADDITION OF TWO MATRICES. INPUT



## PROGRAM ABSTRACTS

## 52332D (CONTD)

ERRORS CAN BE CORRECTED. (LIMIT :  
MXN<24).

106PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

## 52333D 67-VELOCITY OF A MOLECULE OF A GAS

PROGRAM CALCULATES AVERAGE VELOCITY  
OF A MOLECULE OF A GAS AFTER YOU  
HAVE ENTERED THE TEMPERATURE IN  
KELVIN AND THE MOLAR WEIGHT IN  
GRAMS. THERE ARE ROUTINES PROVIDED  
TO CONVERT DEGREES.

036PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

## 52334D 67-DISTANCES IN A PLANE

PROGRAM COMPUTES DISTANCES BETWEEN  
TWO POINTS, A POINT AND A STRAIGHT  
LINE AND BETWEEN TWO STRAIGHT LINES  
IN A PLANE.

102PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

## 52335D 67-ORDER OF A 3X3 MATRIX

PROGRAM FINDS ORDER OF A 3X3 MATRIX  
(=GREATEST POSSIBLE NON-SINGULAR  
PARTIAL MATRIX) BY CALCULATING ALL  
DETERMINANTS. IT IS ALSO POSSIBLE  
TO FIND THE ORDER OF A 2X2 MATRIX.

145PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

## 52336D 67-ERROR CALCULATION

PROGRAM CALCULATES THE FOUR BASIC  
ARITHMETIC FUNCTIONS AND RAISES  
INTO POWERS AND TAKES ROOTS. WITH  
THESE CALCULATIONS IT DETERMINES  
THE ABSOLUTE ERROR ON THE RESULT.  
THE DISPLAY IS AUTOMATICALLY  
ROUNDED AND FIXED.

128PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

## 52337D 67-IRRATIONAL EQUATIONS

PROGRAM SOLVES IRRATIONAL EQUATIONS  
OF THE FORM  $(AX+B)^{1/2} = (CX+D)^{1/2}$   
OR  $(AX+B)^{1/2} + (CX+D)^{1/2} = E$  AND CHECKS IF THE  
RESULTS ARE VALID OR NOT. EASY  
INPUT MODES.

202PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

## 52338D 67-LABYRINT

ON A 10X10 GRID, THE PROGRAM MAKES  
A LABYRINTH FOR YOU AND GIVES YOU A  
POSITION ON THE LEFT SIDE. NOW YOU  
HAVE TO GET TO THE RIGHT SIDE WITH  
MAKING AS FEW MISTAKES AS POSSIBLE.  
WHEN YOU HAVE REACHED THE RIGHT  
SIDE, THE PROGRAM TELLS YOU THE  
NUMBER OF ERRORS YOU HAVE MADE. BUT  
BE CAREFUL, WHEN YOU ARE ON A WRONG  
TRACK, YOU MUST GO BACK.

159PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

## 52339D 67-CIRCLE FROM THREE GIVEN POINTS

GIVEN THREE NON-COLLINEAR POINTS IN  
A PLANE, THE PROGRAM COMPUTES THE  
CENTER OF THE CIRCLE THROUGH THESE  
POINTS, THE RADIUS AND THE SURFACE  
OF THIS CIRCLE.

137PROGRAM STEPS  
KRIS HENDRIECKX

## 52339D (CONTD)

B-DEURNE.

## 52340D 67-SCALAR PRODUCT OF TWO 12-DIMENSIONAL VECTORS

THE PROGRAM COMPUTES THE SCALAR  
PRODUCT OF TWO VECTORS WITH A  
DIMENSION SMALLER THAN OR EQUAL TO  
12. THE TWO VECTORS ARE ENTIRELY  
SAVED BY THE PROGRAM. THERE ARE  
ALSO ROUTINES PROVIDED TO REVIEW  
THESE VECTORS AND MAKE CORRECTIONS  
WHERE NECESSARY.

079PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

## 52341D 67-RAISING A 2X2 MATRIX INTO AN INTEGER POWER

THE PROGRAM RAISES A 2X2 MATRIX  
INTO AN INTEGER POWER. THE RESULT  
CAN IMMEDIATELY BE USED AGAIN.

112PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

## 52342D 67-LOCATE THE MOVING SHIP

A SHIP IS RANDOMLY HIDDEN ON A  
100X100 FIELD. YOU GUESS EACH TIME  
WHERE YOU THINK IT IS AND THE  
CALCULATOR TELLS YOU HOW FAR YOU  
ARE AWAY FROM THE SHIP WITH YOUR  
GUESSES. BUT BE CAREFUL : EVERY TWO  
GUESSES THE SHIP CAN MOVE ONE  
PLACE RANDOMLY.

085PROGRAM STEPS  
KRIS HENDRIECKX  
B-DEURNE.

## 52343D 67-HUMANBODY GRAVITYCENTER

PROGRAM FINDS THE X- AND THE Y-  
COORDINATES OF THE CENTER OF GRAVI-  
TY TO A GIVEN BODY-POSITION (FOR  
INSTANCE: ONE POSITION OUT OF A  
SPORTING SKILL GIVEN BY A PHOTO).  
NECESSARY ARE THE X- AND THE Y-  
COORDINATES FOR FOLLOWING POINTS:  
GRAVITYCENTER OF HEAD, AND GRAVITY-  
CENTER OF BOTH HANDS (APPROXIMATED),  
AND THE POINTS OF SHOULDER-JOINTS,  
HIPJOINTS, KNEEJOINTS, FOOTJOINTS,  
FOOTTIPS, ELBOWS AND WRIST.

407PROGRAM STEPS  
HERTHA WAPPLER  
D-MARKBURG/LAHN.

## 52344D 67-SEVEN INCOMPLETE GAMMA FUNCTIONS WITH COMPLEX VARIABLE

PROGRAM GIVES SEVEN INCOMPLETE  
GAMMA FUNCTIONS, WITH COMPLEX  
VARIABLE, BEING THE PARAMETER AN  
INTEGER.

223PROGRAM STEPS  
FELIPE LANDA  
E-CODDOBA.

## 52345D 67-VARIATIONS WITH REPLACEMENT

GIVEN N ELEMENTS K OF WHICH ARE TO  
BE SAMPLED WITH REPLACEMENT  
(N,K<10) THIS PROGRAM CALCULATES  
THE NUMBER OF VARIATIONS, THE ORDER  
NUMBER OF A GIVEN VARIATION, IT  
DISPLAYS OR PRINTS ALL POSSIBLE  
VARIATIONS, OR ALL VARIATIONS BE-  
TWEEN TWO GIVEN VARIATIONS OR A  
NUMBER OF ACCIDENTAL VARIATIONS,  
AND SOME OTHER THINGS. THIS PROGRAM  
IS SIMILAR TO PROGRAM 50954D, BUT  
IT IS SMALLER AND COMPUTES MORE  
THINGS.

191PROGRAM STEPS  
PETER BURGEY  
D-MAXDORF.

## 52346D 67-A TEST FOR HOMOSCEDASTICITY

## 52346D (CONTD)

THIS PROGRAM PERFORMS A TEST FOR  
HOMOSCEDASTICITY OF THE ERROR TERM  
BY A GOLDFELD, QUANDT METHOD.

112PROGRAM STEPS  
EVERT CARLSSON  
S-GÖTEBORO.

## 52347D 67-TEST OF RANDOM NUMBER GENERATOR WITH POKER-METHOD

THE PROGRAM GENERATES A SIMPLE  
PSEUDORANDOM GENERATOR AND TESTS  
THE RANDOMNESS. THE PROGRAM USES A  
"POKER-TEST" WHICH MEANS THAT THE  
LINE OF RANDOM INTEGERS IS DIVIDED  
INTO 5-DIGIT SEQUENCES. THE  
SEQUENCES COMPOSITIONS ARE EVALU-  
ATED ACCORDING TO THE POKER RULES  
AND COMPARED WITH THE THEORETIC  
PROBABILITIES. AS AN OPTION THE  
SUCCESSION OF RANDOM INTEGERS CAN  
BE DIVIDED INTO 4-DIGIT SEQUENCES.

216PROGRAM STEPS  
FRISK OLUF  
S-HANDEN.

## 52348D 67-REINFORCEMENT OF CONCRETE SLABS

BEING GIVEN TWO OF THE THREE FOLLO-  
WING VALUES: 1) AREA OF REINFORCE-  
MENT, AS 2) DISTANCE BETWEEN REIN-  
FORCEMENT BARS, E, AND 3) DIAMETER  
OF BARS, #, THE PROGRAM CALCULATES  
THE THIRD VALUE, TAKING INTO CONSI-  
DERATION THE ALLOWED MAXIMUM DIS-  
TANCE BETWEEN BARS ACCORDING TO  
GERMAN REGULATION DIN 1045

099PROGRAM STEPS  
CLAUS M. DACHSELT  
D-WITTEN-ANNEN.

## 52349D 97-REFRIGERANT PIPELINES (VI)

PROGRAM DETERMINES THE CORRECT SIZE  
FOR LIQUID LINES ON REFRIGERANT  
PLANTS. STEEL TUBE. AVAILABLE ONLY  
FOR R-717 AMMONIA.

223PROGRAM STEPS  
JUAN LUIS GARCIA LAGO  
E-MURCIA.

## 52350D 97-REFRIGERANT PIPELINES (V)

PROGRAM DETERMINES THE CORRECT SIZE  
FOR LIQUID LINES ON REFRIGERANT &  
AIRCONDITIONING PLANTS. COOPER TUBE  
AVAILABLE ONLY FOR R-502.

224PROGRAM STEPS  
JUAN LUIS GARCIA LAGO  
E-MURCIA.

## 52351D 97-REFRIGERANT PIPELINES (IV)

PROGRAM DETERMINES THE CORRECT SIZE  
FOR LIQUID LINES ON REFRIGERANT &  
AIRCONDITIONING PLANTS. COOPER TUBE  
AVAILABLE ONLY FOR R-22.

224PROGRAM STEPS  
JUAN LUIS GARCIA LAGO  
E-MURCIA.

## 52352D 97-REFRIGERANT PIPELINES (III)

PROGRAM DETERMINES THE CORRECT SIZE  
FOR LIQUID LINES ON REFRIGERANT &  
AIRCONDITIONING PLANTS. COOPER TUBE  
AVAILABLE ONLY FOR R-12.

224PROGRAM STEPS  
JUAN LUIS GARCIA LAGO  
E-MURCIA.

## 52353D 97-REFRIGERANT PIPELINES (II)

PROGRAM DETERMINES THE CORRECT SIZE  
FOR SUCTION AND DELIVERY LINES ON  
REFRIGERANT & AIRCONDITIONING  
PLANTS. STEEL TUBE REFRIGERANTS :  
R-12; R-22; R-502 AND R-717

## PROGRAM ABSTRACTS

## 523530 (CONTD)

AMMONIA.

219PROGRAM STEPS  
JUAN LUIS GARCIA LAGO  
E-MURCIA.

## 523540 97-REFRIGERANT PIPELINES (I)

PROGRAM DETERMINES THE CORRECT SIZE FOR SUCTION AND DELIVERY LINES ON REFRIGERANT & AIRCONDITIONING PLANTS. COOPER TUBE REFRIGERANTS: R-12; R-22; R-502; (COOPER TUBE IS NOT VALID FOR R-717).

218PROGRAM STEPS  
JUAN LUIS GARCIA LAGO  
E-MURCIA.

## 523550 97-AIRCONDITIONING CALCULATION

THIS PROGRAM CALCULATES HEAT BALANCE FOR AIRCONDITIONING SYSTEM SUMMER AND WINTER, AND DISPLAYS EFFECTIVE SENSIBLE HEAT, EFFECTIVE LATENT HEAT, AIR-CHANGE HEAT AND TOTAL HEAT. ALSO CALCULATES HEAT BALANCE FOR WINTER HEATING AND DISPLAYS KCAL/HOUR FOR DAILY RUNNING AND NIGHT/DAY RUNNING.

224PROGRAM STEPS  
JUAN LUIS GARCIA LAGO  
E-MURCIA.

## 523560 67-CONCRETE DOSES (I)

THIS PROGRAM OBTAIN MEASURE OUT DOSES CONCRETE FOR ONE M3, KNEW; CHARACTERISTIC STRENGTH CONCRETE, GRANULOMETRIE OF GRAVELS, BREAK GRAVEL OBTAINING IN QUARRY OR ROLLING STONES, TYPE OF CEMENT COMPARED WITH USUAL PORTLAND CEMENT QUANTITY OF WATER, HUMIDITY OF GRAVEL (PERCENTAGE IN WEIGHT). DOSES IT IS POSSIBLE FOR TWO SIZE GRAVELS ONLY.

