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AI-MEMO 9201 Revision I

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April, 1964

AI-MEMO-9201*
Revision 1

ABSTRACTS OF AVAILABLE CODES

AT

ATOMICS INTERNATIONAL

by

R. A. Blaine

Mathematics & Computer Applications

ATOMICS INTERNATIONAL

a division of North American Aviation, Inc.

* (Obsoletes AI-MEMO-9201 of November, 1963)

COMMENT SHEET

TO: MATHEMATICS & COMPUTER APPLICATIONS GROUP
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California

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ACKNOWLEDGMENT

The author is grateful to the supervisors in the Mathematics and Computer Applications Group for supplying abstracts of codes under their cognizance; and to Mrs. Joanne S. Temple for proofreading and correcting the final copy.

AI-MEMO-9201
Revision 1

ABSTRACT

Revision 1 to AI-MEMO-9201 (Code Abstracts)* contains sections XIX - XXIII (mathematics, economics, ... and graphical display codes and subroutines) which were not included in the original document. In addition, fifteen nuclear codes have been added.

The abstracts are representative of the codes available at Atomics International but are not complete. Many codes of special application are not included.

The document can be kept in a loose-leaf notebook with dividers between each section for handy reference. As new codes become available revisions will be distributed.

AI-MEMO-9201, November, 1963, is obsolete with the publishing of this Revision 1.

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THE INTENT OF THIS DOCUMENT IS TO SERVE AS A GUIDE TO AVAILABLE CODES AT ATOMICS INTERNATIONAL. THE MAJORITY OF THOSE LISTED WERE WRITTEN BY THE APPLIED MATHEMATICS GROUP ALTHOUGH SOME (PARTICULARLY THE SHIELDING CODES) WERE WRITTEN BY OTHER GROUPS AT ATOMICS INTERNATIONAL. MANY OF THE LISTED CODES ARE FROM OTHER AEC INSTALLATIONS. MOST OF THE CODES ARE WRITTEN IN FORTRAN ALTHOUGH THERE ARE MANY EXCEPTIONS.

THE CODES ARE GROUPED INTO 22 CATEGORIES (WITH DIFFICULTY). SOME FALL INTO SEVERAL CATEGORIES - IN THESE CASES THE ABSTRACT APPEARS UNDER THE PRINCIPLE CATEGORY AND IS LISTED UNDER - CROSS REFERENCES - AT THE END OF EACH SECTION.

THE NUCLEAR CODES, SECTIONS I-XV ARE FAIRLY COMPLETE. SECTIONS XVI - XXII ARE REPRESENTATIVE OF WHAT IS AVAILABLE. SOME OF THESE SECTIONS SHOULD HAVE 50 - 100 CODES.

THE WRITER WILL APPRECIATE ANY ADDITIONS, SUGGESTIONS, OR ERRORS (WHICH ARE MOST LIKELY KEYPUNCH ERRORS)... CONTRIBUTIONS SHOULD INCLUDE AN ABSTRACT (IN THE SAME SPIRIT AS THOSE INCLUDED) AND A COMPLETE REFERENCE. THESE WILL BE INCLUDED ALONG WITH NEW CODES AS SOON AS POSSIBLE.

BECAUSE OF THE GIGANTIC TASK INVOLVED IN ABSTRACTING AND REFERENCING ALL OF THE AVAILABLE CODES (650 DECK NUMBERS) SINCE 1959) THE WORK IS FAR FROM COMPLETE. IN ORDER TO PROVIDE SOME GUIDE FOR CODE USERS (PARTICULARLY NEW EMPLOYEES) THOSE SECTIONS WHICH ARE COMPLETE ARE BEING DISTRIBUTED ALONG WITH A TABLE OF CONTENTS AND THIS BRIEF EXPLANATION. AS ADDITIONAL SECTIONS ARE COMPLETED THEY WILL BE DISTRIBUTED. THE SECTIONS ARE NUMBERED WITH ROMAN NUMERALS AND CAN BE KEPT IN A NOTEBOOK WITH DIVIDERS BETWEEN EACH SECTION.

FOR THOSE INTERESTED, THIS DOCUMENT WAS WRITTEN ON 80 COLUMN WORK SHEETS. THE SPACING IS ACCOMPLISHED BY WRITING THE STANDARD FORTRAN CONTROL CHARACTERS IN COLUMN 1 OF EACH CARD. THE SHEETS WERE KEYPUNCHED ON STANDARD 80 COLUMN IBM CARDS AND LISTED BY AN IBM 1401 UNDER PROGRAM CONTROL ON MULTILITH MASTERS WHICH WERE THEN REPRODUCED. THE WRITER IS GRATEFUL TO MR. L.R. BLUE FOR THE IDEA. DISTRIBUTION IS ALSO AUTOMATED AS THE DISTRIBUTION LIST (FOR THE MOST PART) IS ON CARDS.

MANY CODES ARE USED ON TAPE AND SO NO DECK IS IN THE PRODUCTION FILES. AN UP-TO-DATE LIST OF TAPE LOCATIONS CAN BE OBTAINED FROM APPLIED MATHEMATICS. SOME DECKS ARE NOT IN THE PRODUCTION FILES FOR VARIED REASONS. THESE CAN BE OBTAINED BY CONTACTING THE WRITER.

ANY QUESTION IN REGARD TO THE USE, THEORY, OR INTERPRETATION OF ANY CODE CAN BE ANSWERED MOST EFFICIENTLY BY CONTACTING THE AUTHOR OF THE CODE OR THE SUPERVISOR OF THE APPROPRIATE UNIT OF THE APPLIED MATHEMATICS GROUP (ALTHOUGH THE WRITER IS GLAD TO GIVE ANY ASSISTANCE). A BRIEF LIST OF THE MAJOR AREAS OF RESPONSIBILITIES FOLLOWS.

ANALOG UNIT - SOLUTION OF COUPLED LINEAR AND NONLINEAR
DIFFERENTIAL EQUATIONS.

CODE DEVELOPMENT- REACTOR THEORY, DEVELOPMENT OF NUCLEAR CODES

DIGITAL APPLICATIONS- HEAT TRANSFER, MATHEMATICAL METHODS,
CHEMICAL KINETICS, ENGINEERING CODES

INFORMATION SYSTEMS- DATA REDUCTIONS, CRT DISPLAYS, MANAGEMENT
STUDIES

MATH-PHYSICS- MATHEMATICS, PHYSICS, CROSS SECTIONS, HEAT TRANSFER

ANY MEMBER OF APPLIED MATHEMATICS IS HAPPY TO OFFER HELP WITH PROGRAMMING PROBLEMS.

REQUESTS FOR CODES FROM OTHER AEC INSTALLATIONS SHOULD BE DIRECTED TO THE WRITER WHO IS THE ATOMICS INTERNATIONAL CODES COORDINATOR AND REPRESENTATIVE TO THE ARGONNE CODE CENTER.

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I ONE DIMENSIONAL DIFFUSION THEORY CODES

AIM-5

DESCRIPTION FEW GROUP ,239 MESH POINTS,UP TO 12 GROUPS. SEARCHES INCLUDE HOMOGENEOUS POISON,BUCKLING,AND BOUNDARY. SPECIAL FEATURES INCLUDE CHOICE OF 8 SETS OF BOUNDARY CONDITIONS,ADJOINT FLUX,THREE GEOMETRIES,RESTART DUMP FOR SNG,AND ONE ITERATION PROBLEMS.DOWNSCATTER TO ANY LOWER GROUP

REFERENCE H.P.FLATT AND D.C.BALLER, AIM-5,A MULTI-GROUP, ONE DIMENSIONAL DIFFUSION EQUATION CODE ,NAA-SR-4694 DECEMBER 1959

DECK NUMBERS 3W145 - NO SEARCHES OR ADJOINT FLUX CALCULATION
3W146 CONTAINS ALL OPTIONS

FOG

DESCRIPTION FOG IS BASED ON AIM-5 BUT HAS IMPROVED NUMERICAL TECHNIQUES. A MAXIMUM OF 4 GROUPS,239 POINTS,AND 40 REGIONS. DOWNSCATTER OCCURS ONLY TO ONE LOWER GROUP. A NEW FEATURE IS THE BUCKLING ITERATION OR SYNTHESIS CALCULATION FOR A RIGHT CYLINDER

REFERENCE H.P.FLATT, THE FOG ONE-DIMENSIONAL NEUTRON DIFFUSION EQUATION CODES, NAA-SR-6104, MAY 1961

DECK NUMBERS 3W385 FLUX CALCULATION
3W386 BUCKLING ITERATION
3W387 SEARCHES AND ADJOINT CALCULATION

AIM-6

DESCRIPTION MULTIGROUP CODE BASE ON AIM-5. PROVISIONS FOR 20 ELEMENT LIBRARY OF MICROSCOPIC CROSS SECTIONS. 18 GROUPS, 101 MESH POINTS, DOWNSCATTER TO AS MANY AS 5 LOWER GROUPS. ALL OPTIONS OF AIM-5 ARE INCLUDED IN ADDITION TO ONE AND TWO ELEMENT CONCENTRATION SEARCHES. MICROSCOPIC CROSS SECTIONS CAN BE CHANGED AT EXECUTION TIME. ALLOWS FOR INPUT OF MACROSCOPIC CROSS SECTIONS IF DESIRED. SEVERAL SPECIAL DECKS ARE AVAILABLE.

REFERENCE H.P. FLATT AND D.C. BALLER, THE AIM6 CODE, NAA-SR-MEMO-9204, JAN. 1964

DECK NUMBERS 3W300 AIM-6 - PROGRAM IS ON TAPE
3W382 18 GROUP LIBRARY
3W383 16 GROUP LIBRARY
3W384 11 GROUP LIBRARY
3W391 18 GROUP LIBRARY REVISED
3W411 BUCKLING ITERATION - SEE FOG
FEW GROUP REDUCTION - NOT IN PRODUCTION FILE

AIM-7

DESCRIPTION CONSISTENT P1 APPROXIMATION - ALL AIM-6 OPTIONS ARE AVAILABLE.

REFERENCE R.A. BLAINE, UNPUBLISHED

DECK NUMBER NOT IN PRODUCTION FILE

FAIM-CELL

DESCRIPTION BASED ON AIM-6 WITH MATHEMATICAL TECHNIQUES OF FOG. ADDED OPTIONS ARE CALCULATION OF TRANSVERSE BUCKLING, 3 ELEMENT CONCENTRATION SEARCH, AND DOWNSCATTER TO AS MANY AS 8 LOWER GROUPS. AN EXTENSIVE EDIT IS GIVEN INCLUDING ABSORPTION BY ELEMENT, BREEDING RATIOS, ETC. LIMITS ARE 18 GROUPS, 101 MESH POINTS, AND 20 REGIONS. FIXED DATA SHEETS ARE AVAILABLE. THE CODE WILL PERFORM CELL AVERAGING CALCULATIONS FOR ANY REGIONS, HOMOGENIZE THE PROPERTIES AND THEN DO REACTOR CALCULATIONS USING THE HOMOGENIZED RESULTS.