224PROGRAM STEPS  
LORENZO PORTILLO MORO  
E-CASTELLON.

## 523570 67-CONCRETE DOSES (III)

THIS PROGRAM IS THE CONTINUATION OF CONCRETE DOSES (I) FOR AERATED CONCRETE, OR TRANSFORMATION UNITS OF WEIGHT IN VOLUME UNITS.

057PROGRAM STEPS  
LORENZO PORTILLO MORO  
E-CASTELLON.

## 523580 67-RENDEZVOUS POINT FOR 2 VESSELS UNDER SPEED.

PROGRAM FITS IF A VESSEL NEEDS A HELP OR ASSISTANCE; COURSE AND TIME FOR THE RENDEZVOUS WILL BE GIVEN. TO KEEP A VESSEL FROM ANOTHER TARGET/SHIP OFF-A DISTANCE/ DIRECTION MUST BE GIVEN = SO COURSE AND TIME WILL BE GIVEN. TO OVERTAKE A VESSEL ALWAYS WITH THE SAME DISTANCE TO THE OTHER SHIP, DIFFERENT COURSES ARE NECESSARY = COURSES, TIMES OF CHANGES WILL BE AS OUTPUT.

224PROGRAM STEPS  
CAPT. LUTZ LEWKE  
D-HAMBURG.

## 523590 97-LOGIC TRAINER

TO GIVEN INPUT-SIGNALS THE PROGRAM COMPUTES THE OUTPUT-SIGNAL WHICH RESULTS BY USING A AND-, OR-, NOT-, NAND-, NOR-, OR EXOR-TTL- CIRCUIT. THEREFORE, THE PROGRAM IS SUITABLE FOR BEGINNERS IN DIGITAL-ELECTRONIC AS A LOGIC-TRAINER AND FOR UNDERSTANDING DIGITAL CIRCUITS.

128PROGRAM STEPS  
KARL-LUDWIG BUTTE

## 523590 (CONTD)

D-MARBURG.

## 523600 67-OHM'S LAW PARALLEL R U OVER SERIAL R POWER SUPPLY

PROVIDED IS : OHM'S LAW WITH I; U; R; P; RESISTANCE OF TWO PARALLEL R'S; VOLTAGE OVER TWO SERIAL R'S; CALCULATION OF CURRENT LIMITOR RESISTOR IN ZENER POWER SUPPLY.

143PROGRAM STEPS  
ALEX SLAETS  
B-MECHELEN.

## 523610 67-MULTISTORY SINGLERAY SYMMETRICAL FRAME LATERAL LOAD.

THIS PROGRAM CALCULATES MOMENTS IN BEAMS AND COLUMNS OF A MULTISTORY SINGLE-BAY SYMMETRICAL FRAME DUE TO LATERAL LOADS. THE TOTAL NUMBER OF STORIES MUST NOT EXCEED 15. THE PROGRAM CAN ALSO BE UTILIZED FOR FRAME ANALYSIS OF MULTI-BAY BUILDINGS BY LUMPING THE COLUMNS AND BEAMS SO THAT A FRAME OF SEVERAL BAYS IS REPRESENTED AND ANALYSED AS A SINGLE-BAY FRAME.

278PROGRAM STEPS  
AGHA MUNIR SHERWANI  
U.A.E.-SHARJAH.

## 523620 67-SUN AND PLANETS SRT WITH AUTOMATIC SAILING CORRECTION

THE PROGRAM REDUCES SIGHTS FROM SUN OR PLANET OBSERVATIONS. ALL DR AND ALMANAC DATA IS NEEDED. GMT OF OBSERVATION WILL GIVE ZN AND HS WILL GIVE DIFFERENTIAL ALTITUDE FOR MORE OBS. OF SAME OBJECT, ONLY NEW GMT & NEW HS IS NEEDED. FOR A NEW OBJECT, THE ALMANAC DATA MUST FIRST BE UPDATED. THIS CARD MAY BE USED WITH THE STAR AND MOON CARDS. THE PROGRAMS WILL FIT THE "MULTI-FIX" PROGRAM.

205PROGRAM STEPS  
JAN DIDR. ANDERSEN  
N-BERGEN.

## 523630 67-STAR SRT WITH AUTOMATIC SAILING CORRECTION

THE PROGRAM REDUCES SIGHTS FROM STAR OBSERVATIONS. ALL DR AND ALMANAC DATA IS NEEDED. GMT OF OBSERVATION WILL THEN GIVE ZN AND HS WILL GIVE A. FOR A NEW STAR ENTER SHA\* AND DEL\*, AND CONTINUE WITH GMT & HS. THE PROGRAM MAY BE USED WITH THE SUN & PLANETS AND THE MOON PROGRAMS. THE PROGRAMS WILL FIT THE "MULTI-FIX" PROGRAM.

178PROGRAM STEPS  
JAN DIDR. ANDERSEN  
N-BERGEN.

## 523640 67-LOAN AMORTIZATION ACCUMULATED INTEREST, REM. BALANCE

THIS PROGRAM EXTENDS THE SCOPE OF PROGRAM 001260 (BD1-05A) BY (1) PERMITTING CALCULATION OF PERIOD OF LOAN, PERIODIC PAYMENT, PRESENT VALUE IF ANY TWO OF THESE AND INTEREST RATE ARE KNOWN; (2) AN OPTION OF LISTING ACCUMULATED INTEREST DURING SCHEDULE GENERATION OR AT END OF IT; (3) OPTIONAL SCHEDULE LISTING AT MULTIPLE PERIOD INTERVALS; (4) ERROR SIGNALS IF PAYMENT PERIODS J,K EXCEED TOTAL LOAN PERIOD. ACCUMULATED PAYMENTS TO PRINCIPAL ARE ALSO LISTED, MAKING AMORTIZATION SCHEDULES MORE COMPLETE.

217PROGRAM STEPS  
L. ANDREW MANNHEIM  
GB-RICHMOND.

## 523650 67-FLUID VOLUME CONVERSIONS

## 523650 (CONTD)

FLUID MEASURES ARE CONFUSED NOT ONLY BY THE EXISTANCE OF METRIC AND ENGLISH UNITS BUT ALSO BY SEPARATE BRITISH AND US SYSTEMS. THIS PROGRAM CONVERTS ANY ONE OF MILLILITERS, LITERS, MINIMS, FL.OZ, QUARTS, GALLONS AND CUBIC INCHES INTO ANY OR ALL OF THE OTHERS. AN OPTION CONVERTS TO OR FROM BRITISH OR US UNITS OR EVEN BETWEEN THEM.

217PROGRAM STEPS  
L. ANDREW MANNHEIM  
GB-RICHMOND.

## 523660 67-MASS/WEIGHT UNIT CONVERSION

THIS PROGRAM INTERCONVERTS ANY ONE OF THE FOLLOWING UNITS OF MASS/WEIGHT INTO ANY OR ALL OF THE OTHERS: KILOGRAM, GRAM, METRIC TON, BRITISH IMPERIAL TON, US (SHORT) TON, AVOIRDUPOIS GRAINS, AVOIRDUPOUNCE, TROY OUNCE, LB, STONE; THUS COVERING VIRTUALLY ALL COMMONLY USED MASS UNITS IN THE SI SYSTEM AND THE BRITISH AND US SCENE.

214PROGRAM STEPS  
L. ANDREW MANNHEIM  
GB-RICHMOND.

## 523670 67-CUBIC VOLUME CONVERSIONS

TO PERMIT EASY SWITCHING BETWEEN METRIC AND ENGLISH VOLUME UNITS, THE PROGRAM CONVERTS ANY ONE OF CM\*\*3 (LITERS), CM\*\*3, IN.\*\*3, FEET\*\*3, YARDS\*\*3, IMPERIAL GALLONS AND US GALLONS INTO ANY OR ALL OF THE OTHERS. THIS PROGRAM COVERS MAINLY CUBIC VOLUME AS DISTINCT FROM FLUID VOLUME; A SIMILAR PROGRAM - FLUID VOLUME CONVERSIONS - DEALS WITH THE LATTER. GALLONS ARE HOWEVER ADDED HERE FOR COMPARISON.

174PROGRAM STEPS  
L. ANDREW MANNHEIM  
GB-RICHMOND.

## 523680 67-AREA CONVERSIONS

THIS PROGRAM INTERCONVERTS ANY ONE OF THE FOLLOWING UNITS OF AREA IN METRIC, SI OR ENGLISH UNITS INTO ANY OR ALL OF THE OTHERS: M\*\*2, CM\*\*2, MM\*\*2, HECTARES, KM\*\*2, INCH\*\*2, FEET\*\*2, YARDS\*\*2, ACRES AND MILES\*\*2. THIS THUS COVERS AREAS ON A GEOGRAPHICAL SCALE AS WELL AS FOR EVERYDAY AND LABORATORY USE.

203PROGRAM STEPS  
L. ANDREW MANNHEIM  
GB-RICHMOND.

## 523690 67-DEFINITE INTEGRAL 5 SIMPSON

WITH A CONTINUOUS AREA BETWEEN THE GIVEN LIMITS THE PROGRAM APPROXIMATES:

- 1) THE AREA UNDER THE CURVE.
- 2) THE VOLUME TRACED OUT BY THAT AREA, REVOLVED.
- 3) THE CENTROIDS OF THAT AREA.
- 4) THE CENTRE OF GRAVITY OF THE VOLUME TRACED OUT.
- 5) THE LENGTH OF THE CURVE BETWEEN THE GIVEN LIMITS... USING "SIMPSONS RULE".

093PROGRAM STEPS  
LAWRENCE B. HARTLEY  
GB-BRIERFIELD.

## 523700 67-REGRESSION OF DEGREE 4

THIS PROGRAM FINDS THE BEST FOURTH DEGREE POLYNOMIAL, THE GRAPHIC REPRESENTATION OF WHICH PASSES THROUGH ANY NUMBER OF GIVEN POINTS, EITHER WITH EQUIDISTANT ABSCISSAS, OR NOT.