REFERENCE D.C. BALLER, THE FAIM CODE-A MULTIGROUP, ONE DIMENSIONAL DIFFUSION EQUATION CODE , AMTD-118(NAA-SR-7137) JANUARY 1961
D.C. BALLER, THE FAIM CELL CALCULATION AND THE FAIM BUCKLING CALCULATION , AMTD-128A , JULY, 1962
D.C. BALLER, THE FAIM LIB CODE , AMTD-140, JULY, 1962
D.C. BALLER, THE FAIM LIST CODE , AMTD-141, JULY 1962

DECK NUMBERS FAIM- ON TAPE
3W508 -18 GROUP LIBRARY
3W509 -16 GROUP LIBRARY
3W526 - FAIM LIB
3W527 - FAIM LIST

ULCER

DESCRIPTION 40 GROUP, 101 SPACE POINTS UPSCATTERING TO 32 HIGHER GROUPS, DOWN SCATTER TO 39. MATHEMATICAL METHODS ARE SIMILAR TO FAIM. PROGRAM USES CROSS SECTION LIBRARY ON TAPE. ALLOWS FOR CALCULATIONS WHERE VARIATION OF THERMAL SPECTRUM IS IMPORTANT.

REFERENCES D.S. VARGOFCAK, ULCER, AMTD-123, APRIL 1962

DECK NUMBERS PROGRAM IS ON TAPE
3W-538 LIBRARY TAPE PROGRAM
LIBRARY ON TAPE

9-ZOOM

DESCRIPTION 18 GROUP, 41 MESH POINT CODE WITH UPSATTER AS WELL AS DOWN SCATTER. MACHINE LANGUAGE - PROGRAMMED AT LRL.

REFERENCE S.P. STONE, ET. AL., 9-ZOOM - A ONE DIMENSIONAL, MULTI-GROUP, NEUTRON DIFFUSION THEORY REACTOR CODE FOR THE IBM 709, UCRL 5682, AUGUST 1959

DECK NUMBERS PROGRAM IS ON TAPE
LIBRARY ON TAPE

P1MG

DESCRIPTION COMBINES A 54 GROUP MUFT TREATMENT WITH ONE THERMAL MATHEMATICAL METHOD IS THAT OF WANDA AND MUFT4

REFERENCE H. BOHL, ET. AL., P1MG - A ONE DIMENSIONAL MULTIGROUP P1 CODE FOR THE IBM 704 , WAPD-TM-135, JULY, 1959

DECK NUMBER NOT IN PRODUCTION FILE

CAESAR

DESCRIPTION CAESAR IS AN EXTENSION OF FAIM-CELL WHICH PROVIDES RESONANCE INTEGRAL CALCULATIONS IN HOMOGENEOUS AND HETEROGENEOUS REGIONS USING THE ARES CODE. THE CODE CONTAINS ALL FEATURES OF PRIOR CODES IN THIS SERIES- 6 SEARCHES, ADJOINT FLUX, EXTENSIVE EDIT, ETC. THE FIRST CASE USES THE FAIM INPUT SHEETS-SUCCESSIVE CASE USE ADDRESSIBLE DATA SHEETS AND ONLY CHANGES ARE SPECIFIED. ALL PREVIOUS DATA FOR HETEROGENEOUS REGIONS ARE SAVED ON TAPE.

REFERENCE D.C. BALLER, CAESAR- A MULTIGROUP, ONE-DIMENSIONAL DIFFUSION EQUATION CODE WITH CROSS-SECTION AVERAGING USING ENERGY SPECTRUM WITH ARES FOR THE RESONANCES, NAA-SR-MEMO-9423, JAN. 1964

DECK NUMBER PROGRAM IS ON TAPE
 3W528 18 GROUP LIBRARY INCLUDING ARES DATA
 3W529 16 GROUP LIBRARY INCLUDING ARES DATA
 3W510 ARES DATA DECK FOR USE WITH SPECIAL LIBRARIES

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II TWO DIMENSIONAL DIFFUSION THEORY CODES

PDQ-2-90

DESCRIPTION 2-4 GROUP, X-Y OR R-Z CODE ALLOWING UP TO 5500 MESH POINTS, NO SEARCH OPTIONS.

REFERENCE R.D. WHITESELL, PDQ-2-90, IBM, JUNE 1961
G.G. BILODEAU, ET. AL, PDQ, AN IBM 704 CODE TO SOLVE THE TWO DIMENSIONAL FEW GROUP NEUTRON DIFFUSION APPROXIMATION, WAPD-TM-70

DECK NUMBERS PROGRAM IS ON TAPE

EQUIPOISE 3

DESCRIPTION TWO-GROUP, 2100 MESH POINTS, X-Y OR R-Z GEOMETRY. ADJOINT FLUX CALCULATION. 5 MINUTES FOR 1400 POINTS.

REFERENCE T.B. FOWLER AND M.L. TOBIAS, EQUIPOISE-3, A TWO-DIMENSIONAL TWO GROUP, NEUTRON DIFFUSION CODE FOR THE IBM 7090 COMPUTER, ORNL-3199, FEBRUARY 1962

DECK NUMBER PROGRAM IS ON TAPE

9-ANGIE

DESCRIPTION 18 GROUPS, 2000 MESH POINTS IN X-Y, OR R-Z, 20 ZOOM.

REFERENCE S.P. STONE, 9-ANGIE-A TWO-DIMENSIONAL MULTIGROUP, NEUTRON DIFFUSION-THEORY REACTOR CODE FOR THE IBM 709 OR 7090 UCRL-6076, OCTOBER, 1960

DECK NUMBERS PROGRAM IS ON TAPE

CURE

DESCRIPTION 50 GROUP, X-Y, R-Z, OR R-THETA GEOMETRY

REFERENCES E.L. WACHSPRESS, CURE, A GENERALIZED TWO-SPACE-DIMENSION MULTIGROUP CODING FOR THE IBM 704, KAPL-1724, 1957

DECK NUMBER PROGRAM IS ON TAPE

EQUIPOISE 3A

DESCRIPTION EXPANDED VERSION OF EQUIPOISE 3 TO PROVIDE A PICTURE OF THE ARRANGEMENT OF MATERIALS WITHIN THE REACTOR AND FIRST-ORDER PERTURBATION THEORY ESTIMATES OF THE NEUTRON LIFETIME AND OF THE REACTIVITY RESULTING FROM UNIT INCREASE OF EACH GROUP CONSTANT BY REGION.

REFERENCE C.W. NESTOR, JR., EQUIPOISE 3A, ORNL 3199 ADDENDUM, JUNE, 1963

DECK NUMBER PROGRAM IS ON TAPE

TWENTY GRAND

DESCRIPTION TWO DIMENSIONAL, DIFFUSION THEORY CODE FOR CYLINDRICAL OR SLAB GEOMETRY. ONE TO SIX GROUPS WITH UPSCATTER. 3000 MESH POINTS - RUNNING TIME APPROX. 8 MIN. ON 7090 FOR 250 POINTS, 4 GROUPS, UPSCATTER.

REFERENCE M.L. TOBIAS AND T.B. FOWLER, THE TWENTY GRAND PROGRAM FOR THE NUMERICAL SOLUTION OF FEW GROUP NEUTRON DIFFUSION EQUATIONS IN TWO DIMENSIONS, ORNL 3200, 1962

DECK NUMBER PROGRAM IS ON TAPE (3W-685)

CRAM

DESCRIPTION SOLVES ONE AND TWO DIMENSION MULTIGROUP DIFFUSION
EQUATIONS -PLANE,CYLINDER,SPHERE,X-Y,R-Z AND R-THETA
UP TO 100 GROUPS WITH SCATTERING TO ANY GROUP
PERFORMS K CALCULATION,MATERIAL COMPOSITION SEARCH,
BUCKLING SEARCH AND BOUNDARY SEARCH. SOLVES FIXED
SOURCE AND ADJOINT PROBLEMS. LIBRARY CAN BE INPUT OR
SELECTED FROM TAPE.
LIMITS ARE-
 100 POINTS IN EACH DIRECTION
 100 GROUPS
 1000 MATERIALS

REFERENCE A.HASSITT, A COMPUTER PROGRAM TO SOLVE THE MULTI-
GROUP DIFFUSION EQUATIONS, UKAEK- TRG REPORT 229(R),
MARCH 1962
B.M. SEGAL, CRAM USAGE WRITEUP, APDA MEMO P-62-438
NOV. 1962

DECK NUMBER PROGRAM IS ON TAPE

KERNMAT

DESCRIPTION	SOLVES FOR THE EFFECTIVE MULTIPLICATION FACTOR AND RELATIVE POWER DISTRIBUTION OF FUEL ASSEMBLIES BY THE HETEROGENEOUS METHOD OR SMALL SOURCE THEORY OF REACTOR CALCULATIONS. FUEL ASSEMBLIES THAT ARE FULLY EQUIVALENT TO EACH OTHER WITHIN THE LATTICE FORM A ROD TYPE. COORDINATE SPECIFICATION OF EVERY PAIR OF RODS FOR ALL THE ROD TYPES MUST BE ENTERED. FOR RECTANGULAR LATTICES A SEPARATE ROUTINE, DECART, IS AVAILABLE FOR COORDINATE GRID GENERATION. 36 ROD TYPES CAN BE USED. THERMAL AGE-DIFFUSION KERNELS OR THEIR LINEAR COMBINATION UP TO 3 TERMS CORRESPONDING TO INFINITE LINE SOURCE -SINKS IN AN INFINITE MODERATOR ARE ASSUMED WITH ALL RESONANCE ABSORPTIONS-FISSIONS IN FUEL LUMPED AT ONE ENERGY. RUNNING TIME 1-5 MINUTES.
REFERENCE	S.A. RAJE, KERNMAT, A FORTRAN CODE FOR THE HETEROGENEOUS METHOD OF REACTOR CALCULATIONS, CVNA-107 (SEPT, 1961)
DECK NUMBER	3W-811 KERNMAT 3W-812 DECART

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WHIRLAWAY
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III THREE DIMENSIONAL DIFFUSION THEORY CODES

WHIRLAWAY

DESCRIPTION	TWO GROUP, XYZ GEOMETRY, 12,750 MESHPOINTS. TYPICAL RUNNING TIME FOR 10,000 POINT PROBLEM IS 2-3 HOURS
REFERENCE	T.B.FOWLER AND M.L.TOBIA, WHIRLAWAY - A THREE DIMENSIONAL, TWO GROUP NEUTRON DIFFUSION CODE FOR THE IBM 7090 COMPUTER, ORNL-3150, AUGUST 1961 ADDENDUM - JANUARY 1962
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PERT
2D PERT
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IV PERTURBATION THEORY CODES

PERT

DESCRIPTION PERFORMS LINEAR PERTURBATION THEORY CALCULATIONS
USING PUNCHED OUTPUT FROM AIM-5, AIM-6, FOG, OR FAIM.
FINDS DELTA K EFF, LIFETIME, BETA EFFECTIVE, AND WEIGHTS
CROSS SECTIONS.

REFERENCE H.P. FLATT, PERT, A PERTURBATION THEORY CODE, NAA
PROGRAM DESCRIPTION, FEBRUARY, 1961

DECK NUMBER 3W-388

2D-PERT

DESCRIPTION PERFORMS LINEAR PERTURBATION THEORY CALCULATIONS IN
TWO DIMENSIONS. FINDS PROMPT LIFETIME, LOCAL AND
INTEGRATED PERTURBATIONS. 20 GROUPS, 36 REGIONS, 3000
MESH POINTS (R-Z).

REFERENCE J.M. CHAUMONT AND J.A. KOERNER, 2D PERT, A TWO
DIMENSIONAL PERTURBATION CODE, ANL 6555, MAY, 1962

DECK NUMBER 3W-771 (NOT IN PRODUCTION FILE)

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V ZERO DIMENSIONAL BURN-UP CODES

KINDLE

DESCRIPTION TWO GROUP DEPLETION CALCULATION. CRITICALITY IS MAINTAINED BY UNIFORM THERMAL POISON. XE AND SM CHAINS.

REFERENCE R. SEVY, A SIMPLIFIED TWO GROUP METHOD FOR CALCULATING REACTOR LIFE TIME BEHAVIOR, TDR-5168 REV. A, JUNE 1960

DECK NUMBER 3W-480

AIMFIRE

DESCRIPTION TWO GROUP THEORY - ALLOWS FOR VARIATION OF THERMAL SPECTRUM AND DISADVANTAGE FACTORS WITH BURN-UP. CONCERNED WITH MULTICYCLE DECONTAMINATION AND REPROCESSING OF URANIUM FUELS.

REFERENCE R. A. BLAINE, AIMFIRE - A FUEL ECONOMICS CODE, NAA-SR-6706, SEPTEMBER 1961.

DECK NUMBER 3W-443

TAPER I

DESCRIPTION ANALYTIC SOLUTION TO ISOTOPE EQUATIONS FOR NEUTRON CAPTURE AND BETA DECAY. INVESTIGATES 6 ISOTOPES IN EACH DIRECTION.

REFERENCE D. C. BALLER, TAPER I, UNPUBLISHED

DECK NUMBER 3W-487

TAPER II

SOLVES FOR CONCENTRATION OF ALL FISSION PRODUCTS
PRODUCED, FINDS MASS BY ELEMENT AND AVERAGE CROSS
SECTION PER FISSION. BASED ON TAPER I.

REFERENCE J.S. TEMPLE AND R.A. BLAINE, TAPER II, A FISSION PRODUCT
CODE, AI-64-MEMO-67, APRIL, 1964

DECK NUMBER 3W-500

FUEL DEPLETION AND POISON BUILD-UP

DESCRIPTION SOLVES U235, U238, XE135, SM149, AND LUMPED FISSION
PRODUCT CHAINS.

REFERENCE A.N. NICKOLS, FUEL DEPLETION AND POISON BUILD-UP IN
REACTOR FUELS, NAA PROGRAM DESCRIPTION, JUNE 1960

DECK NUMBER 3W-282

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VI ONE DIMENSIONAL BURN-UP CODES

SIZZLE

DESCRIPTION INTERMEDIATE - FAST REACTOR, MULTIGROUP CODE BASED ON AIM-6. CONCENTRATION SEARCH AND CRT OUTPUT ARE SPECIAL FEATURES. USES 18 GROUP CALCULATION TO WEIGHT CROSS SECTIONS AND USES 1-6 GROUPS FOR BURN-UP. ISOTOPE EQUATIONS ARE SOLVED REGIONWISE.

REFERENCE D.P.SATKUS AND H.P.FLATT, SIZZLE, NAA PROGRAM DESCRIPTION, FEBRUARY, 1961

DECK NUMBERS 3W-376 PROGRAM DECK WITH LIBRARY
PROGRAM IS ON TAPE
3W-535 - 18 GROUP LIBRARY FOR USE WITH TAPE

CANDLE

DESCRIPTION 4 GROUP ALLOWS FOR CRITICAL POISON AND BOUNDARY SEARCHES. SOLVES ISOTOPE EQUATIONS POINTWISE

REFERENCES O.J.MARLOWE ,ET.AL, CANDLE - A ONE DIMENSIONAL FEW GROUP DEPLETION CODE FOR THE IBM-704,WAPD-TM-53, MAY 1957
R.A.BLAINE, RECENT EXPERIENCES WITH CANDLE I,NAA-SR-MEMO 4033, JUNE 1959
E.FLATT,CANDLE LIBRARY SUBROUTINE,NAA PROGRAM DESCRIPTION, AUGUST 1958
J.HUME AND M.P.ARONCHICK, EXPERIENCES WITH CANDLE, IOL TO W.G.ALLEN, OCTOBER 1959

DECK NUMBERS 3W-202 CANDLE TAPE PREPARATION DECK
W3-284 LIBRARY MODIFICATION DECK

SCANDLE

DESCRIPTION	<p>FORTTRAN VERSION OF CANDLE WITH ADDITIONAL FEATURE OF 3 FAST LIBRARIES ON TAPE SUCH THAT ANY ELEMENTS MAY HAVE DIFFERENT FAST GROUP CROSS SECTIONS IN VARIOUS REGIONS. GENERAL FEATURES ARE</p> <p>251 SPACE POINTS</p> <p>25 REGIONS</p> <p>2 OR 4 GROUPS</p> <p>25 TIME STEPS</p> <p>30 ELEMENTS PER LIBRARY</p> <p>POISON, BUCKLING, COMPOSITION AND POISON BOUNDARY SEARCHES</p> <p>XENON OVERRIDE</p> <p>RODDED REGIONS</p> <p>RESTART</p>
REFERENCE	<p>R.A. BLAINE, OPERATING INSTRUCTIONS FOR SCANDLE AT A1, UNPUBLISHED</p> <p>O.J. MARLOWE AND P.A. OMBRELLARO, CANDLE- A ONE-DIMENSIONAL FEW GROUP CODE FOR THE IBM-704, WAPD-TM-53, MAY 1957 AND ADDENDUM I, OCTOBER 1957</p>
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FUELMOVE
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VII TWO DIMENSIONAL BURN-UP CODES

FUELMOVE

DESCRIPTION ALLOWS FOR CONTROL ROD PROGRAMMING AND FUEL MOVEMENT
COMPUTES ECONOMIC DATA AS WELL AS PHYSICS DATA.
THERMAL SPECTRUM CALCULATED USING THE WILKINS
EQUATION. CYLINDRICAL GEOMETRY(R-Z)

REFERENCE N.B.MCLEOD,ET.AL.,THE EFFECT OF FUEL AND POISON
MANAGEMENT ON NUCLEAR POWER SYSTEMS,NY0 9715,MITNE-10
SEPTEMBER,1961.

DECK NUMBERS 3W545
PROGRAM IS ON TAPE

TURBO

DESCRIPTION TWO DIMENSIONAL X-Y OR R-Z VERSION OF CANDLE -
TWO-FOUR GROUPS. USES METHOD OF PDQ.

REFERENCE J.B.CALLAGHAN,ET.AL, TURBO - A TWO-DIMENSIONAL FEW
GROUP DEPLETION CODE FOR THE IBM-704,WAPD-TM-95,
NOVEMBER,1957.

DECK NUMBER PROGRAM IS ON TAPE

EQUIPOISE BURNOUT

DESCRIPTION

TWO DIMENSIONAL, TWO GROUP DIFFUSION THEORY BURN-UP CODE. SEARCHES ON FUEL OR POISON CONCENTRATION. COOLANT DENSITY DISTRIBUTION CAN BE TAKEN INTO ACCOUNT. P3 CELL CALCULATIONS AND SPECTRAL HARDENING CALCULATIONS CAN BE REPEATED. SHUFFLING OF FUEL, SHUTDOWN CALCULATION AND FUEL CYCLE COST CALCULATION ARE ADDITIONAL FEATURES.

RESTRICTIONS ARE 1600 MESH POINTS

X-Y AND R-Z GEOMETRY

69 REGIONS

99 NUCLIDES

10 P3 CALCULATIONS PER STEP

COOLANT DENSITY CALCULATION - 30 REG

50 REGIONS AND 50 NUCLIDES FOR

SPECTRUM CALCULATION

90 TIME STEPS

PROBLEMS RUN FROM 0.1 HR FOR ONE STEP, 35X38 MESH

WITH FUEL SEARCH TO 2 HR FOR A 36X24 MESH, 17 STEPS

AND A ROD SEARCH (IBM 7090)

REFERENCE

D.R. VONDY AND T.B. FOWLER, EQUIPOISE BURNOUT - A REACTOR DEPLETION CODE, UNPUBLISHED ORNL DOCUMENT

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VIII ONE DIMENSIONAL TRANSPORT THEORY CODES

FORTAN-SNG

DESCRIPTION TRANSLATION OF AN ANL-SNG CODE INTO FORTAN. SOLVES THE BOLTZMAN EQUATION BY THE SNG METHOD. 100 SPACE POINTS, 20 GROUPS, UP TO 8 ANGULAR SUBDIVISIONS. SEARCH FOR CRITICAL RADIUS.

REFERENCE B.J.LEMKE, FORTAN SNG CODE, NAA PROGRAM DESCRIPTION JULY 1959

DECK NUMBER 3W-089 PLANE AND SPHERICAL GEOMETRY
3W-121 CYLINDRICAL GEOMETRY

DSN

DESCRIPTION DISCRETE SN SOLUTION TO THE BOLTZMAN EQUATION. FASTER THAN THE SNG APPROACH. USES THE FLOC PROGRAMMING LANGUAGE. MULTIGROUP, ALLOWS FOR UPSCATTER AS WELL AS DOWN SCATTER. SEARCHES ON CONCENTRATION, RADIUS, AND PERIOD.

REFERENCES B.CARLSON, ET.AL., THE DSN AND TDC NEUTRON TRANSPORT CODES, LAMS-2346, FEBRUARY 1960

DECK NUMBERS NOT IN PRODUCTION FILE (3W-664)

SAIL

DESCRIPTION DISCRETE SN PLANE GEOMETRY ONE GROUP CELL CODE. 100 SPACE POINTS, 100 REGIONS, AND 8 ANGULAR SUBDIVISIONS. OPTION TO USE S2 CALCULATION AS GUESS FOR S8.

REFERENCE B.J. LEMKE, SAIL-NAA PROGRAM DESCRIPTION, FEBRUARY 1961

DECK NUMBER 3W-341

RANCH

DESCRIPTION DISCRETE ORDINATE PLANE GEOMETRY ONE GROUP CELL CODE ANISOTROPIC SCATTERING-UP TO 12 ANGULAR DIVISIONS. FOR 4 ANGULAR DIVISIONS, 1250 SPACE POINTS. WITH 12 ANGULAR DIVISIONS, 833 SPACE POINTS.

REFERENCE L.A. HAGEMAN AND J.T. MANDEL, RANCH- AN IBM-704 PROGRAM USED TO SOLVE THE ONE-DIMENSIONAL, SINGLE ENERGY NEUTRON TRANSPORT EQUATION WITH ANISOTROPIC SCATTERING, WAPD-TM-268, FEBRUARY 1961

DECK NUMBER 3W-560-NOT IN PRODUCTION FILE
THIS CODE MUST BE RUN ON AN IBM-704. SPECIAL ARRANGEMENTS CAN BE MADE ON ONE DAY ADVANCE NOTICE

S4 CYLINDRICAL GEOMETRY CELL CODE

DESCRIPTION SOLVES ONE GROUP TRANSPORT EQUATION IN CYLINDRICAL GEOMETRY. USES DIFFUSION THEORY TO PROVIDE STARTING POINT FOR SOLUTION. PROVIDES FOR CRT DISPLAY OF FLUX DISTRIBUTION. 400 MESH POINTS, 100 REGIONS.

REFERENCES J.S. TEMPLE AND R.A. BLAINE, S4 CYLINDRICAL GEOMETRY CELL CODE, NAA-SR-MEMO-9202, NOV. 1963

DECK NUMBER 3W-485

S8 CYLINDRICAL GEOMETRY CELL CODE

DESCRIPTION SOLVES ONE GROUP TRANSPORT EQUATION IN CYLINDRICAL GEOMETRY. NOT IN POLISHED FORM. S8 APPROXIMATION.