223PROGRAM STEPS

## PROGRAM ABSTRACTS

- 52370D (CONTD)**  
RAYMOND BROECKX  
B-WILRIJK.
- 52371D 67-LINEAR, QUADRATIC AND CUBIC REGRESSION**  
GIVEN ANY NUMBER OF POINTS (X,Y), EITHER WITH EQUIDISTANT ABSCISSAS OR NOT, THIS PROGRAM FINDS THE CORRESPONDING LINEAR, QUADRATIC AND CUBIC REGRESSION LINES.  
178PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.
- 52372D 67-PHYSICAL STATISTICS WITH URNS**  
PROGRAM CALCULATES PROBABILITIES FOR SINGLE AND COMBINED EVENTS AT THE STATISTICS OF MAXWELL-BOLTZMANN BOSE-EINSTEIN AND FERMI-DIRAC.  
093PROGRAM STEPS  
HORST VOELZ  
D-BERLIN.
- 52373D 67-AUTOMATIC FEED-BACK CALCUALTIONS (REAL)**  
A TRANSISTOR, TUBE OR AMPLIFIER MAY BE DESCRIBED BY S,D,KI. WITH AN OUTPUT-RESISTOR RA EXISTS AN AMPLIFICATION V. BY FEED-BACK WITH CURRENT AND/OR VOLTAGE IT HAS GGT DATES S\*, D\*, RI\* AND V\*. YOU PUT SOME VALUES IN AND THEN ASK FOR OTHERS.  
224PROGRAM STEPS  
HORST VOELZ  
D-BERLIN.
- 52374D 67-MATRIX-PARAMETERS FOR FOUR-TERMINAL-CIRCUITS**  
AT FOUR-TERMINAL-CIRCUITS EXISTS 12 MATRIX-FORMS MULTIPLIED BY 3 BASE-MODIFICATIONS. ALL PARAMETERS FOR THE 36 EQUATIONS YOU CAN CHANGE WITH THIS ONE-CARD-PROGRAM + DATA-CARD EACH TO THE OTHER ONLY WITH ONE STEP.  
311PROGRAM STEPS  
HORST VOELZ  
D-BERLIN.
- 52375D 67-POLYNOMIAL-ARITHMETIC**  
FROM TWO POLYNOMS P AND Q EACH UP TO DEGREE EQUAL K7 PROGRAM CALCULATES THE COEFFICIENTS OF THE POLYNOMS: P+Q, P-Q, P\*Q, P/Q, Q/P, P\*\*N Q\*\*N (IN REAL NUMBER) AND FOR THE VALUES ONLY P(Q(X)).  
224PROGRAM STEPS  
HORST VOELZ  
D-BERLIN.
- 52376D 67-MORE REGISTERS**  
IT IS POSSIBLE WITH THIS PROGRAM TO STORE 36 VALUES WITH AN ACCURACY OF 4 DIGITS IN RANGE FROM 10\*\*-50 TO 9.999\*10\*\*49.  
112PROGRAM STEPS  
HORST VOELZ  
D-BERLIN.
- 52377D 67-LENGTH AND AREA OF POLYGONS CIRCLES AND OTHERS**  
PROGRAM CALCULATES AREA AND LENGTH OF POLYGONS POINT BY POINT, OF CIRCLES AND OTHERS BY ITS EQUATIONS WITH SMALL STEPS.  
110PROGRAM STEPS  
HORST VOELZ  
D-BERLIN.
- 52378D 67-GERMAN INCOME TAX AND CHURCH**
- 52378D (CONTD)**  
00000D RATE SINCE 1979  
PROGRAM CALCULATES NEW GERMAN INCOME TAX AND CHURCH RATE (VALID SINCE JANUARY 1979) FOR GROUND AND SPLIT TAKIF AS AMOUNT, % AND % ON TOP.  
222PROGRAM STEPS  
HEINZ RECHMANN  
D-LEVERKUSEN.
- 52379D 67-MAX AND MIN OF FUNCTIONS**  
PROGRAM CALCULATES MAXIMUM OR MINIMUM OF MATHEMATICAL FUNCTIONS. CAN ALSO BE USED FOR EQUATIONS WHICH CAN NOT BE SOLVED EXPLICITLY BY MATHEMATICAL ANALYSIS.  
096PROGRAM STEPS  
CHRISTIAN W. HIRSCH  
N-OSLU.
- 52380D 67-97-POSITIVE AND NEGATIVE NUMBERS CONVERTER TABULATOR**  
THIS PROGRAM CONVERTS AND TABULATES IN A PRESELECTED SEQUENCE, WHOLE POSITIVE OR NEGATIVE DEC. NUMBERS TO THE EQUIVALENT OCTAL, HEXADECIMAL AND SIGNED BINARY NUMBERS. IF NEGATIVE NUMBERS ARE TO BE CONVERTED, THE SIGNED BINARY NUMBERS ARE CODED AS THE TWO COMPLEMENT OF THEIR POSITIVE COUNTER PARTS. THE PROGRAM PROCESSES SIGNED BINARY NUMBERS WITH A MAXIMUM OF 20 BITS, AND CALCULATES THE DECIMAL RANGE AS A FUNCTION OF THE NUMBER OF BITS.  
221PROGRAM STEPS  
ERNST E. SIE  
D-EMMENDINGEN
- 52381D 97-DISCONTINUITY IN A MEASURED CURVE**  
GIVEN THE EXPERIMENTAL VALUES OF A (GENERALLY) TIME-DEPENDENT QUANTITY, THE PROGRAM REDUCES THE STEADY CURVE TO AN IDEALIZED STEP-LIKE SHAPE, AS NEEDED IN THE EVALUATION OF TEMPERATURE-TIME PLOTS FOR THE DETERMINATION FOR SPECIFIC HEATS OR OTHER PHYSICO-CHEMICAL QUANTITIES. IT IS THEN POSSIBLE TO DEFINE UNIQUELY THE MAGNITUDE AND POINT OF ALTERATION.  
099PROGRAM STEPS  
BERND DUMBACHER  
D-FRANKFURT.
- 52382D 97-LINEAR REGRESSION WITH CONVENIENT HANDLING**  
PROGRAM CALCULATES THE REGRESSION COEFFICIENTS, THEIR STANDARD DEVIATIONS AND THE CORRELATION COEFFICIENT. BY MEANS OF LEAST SQUARE METHOD PROGRAM ENABLES FITTING OF A GIVEN SET OF POINTS (X,Y) OR ANY FUNCTIONS OF THEM TO A STRAIGHT LINE. THE HANDLING OF THE PROGRAM IS MADE VERY COMFORTABLY (CORRECTION OF INPUT ERRORS, INTERMEDIATE CALCULATIONS, OUTPUT FORMAT, FUNCTIONS OF X AND Y).  
187PROGRAM STEPS  
BERND DUMBACHER  
D-FRANKFURT.
- 52383D 67-HULL AREA-WEIGHT-CENTRE OF GRAVITY-NAVAL ARCHITECTURE**  
COMPUTES THE AREA, WEIGHT, LONGITUDINAL AND VERTICAL CENTRE OF GRAVITY OF THE HULL.  
110PROGRAM STEPS  
ROBERT FREDERIC MENZI  
CH-GENEVA.
- 52384D (CONTD)**  
DATA SERIE OF E.G. MONTHLY VALUES IS SUBSEQUENTLY TRANSFORMED TO OTHER SERIES OF FOR INSTANCE  
A) 3-,6- OR 12 MONTH AVERAGES  
B) INDICES OF FREE CHOSEN BASE PERIOD  
C) PERCENTUAL CHANGE WITHIN 12-MONTH PERIOD  
D) STANDARDIZED VALUES KEYING ORIGINAL DATA ONLY ONCE (DATA CARD) UNLIMITED LENGTH OF DATA FILE.  
112PROGRAM STEPS  
PETER PESCHEL  
D-ESSEN.
- 52385D 67-CIRCLE SEGMENT/CURVE SOLUTIONS**  
GIVEN ANY TWO OF THE THREE CIRCLE SEGMENT DATA - CENTRAL ANGLE, CHORD LENGTH AND RADIUS - THE PROGRAM CALCULATES AND THEN DISPLAYS (IN THIS ORDER) THE CHORD LENGTH, RADIUS, CENTRAL ANGLE, SEGMENT LENGTH, TANGENT LENGTH, SEGMENT HEIGHT, SECTOR TRIANGLE HEIGHT, TANGENT TRIANGLE LENGTH, SEGMENT AREA, SECTOR AREA, SECTOR TRIANGLE AREA. OUTPUT SEQUENCE IS NUMERICALLY CODED; ALL RESULTS CAN ALSO BE CALLED UP INDIVIDUALLY.  
192PROGRAM STEPS  
L. ANDREW MANNHEIM  
GB-RICHMOND.
- 52386D 67-ETERNAL DAY-OF-WEEK CALENDAR**  
THIS PROGRAM CALCULATES THE DAY OF THE WEEK FOR ANY DATE FROM DISTANT ANTIQUITY TO THE INFINITE FUTURE IN THE JULIAN OR GREGORIAN CALENDARS. IT ACCEPTS INPUT IN EITHER THE DD.MYYYY OR THE MM.DDYYYY NOTATION DATES BEFORE ABOUT 300 AD AND BC DATES NECESSARILY YIELD NOTIONAL ODW INDICATIONS, AS 7-DAY WEEK WAS NOT INTRODUCED IN JULIAN CALENDAR UNTIL ABOUT THEN.  
116PROGRAM STEPS  
L. ANDREW MANNHEIM  
GB-RICHMOND.
- 52387D 67-BRITISH & COMMONWEALTH HOLIDAYS, BANK HOLIDAYS ETC.**  
THE PROGRAM CALCULATES THE DATE EACH YEAR OF ENGLISH, SCOTTISH ETC. SPRING AND SUMMER BANK HOLIDAYS, ALSO REMEMBRANCE SUNDAY, ADVENT SUNDAY, AUSTRALIA DAY, AND CANADIAN HOLIDAYS OF VICTORIA DAY, LABOR DAY AND THANKSGIVING DAY (=US COLUMBUS DAY). THE PROGRAM COVERS DATES FROM THE START OF THE GREGORIAN CALENDAR TO YEAR 9999 AND BEYOND ACCORDING TO CURRENT DEFINITION OF ABOVE HOLIDAYS. PROGRAM LISTINGS ARE GIVEN FOR EUROPEAN DD.MYYYY AS WELL AS MM.DDYYYY NOTATIONS. (OR 173 STEPS).  
170PROGRAM STEPS  
L. ANDREW MANNHEIM  
GB-RICHMOND.
- 52388D 67-INTERNATIONAL DAYLIGHT SAVING TIME DATES**  
PROGRAM CALCULATES BEGINNING AND END DATES OF DAYLIGHT SAVING PERIODS IN SOME 17 COUNTRIES OF THE WORLD (INCLUDING MUCH OF EUROPE, USA, AUSTRALIA, NEW ZEALAND ETC.) ACCORDING TO CURRENT DEFINITIONS OF DAYLIGHT SAVING TIME. COVERS DATES FROM PRESENT TO AT LEAST YEAR 9999 (AS LONG AS CURRENT DEFINITIONS REMAIN VALID), AND GIVES PROGRAM LISTINGS IN BOTH EUROPEAN DD.MYYYY AND AMERICAN MM.DDYYYY NOTATIONS. (OR 149 STEPS)  
150PROGRAM STEPS  
L. ANDREW MANNHEIM  
GB-RICHMOND.
- 52384D 97-TRANSFORMING TIME SERIES 1\*2**

## PROGRAM ABSTRACTS

**52389D 67-OVERCAPACITY, BACKLOG DEPENDENT OF CAPACITY, ORDERS RECEIVED**

IF A CERTAIN CAPACITY IS GIVEN WITH AN UPPER AND A LOWER LIMIT AND A CERTAIN PATTERN OF ORDERS RECEIVED, THEN THE PROGRAM CALCULATES THE CUMULATED OVERCAPACITY AND THE CUMULATED BACKLOG OF UNFULFILLED ORDERS OVER A PERIOD OF UP TO 30 TIME SECTIONS. THE PROGRAM TRANSFERS A BACKLOG FROM ONE TIME SECTION TO THE FOLLOWING ONE AND COUNTS THE SECTIONS WITH OVERCAPACITY AND THOSE WITH BACKLOG.

224PROGRAM STEPS  
DIETER SOINE  
D-HANNOVER.

**52390D 67-ROOT OF A SPECIAL FUNCTION**

GIVEN THE FUNCTION  $\exp(-\lambda)$ , THIS PROGRAM COMPUTES THE ONLY ROOT  $\lambda$  DIRECTLY FOR ANY  $N$  OR FOR ALL  $N$ 'S, STEP BY STEP.

042PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

**52391D 67-BESSEL'S DIFFERENTIAL EQUATION**

GIVEN THE DIFFERENTIAL EQUATION  $x'' + xy' + (x^2 - p^2)y = 0$ , THIS PROGRAM COMPUTES  $y$ ,  $y'$  AND  $y''$  IN  $x$ , WHEN IS GIVEN  $p$  AND  $N$ .

096PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

**52392D 67-A SPECIAL PROBLEM**

GIVEN THE FUNCTION  $\exp at$  WITH  $a = a$  SQUARE MATRIX AND  $t$  ANY NUMBER, THIS PROGRAM EXAMINES THE EVOLUTION OF THE INFINITE SERIES, TERM BY TERM TO OBTAIN A SOLUTION.

100PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

**52393D 67-PROBLEM OF DOUBLE SPRING**

GIVEN TWO MASSES  $M_1$  AND  $M_2$ , SEPARATED BY A SPRING FOR WHICH  $k = k_2$   $N$   $M_1 - 1$  AND  $M_1$  IS ATTACHED TO A SUPPORT BY A SPRING FOR WHICH  $k = k_1$   $N$   $M_1 - 1$ . AFTER THE SYSTEM IS BROUGHT TO REST, THE MASSES ARE DISPLACED A METRE DOWNWARD AND RELEASED. THIS PROGRAM COMPUTES THE MOTION OF BOTH MASSES, EVERY 1/10 SEC.

152PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

**52394D 67-POTENTIAL BETWEEN TWO CONCENTRIC CHARGES**

GIVEN TWO CONCENTRIC SPHERES OF RADII  $R_1$  AND  $R_2$  ( $R_1 < R_2$ ), CARRIED AN ELECTRIC CHARGE OF SUC.  $V_1$  AND  $V_2$ , THE PROGRAM COMPUTES THE POTENTIAL  $V$  AT ANY POINT BETWEEN THE GIVEN SPHERES.

036PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

**52395D 67-POSITION OF A PARTICULAR**

THIS PROGRAM COMPUTES THE POSITION OF A PARTICULAR OF MASS  $M$ , REPELLED FROM AN ORIGIN ( $O$ ) WITH A FORCE EQUAL TO  $(k > 0)$  TIMES DISTANCE FROM  $O$ , IF THIS PARTICULAR STARTS FROM REST AT A DISTANCE  $P$  FROM  $O$ ,  $t$  (SEC) LATER, OR SECOND BY SECOND.

051PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

**52396D 67-MOTION OF A PROJECTILE**

A PROJECTILE OF MASS  $M$  IS FIRED INTO THE AIR WITH INITIAL VELOCITY  $V_0$  AT AN ANGLE  $X$  WITH THE GROUND. THIS PROGRAM FINDS THE POSITION  $(X, Y)$  OF THE PROJECTILE, DELTA  $T$  BY DELTA  $T$ . (DELTA  $T$  IS CHOSEN BY YOURSELF). THE RESISTANCE OF THE AIR ( $K$ ) MUST ALSO BE GIVEN.

080PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

**52397D 67-STURM-LIOUVILLE PROBLEM**

PROGRAM COMPUTES  $T_N = E^* X$  IN TERMS OF THE EIGENFUNCTIONS OF THE STURM-LIOUVILLE PROBLEM  $y'' + \lambda y = 0$  IF  $y'(0) = 0$  AND  $y(P) = 0$

045PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

**52398D 67-FOURIER SIN AND COS SERIES FOR EXP X**

PROGRAM COMPUTES STEP BY STEP THE EVOLUTION OF A FOURIER SIN OR COS SERIES OF EXP  $X$ .

075PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

**52399D 67-A DYNAMIC PROBLEM**

A BODY OF MASS  $M$  IS THROWN VERTICALLY INTO THE AIR WITH AN INITIAL VELOCITY  $V_0$ . THE BODY ENCOUNTERS AN AIR RESISTANCE  $K$  PROPORTIONAL TO THIS VELOCITY. THIS PROGRAM COMPUTES DIFFERENT HEIGHT'S  $H_N$  FOR DELTA  $T$ 'S TO MAKE A GRAPH OF THE EVOLUTION.

048PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

**52400D 67-STORE, ORDER AND RECALL (1)**

WITH  $B$ : STORE UP TO 25 ARBITRARY NUMBERS. WITH  $C$ : REARRANGE THEM IN INCREASING ORDER. SPECIAL DEVICES : 1) A FLAG FOR EARLY GOOD ORDER AND 2) A DECREASING OF THE NUMBER OF REGISTERS AFTER EACH STROKE. MAX. CALCULATION TIME : 6 MINUTES.

065PROGRAM STEPS  
HANS AUSEM  
NL-BREDA.

**52401D 67-STORE, ORDER AND RECALL (2)**

WITH  $B$ : STORE UP TO 50 POSITIVE INTEGERS, EACH OF MAX 5 FIGURES. WITH  $C$ : REARRANGE THEM IN INCREASING ORDER. SPECIAL DEVICES : 1) A FLAG FOR EARLY GOOD ORDER AND 2) A DECREASING OF THE NUMBER OF REGISTERS AFTER EACH TWO STROKES. MAX. CALCULATION TIME : 61 MINUTES.

149PROGRAM STEPS  
HANS AUSEM  
NL-BREDA.

**52402D 67-STORE, ORDER AND RECALL (3)**

WITH  $B$ : STORE UP TO 75 POSITIVE INTEGERS, EACH OF MAX. 3 FIGURES. WITH  $C$ : REARRANGE THEM IN INCREASING ORDER. SPECIAL DEVICES : 1) A FLAG FOR EARLY GOOD ORDER AND 2) A DECREASING OF THE NUMBER OF REGISTERS AFTER EACH THREE STROKES MAX. CALCULATION TIME : 4 HOURS 17 MINUTES.

222PROGRAM STEPS  
HANS AUSEM  
NL-BREDA.

**52403D 67-STORE, ORDER AND RECALL (4)**

WITH  $B$ : STORE UP TO 125 POSITIVE INTEGERS, EACH OF MAX. 2 FIGURES. WITH  $C$ : REARRANGE THEM IN INCREASING ORDER. SPECIAL DEVICES : 1) A FLAG FOR EARLY GOOD ORDER AND 2) A DECREASING OF THE NUMBER OF REGISTERS AFTER EACH 5 STROKES. MAX. CALCULATION TIME : 15 HOURS 47 MIN.

223PROGRAM STEPS  
HANS AUSEM  
NL-BREDA.

**52404D 67-STORE, ORDER AND RECALL (5)**

WITH  $B$ : STORE UP TO 250 POSITIVE INTEGERS OF 1 FIGURE. WITH  $C$ : REARRANGE THEM IN INCREASING ORDER. SPECIAL DEVICES : 1) A FLAG FOR EARLY GOOD ORDER AND 2) A DECREASING OF THE NUMBER OF REGISTERS AFTER EACH 10 STROKES. MAX. CALCULATION TIME : 115 HOURS.

207PROGRAM STEPS  
HANS AUSEM  
NL-BREDA.

**52405D 67-ALL PERMUTATIONS OF THE NUMBERS 1,2,...,N ; 2<=N<=25**

THIS PROGRAM IS THE SPEEDED UP VERSION OF A BASE PROGRAM OF 48 PROGRAM STEPS (CARD INCLUDED) AND SHOWS ALL PERMUTATIONS OF THE FIRST POSITIVE INTEGERS 1,2,...,N WITH  $2 < N < 25$  (19 MIN 15 SEC IF  $N=5$ ).

223PROGRAM STEPS  
HANS AUSEM  
NL-BREDA.

**52406D 67-CRITICAL REVOLUTIONS IN TORSIONAL VIBRATIONS**

THIS PROGRAM COMPUTES NATURAL FREQUENCIES OF MACHINES. NEEDED INPUT DATA ARE REDUCED MASS AND TORSION SPRING RATE. THESE MAY BE OBTAINED WITH PROGRAMS "REDUCTION OF MASS" AND "REDUCTION OF LENGTH".

190PROGRAM STEPS  
WERNER HINTZE  
D-HAMBURG.

**52407D 67-REDUCTION OF LENGTH FOR CRITICAL SPEED CALCULATION**

THIS PROGRAM COMPUTES REDUCED LENGTH OF MACHINE AND ENGINE PARTS, AS NEEDED FOR EVALUATION OF TORSIONAL STRESS DUE TO CRITICAL ROTATION SPEED.

194PROGRAM STEPS  
WERNER HINTZE  
D-HAMBURG.

**52408D 67-REDUCTION OF MASS FOR CRITICAL SPEED CALCULATION**

THIS PROGRAM REDUCES THE MASS OF ENGINE AND MACHINE PARTS, FOR USE IN CALCULATION OF CRITICAL ROTATION SPEED.

179PROGRAM STEPS  
WERNER HINTZE  
D-HAMBURG.

**52409D 67-GEOGRAPHIC CLIMATS**

GIVE FOR EACH MONTH THE AVERAGE TEMPERATURE (CELCIUS) AND THE TOTAL RAINFALL (MM) AND THIS PROGRAM WILL CALCULATE THE GEOGRAPHIC CLIMAT AND THE TYPICAL PARAMETERS. WITH EXPLANATION AND A FLOW CHART OF THE USED METHOD.

191PROGRAM STEPS  
HERMAN PEETERS  
B-BOECHOUT.

**52410D 67-ALGEBRAIC COMBINATION OF TWO**



## PROGRAM ABSTRACTS

## 52410D (CONTD)

## 00000D DATACARDS AND REGISTER-SUM

24 REGISTERS OF A DATACARD WILL BE COMBINED (ADDED OR SUBTRACTED OR MULTIPLIED OR DIVIDED) WITH 24 REGISTERS OF ANOTHER DATACARD: R0 WITH R0, R1 WITH R1 AND SO ON. RESULTS WILL BE STORED ON A NEW DATACARD. PROGRAM SIMPLIFIES THAT WAY COMPLICATED STATISTICAL CALCULATIONS IN RESPECT TO DATA ENTRY. IT ALSO ALLOWS SUMMARIZATION OF 26 REGISTERS OF THE CALCULATOR WITHOUT CHANGING ANY REGISTERCONTENT.

197PROGRAM STEPS  
HEINZ RECHMANN  
D-LEVERKUSEN.

## 52411D 67-97-STRESS-STRAIN RELATIONS IN A PRESSURIZED CYLINDER

IN A PRESSURIZED THICK WALLED CYLINDER, SIX QUANTITIES ARE OF IMPORTANCE: INNER AND OUTER PRESSURE, TANGENTIAL STRESS AT THE BORE AND AT THE EXTERNAL WALL, RADIAL DEFORMATION AT THE BORE AND EXTERNAL WALL. ONCE THE CYLINDER HAS BEEN DEFINED, THE PROGRAM COMPUTES FROM ANY TWO OF THESE VALUES THE FOUR REMAINING ONES.

661PROGRAM STEPS  
FRANCOIS HAENSSLER  
CH-GENEVA.

## 52412D 67-UNIVERSAL UNIT CONVERSION PROGRAM

THIS PROGRAM CONVERTS A QUANTITY FROM ANY ONE TO ANY OTHER OF UP TO FIVE DIFFERENT UNITS. FROM A MAXIMUM OF FOUR CONVERSION FACTORS, THE PROGRAM GENERATES THE CONVERSION TABLE WHICH CAN BE STORED ON ONE SIDE OF A DATA CARD. SEVERAL EXAMPLES ARE GIVEN FOR PHYSICAL AND MONETARY QUANTITIES.

212PROGRAM STEPS  
FRANCOIS HAENSSLER  
CH-GENEVA.

## 52413D 97-LAME-CLAPEYRON EQUATIONS

THE PROGRAM COMPUTES AXIAL, TANGENTIAL AND RADIAL STRESSES AS WELL AS RADIAL DEFORMATIONS AT ANY POINT IN THE WALLS OF A THICK STEEL CYLINDER SUBMITTED TO INTERNAL AND/OR EXTERNAL HYDROSTATIC PRESSURES. FACILITY IS ALSO GIVEN FOR TABULATING THESE VALUES BETWEEN INTERNAL AND EXTERNAL RADIUS OF THE CYLINDER.

185PROGRAM STEPS  
FRANCOIS HAENSSLER  
CH-GENEVA.

## 52414D 67-PROBLEM OF THE DOUBLE SPRING 2

GIVEN TWO MASSES M1 AND M2, SEPARATED BY A SPRING FOR WHICH  $K=K2 \cdot N^{M-1}$  AND M1 IS ATTACHED TO A SUPPORT BY A SPRING FOR WHICH  $K=K1 \cdot N^{M-1}$ . AFTER THE SYSTEM IS BROUGHT TO REST, THE MASSES ARE DISPLACED A METRES DOWNWARD AND RELEASED. THIS PROGRAM COMPUTES THE MOTION OF BOTH MASSES, EVERY 1/10 SEC.

143PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 52415D 67-A BALLISTIC PROBLEM A

A PROJECTILE OF MASS M IS FIRED INTO THE AIR (AIR-RESISTANCE = K) WITH INITIAL VELOCITY V0 AT AN ANGLE ALPHA WITH THE GROUND. THIS PROGRAM COMPUTES : A) THE POSITION OF THE PROJECTILE (X,Y) DELTA T BY DELTA T TO MAKE A GRAPH, B) GIVEN THE DISTANCE OF THE TARGET TO (0,0) AND THE WANTED TIME T, THE NECESSA-

## 52415D (CONTD)

RY ANGLE ALPHA, C) GIVNE THE DISTANCE AND ALPHA, THE EXACT TIME.

097PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 52416D 67-A BALLISTIC PROBLEM B

A PROJECTILE OF MASS M IS FIRED INTO THE AIR (AIR RESISTANCE = K) WITH INITIAL VELOCITY V0 AT AN ANGLE ALPHA WITH THE GROUND. THIS PROGRAM COMPUTES THE DISTANCE BETWEEN THE START AND THE FALL ON THE GROUND, AND THE TIME T BETWEEN BOTH EVENTS. YOU CAN ALSO COMPUTE THE EXACT TIME WHEN THE DISTANCE IS GIVEN.

103PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 52417D 67-HORIZONTAL BEAMS 1

A HORIZONTAL BEAM OF LENGTH L METRES IS FIXED AT ONE END AND FREELY SUPPORTED AT THE OTHER END. THE BEAM CARRIES A UNIFORM LOAD  $Q(NM^{**}-1)$  OF LENGTH AND A WEIGHT P AT THE MIDDLE. WITH THIS PROGRAM YOU CAN LOCATE THE POINT OF MAXIMUM DEFLECTION AND THIS DEFLECTION IN METRES, WHEN ALSO GIVEN IS I AND E.

147PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 52418D 67-HORIZONTAL BEAMS 2

A HORIZONTAL BEAM OF LENGTH L METRES IS FREELY SUPPORTED AT BOTH ENDS. THE BEAM HAS A LOAD OF PN BETWEEN BOTH ENDS, AT 5 METRES FROM LEFT. THIS PROGRAM COMPUTES : A) THE LOCATION OF THE POINT OF MAXIMUM DEFLECTION AND B) THIS MAXIMUM DEFLECTION.

061PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 52419D 67-ECCENTRIC FORCING-CONE CIRCLE RECTANGLE

THIS PROGRAM ALLOWS TO DESIGN THE DEVELOPMENT OF AN ECCENTRIC FORCING-CONE CIRCLE RECTANGLE.

147PROGRAM STEPS  
EDUARD STÜESSEL  
CH-DUEBENDORF.

## 52420D 67-CIRCLE, ANGLE, ARC AND SEGMENTS

THIS PROGRAM CALCULATES FOUR OF THE SIX FOLLOWING QUANTITIES WHEN THE TWO OTHERS ARE GIVEN: THE SIX QUANTITIES ARE (ALL FOR THE SAME CIRCLE) : RADIUS, HALF OF THE ANGLE AT THE CENTER, ARC CHORD, DISTANCE BETWEEN CENTER AND CHORD, AND DISTANCE BETWEEN MIDDLE OF ARC AND CHORD.

224PROGRAM STEPS  
BENOIT LEMERCIER  
B-BRUXELLES.

## 52421D 67-CUBE ROOT WITH NEWTON-RAPHSON-METHOD

PROGRAM FINDS THE CUBE ROOT OF X BY NEWTON-RAPHSON-METHOD. USER DEFINED LEVEL OF ACCURACY AND IF THE VALUE SHOULD BE ROUNDED OFF OR UP.

068PROGRAM STEPS  
MICHAEL TARNOWSKI  
D-WIESBADEN.

## 52422D 97-BIORHYTHM WITH PLOTTING OF CYCLES

THIS PROGRAM GIVES BY GIVEN BIRTHDAY AND A STARTING DATE A PRINTOUT OF ALL THREE BIORHYTHM-CYCLES FOR THE GIVEN DATE OR A PERIOD OF TIME. THE TWO DATES MUST OCCUR BETWEEN MARCH 1, 1900 AND FEBRUARY 28 2100. PART TWO OF THE PROGRAM PRINTS A GRAPHICAL OUTPUT OF ALL CYCLES.

224PROGRAM STEPS  
MICHAEL TARNOWSKI  
D-WIESBADEN.

## 52423D 67-NAVIGATORS NOON DATA 1

THIS PROGRAM COMPUTES DR NOON POSITION AND THE TIME WHEN THE SUN IS PASSING THE MERIDIAN. AFTER THE TIME IS OBTAINED, IT CALCULATES THE DR POSITION AND EXPECTS SEXTANT ALTITUDE FOR THE MERIDIAN PASSAGE.

192PROGRAM STEPS  
RUDOLF KREUTZER  
D-TANGSTEDT/HAMBURG.

## 52424D 67-SUN CULMINATION

THIS PROGRAM COMPUTES THE GREENWICH TIME OF SUN CULMINATION. THEN GIVING THE SEXTANT HEIGHT OF THE SUN IT COMPUTES THE LATITUDE OF POSITION. SEXTANT READING IS CORRECTED FOR DIP OF THE HORIZON, MEAN REFRACTION AND SEMI DIAMETER OF THE SUN.

221PROGRAM STEPS  
FRANCOIS SAINT-BLANCAT  
F-LE VESINET.

## 52425D 67-TIDE CALCULATION FOR FRENCH TYPE TABLES AND CHARTS.

FROM TIDE DATA IN STANDARD PORT AND TIDE CORRECTIONS IN SECONDARY PORT, PUTING IN TWO PARAMETERS, COMPUTES THE THIRD ONE. PARAMETERS : DEPTH OF WATER UNDER SHIP, CHART HEIGHT AT SHIP POSITION AND TIME. THIS PROGRAM WORKS INDIFERENTLY DURING EBB OR FLOOD AND WITH TIME LIMITS IN SAME DAY OR IN TWO CONSECUTIVE DAYS (FRENCH UNITS, TABLES AND CHART SYSTEM).

149PROGRAM STEPS  
ERIC BERGUD  
F-LYON.

## 52426D 67-HIP

HIP, A GAME INVENTED BY MARTIN GARDNER, IS PLAYED ON A 6X6 TYPE CHESSBOARD. YOU AND THE CALCULATOR HAVE 18 BLACK AND WHITE PIECES RESPECTIVELY. THESE ARE PUT ON THE BOARD ALTERNATELY. WHQEVER PUTS DOWN 4 PIECES FIRST SUCH THAT THEY FORM A SQUARE OF ANY KIND (I.E. WITH SIDES NOT NECESSARILY PARALLEL TO THOSE OF THE BOARD) LOSES THE GAME. OPTIONALLY THE PROGRAM WILL CHECK WHETHER YOU HAVE PUT DOWN A SQUARE.

216PROGRAM STEPS  
ALEXANDER GRUZA  
GB-LONDON.

## 52427D 67-FILON'S RULE FOR FOURIER COEFFICIENTS UP TO 9 FUNCTIONS

FILON'S INTEGRATION FORMULA IS THE ONLY PROCEDURE TO OBTAIN AT OR BT FOURIER COEFFICIENT WHEN ITS ORDER IS HIGH. ANOTHER NUMERICAL INTEGRATION AS PER SIMPSON'S RULE, IS UNABLE. THE ACCURACY OF FILON'S IS ESTIMABLE. MOREOVER THIS PROGRAM ALLOWS A PERIOD PARTITION UP TO 9 DIVISIONS AND THESE CAN BE UNLIKE. LIMITS CAN BE PI(N) OR RATIONAL NUMBERS, INDISCRIMINATELY THERE ARE 46 OR 63 STEPS TO INPUT FUNCTIONS.

179PROGRAM STEPS



## PROGRAM ABSTRACTS

## 52427D (CONTD.)

FELIPE LANDA  
E-CORDOBA.

## 52428D 67-WORM CONVEYER

THIS PROGRAM CALCULATES THE LEADING DIMENSIONS WITH INTERCHANGEABLE IN- AND OUTPUT OF THE THROUGHPUT PER UNIT OF TIME, SPEED OF ROTATIONS AND DIAMETER OF THE WORM CONVEYER. BESIDES YOU MAY CALCULATE THE MOST EXTERNAL DIAMETER OF ITS BRACING TUBE, SKETCH THE DEVELOPMENT OF THE SCREW THREAD, AND ROUND THE DIMENSIONS ACCORDING TO THE E20-ROW.

317PROGRAM STEPS  
EDUARD STOESEL  
CH-DUEBENDORF.

## 52429D 67-HIGH ACCURACY TIMER WITH PERMANENT TIME DISPLAY.

WITH THIS PROGRAM YOUR HP-67/97 WILL BECOME A HIGH ACCURACY TIMER (MINIMUM INTERVAL ABOUT 5/100 SEC) WITH PERMANENT TIME DISPLAY I (IN SECONDS).

224PROGRAM STEPS  
ARNOLD TEN CATE  
NL-AMSTERDAM.

## 52430D 67-SQUARE ROOTS OF ANY 2X2 MATRIX

THIS PROGRAM CALCULATES WITHOUT ITERATION :

- 1) ALL THE REAL SQUARE ROOTS OF A REAL 2X2 MATRIX.
- 2) ALL THE SQUARE ROOTS OF A REAL 2X2 MATRIX
- 3) ALL THE SQUARE ROOTS OF A COMPLEX MATRIX OF DIMENSION 2.

224PROGRAM STEPS  
PHILIPPE LEAIME  
B-CHENEY.

## 52431D 67-97-BINARY HEXADECIMAL CONVERTER

THIS PROGRAM CONVERTS SIGNED BINARY NUMBERS, UP TO A MAXIMUM OF 20 BITS TO HEXADECIMAL AND VICE-VERSA. PROGRAM ACCEPTS AND DISPLAYS/PRINTS HEXADECIMAL NUMBERS WITHOUT THE CONVENTIONAL ALLOCATION OF TWO PLACES FOR EACH NON ALPHA NUMERIC DIGIT. A SPECIAL MARKER DISTINGUISHES THE ALPHANUMERIC DIGITS FROM THE OTHER NON ALPHA DIGITS.

223PROGRAM STEPS  
ERNST E. SIE  
D- EMMENDINGEN.

## 52432D 67-POLYNOMIAL REAL ROOT AUTOMATIC TRACKING

THIS PROGRAM COMPUTES AUTOMATICALLY ALL REAL ROOTS OF A REAL COEFFICIENT POLYNOMIAL WITHIN ANY GIVEN INTERVAL BY NEWTON'S ITERATION METHOD AND WITHOUT DUPLICATION. MOREOVER THE VALUES OF THE POLYNOMIAL AND OF ITS FIRST DERIVATIVE CAN BE COMPUTED WITHIN THE SAME INTERVAL AT VARIABLE SAMPLES DISTRIBUTED IN LINEAR INCREMENTS.

189PROGRAM STEPS  
PIERRE GRANIER  
F-VANVES.

## 52433D 67-CAUER 1 AND 2 REALIZATIONS- ROUTH TEST FOR STABILITY

THE PROGRAM REALIZES REACTANCE ONE-PORTS FROM A REACTANCE FUNCTION OF ORDER  $N \leq 20$  WHICH IS ALPHA RATIO OF ALPHA FULL ODD (EVEN) TO A FULL EVEN (ODD) POLYNOMIAL OF  $S$ , BY EXPANDING IT INTO ALPHA CONTINUED FRACTION ALPHA ROUND INFINITY (COVER 1 REALIZATION) OR ALPHA ROUND ZERO (COVER 2 REALIZATION). MOREOVER, THE PROGRAM MAY EXAMINE IF ALPHA FULL POLYNOMIAL OF DEGREE

## 52433D (CONTD.)

$N \leq 20$  IS STRICTLY HURWITZ, USING THE ROUTH TEST.

130PROGRAM STEPS  
HERAKLES DIMOPOULOS  
GR-ATHENS.

## 52434D 97-SORTED DATA AND THEIR INDICES

A FILE OF MAX. 48 DATA IS TRANSFORMED TO A SERIE OF INCREASING VALUES OUTPUT OF TOTAL AND AVG. OF DATA WITH THEIR NEW AND THEIR ORIGINAL INDEX. NEW INDEX PERMITS QUICK IDENTIFICATION OF MEDIAN, ORIGINAL INDEX IDENTIFIES SUBJECTS THAT DATA REPRESENT.

196PROGRAM STEPS  
PETER PESCHEL  
D-ESSEN.

## 52435D 67-UP TO 5 FUNCTIONS IN STORED 5X12 TABLE AND INTERPOLATION

PROGRAM GIVES EASY POSSIBILITIES OF STORING UP TO 5 FUNCTIONS GIVEN IN A TABLE OF UP TO 60 Y-VALUES ACCORDING TO 12 X-VALUES AND LINEAR INTERPOLATION FOR ANY X-VALUE IN TABLE RANGE. WITH 72 STORED VALUES 24 REGISTERS ARE USED AND ONLY REGISTER 0 AND 1 ARE FREE FOR PRECEDING CALCULATION. THE X-AND 3 Y-VALUES MAY HAVE 3 VALID DIGITS, TWO Y-VALUES MAY HAVE 4 VALID DIGITS.

106PROGRAM STEPS  
RALPH BEAUCAMP  
D-MUENSTER.

## 52436D 67-AERIAL BATTLE

A TWO PLAYER'S GAME : EACH PLAYER IS IN A PLANE AND MUST DESTROY THE OTHER ONE. YOU MUST FIND YOUR ENEMY IN A 2 DIMENSIONS AREA AND SHOOT HIM BEFORE HE DOES IT. BE CAREFUL : SAVE YOUR GAS AND DO NOT DECREASE YOUR SPEED TOO MUCH IF YOU DO NOT WANT TO SCRATCH.

221PROGRAM STEPS  
PHILIPPE SAUVAN-MAGNET  
F-MARLY LE ROI.