REFERENCE J.H. WARNER AND H.P. FLATT, S4 AND S8 CYLINDRICAL AND S4 PLANE GEOMETRY CELL, N REGION CALCULATION, NAA PROGRAM ADDENDUM, SEPTEMBER, 1959

DECK NUMBER 3W-110

DTK

DESCRIPTION ONE DIMENSIONAL MULTIGROUP TRANSPORT CALCULATION USING AN IMPROVED DISCRETE SN METHOD. LIBRARIES FOR 11, 16, 18 AND 22 GROUPS ARE AVAILABLE ON TAPE. PROVISIONS FOR ANISOTROPIC SCATTERING AND UP-SCATTERING. EXTENSIVE EDIT INCLUDING CRT DISPLAY, NEUTRON BALANCE, LEAKAGE, REACTION RATES, ETC. SEARCHES ARE FOR HOMOGENEOUS POISON, CRITICAL DIMENSION, AND ONE ELEMENT CONCENTRATION. GROUPS TIMES MESH POINTS MUST BE LESS THAN 15,000. 16 GROUP, 40 MESH POINT PROBLEM, WITH NO UP-SCATTERING OR ANISOTROPIC SCATTERING RUN IN 2-3 MINUTES ON AN IBM 7094.

REFERENCE DTK INTERNAL LOS ALAMOS, NOVEMBER 1962

DECK NUMBER PROGRAM ON TAPE
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DTF

DESCRIPTION	FORTTRAN VERSION OF DTK CODED BY UNITED NUCLEAR AND MODIFIED IMPROVED AT AI. CHANGES ARE - IMPROVED FLUX CALCULATION POINT-WISE CONVERGENCE ON INNER OR OUTER FLUX ITERATIONS DIFFUSION CALCULATION FOR ANY OR ALL GROUPS
REFERENCE	AI INTERNAL LETTER, W.W.ENGLE, DTF, APRIL 1964 LOS ALAMOS INTERNAL LETTER,DTK, NOVEMBER 1962
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99	CROSS REFERENCES

IX TWO DIMENSIONAL TRANSPORT THEORY CODES

TDC

DESCRIPTION TWO DIMENSIONAL VERSION OF DSN IN R-Z GEOMETRY. TYPICAL RUNNING TIME FOR 6-GROUP, 1000 MESH POINT PROBLEM IS 1-1/2 HOURS ON AN IBM-7090. FLOCO.

REFERENCE B. CARLSON, ET. AL., THE DSN AND TDC NEUTRON TRANSPORT CODES

DECK NUMBER NOT IN PRODUCTION FILE (3W-665)

2DXY

DESCRIPTION TDC IN X-Y GEOMETRY. FLOCO.

REFERENCE J. BENGSTON, ET. AL., 2DXY - TWO DIMENSIONAL, CARTESIAN COORDINATE SN TRANSPORT CALCULATION, AGN TM-392, JUNE 1961

DECK NUMBER 3W562-NOT IN PRODUCTION FILE

DDK

DESCRIPTION TWO-DIMENSIONAL VERSION OF DTK- MULTIGROUP TRANSPORT CODE. PROVIDES X-Y, R-Z, AND R-THETA GEOMETRIES. ALLOWS FOR ANISOTROPIC SCATTERING, UP-SCATTERING AND SEARCHES. 16 GROUP PROBLEM WITH 875 MESH POINTS AND ANISOTROPIC SCATTERING IN R-Z GEOMETRY RAN 45 MIN. ON AN IBM-7094. RESTRICTION - 900 MESH POINTS WITH ANISOTROPIC SCATTERING - 1300 WITHOUT.

REFERENCE LOS ALAMOS INTERNAL DOCUMENT.

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X FAST SPECTRUM AND GROUP CONSTANTS CODES

GAM 1

DESCRIPTION COMPUTES FAST REACTOR SPECTRUM AND FEW OR MULTIGROUP
CONSTANTS BY SOLVING CONSISTENT P1 OR B1 EQUATIONS.
ENERGY DEPENDANT LEAKAGE IS ALLOWED

REFERENCE G.D.JOANOU AND J.S.DUDEK, GAM-1, A CONSISTENT P1 MULTI-
GROUP CODE FOR THE CALCULATION OF FAST NEUTRON
SPECTRA AND MULTIGROUP CONSTANTS, GA-1850, JUNE 1961

DECK NUMBER 3W-488
LIBRARY ON TAPE

FORM

DESCRIPTION FORTRAN VERSION OF MUFT 4. FOURIER TRANSFORM SLOWING
DOWN CODE. SOLVES P1 OR B1 APPROXIMATIONS TO THE
SPACE INDEPENDENT BOLTZMAN EQUATION.

REFERENCE R.A.BLAINE, MODIFICATIONS AND EXTENSIONS OF THE FORM
CODE, NAA-SR-MEMO-9174, NOV. 1963
D.J.MC GOFF, FORM, A FOURIER TRANSFORM FAST SPECTRUM
CODE FOR THE IBM-709, NAA-SR-MEMO 5766, SEPTEMBER 1960

DECK NUMBER 3W-353
LIBRARY ON TAPE

ELMOE

DESCRIPTION

CALCULATES THE FOURIER TRANSFORM OF THE FAST NEUTRON FLUX FOR A MIXTURE OF MODERATORS HEAVIER THAN HYDROGEN WITH THE MODERATOR SCATERING LAW RIGOROUSLY TAKEN INTO ACCOUNT. ITERATES ON THE BUCKLING UNTIL A NEUTRON BALANCE CONDITION IS SATISFIED. DETAILED TREATMENT OF SODIUM RESONANCES USING HIBBONS DATA. 24 COARSE GROUPS FOR SLOWLY VARYING PARAMETERS - 500-800 FINE GROUPS FOR OTHERS. LIBRARY OF LEGENDRE EXPANSION COEFFICIENTS FOR FE, NI, CR, NB, V, AL, NA, C AND O.

REFERENCE

UNPUBLISHED ANL DOCUMENT (1962)
L.R.BLUE, ELMOE, OPERATING INSTRUCTIONS AT AI,
UNPUBLISHED AT DOCUMENT

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XI THERMAL SPECTRUM AND GROUP CONSTANTS CODES

TEMPEST II

DESCRIPTION A NEUTRON THERMALIZATION CODE BASED ON THE SOLUTION OF THE WILKINS EQUATION FOR A HEAVY MODERATOR, THE WIGNER-WILKINS EQUATION FOR A LIGHT MODERATOR, OR THE USE OF A MAXWELLIAN SPECTRUM. SWITCHING OF EQUATIONS IS PERMITTED AND MULTIGROUP CONSTANTS CAN BE OBTAINED. INFINITE MEDIUM CALCULATION.

REFERENCES R.H. SHUDE AND J. DYER, TEMPEST II - A NEUTRON THERMALIZATION CODE, AMTD-111, JUNE 1962

DECK NUMBER 3W-441

BAM

DESCRIPTION ASSUMES SEPARABILITY OF SPACE AND ENERGY - ITERATES BETWEEN TEMPEST II AND THE S4 CYLINDRICAL GEOMETRY CELL CODE. 10 REGIONS, 100 SPACE POINTS, PROVIDES FOR INITIAL GUESS AT DISADVANTAGE FACTOR. USES RESULTS FROM ONE CASE AS A FIRST GUESS FOR THE NEXT.

REFERENCE R.A. BLAINE, V.E. ANDERSON, B.F. MASKOWITZ, BAM, A CODE TO COMPUTE THERMAL GROUP CONSTANTS, AMTD 167, SEPTEMBER 1962

DECK NUMBER 3W-606

THERMOS

DESCRIPTION SOLUTION TO INTEGRAL BOLTZMAN EQUATION. SOLVES FOR ENERGY AND SPACE DISTRIBUTION AND COMPUTES AVERAGE CROSS SECTIONS. 30 GROUPS, 20 SPACE POINTS

REFERENCE H.C. HONECK, THERMOS, A THERMALIZATION TRANSPORT THEORY CODE FOR REACTOR LATTICE CALCULATIONS, BNL 5826, JANUARY, 1962

DECK NUMBERS 3W-531 PLANE GEOMETRY
3W-532 CYLINDRICAL GEOMETRY
LIBRARY ON TAPE

QUICKIE III

DESCRIPTION PROVIDES AN INFINITE MEDIUM SOLUTION TO THE SLOWING DOWN AND THERMALIZATION PROBLEM USING THE ULCER LIBRARY TAPE. FINDS FEW GROUP MACROSCOPIC CROSS SECTIONS, PUNCHES INPUT DATA FOR ULCER, FAIM, DSN, TDC, ETC., PROVIDES GRAPHICAL DISPLAYS OF THE THERMAL SPECTRUM, PUNCHES ULCER MULTIGROUP LIBRARY, AND PROVIDES A REFLECTOR CALCULATION.

REFERENCES M.A. BOLING AND W.A. RHOADES, QUICKIE III 9W-005, 10L TO QUICKIE DISTRIBUTION, JULY 2, 1963
W. RHOADES, QUICKIE II, 3W-712, 10L TO ULCER DISTR. LIST, JANUARY 21, 1962
W.A. RHOADES AND G.A. LONG, MULTIGROUP REACTIVITY CALCULATIONS FOR ONE REGION SYSTEMS, NAA-SR-TDR 7515 JUNE, 1962

DECK NUMBER 9W-005 QUICKIE III
3W-712 QUICKIE II
3W-517 QUICKIE I

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XII REACTOR KINETICS

AIREK III

DESCRIPTION SOLVES UP TO 50 COUPLED DIFFERENTIAL EQUATIONS USING A NUMERICAL METHOD DEVELOPED BY E.R.COHEN. PROVIDES FOR AUTOMATIC INTERVAL SWITCHING AND ANALYTIC OR TABULAR SPECIFICATION OF REACTIVITY. PROVISIONS FOR SPECIAL FEED BACK EQUATIONS-SEE FOR EXAMPLE R.BLAINE A NOTE ON THE NUMERICAL SOLUTION USED IN AIREK TO FIND THE VOID VOLUME AND PRESSURE IN KEWB, AMTD-127, APRIL 1962

REFERENCE L.R.BLUE AND M.HOFFMAN, AIREK 3 - GENERALIZED PROGRAM FOR THE NUMERICAL SOLUTION OF SPACE INDEPENDENT REACTOR KINETICS EQUATIONS, NAA-SR-MEMO-9197, NOV.1963

DECK NUMBER 3W-646

SNACK

DESCRIPTION SOLVES THE SPATIALLY INDEPENDENT REACTOR KINETICS EQUATIONS ANALYTICALLY FOR STEP REACTIVITY INSERTION AT SPECIFIED TIMES. ALLOWS FOR PHOTO-NEUTRON PRODUCTION.

REFERENCE H.P.FLATT AND D.P.SATKUS, SNACK, SNAP CODE FOR KINETICS, NAA PROGRAM DESCRIPTION, FEBRUARY 1961

DECK NUMBER 3W-644

INHOOR

DESCRIPTION SOLVES INHOOR EQUATION FOR REACTIVITY.
REFERENCE A.SCHWARTZ AND R.J.MIKELL, INHOOR, NAA PROGRAM DESCRIPTION, APRIL 1960
DECK NUMBER 3W-272

SNAPKIN AND SNAPKIN A

DESCRIPTION SPECIAL VERSION OF AIREK WITH HYDROGEN LOSS AS A FEEDBACK. DATA INPUT - OUTPUT ARE IN COMPACT FORM. SNAPKIN ALLOWS FOR REGION WEIGHTING OF POWER, HEAT CAPACITY, AND REACTIVITY IMPORTANCE FOR 25 REGIONS.
REFERENCE W.A.RHODES AND G.A.LONG, SNAPKIN AND SNAPKIN A, NAA-SR TOR 7517, JUNE 1962
DECK NUMBER NOT IN PRODUCTION FILE

AIRKEX

DESCRIPTION ANALYTIC SOLUTION FOR ONE DELAY GROUP WITH STEP REACTIVITY INPUT. ERROR TERMS ARE ALSO COMPUTED.
REFERENCE J.S.TEMPLE, AIRKEX, ATOMICS INTERNATIONAL REACTOR KINETICS EXPONENTIAL, NAA PROGRAM DESCRIPTION, MARCH 1960
DECK NUMBER 3W-245

AITRANS III

DESCRIPTION CALCULATES THE CLOSED LOOP TRANSFER FUNCTION FOR A REACTOR SYSTEM, INCLUDING AS MANY AS SIX DELAYED NEUTRON GROUPS AND A GENERALIZED REACTIVITY FEEDBACK LOOP

REFERENCE L.R.BLUE AND D.C.BALLER, UNPUBLISHED

DECK NUMBER 3W-368

OSCAI 1

DESCRIPTION CALCULATES DYNAMICS OF UNMODERATED REACTORS, INCLUDING SIMPLIFIED ANALYSES OF PARTIAL FUEL MELTING AND COOLANT CHOKING IN INDIVIDUAL CHANNELS. IT IS SPECIFICALLY INTENDED FOR SODIUM COOLED REACTORS WITH FUEL TEMPERATURES SUBSTANTIALLY HIGHER THAN COOLANT TEMPERATURES, MOVING COOLANT SEGMENTS DETERMINE COOLANT CONDITIONS. UP TO 50 CHANNELS EACH HAVING A DISTINCTIVE COOLANT FLOW RATE, HEAT TRANSFER COEFFICIENT, POWER FRACTION, VOLUME OF FUEL, AND VOLUME OF COOLANT. CHANGE OF PHASE, MELTING, PRESURIZATION, CHOKING, AND THERMAL EXPANSION ARE INCLUDED. GRAPHICAL DISPLAYS ARE PROVIDED

REFERENCE O.D. SEAWELL, OSCAI 1, DIGITAL MULTI-CHANNEL NUCLEAR REACTOR TRANSIENT SIMULATION PROGRAM, AI-MEMO-8296, MARCH, 1963

DECK NUMBER 9W-730

BOOMER

DESCRIPTION DYNAMICAL SIMULATOR OF THE SNAP 2/10 REACTOR INCLUDING REACTOR KINETICS, HEAT TRANSFER, AND HYDROGEN DIFFUSION. THE HEAT TRANSFER AND HYDROGEN DIFFUSIONS ARE SPATIALLY DISCRETIZED WITHIN AN AVERAGE FUEL ROD, AND ARE INTEGRATED IN TIME ALONG WITH THE PROMPT NEUTRON EQUATION AND SIX DELAYED NEUTRON EQUATIONS BY USE OF EULERS METHOD. GRAPHICAL DISPLAYS ARE PROVIDED OF AXIAL AND RADIAL TEMP. DISTRIBUTIONS IN THE FUEL, AXIAL TEMP. IN THE COOLANT CHANNEL, HYDROGEN DISTRIBUTION, HYDROGEN PRESSURE WITHIN THE CLADDING GAP, REACTOR POWER, NEUTRON FLUX AND DELAYED NEUTRON PRECURSERS.

REFERENCE D.F. PADDLEFORD AND R.W. WINSON, BOOMER - A DIGITAL PROGRAM EVALUATING THE THERMAL AND KINETICS TRANSIENT RESPONSE OF A SNAP 2/10 REACTOR, NAA-SR-TDR-8013, MARCH, 1963.

DECK NUMBER NOT IN PRODUCTION FILE

AIREK 3A AND 3B

MODIFICATIONS TO AIREK TO PROVIDE ADDITIONAL
GENERALITY FOR DYNAMIC SIMULATION OF A REACTOR
USE NUMERICAL METHOD DEVELOPED BY ER COHEN

AIREK 3A -

INCLUDES EQUATIONS FOR FLOW DECAY FROM FULL POWER
AND AFTER A SCRAM, SCRAMS BASED ON DELAYED
INSTRUMENTATION SIGNALS, AFTER GLOW HEATING, CONTROL
ROD FALL UNDER GRAVITY AND GENERALIZED PRINTED AND
GRAPHICAL OUTPUT. ANY FEEDBACKS CAN BE GROUPED ON A
CRT FRAME AND OR PRINTED. PROVISION FOR HEAT TRANS-
FER BY CONDUCTION AND CONVECTION WITH FLOW DEPENDANT
FILM COEFFICIENT.

AIREK 3B -

MODIFICATION OF AIREK 3A TO PROVIDE CRUDE MODELS
FOR FUEL MELTING, NUCLEATE AND BULK BOILING,
VAPORIZATION OF COOLANT AND BURN OUT.

REFERENCE

R.A. BLAINE AND R.F. BERLAND, PROGRESS TO DATE TOWARD
THE DEVELOPMENT OF A GENERALIZED DIGITAL SIMULATOR
FOR REACTOR DYNAMICS - AIREK 3A AND 3B, NAA-MEMO-
9800, APRIL 1964

DECK NUMBER

3W-831 AIREK 3A
3W-832 AIREK 3B

SNAPKIN VI

DESCRIPTION GENERALIZATION OF SNAPKIN TO INCLUDE REFLECTOR EFFECTS, BUILT-IN REACTIVITY FUNCTIONS, BINARY CARD DUMP AND USE OF FULL FIVE PART NUMERICAL SOLUTION. INCORPORATES EFFECTS OF HYDROGEN AND TEMPERATURE FEEDBACK FOR SNAP REACTORS

REFERENCE W.A. RHOADES, THE SNAPKIN VI COMPUTER PROGRAM FOR SNAP REACTOR KINETICS CALCULATIONS, NAA-SR-TDR-7835, OCTOBER, 1963

DECK NUMBER 9W-011

KUMQUAT

DESCRIPTION ANALYZES THE NON-LINEAR VARIATION OF INVERSE PERIOD ABOVE PROMPT CRITICAL IN TERMS OF A HYPOTHETICAL SEVENTH GROUP OF DELAYED NEUTRONS. DETERMINES THE LIFETIME AND FRACTION FOR THIS GROUP BY AN ITERATIVE PROCEDURE GIVEN INVERSE PERIOD VS REACTIVITY.

REFERENCE W.A. RHOADES, KUMQUAT, A COMPUTER PROGRAM FOR KINETIC PARAMETER EVALUATION FROM INVERSE PERIOD DATA, NAA-SR-TDR-7824, OCTOBER 1963

DECK NUMBER NOT IN PRODUCTION FILE

TRAFFIC

DESCRIPTION COMPUTES THE REACTOR TRANSFER FUNCTION FOR UP TO FIVE FOURTH DEGREE FEEDBACKS AND PROVIDES GRAPHICAL DISPLAYS OF THE MAGNITUDE AND PHASE OF THE TRANSFER FUNCTION, A NYQUIST DIAGRAM, THE BODE PLOTS, AND A PLOT OF PUGH.

REFERENCE W.A. RHOADES AND M.A. BÖLING, TRAFFIC-A COMPUTER PROGRAM FOR REACTOR TRANSFER FUNCTIONS CALCULATIONS IN THE COMPLEX DOMAIN, NAA-SR-TOR-8607, JUNE, 1963

DECK NUMBER NOT IN PRODUCTION FILE

AISITE

DESCRIPTION DETERMINES REACTOR SITING CRITERIA BASED ON THE METHOD DESCRIBED IN TID-14844. COMPUTES THE REACTOR FISSION PRODUCT INVENTORY ACCOUNTING FOR OPERATING AND COOLING TIME, RELEASE FRACTIONS FOR MULTIPLE CONTAINMENT, DIRECT, CLOUD, AND INHALATION DOSE BY ISOTOPE AND ORGAN- SEARCHES FOR EXCLUSION AND LOW POPULATION BOUNDARY DISTANCES, CRITICAL ORGAN, AND CRITICAL ISOTOPE AS A FUNCTION OF ANY PARAMETER SUCH AS BUILDING LEAK RATE, FILTER EFFICIENCY, ETC WHICH IS VARIED. PROVIDES GRAPHICAL DISPLAYS OF THE CRITICAL DISTANCES VS THE SELECTED PARAMETER AND DOSE VS DISTANCE BY ORGAN. RUNNING TIME - 30 SEC

REFERENCE R.A. BLAINE, AISITE - A REACTOR SITING CODE, NAA-SR-MEMO-9235 (JAN, 1964)

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XIII MONTE CARLO (GENERAL)

TYCHE

DESCRIPTION SOLVES INFINITE MEDIUM SLOWING DOWN PROBLEM TO FIND AGE AND HIGHER MOMENTS USING RECURSION RELATIONS. .
ALLOWS FOR ANISOTROPIC SCATTERING. A LIBRARY IS AVAILABLE FOR 10 ELEMENTS. RUNNING TIMES OF 5-20 MIN.

REFERENCE R.A.BLAINE, TYCHE, A MONTE CARLO SLOWING DOWN CODE, NAA-SR-7357 (AMTD-124) , JUNE 1962

DECK NUMBER 3W 482

RBU CELL MONTE CARLO

DESCRIPTION THE MONTE CARLO PORTION OF RBU IS USED TO SOLVE A VARIETY OF PROBLEMS FOR MULTIROD CLUSTERS, FINITE GEOMETRY AGE CALCULATIONS, SHIELDING PROBLEMS, ETC. SOME OF THE PROBLEMS ARE AGE, THERMALIZATION, FAST EFFECT, AND RESONANCE ESCAPE. RUNNING TIMES ARE 1/2 TO 1 1/2 HOUR.

REFERENCE J.R. TRIPLET, E.T. MERRILL, AND J.R. BURR, THE RBU REACTOR BURNUP CODE - FORMULATION AND OPERATING PROCEDURES, HW-70049, JULY 1961

DECK NUMBER NOT IN PRODUCTION FILE

SARA

DESCRIPTION GENERALIZED GEOMETRY ONE, TWO OR THREE DIMENSIONAL
MONTE CARLO COMPUTATION OF THE RESONANCE ESCAPE
PROBABILITY AS A FUNCTION OF ENERGY IN AN INFINITE
REPETITIVE, CELLULAR ARRAY IN WHICH THE SHAPE OF THE
CELLS MAY BE CYLINDRICAL, RECTANGULAR OR HEXAGONAL.
TWENTY ZONES IN A CELL, 5 ELEMENTS PER ZONE, 15
ELEMENTS IN ALL AND 5 RESONANCE ABSORBERS. USES
DOPPLER BROADENED, POINTWISE MICROSCOPIC CROSS
SECTIONS. RUNNING TIME 3-10 MINUTES.