## 52437D 67-RCL AND RESONANCE CIRCUIT

THIS PROGRAM CALCULATES THE IMPEDANCE  $Z$  PHASE,  $\phi$  (RAD),  $C, L, R$  AND FREQUENCY, RESONANT VALUE  $\phi = 0$  AND  $C$  KNOWING  $R, L$  OR  $4$  DATA  $F(R, L, C, \phi)$ . IT SOLVES MANY KIND OF PROBLEMS FA(RLC) SERIAL CIRCUITS

139PROGRAM STEPS  
PHILIPPE SAUVAN MAGNET  
F-MARLY LE ROI.

## 52438D 67-AUTOMOBILE RACE

YOU HAVE TO TRAVERSE A SQUARE FROM THE LOWER LEFT TO THE UPPER RIGHT DIAGONAL POINT. THE SQUARE IS DIVIDED IN FIVE REGIONS EACH OF THEM WITH A SPECIFIC VELOCITY. GIVE IN EACH REGION THE ANGLE OF TRAVERSE AND REACH THE END POINT AS QUICK AS POSSIBLE. THERE IS ALSO A ROUTINE TO CALCULATE THE BEST TIME AND THE CORRESPONDING BEST ANGLES.

221PROGRAM STEPS  
HERMAN PEETERS  
B-BEGHOUT.

## 52439D 67-CONTINUOUS MEMORY

WITH THIS PROGRAM YOU PRESERVE YOUR PROGRAM : THE REGISTERS R0 TO R25 ARE A CARD; THE REGISTERS RX, RY, RZ, RT AND LAST X ; THE FLAGS, THE NOTATION, TRIG AND DSP ON A SIDE OF THE OTHER CARD.

112PROGRAM STEPS

## 52439D (CONTD.)

JEAN REIBEL  
F-FONTENAY AUX ROSES.

## 52440D 97-DATA FREQUENCY REGISTRATION &amp; PERCENTILE CALCULATION

PROGRAM STORES DATA FREQUENCIES IN USER DEFINED CLASSES AND EXECUTES CALCULATION OF ANY PERCENTILE AND ITS CONFIDENCE LIMITS. AN ADDITIONAL PRINT OUT OF CLASS LIMITS, CLASS FREQUENCY & CUMULATED FREQUENCY IS POSSIBLE AT ANY MOMENT OF DATA INPUT PROCEDURE.

224PROGRAM STEPS  
ROBERT F.J. VAN DAMME  
B-TIENEN.

## 52441D 97-COORDINATES FROM DIFFERENCE IN HEIGHT

PROGRAM CALCULATES COORDINATES OF POINTS AROUND RESERVOIR/LAKE WATER LEVEL FROM DIFFERENCE IN HEIGHT OF HEIGHT OF COLLIMATION AND WATER LEVEL, USING ONE THEODOLITE AND OBSERVING ONLY HORIZONTAL AND VERTICAL ANGLES.

089PROGRAM STEPS  
BRIAN LASBY  
GB-BANGOR.

## 52442D 67-DEFINITE INTEGRAL &amp; SIMPSON

WITH A CONTINUOUS AREA BETWEEN THE GIVEN LIMITS THE PROGRAM APPROXIMATES : 1) AREA UNDER THE CURVE. 2) VOLUME TRACED OUT BY THAT AREA REVOLVED. 3) CENTROIDS OF THAT AREA 4) CENTRE OF GRAVITY OF THE VOLUME TRACED OUT. 5) LENGTH OF THE CURVE. 6) SURFACE AREA TRACED OUT BY THE CURVE.... USING "SIMPSON'S RULE".

099PROGRAM STEPS  
LAWRENCE B. HARTLEY  
GB-BRIERFIELD.

## 52443D 67-A SPECIAL DISTRIBUTION 2

PROGRAM COMPUTES THE SPECIAL DISTRIBUTION, POINT AFTER POINT, OR DIRECTLY.

050PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 52444D 67-QUANTUM-MECHANICS I

GIVEN AN HOMOGENIUS INTEGRAL-EQUATION OF THE TYPE, THIS PROGRAM FINDS THE EIGENFUNCTIONS AFTER COMPUTING THE EIGENVALUES.

060PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 52445D 67-BAIRSTOW METHOD FOR POLYNOMIALS OF DEGREE 1 TO 10

GIVEN A POLYNOMIAL OF DEGREE 1 TO 10 WITH REAL COEFFICIENTS, THIS PROGRAM CALCULATES ITS ROOTS WITH THE BAIRSTOW METHOD. FOR DEGREE LARGER THAN 2, A QUADRATIC FACTOR WITH REAL COEFFICIENTS AND THE CORRESPONDING QUOTIENT ARE GIVEN FIRST, THEN THE ROOTS OF THE FACTOR.

224PROGRAM STEPS  
RAYMOND BROECKX  
B-WILRIJK.

## 52446D 67-BAIRSTOW METHOD FOR POLYNOMIALS OF DEGREE 4 TO 9

GIVEN A POLYNOMIAL OF DEGREE 4 TO 9 WITH REAL COEFFICIENTS, THIS PROGRAM USES THE BAIRSTOW METHOD TO FIND QUADRATIC FACTORS WITH REAL COEFFICIENTS. HAVING FOUND ONE,

## PROGRAM ABSTRACTS

- 52446D (CONTD)**  
YOU ALSO GET THE QUOTIENT, WITH WHICH YOU CAN REPEAT THIS PROCEDURE A SUBROUTINE ALLOWS YOU TO FIND OUT HOW ACCURATE CALCULATIONS WERE, BY RECALCULATING THE ORIGINAL POLYNOMIAL FROM ITS FACTORS.  
  
223PROGRAM STEPS  
RAYMOND BRUECKX  
B-WILRIJK.
- 52447D 67-QUATRINIM**  
  
TWO PLAYERS, YOU AND MAC, ALTERNATIVELY TAKE A NUMBER OF OBJECTS FROM A GIVEN PILE, AT LEAST ONE AND AT MOST FOUR TIMES THE PRECEDING NUMBER TAKEN. THE FIRST PLAYER CAN TAKE ANY NUMBER OF OBJECTS, BUT NOT ALL IN THE POSITIVE VERSION OF THE GAME, AND NOT ALL BUT ONE IN THE NEGATIVE VERSION. HE WHO TAKES LAST OBJECT WINS THE GAME IN THE POSITIVE VERSION, AND LOSES IN THE NEGATIVE VERSION. MAC REFUSES YOUR FALSE MOVES.  
  
128PROGRAM STEPS  
RAYMOND BRUECKX  
B-WILRIJK.
- 52448D 67-TRINIM**  
  
TWO PLAYERS, YOU AND MAC, ALTERNATIVELY TAKE A NUMBER OF OBJECTS FROM A GIVEN PILE, AT LEAST ONE AND AT MOST THREE TIMES THE PRECEDING NUMBER TAKEN. THE FIRST PLAYER CAN TAKE ANY NUMBER OF OBJECTS, BUT NOT ALL IN THE POSITIVE VERSION OF THE GAME, AND NOT ALL BUT ONE IN THE NEGATIVE VERSION. HE WHO TAKES LAST OBJECT WINS IN THE POSITIVE VERSION AND LOSES IN THE NEGATIVE VERSION. MAC REFUSES YOUR FALSE MOVES.  
  
121PROGRAM STEPS  
RAYMOND BRUECKX  
B-WILRIJK.
- 52449D 67-BINIM**  
  
TWO PLAYERS, YOU AND MAC, ALTERNATIVELY TAKE A NUMBER OF OBJECTS FROM A GIVEN PILE, AT LEAST ONE AND AT MOST TWICE THE PRECEDING NUMBER TAKEN (AS IN FIBONIM). THE FIRST PLAYER CAN TAKE ANY NUMBER OF OBJECTS, BUT NOT ALL IN THE B\*\*\*-VERSION OF THE GAME (I.E. FIBONIM) AND NOT ALL BUT ONE IN THE B\*\*-VERSION OF THE GAME. HE WHO TAKES LAST OBJECT WINS IN B\*\*\* AND LOSES IN B\*\*-MAC REFUSES FALSE MOVES.  
  
112PROGRAM STEPS  
RAYMOND BRUECKX  
B-WILRIJK.
- 52450D 67-CHARACTERISTIC EQUATION OF 4.4 MATRIX**  
  
THIS ONE CARD PROGRAM CALCULATES THE COEFFICIENTS OF THE CHARACTERISTIC EQUATION OF A 4.4 MATRIX.  
  
214PROGRAM STEPS  
RAYMOND BRUECKX  
B-WILRIJK.
- 52451D 67-OSCULATING CIRCLES OF GIVEN CONIC**  
  
GIVEN THE EQUATION OF A CONIC IN AN ORTHONORMAL BASE, THIS PROGRAM FINDS THE COORDINATES OF THE CENTER AND THE RADIUS OF THE OSCULATING CIRCLE IN ANY POINT OF THIS CONIC.  
  
204PROGRAM STEPS  
RAYMOND BRUECKX  
B-WILRIJK.
- 52452D 67-CHESS 6.7**  
  
IN THIS GAME, YOUR HP BECOMES AN ACTUAL CHESS PLAYER. WITH THAT
- 52452D (CONTD)**  
  
PROGRAM YOU CAN PLAY CHESS AGAINST IT, WITH A KING, A QUEEN, CASTLES, BISHOPS, KNIGHTS, PAWNS. IT IS SURPRISING, BUT THE HP HAS AN ACTUAL CHANCE TO WIN AGAINST A BEGINNER.  
  
161PROGRAM STEPS  
JEAN-PIERRE FAISAN  
F-PARIS.
- 52453D 67-COMPUTE YOUR NET SALARY VS PROPORTIONAL FIXED DEDUCTIONS**  
  
GIVEN TEN RATES OF DEDUCTIONS AND FOUR FIXED DEDUCTIONS (MAXIMUM) THIS PROGRAM COMPUTES NET SALARY. RATES MAY BE APPLIED EITHER TO TOTAL AMOUNT OR TO PARTIAL AMOUNT THROUGH A VERSATILE CODE WORD. DEDUCTIONS AND CODE WORD MAY BE DEFINED BY USER AND RECORDED ON SIDE NO 1 OF MAGNETIC CARD IF NOT SECURED.  
  
112PROGRAM STEPS  
PIERRE GRANIER  
F-VANVES.
- 52454D 67-CONVERSION OF INTEGERS FROM ONE BASE TO ANOTHER**  
  
PROGRAM WILL CONVERT AN INTEGER FROM ONE BASE TO ANOTHER. THE TWO BASES MAY BE ANY FROM 2 TO (AND INCLUDED) 10. CONVERSION MAY BE DONE IN BOTH DIRECTIONS.  
  
146PROGRAM STEPS  
KAI VIGGO MUNCH  
N-RYKKINN.
- 52455D 67-PRINCIPAL STRESSES**  
  
COMPUTATION OF PRINCIPAL STRESSES FROM A GENERAL TRIAXIAL (OR BIAXIAL) STRESS STATE.  
  
146PROGRAM STEPS  
KAI VIGGO MUNCH  
N-RYKKINN.
- 52456D 67-TEST OF EQUALITY BETWEEN REGRESSORS OF TWO REGRESSIONS**  
  
THIS PROGRAM TESTS THE EQUALITY BETWEEN THE REGRESSORS BY USING A CHOW-METHOD.  
  
132PROGRAM STEPS  
EVERT CARLSSON  
S-GOETEBORG.
- 52457D 67-CALCULATOR EXTENSION, GENERAL FINANCE**  
  
THIS PROGRAM WORKS LIKE PROGRAM NO 51760D, BUT IT INCLUDES FINANCIAL FUNCTIONS. THE FUNCTIONS ARE : N-I-PV-PMT-FV, BEGIN-END SWITCH AND A LIST-FUNCTION. THE PROGRAM IS ALSO USABLE, WHEN MORE THAN ONE PAYMENT OCCUR IN EACH INTERESTING PERIOD. THE PROGRAM USES THE SAME CASH-FLOW-SIGN CONVENTION AS THE HP FINANCIAL CALCULATORS DO. STACK AND LAST X CHANGE AND ERROR DISPLAY COMES UP LIKE THEY DO FOR BUILD-IN FUNCTIONS. CARD 2 IS USED ONLY WHEN SOLVING FOR INTEREST RATE WITH PAYMENTS INVOLVED.  
  
431PROGRAM STEPS  
BJORN ENGSG  
DK-ALLEROD.
- 52458D 67-GERMAN INCOME-TAX SINCE 1979**  
  
ACCORDING TO "STEUERAENDERUNGSGESETZ 1979 VOM 30.11.1978" THIS PROGRAM CALCULATES YEARLY TAX WHEN YEARLY INCOME IS ENTERED.  
  