REFERENCE L.B. LEVITT, SARA, A 3D STOCHASTIC ANALYSIS OF
RESONANCE ABSORPTION, UNPUBLISHED AI REPORT (1963)

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XIV SHIELDING CODES

GRACE I

DESCRIPTION COMPUTES GAMMA-RAY DOSE RATES OR HEAT GENERATION
RATE IN SLAB SHIELDS USING TAYLORS DOUBLE EXPONENTIAL
REPRESENTATION OF THE BUILD-UP FACTOR.

REFERENCE D.S.DUNCAN, GRACE I, GAMMA-RAY ATTENUATION CODE IN
SLAB GEOMETRY, NAA-SR-3719, JUNE, 1959

DECK NUMBER 2W-057

GRACE II

DESCRIPTION COMPUTES GAMMA-RAY DOSE RATES OR HEAT GENERATION
RATES IN SLAB SHIELDS USING TRUNCATED CONE SOURCE.
TAYLORS DOUBLE EXPONENTIAL REPRESENTATION OF THE
BUILDUP FACTOR WAS USED.

REFERENCE D.S.DUNCAN AND A.B.SPEIR, GRACE II, GAMMA-RAY ATTENUA-
TION CODE FOR TRUNCATED CONE SOURCES, NAA-SR-4649,
NOVEMBER, 1959

DECK NUMBER 2W-084

62

FARSE-1A

DESCRIPTION COMPUTES THE NEUTRON LEAKAGE FROM A SHIELD ANNULUS USING AN ATTENUATION MODEL BASED ON MEAN FREE PATHS TRAVERSED ALONG A STRAIGHT LINE TRAJECTORY. THE REMOVAL CROSS SECTIONS INCORPORATE MULTIPLE SCATTERING EFFECTS. SNAP GEOMETRY.

REFERENCE K.L.ROONEY, FARSE-1A, A MODIFICATION OF FARSE TO INCLUDE ANGULAR DEPENDENCE OF SHIELD LEAKAGE, TDR-5954, DECEMBER, 1960

DECK NUMBER 3W-602

SCARF 1

DESCRIPTION FIRST ORDER APPROXIMATION OF THE FAST NEUTRON CURRENT AT THE PAYLOAD SURFACE DUE TO NEUTRONS WHICH SCATTER FROM THE RADIATOR FINS. SNAP GEOMETRY. COMPLEMENTARY PROGRAM TO FARSE

REFERENCE C.A.GOETZ AND M.A.BOLING, SCARF 1, A FIRST ORDER APPROXIMATION OF THE SCATTERED FAST NEUTRON CURRENT FOR SNAP REACTOR SYSTEMS, TDR 5948, DECEMBER 1960

DECK NUMBERS NOT IN PRODUCTION FILE

CLOUD

DESCRIPTION COMPUTES THE GAMMA DOSE RESULTING FROM THE CONTINUOUS RELEASE OF RADIOACTIVE MATERIALS TO THE ATMOSPHERE. METEOROLOGICAL PARAMETERS, DEPLETION DUE TO WASH-OUT AND FALL-OUT, CHOICE OF PARENT-DAUGHTER OR WAY-WIGNER DECAY SCHEMES ARE THE PRINCIPLE FEATURES

REFERENCE D.S.DUNCAN, CLOUD, AN IBM-709 PROGRAM FOR COMPUTING GAMMA-RAY DOSE RATE FROM A RADIOACTIVE CLOUD, NAA-SR-MEMO 4822, FEBRUARY, 1960

DECK NUMBER 3W-137

PATCH-A

DESCRIPTION COMPUTES MULTI-LAYER GAMMA BUILD-UP FACTORS, BOTH FOR DOSE AND ENERGY-ABSORPTION

REFERENCE P.SPIEGLER, PATCH, AN IBM 709 PROGRAM FOR CALCULATING GAMMA-RAY BUILD-UP FACTORS FOR MULTI-LAYERED SHIELDS, NAA-SR-MEMO 5299, 1960
N.A.HARRIS, SOME ADDITIONAL COMMENTS ON PATCH-A 709 CODE FOR DETERMINING MULTI-REGION GAMMA-RAY BUILD-UP FACTORS, TDR-5557, AUGUST 1960

DECK NUMBER NOT IN THE PRODUCTION FILE

FMC-G AND FMC-N

DESCRIPTION COMPUTES GAMMA AND NEUTRON HISTORIES USING MONTE CARLO TECHNIQUES IN A SOURCE-SHIELD CONFIGURATION. GENERALIZED GEOMETRY.

REFERENCE J.J.LOECHLER AND J.E. MC DONALD, FLEXIBLE MONTE CARLO PROGRAMS FMC-N AND FMC-G, APEX 706, APRIL 1961

DECK NUMBER 3W-568 - NOT IN THE PRODUCTION FILE

14-SERIES

DESCRIPTION REACTOR SHIELDING CODES. TRACES NEUTRONS BY MONTE CARLO TECHNIQUES

REFERENCES J.T.MARTIN,ET.AL., SHIELDING COMPUTER PROGRAMS 14-0 AND 14-1,REACTOR SHIELD ANALYSIS, XDC 59-2-16
J.T.MARTIN,ET.AL., SHIELDING COMPUTER PROGRAM,14-2, REACTOR SHIELD ANALYSIS, XDC 59-6-173
M.D.MC DONALD, SHIELDING COMPUTER PROGRAM, 14-3, DATA CHECK FOR SHIELDING COMPUTER PROGRAMS 14-0, 14-1,AND 14-2, XDC 59-3-52

DECK NUMBERS 3W-563 - MONITOR - NOT IN PRODUCTION FILE
3W-565 - 14-0 - NOT IN PRODUCTION FILE
3W-566 - 14-1 - NOT IN PRODUCTION FILE
3W-567 - 14-2 - NOT IN PRODUCTION FILE
3W-564 - 14-3 - NOT IN PRODUCTION FILE

CORPSE

DESCRIPTION SINGLE SCATTER RAY TRACING. EVALUATES SCATTERING
FROM A CONE. COMPLEMENTARY TO FARSE.

REFERENCE K.L.ROONEY, UNPUBLISHED

DECK NUMBER NOT IN PRODUCTION FILE

SCAR

DESCRIPTION SINGLE SCATTER RAY TRACING. EVALUATES SCATTERING
FROM A RING. COMPLEMENTARY TO FARSE.

REFERENCE C.A.GOETZ, SCAR 1 (SCATTERING CONTRIBUTION FROM A
RING) - SCATTERED FAST NEUTRON CURRENT FROM AN ION
MOTOR RING, TDR-6191, MARCH 1961

DECK NUMBER NOT IN PRODUCTION FILE

HAMBONE

DESCRIPTION THERMAL NEUTRON SCATTERING IN FUEL ELEMENTS. MONTE
CARLO CODE WHICH TESTS STOCHASTIC BIASING TECHNIQUES.

REFERENCE W.J.ROBERTS AND K.L.ROONEY, HAMBONE - A MONTE CARLO
CODE TO EVALUATE NEUTRON SCATTERING FOR CYLINDRICAL
FUEL RODS, TDR- 6078, JANUARY 1961

DECK NUMBER NOT IN PRODUCTION FILE

LEMMON

DESCRIPTION TWO DIMENSIONAL SHIELDING MONTE CARLO FOR SNAP
TYPE GEOMETRY. COMPUTES SURFACE LEAKAGE. ALLOWS
FOR REENTRANT SURFACES.

REFERENCE M.TARPINIAN, UNPUBLISHED

DECK NUMBER NOT IN PRODUCTION FILE

ORANGE-AID

DESCRIPTION CYLINDRICAL GEOMETRY LEAKAGE MONTE CARLO. TRANSFORMS
A VOLUME DISTRIBUTED SOURCE TO A PLANE SOURCE AND
STORES ON TAPE FOR USE BY ORANGE.

REFERENCE K.L.ROONEY, UNPUBLISHED

DECK NUMBER NOT IN PRODUCTION FILE

ORANGE

DESCRIPTION USES THE SOURCE PRODUCED BY ORANGE-AID TO COMPUTE
THE NEUTRON PENETRATION THROUGH SNAP TYPE GEOMETRY.
USES MONTE CARLO TECHNIQUE WITH SELECTIVE BIASING
TO REDUCE VARIANCE.

REFERENCE K.L.ROONEY, UNPUBLISHED

DECK NUMBER NOT IN PRODUCTION FILE

PHONEY

DESCRIPTION EVALUATES GAMMA-RAY PENETRATION FROM SHIELD ACTIVATION.

REFERENCE K.L.ROONEY,PHONEY - A SHIELDING CODE TO EVALUATE THE GAMMA RAY DOSE RATE FROM CORE AND SECONDARY GAMMA RADIATION, TDR-6335, APRIL 1961

DECK NUMBER NOT IN PRODUCTION FILE

MACE

DESCRIPTION EVALUATION OF NEUTRON BEAM COLLIMATION BY MONTE CARLO. CAN BE USED TO FIND STREAMING FOR SPECIFIC GEOMETRY.

REFERENCE R.KIESER,UNPUBLISHED

DECK NUMBER NOT IN PRODUCTION FILE

NIOBE

DESCRIPTION NUMERICAL INTEGRATION OF THE BOLTZMAN EQUATION IN SPHERICAL GEOMETRY. UP TO 200 SPACE POINTS, 16 DIRECTIONS,AND 40 ENERGIES.

REFERENCE S.PREISER,ET.AL.,A PROGRAM FOR THE NUMERICAL INTEGRATION OF THE BOLTZMAN TRANSPORT EQUATION - NIOBE, NDA 2113-4, SEPTEMBER 1960

DECK NUMBER PROGRAM IS ON TAPE

RATRAP

DESCRIPTION COMPUTES DOSE RATE AT SPECIFIED SPATIAL POINTS ABOUT A SYSTEM OF SNAP GEOMETRY. AN ATTENUATION MODEL BASED ON MEAN FREE PATHS TRAVERSED ALONG A STRAIGHT LINE IS USED. 1000 CORE/REFLECTOR SOURCE POINTS, 50 DOSE POINTS. RUNNING TIME - 100 POINTS PER SEC. ON AN IBM 7094 WHERE THE NUMBER OF POINTS IS GIVEN BY THE PRODUCT OF THE NUMBER OF SOURCE AND DOSE POINTS.

REFERENCE W.B.GREEN, THE RATRAP CODE - A MODIFICATION OF THE FARSE METHOD FOR SNAP SHIELD GEOMETRY, NAA-SR-MEMO-8968 (SEPT, 1963)

DECK NUMBER 9W-022

MORTIMER

DESCRIPTION COMPUTES DOSE RATE AT SPECIFIED SPATIAL POINTS ABOUT A SYSTEM OF SNAP GEOMETRY. THREE TYPES OF DOSE RATE CALCULATIONS ARE AVAILABLE - (A) ATTENUATION MODEL BASED ON MEAN FREE PATHS TRAVERSED ALONG A STRAIGHT LINE TRAJECTORY (B) ANGULARLY DEPENDANT LEAKAGE SURFACE DOSE RATE, (C) A TWO COMPONENT CALCULATION WHICH USES CALCULATION (1) WITH COLLIMATED CROSS SECTIONS TO SIMULATE RELATIVELY UNSCATTERED PARTICLE DOSE RATE, AND CALCULATION (2) WITH BROAD BEAM CROSS SECTIONS TO ACCOUNT FOR SCATTERED PARTICLE DOSE RATE 1000 CORE-REFLECTOR SOURCE POINTS, 640 SHIELD MESH POINTS (FOR THE DIFFUSE DOSE CALCULATION), 50 DOSE POINTS. RUNNING TIME - 100 POINTS PER SECOND ON AN IBM 7094 WHERE THE NUMBER OF POINTS IS GIVEN BY THE PRODUCT OF SOURCE, SHIELD AND DOSE POINTS.

REFERENCE W.B.GREEN, MORTIMER - A MODIFICATION OF THE RATRAP CODE WHICH INCLUDES THE TWO COMPONENT METHOD OF SHIELD ANALYSIS, NAA-SR-MEMO-9327 (DEC, 1963)

DECK NUMBER 9W-023

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XV MICROSCOPIC CROSS SECTION CODES

HSCAT

DESCRIPTION COMPUTES P0 AND P1 COMPONENTS OF THE HYDROGEN SCATTERING MATRICES FOR THE MULTIGROUP P1 AND CONSISTENT P1 CODES. A 1/E SPECTRUM IS USED IN THE LOW ENERGY GROUPS AND A FISSION SPECTRUM IN THE HIGH ENERGY GROUPS TO AVERAGE THE CROSS SECTIONS.

REFERENCE R.A.BLAINE, HSCAT- A PROGRAM TO COMPUTE HYDROGEN SCATTERING MATRICES, AMTD-109, OCTOBER 1961

DECK NUMBER 3W-342

SLAP

DESCRIPTION COMPUTES THE AVERAGE COSINE OF THE SCATTERING ANGLE IN THE LABORATORY SYSTEM AND THE AVERAGE LOGARITHMIC ENERGY DECREMENT PER COLLISION GIVEN SCATTERING COEFFICIENTS IN EITHER THE CENTER OF MASS OR THE LABORATORY SYSTEM. THE PROGRAM WILL FIND THE TOTAL SCATTERING CROSS SECTION IN ADDITION TO THE ENERGY DECREMENT AND AVERAGE COSINE WHEN DIFFERENTIAL CROSS SECTIONS ARE SPECIFIED IN EITHER COORDINATE SYSTEM.

REFERENCE H.J.LORENZI AND F.D.RUDNICK, SLAP, AMTD-105, NOVEMBER 1961

DECK NUMBER 3W-495

TRANSCAT

DESCRIPTION PRODUCES A SET OF COEFFICIENTS DESCRIBING THE COSINE OF THE SCATTERING ANGLE AS A FUNCTION OF A NORMALIZED DISTRIBUTION. THE COEFFICIENTS ARE USED FOR RIGOROUSLY TREATING ANISOTROPIC SCATTERING IN MONTE CARLO CODES WHERE A RANDOM NUMBER IS THE NORMALIZED DISTRIBUTION.

REFERENCE H.J.RICHARDSON AND F.D.RUDNICK, TRANSCAT, AMTD-106, SEPTEMBER 1961

DECK NUMBER 3W-471

AIRY

DESCRIPTION COMPUTES THE COEFFICIENTS OF A POWER SERIES EXPANSION WHICH REPRESENTS THE COSINE OF THE SCATTERING ANGLE IN TERMS OF A NORMALIZED DISTRIBUTION AND PUNCHES DATA IN A FORM USABLE FOR MONTE CARLO.

REFERENCE G.M.HOLDEN, AIRY, AMTD-108, SEPTEMBER 1961

DECK NUMBER 3W448

RESONANCE INTEGRAL CODE

DESCRIPTION CALCULATES ABSORPTION CROSS SECTION FOR U238 IN THE RESONANCE REGION AS A FUNCTION OF TEMPERATURE AND S/M USES RESULTS OF A.R.VERNON.

REFERENCE R.A.BLAINE, CROSS SECTION CALCULATION FOR U238 METAL IN THE RESONANCE REGION FOR USE IN AIM 6, NAA PROGRAM DESCRIPTION, MAY 1960

DECK NUMBER 3W-288

ARES II

DESCRIPTION COMPUTES EFFECTIVE RESONANCE INTERGALS AND MULTIGROUP CROSS SECTIONS FOR LUMPS AND MIXTURES USING RESONANCE PARAMETERS. UP TO 50 RESONANCE GROUPS. A LIBRARY OF RESONANCE PARAMETERS IS INCLUDED

REFERENCE F.L.FILLMORE AND B.D.O REILLY, ARES II - A RESONANCE INTEGRAL CODE, NAA-SR-MEMO-8889, AUG. 1963

DECK NUMBER 3W-557

XCHANGE II

DESCRIPTION VOLUME-FLUX WEIGHTS MICROSCOPIC CROSS SECTIONS USING DATA PRODUCED BY AN AIM-6 CELL CALCULATION SO AS TO PRODUCE NEW CROSS SECTIONS TO BE USED IN A HOMOGENEOUS REGION AND TO CONSERVE REACTION RATES. SUPPLEMENTAL PROGRAMS ARE AVAILABLE

REFERENCES H.E.JACKEL, XCHANGE II, A DIGITAL COMPUTER CODE TO FLUX AND VOLUME WEIGHT NUCLEAR CROSS SECTIONS, AI-TDR-7095, MARCH 1962
H.E.JACKEL, SUPPLEMENTAL PROGRAMS FOR USE WITH THE XCHANGE SERIES OF CODES, AI-TDR-7096, FEBRUARY 1962

DECK NUMBERS 3W-478 PROGRAM DECK
3W-551 18 GROUP LIBRARY
3W-552 SIZZLE LIBRARY
3W-479 SETUP

CROSS SECTION AVERAGING CODE

DESCRIPTION FINDS AVERAGE CROSS SECTIONS BY INTEGRATING OVER
INTERNALLY GENERATED OR EXTERNALLY SUPPLIED SPECTRA.

REFERENCE R.A.BLAINE,CROSS SECTION AVERAGING,NAA PROGRAM
DESCRIPTION,MARCH 1960

DECK NUMBER 3W-236

WEIGHT

DESCRIPTION COMBINES ADJUSTED CROSS SECTIONS PRODUCED BY AETRA
INTO A CONSISTENT CROSS SECTION SET.

REFERENCE J.S.TEMPLE, WEIGHT, AMTD-102,AUGUST 1961

DECK NUMBERS 3W-371 WITH RESULTS OF 3W-295(18 GROUP AETRA)
3W-470 FOR G GROUPS (G LESS OR EQUAL TO 6)
3W-447 WITH RESULTS OF 3W-446(15 GROUP AETRA)

SIG-CUM

DESCRIPTION . RIGOROUS TREATMENT OF ELASTIC ANISOTROPIC SCATTERING TO PROVIDE A SET OF COEFFICIENTS WHICH DESCRIBE THE NORMALIZED ANGULAR DISTRIBUTION $D(\xi)/D(\eta)$ AS A POWER SERIES IN η , THE COSINE OF THE ANGLE OF SCATTERING. CALCULATIONS ARE DONE IN THE LAB SYSTEM AND A TRANSFORMATION ROUTINE IS PROVIDED FOR DATA ENTERED IN THE CENTER OF MASS SYSTEM.

REFERENCE F.D. RUDNICK AND H.J. LORENZI, SIG-CUM, A CODE TO TREAT ANISOTROPIC ELASTIC SCATTERING OF NEUTRONS, NAA-SR-TDR-7776, OCTOBER 1962

DECK NUMBER NOT IN THE PRODUCTION FILE

DSDE

DESCRIPTION CALCULATES FLUX WEIGHTED MULTIGROUP SCATTERING CROSS SECTIONS (UPSCATTER AND DOWNSCATTER) BY NUMERICAL INTEGRATION OF ONE OF SEVERAL POSSIBLE DIFFERENTIAL SCATTERING KERNELS GENERATED BY THE PROGRAM. GAUSSIAN INTEGRATION IS USED AND CROSS SECTIONS ARE PUNCHED FOR DIRECT INPUT TO THE ULCER LIBRARY CODE.

REFERENCE M.A. BOLING AND W.A. RHODES, DSDE, A COMPUTER PROGRAM FOR CALCULATION OF MULTIGROUP THERMAL SCATTERING CROSS SECTIONS, NAA-SR-TDR-7940, NOVEMBER, 1962

DECK NUMBER NOT IN THE PRODUCTION FILE

MOMUS

DESCRIPTION

PROGRAM TO CONSTRUCT AND MAINTAIN THE NEUTRON CROSS SECTION MASTER TAPE CONTAINING MICROSCOPIC NEUTRON DATA DEVELOPED BY THE AI CROSS SECTION ANALYSIS AND APPLICATION PROJECT- THE PROGRAM PERFORMS THE FOLLOWING OPERATIONS.

MAKE A MASTER TAPE

LIST SELECTED ELEMENTS

UPDATE- ADD OR CORRECT ANY ELEMENT PARAMETER

MAKE A CUSTOMER TAPE WITH SELECTED ELEMENTS

PROVIDE GRAPHICAL DISPLAY -ANY ELEMENT-ANY XSEC

PUNCH POINT XSEC DATA

REFERENCE

R.A.BLAINE, MOMUS- A PROGRAM TO CONSTRUCT, UP-DATE, AND MODIFY THE NEUTRON MICROSCOPIC CROSS SECTION MASTER TAPE, NAA-SR-MEMO-8823, AUGUST 1963

DECK NUMBER

3W-789

GRAVE

DESCRIPTION

GRAVE COMPUTES CROSS SECTIONS AVERAGED OVER ANY GIVEN SPECTRUM. THE MICROSCOPIC CROSS SECTIONS ARE ON TAPE AND WERE DEVELOPED BY THE AI CROSS SECTION ANALYSIS AND APPLICATIONS PROJECT. ELEVEN CROSS SECTION PARAMETERS ARE ON TAPE AND FROM THESE SOME 20 GROUP AVERAGE CROSS SECTIONS CAN BE FORMED. CONSIDERABLE FLEXIBILITY IS GIVEN IN CHOOSING THE SPECTRUM. STANDARD SPECTRA ARE BUILT IN AND OTHERS MAY BE READ IN. SPECIAL TREATMENT IS GIVEN TO THE RESONANCE REGION VIA THE INCORPORATION OF THE ARES II PROGRAM.

REFERENCE

R.A. BLAINE AND J.S. TEMPLE, GRAVE- A GROUP CROSS SECTION AVERAGING PROGRAM, NAA-SR-MEMO-9276, DECEMBER, 1963

DECK NUMBER

PROGRAM IS ON TAPE (3W-710)
3W-813 - ARES II LIBRARY

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10	MULTICHANNEL TWO PHASE FLOW
10	COOLANT MIXING ANALYTIC FLOW MODEL

XVI HEAT AND MASS TRANSFER CODES

THT-A

DESCRIPTION GENERAL NODAL SOLUTION TO THE HEAT DIFFUSION EQUATION
USING AN IMPLICIT FORMULATION TO THE FINITE
DIFFERENCE EQUATIONS.