190PROGRAM STEPS  
HANS FLORIAN HOYER  
D-STUTTGART.
- 52459D 67-DIMENSIONING OF STEEL PROFILES FOR BENDING**  
  
YOU CHOOSE TYPE OF PROFILE (HE-A, HE-B, HE-M, I) STORE MOMENT, SPAN, ADMISSIBLE BENDING TENSION AND DEFORMATION, AND THE PROGRAM RETURNS TO YOU THE NECESSARY HEIGHT OF CHOSEN PROFILE. NO DATA CARDS NEEDED.  
  
223PROGRAM STEPS  
HANS FLORIAN HOYER  
D-STUTTGART.
- 52460D 67-APPROXIMATION OF OMEGA NUMBERS ACCORDING TO DIN 4114**  
  
THIS PROGRAM GIVES YOU TWO SUBPROGRAMS FOR OWN USE. FOR BOTH ST 37 AND ST 52 THESE SUBPROGRAMS RETURN YOU THE APPROX. OMEGA NUMBER FOR THE LAMBDA YOU SPECIFIED. MAXIMUM MISTAKE IS 4.3% ON SAFE SIDE AND 1.8% ON UNSAFE SIDE. FOR LAMBDA GREATER 110, MISTAKE IS LESS THAN ONE PERCENT.  
  
064PROGRAM STEPS  
HANS FLORIAN HOYER  
D-STUTTGART.
- 52461D 97-STAR EQUATORIAL COORDINATES VS EARTH PRECESSION**  
  
PROGRAM PERFORMS EXACT CONVERSION OF EQUATORIAL COORDINATES OF STARS BETWEEN TWO DATES DUE TO EARTH PRECESSION. INPUTS ARE: - JED'S - EITHER RIGHT ASCENSION (HMS OR DMS) OR SHA (DMS), AND DECLINATION (DMS) WITH OR WITHOUT PROPER MOTIONS. ALLOWS CONVERSION FOR NEW DATA OR STAR, ENTERING ONLY MODIFIED ELEMENTS. PROGRAM USES NEW 1976-77 SYSTEM OF ASTRONOMICAL CONSTANTS, AND INCLUDES CONVERSION TO JED OF ANY DATE OF JULIAN OR GREGORIAN CALENDAR.  
  
220PROGRAM STEPS  
JEAN THIBERGE  
F-CHERBOURG.
- 52462D 67-RESISTIVE ATTENUATOR AND MATCHMAKER DESIGN**  
  
I) CALCULATES THE VALUES OF THE RESISTANCES YIELDING SYMETRICAL ATTENUATOR WITH DIFFERENT PATTERN (T,PI,ETC...). THE INPUTS DATA ARE ZC AND THE VOLTAGE ATTENUATION FACTOR IN DB.  
II) THE SAME FOR MATCHMAKER. THE DATA INPUTS ARE ZC1 AND ZC2 AND THE VOLTAGE ATTENUATION FACTOR. CALCULATES THE SMALLEST ATTENUATION AT EITHER END OF THE NETWORK.  
  
202PROGRAM STEPS  
MICHEL PIERQUIN  
F-THIAIS.
- 52463D 67-GENERAL E-DISTRIBUTION**  
  
PROGRAM COMPUTES THE LIMIT IF P=N+NI FOR NI TO N=INFINI, POINT AFTER POINT.  
  
038PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.
- 52464D 67-ORBIT OF AN ELECTRON IN AN ELECTRIC AND MAGNETIC FIELD**  
  
GIVEN F IN V/M AND B IN OERSTED, THIS PROGRAM COMPUTES THE ORBIT OF AN ELECTRON IN THOSE FIELDS, IN X-Y-STYLE, FOR EVERY DELTA T.  
  
073PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.
- 52465D 67-GENERAL BALLISTIC PROBLEM**  
  
AFTER THE INPUT OF V0, ALPHA, K AND

## PROGRAM ABSTRACTS

## 524650 (CONTD)

DELTA T, THIS PROGRAM COMPUTES THE ORBIT OF A PROJECTILE IN X-Y-STYLE. BECAUSE THE AIR-RESISTANCE K AND THE G DEPEND ON THE DISTANCE BETWEEN THE PROJECTILE AND THE EARTH, SOME CORRECTIONS ARE MADE WITH A FEED-BACK CONTROL SYSTEM.

193PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 524660 67-ZETA-FUNCTION OR RIEMANN 2

PROGRAM COMPUTES A ZETA-FUNCTION OF RIEMANN WHEN A AND B ARE GIVEN.

048PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 524670 67-ZETA-FUNCTION OF RIEMANN 3

PROGRAM COMPUTES A ZETA-FUNCTION OF RIEMANN WHEN A AND B ARE GIVEN.

048PROGRAM STEPS  
JOHN VAN THIELEN  
B-STABROEK.

## 524680 97-RAILWAY TIMETABLE ANALYZER

GIVEN TIMES OF DEPARTURE AND ARRIVAL, AND DISTANCE COORDINATES OF STATIONS, PROGRAM COMPUTES :  
1) DISTANCE, TRAVELLING TIME, AVERAGE SPEED FOR A SINGLE SECTION;  
2) TOTAL DISTANCE, TOTAL NET TIME (EXCL. STOPS), TOTAL GROSS TIME (INCL. STOPS) AND THE 2 AVERAGE SPEEDS FOR AN UNLIMITED SEQUENCE OF SECTIONS; 3) CROSSING POINT AND CROSSING TIME WITH A TRAIN COMING FROM THE OPPOSITE DIRECTION.  
OPTIONS: INPUT DATA PRINT, SECTIONS LONGER THAN 24 HOURS, 3 DIFFERENT DATA INPUT MODES.

213PROGRAM STEPS  
HANS STOECKLMAIR  
A-KLAGENFURT.

## 524690 67-BULK MATERIAL CAPACITY OF RECTANGULAR BINS

THE PROGRAM EVALUATES THE TOTAL CAPACITY OF RECTANGULAR BINS WHEN STORING BULK MATERIALS, GIVEN THE ANGLE OF REPOSE AND THE GEOMETRICAL CHARACTERISTICS OF THE BIN. ANY CONSISTENT SET OF UNITS CAN BE USED.

075PROGRAM STEPS  
GIUSEPPE LIGATO  
I-MILANINO.

## 524700 67-THREAD MECHANICS (ISO)

THIS PROGRAM COMPUTES THE NEEDED MOMENT TO ASSEMBLE A SCREW TO A GIVEN AXIAL FORCE, AND THE INVERSE. THE PROGRAM ALSO COMPUTES A MORE EXACT MOMENT. IT NOW TAKES CARE OF THE SETTLEMENT IN THE THREAD AND THE CONTACT SURFACES AND AT LAST IT COMPUTES THE AXIAL AND TORSIONAL STRESS IN THE SCREW. ALL CALCULATIONS FOR ISO-SCREWS.

170PROGRAM STEPS  
ERLING PEDERSEN  
S-GUETEBORG.

## 524710 67-LINEAR EQUATIONS IN 6 UNKNOWNNS

THIS PROGRAM GIVES YOU THE SOLUTION OF A SYSTEM OF 6 LINEAR EQUATIONS IN 6 UNKNOWNNS UNTIL :  
- THE MATRIX IS SYMMETRIC  
-  $A(I,J)=0$  IF  $I>J+3$  OR  $J>I+3$ ,  
BY THE METHOD OF CHOLESKY.

348PROGRAM STEPS  
DIDIER DE BRUYN  
B-BRUXELLES.

## 524720 67-SPHERICAL HARMONICS WITH ANY REAL PARAMETERS AND ARGUMENTS

THIS PROGRAM COMPUTES SPHERICAL HARMONICS FOR ANY REAL PARAMETERS AND ARGUMENTS IN DEGREES. A FACTORIAL FUNCTION FOR A REAL ARGUMENT IS PROVIDED. SINCERELY THE PROGRAM IS COMPLETELY DIFFERENT THAT 502200 BUT BOTH ARE OF SAME MATTER.

223PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 524730 67-97-MULTIPURPOSE CONVERTER

THIS PROGRAM CONVERTS SIGNED BINARY NUMBERS TO DECIMAL OR OCTAL AND VICE-VERSA. ALSO BINARY TO TWO COMPLEMENTS AND VICE-VERSA. THE PROGRAM ACCEPTS, PROCESSES AND DISPLAYS SIGNED BINARY NUMBERS UP TO A MAXIMUM OF 20 BITS. PROGRAM, IN ADDITION, CONVERTS POSITIVE OR NEGATIVE OCTAL NUMBERS TO DECIMAL.

220PROGRAM STEPS  
ERNST E. SIE  
D-EMMENDINGEN.

## 524740 97-TRIGONOMETRICAL CALCULATION OF OPTICAL PATH DIFFERENCE

AN AXIAL RAY IS TRACED TRIGONOMETRICALLY AND THE OPTICAL PATH DIFFERENCE AT EACH SURFACE IS FOUND AND PRINTED, TOGETHER WITH THE OPTICAL PATH DIFFERENCE FOR THE COMPLETE OPTICAL SYSTEM. THE OUTPUT IS IN UNITS OF WAVE LENGTHS OF BRIGHTEST LIGHT. THE UNITS USED TO DEFINE THE OPTICAL SYSTEM MAY BE INCHES OR MILLIMETRES.

188PROGRAM STEPS  
JAMES HOUGHTON  
GB-TETBURY.

## 524750 97-OPTICAL PATH DIFFERENCE FOR PARAXIAL RAYS

GIVEN THE SPECIFICATION OF AN OPTICAL SYSTEM THE PROGRAM DETERMINES THE OPTICAL PATH DIFFERENCE CONTRIBUTED BY EACH SURFACE TOGETHER WITH TOTAL OPTICAL PATH DIFFERENCE FOR THE COMPLETE SYSTEM. THE CALCULATION IS CONFINED TO THE PARAXIAL REGION. THE SPECIFICATION OF THE SYSTEM MAY BE IN INCH OR MILLIMETRE UNITS AND THE OUTPUT IS GIVEN IN UNITS OF WAVELENGTH.

122PROGRAM STEPS  
JAMES HOUGHTON  
GB-TETBURY.

## 524760 67-AREAS-PERIMETERS

THIS PROGRAM COMPUTES THE AREA AND THE PERIMETER OF A RECTANGLE, A PARALLELOGRAM, A TRIANGLE A TRAPEZIUM AND A REGULAR POLYGON.

104PROGRAM STEPS  
GILLES SAUVAGNAT  
F-BRUN.

## 524770 67-MERSENNE'S NUMBERS

THE PROGRAM FINDS FACTORS OF MERSENNE'S NUMBERS I.E. OF NUMBERS OF THE TYPE  $2^{p-1}$  WHERE P IS A PRIME.

072PROGRAM STEPS  
ATTILIO FARINA  
I-TURIN.

## 524780 97-VARIABLES SAMPLING INSPECTION PLANS

LET AN OBJECT BE ACCEPTABLE IF A CERTAIN CHARACTERISTIC IS GREATER (OR SMALLER) THAN A PRESENT LIMIT. THIS PROGRAM WILL COMPUTE THE SAMPLE SIZE AND THE LIMIT OF ACCEPTANCE.

## 524780 (CONTD)

TABILITY FOR THE SAMPLE MEAN AS A FUNCTION OF THE PRODUCER'S RISK FOR REJECTING A LOT HAVING AN ACCEPTABLE PROPORTION OF DEFECTIVES AND THE CONSUMER'S RISK FOR ACCEPTING A LOT HAVING AN UNACCEPTABLE PROPORTION OF DEFECTIVES.

100PROGRAM STEPS  
CLAUDIO BENSKI  
F-CLAIX.

## 524790 67-II. GEODETIC PROBLEM FOR ELLIPSOID NSUI

PROGRAM CALCULATES, FOR GIVEN LONGITUDE AND LATITUDE OF TWO POINTS, THE AZIMUT, COUNTERAZIMUT AND DISTANCE. ELLIPTIC CALCULATION WITH GAUSSIAN MEAN LATITUDE FORMULA FOR DISTANCE SMALLER THAN 150 KM. USING OF DATA SET II.

219PROGRAM STEPS  
JOHANNES GRUSS  
D-WIESBADEN.

## 524800 67-LENGTH OF ELLIPTIC MERIDIAN NSU2

PROGRAM CALCULATES, FOR GIVEN LATITUDE, THE LENGTH OF THE ELLIPTIC MERIDIAN FROM EQUATOR TO THE POINT OR THE LENGTH DIFFERENCE OF TWO GIVEN LATITUDES.

054PROGRAM STEPS  
JOHANNES GRUSS  
D-WIESBADEN.

## 524810 67-I. GEODETIC PROBLEM FOR ELLIPSOID NSU3

PROGRAM CALCULATES, FOR GIVEN LATITUDE AND LONGITUDE OF A POINT AND DISTANCE AND AZIMUT TO A SECOND POINT, LATITUDE AND LONGITUDE OF THIS NEWPOINT AND THE COUNTERAZIMUT ELLIPTIC CALCULATION WITH LEGENDRIAN SERIES FOR DISTANCES SMALLER THAN 100 KM. USING OF DATA SET II.

718PROGRAM STEPS  
JOHANNES GRUSS  
D-WIESBADEN.

## 524820 67-LARGE LEAST POSITIVE RESIDUES

THIS PROGRAM CALCULATES THE LEAST POSITIVE REMAINDER OF  $x^{**n}$ , WHEN DIVIDED BY M. THIS IS OFTEN TERMED "THE RESIDUE OF  $x^{**n}$  MODULO M". LIMITS ARE  $x, n < 10^{**11}$ ,  $M < 10^{**10}$ . PROGRAM CAN BE USED TO QUICKLY DETERMINE IF A NUMBER IS COMPOSITE BY MEANS OF FERMAT'S THEOREM, OR TO APPLY SIMPLE VERSIONS OF SUCH EXPONENTIAL CRYPTOSYSTEMS AS HAVE BEEN DESCRIBED IN SCIENTIFIC AMERICAN.

224PROGRAM STEPS  
ROLAND N. ANDERSON  
S-STOCKHOLM.

## 524830 67-TWO-PASS HEAT EXCHANGER PERFORMANCE

THIS PROGRAM COMPUTES TWO-PASS HEAT EXCHANGERS PERFORMANCES - WHEN HEAT EXCHANGERS ARE NOT STRICTLY COUNTER OR CO-CURRENT. IT IS HARD TO SOLVE THEIR EQUATIONS BY CALCULUS - HERE IT IS SOLVED BY SUCCESSIVE SUMMATION AND APPROXIMATIONS - WHEN ENTERING IN AN OUT TEMPERATURES FOR BOTH FLUIDS AND THE FLOWRATE OF ONE OF THEM, IT COMPUTES THE HEAT TRANSFER COEFFICIENT AND FROM THAT IT COMPUTES, FOR ANY FLOWRATE AND INLET TEMPERATURES, THE OUTLET TEMPERATURES AND HEAT TRANSFER.

222PROGRAM STEPS  
PIERRE DELRUELLE  
B-BRUXELLES.

## PROGRAM ABSTRACTS

## 524840 67-CAPACITORS

THIS PROGRAM COMPUTES THE VOLTAGE OF A CAPACITOR AFTER A SPECIFIED TIME OF CHARGING. IT ALSO COMPUTES THE TIME NECESSARY TO REACH A SPECIFIED VOLTAGE. FURTHERMORE IT CAN COMPUTE THE TIME-CONSTANT, THE VALUE OF THE RESISTOR AND THE CAPACITOR, AND THE CURRENT THROUGH THE CAPACITOR. AN ERROR FUNCTION IS INCLUDED TO PREVENT FAULTY RESULTS BECAUSE OF DATA MISSING.

140PROGRAM STEPS  
OLE THOFT JENSEN  
DK-AARHUS.

## 524850 67-DILOGARITH, PLANCK'S RADIATION &amp; FOUR EINSTEIN'S FUNCTIONS

THIS PROGRAM GIVES DILOGARITHM (SPENCE'S INTEGRAL), PLANCK'S RADIATION FUNCTION AND FOUR EINSTEIN'S FUNCTIONS.

130PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 524860 67-DEBYE FUNCTIONS

THIS PROGRAM GIVES DEBYE'S INTEGRALS FROM ZERO TO INFINITE, FROM ZERO TO X SURPASSING ZERO AND FROM X TO INFINITE. THE PARAMETER N IS AN INTEGER SURPASSING 1. THREE DIFFERENT PROCEDURES ARE USED IN ORDER TO OBTAIN A GREATER CERELITY

223PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 524870 67-F(X) AND THE FIRST FOUR DERIVATIONS OF F(X)

THIS PROGRAM COMPUTES APPROXIMATELY  $Y=F(X)$ ,  $Y=F'(X)$ ,  $Y=F''(X)$ ,  $Y=F'''(X)$ ,  $Y=F^{(4)}(X)$  OF A FUNCTION F(X).

152PROGRAM STEPS  
BURKHARD KASTEN  
D-SAARBUECKEN.

## 524880 67-SYSTEM DYNAMICS

SYSTEM DYNAMICS IS AN ALGORITHMIC METHOD FOR SIMULATING THE EVOLUTION IN TIME OF DYNAMIC, STATE-DETERMINED SYSTEMS - PHYSICAL OR GENERAL. ALTHOUGH SYSTEM SIMULATION IN GENERAL REQUIRES REAL COMPUTERS, THIS SIMPLE METHOD CAN BE USED ON PROGRAMMABLE CALCULATORS AND WILL SHOW THE QUALITATIVE BEHAVIOUR OF A GREAT MANY SYSTEMS IN WHICH THE SOLUTION OF THE DYNAMIC EQUATIONS IS BEYOND REACH.

055PROGRAM STEPS  
BO JENSEN  
DK-COPENHAGEN.

## 524890 67-BELT DRIVE

THIS PROGRAM COMPUTES THE LENGTH OF TAG BELT OR THE DISTANCE BETWEEN THE AXES OF TWO PULLEYS. THEN IT ALSO COMPUTES THE REQUISITED PRESTRESSING FORCE TO TRANSMIT A GIVEN POWER AND AT LAST YOU CAN COMPUTE THE MAXIMUM TENSION IN THE BELT.

224PROGRAM STEPS  
ERLING PEDERSEN  
S-GOTTENBURG.

## 524900 67-DISC BRAKES

WITH THIS PROGRAM YOU CAN CALCULATE THE RADIUS ON WHICH A FORCE SHALL BE ASSEMBLED TO GET AN EVEN WEAR, THE NEEDED FORCE, THE TIME TO STOP FOR EXAMPLE A CAR WITH A GIVEN VELOCITY, THE INCREASE IN TEMPERATURE ON A BRAKE DURING THE BRAKE OPERATION AND THE KINETIC ENERGY A

## 524900 (CONTD)

VEHICLE CAN HAVE. IT CAN BE STOPPED AFTER A GIVEN TIME.

106PROGRAM STEPS  
ERLING PEDERSEN  
S-GOTTENBURG.

## 524910 67-97-CHARACTER OF GRAIN

PROGRAM CALCULATES THE MESH-LINE MIXED TOGETHER FROM 1 TO 5 ADDITIONS TO CONTROL CONCRETE MIXING PLANTS.

166PROGRAM STEPS  
A-FRITZ MAREK  
A-VIENNA.

## 524920 97-WINDING LINE BETWEEN TWO PARALLEL LINES

PROGRAM LISTS THE COORDINATES OF THE MAIN-POINTS OF THE WINDING-LINE AND THE DATES OF THE CURVES FOR GAUGE.

224PROGRAM STEPS  
GERHARD KRIZSANITS  
A-LEGBERSDORF.

## 524930 67-MOON SIGHT REDUCTION WITH AUTOMATIC SAILING CORRECTION

THE PROGRAM REDUCES SIGHTS FROM MOON OBSERVATIONS. ALL DR AND ALMANAC DATA IS NEEDED. GMT OBS WILL THEN GIVE 2N AND HS WILL GIVE ALTITUDE INTERCEPT. THE PROGRAM MAY BE USED IN COMBINATION WITH THE SUN AND THE STAR PROGRAMS. IN BOTH CASES ONLY ALMANAC DATA IS NEEDED. THE PROGRAM WILL ALSO FIT THE "MULTI-FIX" PROGRAM.

217PROGRAM STEPS  
JAN ANDERSEN  
N-GERGEN.

## 524940 67-MOODY'S DIAGRAM IN PIPE HYDRAULICS

THE PROGRAM IS AN APPLICATION OF MOODY'S DIAGRAM IN CIRCULAR PIPE HYDRAULICS, AND WILL CALCULATE ENERGY LOSS, DEBIT OR DIAMETER OF THE PIPE, PROVIDE THE NECESSARY INPUT.

213PROGRAM STEPS  
STELIO VOYATZPOULOS  
GR-ATHENS.

## 524950 67-BOOLEAN SIMULATION SUBROUTINES

SUBROUTINES FOR SIMULATION OF DIFFERENT LOGICAL STANDARD-GATES. INCLUDED ARE 2,3 AND 4 INPUT NAND AND NOR GATES, INVERTERS, JK-FLIP-FLOP AND N-BIT, N LESS EQUAL 9, PARALLEL-ACCESS SHIFTREGISTER. SUBROUTINES ARE GROUPED IN COMPLETELY INDEPENDENT GROUPS IN ORDER TO INCREASE FLEXIBILITY.

083PROGRAM STEPS  
HANS EMLID  
S-GUETEBURG.

## 524960 67-CLAUSEN'S INTEGRAL AND SIX RELATED SUMMATIONS

THIS PROGRAM GIVES THE CLAUSEN'S INTEGRAL AND SIX RELATED SUMMATIONS IN THE CHOSEN PERIOD 0 TO  $P_1$ .

219PROGRAM STEPS  
FELIPE LANDA  
E-CORDOBA.

## 524970 67-ROOTS OF CUBIC EQUATIONS

PROGRAM CALCULATES THE REAL AND/OR COMPLEX ROOTS OF THIRD (OR SECOND) DEGREE EQUATION, USING ONLY ONE MEMORY REGISTER. THIS PROGRAM IS APPLICABLE IN THE

## 524970 (CONTD)

MULTICARD PROGRAMS WHERE OTHER MEMORY REGISTERS SHOULD BE INTACT, OR INDEPENDENTLY.

127PROGRAM STEPS  
FRANC TOMSIC  
YU-LJUBLJANA.

## 524980 67-97-SECTORED DISK

WHEN A CIRCULAR PIECE IS RADICALLY CUT INTO A NUMBER  $N \geq 2$  OF EQUAL SECTORS, THESE CAN FIT WHEN THEY ARE STUCKED TOGETHER INSIDE A CIRCLE WHOSE DIAMETER IS A FUNCTION OF INITIAL DIAMETER, N, AND CUT'S WIDTH. THE PROGRAM COMPUTES ALL THE INTERESTING DIMENSIONS OF THE ASSEMBLY IN FUNCTION OF THE CONTAINING CIRCLE.

211PROGRAM STEPS  
FRANCOIS HAENSSELER  
CH-GENEVA.

## 524990 97-DUCTS (I)

PROGRAM CALCULATES RIGHT-ANGLED DUCTS SIDES A AND B (INTERNAL DIMENSIONS) AND TOTAL SURFACE OF MATERIAL USED. THIS PROGRAM IS AVAILABLE FOR AIRCONDITIONING, VENTILATION AND OTHER. MEASURES SIDES A AND B ARE IN CENTIMETER MEASURES TOTAL SURFACE MATERIAL ARE IN SQUARE METER. SIDES A AND B IN CM ARE ROUND FIVE IN FIVE CENTIMETER. TOTAL M2 SURFACE ADD A PERCENTAGE OF REMAINDER IF FIBERGLASS OR SIMILAR IS USED.

143PROGRAM STEPS  
JUAN LUIS GARCIA LAGO  
E-MURCIA.

## 525000 97-DUCTS (II)

PROGRAM CALCULATES RIGHT-ANGLED DUCTS (AS PROGRAM DUCTS (I)), BUT BOTH SIDES, A AND B (INTERNAL DIMENSIONS) ARE NOT DETERMINATES BY CALCULATOR. YOU INPUT SIDE A AND CALCULATOR DISPLAY SIDE B, THIS ONE CAN BE INPUT OR CHANGE THIS ONE VALUE. CALCULATOR REMEMBERS ONLY SIDES INPUT FOR YOU, THEN CALCULATES TOTAL SURFACE OF MATERIAL USED. MEASURES SIDES A AND B ARE IN CENTIMETER. MEASURES TOTAL SURFACE MATERIAL ARE IN SQUARE METER.

112PROGRAM STEPS  
JUAN LUIS GARCIA LAGO  
E-MURCIA.