REFERENCE J.M.BOTJE, THE THT AND THT-A COMPUTER PROGRAMS,
XUC60-6-25, MAY 1960

DECK NUMBER 3W-569 NOT IN PRODUCTION FILE

30-THGC

DESCRIPTION TRANSIENT OR STEADY STATE, NODAL SOLUTION-RADIATION
SOLVES STEADY STATE PROBLEMS BY TRANSIENT METHOD
USING THE AITKEN DELTA SQUARED METHOD. ALLOWS FOR
INTERNAL HEAT RAMPS AND BOUNDARY RAMPS. MATRIX
MULTIPLICATION IN FAP REMAINDER IS FORTRAN. 30 NODES

REFERENCE R.A.BLAINE, 30-THGC - A 30 NODE TRANSIENT OR STEADY
STATE HEAT GENERATION CODE, NAA-SR-MEMO-9791,
APRIL 1964

DECK NUMBER 3W-574, 30-THGC
3W-700, MOD 2, 30-THGC

500-THGC

DESCRIPTION A GENERALIZED ONE, TWO, THREE DIMENSIONAL HEAT TRANSFER CODE, WITH SPECIAL OPTIONS FOR HANDLING SNAP CIRCULAR ORBIT PRE-STATUS AND START UP PROBLEMS PROVISION IS MADE FOR MASS TRANSFER, DROPPING THE HEAT SHIELD AND SIMULATING ENVIRONMENTAL CONDITIONS BY MEANS OF EFFECTIVE TEMPERATURES.

REFERENCE R.A.BLAINE AND R.F.BERLAND, 500 THGC, TDR-9664 FEBRUARY 1964

DECK NUMBER 3W-543

MODIFIED TIGER II

DESCRIPTION SOLVES STEADY-STATE HEAT CONDUCTION EQUATION IN IRREGULAR GEOMETRY. BASED ON KAPL TIGER II CODE. FORTRAN.

REFERENCE A.P.BRAY AND S.J. MAC CRACKEN, TIGER II, AN IBM-704 DIGITAL COMPUTER PROGRAM, TEMPERATURE FOR INTERNAL GENERATION RATES, KAPL 2204, FEBRUARY 1959

DECK NUMBER 3W-302

HEATING

DESCRIPTION SOLVES STEADY STATE OR TRANSIENT HEAT EQUATION IN NINE GEOMETRIES. ONE OF THE BEST GENERAL HEAT TRANSFER CODES AVAILABLE

REFERENCE R.LIGUOR AND J.STEPHENSON, THE HEATING PROGRAM, ASTRA 417-5.0, JANUARY 1961.
R.BRUNELL, TO BE PUBLISHED

DECK NUMBER 3W-457
3W-798 - INCLUDES RADIATION BOUNDARY

RATE

DESCRIPTION FINDS THE CENTRAL-TEMPERATURE LIMITED AND INTERFACE
TEMPERATURE LIMITED HEAT TRANSFER CONDITIONS -
PRESSURE DROP, MAXIMUM HEAT FLUX, LOCATION OF MAXIMUM
TEMPERATURE, AND REACTOR POWER.

REFERENCE J.A.VITTI, RATE - AN AETR HEAT TRANSFER PROGRAM,
AI-TDR-6738, SEPTEMBER 1961
B.J.LEMKE, RATE, AMTD-116, NOVEMBER 1961

DECK NUMBER 3W-457

SHIELD TEMPERATURE CODE

DESCRIPTION DESCRIBES THE TEMPERATURE DISTRIBUTION IN A FLIGHT
SHIELD WITH HEAT LOSS BY RADIATION FROM THE SIDES.

REFERENCE P.D.COHN, R.WINSON, K.L.ROONEY, UNPUBLISHED

DECK NUMBER 3W-512

REFLECTOR TEMPERATURE CODE

DESCRIPTION COMPUTES THE AXIAL TEMPERATURE DISTRIBUTION AT THE
INNER AND OUTER FACES AND BETWEEN THE REFLECTOR AND
HEAT SINK. ALLOWS FOR VARIABLE EMISSIVITY, CONVECTION,
AND GAS CONDUCTIVITY

REFERENCE P.D.COHN, G.LONG, R.W.WINSTON, REFLECTOR HEATING CODE,
AI-TDR-6906, NOVEMBER 1961

DECK NUMBER 1W-513

TEMPERATURE DISTRIBUTION CODE

DESCRIPTION ANALYTIC APPROXIMATION TO SNAP 2 AND 10A RADIATION
SHIELD TEMPERATURE DISTRIBUTION

REFERENCE L.R.BLUE AND H.R.RICHARDSON, TEMPERATURE DISTRIBUTION
CODE,AMTD-107, SEPTEMBER 1961

DECK NUMBER 3W-466

TEMPERATURE DISTRIBUTION AND FIN EFFECTIVENESS

DESCRIPTION SOLVES FOR THE STEADY STATE TEMPERATURE DISTRIBUTION
AND EFFECTIVENESS OF SNAP 10A RADIATOR FINS.

REFERENCE A.N.NICKOLS, TEMPERATURE DISTRIBUTION AND FIN
EFFECTIVENESS IN RADIATOR FINS,AMTD-149, JUNE 1962

DECK NUMBER 3W-554

FUGUE

DESCRIPTION CALCULATES THE FLOW AND HEAT TRANSFER IN HEATED
CHANNELS IN WHICH THE COOLANT IS BOILING.

REFERENCE H.R.RICHARDSON, FUGUE, NAA PROGRAM DESCRIPTION,
MAY 1960

DECK NUMBER 3W-207

TOSS

DESCRIPTION SOLVES THE HEAT TRANSFER EQUATIONS FOR THE TRANSIENT AND/OR STEADY STATE TEMPERATURE DISTRIBUTION OF A THREE DIMENSIONAL IRREGULAR BODY USING A FIRST-ORDER FORWARD DIFFERENCE METHOD. FEATURES INCLUDE CONDUCTION, RADIATION, FREE AND FORCED CONVECTION, INTERNAL HEAT GENERATION, AND TIME DEPENDANT BOUNDARY NODES. 400 INTERNAL AND 200 SURFACE NODES. CERTAIN SUBROUTINES ARE IN FAP- REMAINDER IS FORTRAN.

REFERENCE D.BAGWELL, TOSS, AN IBM-7090 CODE FOR COMPUTING TRANSIENT OR STEADY STATE TEMPERATURE DISTRIBUTIONS, K-1494, DECEMBER 1961

DECK NUMBER NOT IN PRODUCTION FILE

SIFT

DESCRIPTION SIMPLIFIED INPUT FOR TOSS. GENERATES MUCH DATA REQUIRED BY TOSS AS INPUT. ALL FEATURES OF TOSS ARE INCLUDED. FAP CODING IS USED THROUGHOUT.

REFERENCE D.BAGWELL, SIFT - AN IBM-7090 CODE FOR COMPUTING HEAT DISTRIBUTIONS, K-1528, JULY 1962

DECK NUMBER 3W-608 NOT IN PRODUCTION FILE

JC08

DESCRIPTION GENERATES A MASTER TAPE FOR THERMAL PROPERTIES USEFUL TO THE GENERAL HEATING PROGRAMS. 5TH ORDER POLYNOMIAL COEFFICIENTS ARE DETERMINED TO FIT THE SPECIFIC HEAT AND CONDUCTIVITY AS FUNCTIONS OF TEMPERATURE. THE PROGRAM MAKES A MASTER TAPE, UPDATES THE MASTER TAPE, ADDS MATERIALS, AND/OR LISTS THE MATERIAL PROPERTIES. A TAPE CONTAINING 75 MATERIALS AND THE LISTING ARE AVAILABLE. PREPARED BY DOUGLAS AIRCRAFT CO.

REFERENCE J.A. MARTIN AND R. MEHLMAN, GENERAL MISSILE HEATING THERMAL PROPERTIES (PROGRAM JC08), DAC MEMORANDUM, JANUARY 1960

DECK NUMBER 3W-650 NOT IN PRODUCTION FILE
LIBRARY ON TAPE
PROGRAM IN DAC SYSTEM- SAMPSON

JA56

DESCRIPTION THREE DIMENSIONAL HEAT TRANSFER CODE-COMPUTES HEAT TRANSFER BY CONDUCTION, CONVECTION, AND RADIATION FOR PARAMETER NETWORKS OF CONDUCTORS AND CAPACITORS. THE UP TO 300 NODES IN RECTILINEAR, CYLINDRICAL, AND SPHERICAL GEOMETRY. FOR TRANSIENT OR STEADY STATE PROBLEMS. USES MATERIAL DATA FROM JC08. DAC PROGRAM

REFERENCES L.J. SURFAS, THREE DIMENSIONAL HEAT TRANSFER PROGRAM JA56, DAC MEMORANDUM, MAY 1961
ADDENDUM, JULY 1961
ADDENDUM, AUGUST 1961
ADDENDUM, NOVEMBER 1961
ADDENDUM, NOVEMBER 1961
ADDENDUM, DECEMBER 1961

DECK NUMBER 3W-651 NOT IN PRODUCTION FILE
LIBRARY ON TAPE
PROGRAM IN DAC SYSTEM- SAMPSON

TAP-2

DESCRIPTION THERMAL ANALYZER PROGRAM, REVISION 2. SOLVES THE TRANSIENT THERMAL DIFFUSION EQUATION USING LUMPED-INITIAL CONDITIONS AND BOUNDARY CONDITIONS CAN BE INPUT AS CONSTANTS OR AS TABULAR FUNCTIONS. ALLOWS RADIATION, CONVECTION, HEAT GENERATION, AND PHASE CHANGE ENTHALPIES CAN BE USED. MAXIMUM SIZE - 700 NODES AND 700 CONNECTORS.

REFERENCE J.W. BAUGHN AND R.D. ELLIOTT, THERMO-PHYSICS TECHNICAL NOTE NO. 8, THERMAL ANALYZER PROGRAM (TAP), NAA-SR-TDR 7710, SEPT., 1962

DECK NUMBER NOT IN PRODUCTION FILE - SEE AUTHOR

TAP-3

DESCRIPTION REVISION OF TAP-2 WITH MORE CONVENIENT INPUT. ANY PARAMETER IN THE NETWORK CAN BE FUNCTIONALLY RELATED TO ANY OTHERS. SPECIAL FUNCTIONS CAN BE BUILT BY THE USER THROUGH THE USE OF DUMMY VARIABLES AND SEVERAL ALGEBRAIC FUNCTION. MAXIMUM SIZE - 500 NODES, 500 CONNECTORS, 500 DUMMY LOCATIONS, AND 100 TABLES

REFERENCE R.D. ELLIOTT - UNPUBLISHED

DECK NUMBER NOT IN PRODUCTION FILE - SEE AUTHOR

A TRANSIENT MULTICHANNEL TWO-PHASE HYDRAULIC
CODE

DESCRIPTION PROGRAM SOLVES FOR THE TRANSIENT VOID AND WEIGHT
FLOW DISTRIBUTION AND PRESSURE DROP IN A REACTOR
CORE. CROSS FLOW, RADIAL AND AXIAL POWER DISTRIBUTION
, AND RADIAL INLET FLOW DISTRIBUTION ARE INCLUDED IN
THE MODEL. UP TO TWENTY CHANNELS AND FIFTY NODES PER
CHANNEL MAY BE USED.

REFERENCE L.R. STEELE AND R.F. BERLAND, A TRANSIENT MULTICHANNEL
TWO PHASE HYDRAULIC CODE, NAA-SR-9425, NOV 1963

DECK NUMBER 3W-743

MULTIPLE LIQUID INJECTION ALONG AN ADIABATIC
NOZZLE FOR TWO PHASE FLOW

DESCRIPTION COMPUTATIONS FOR MULTIPLE SUBCOOLED LIQUID INJECTION
ALONG AN ADIABATIC NOZZLE FOR TWO-PHASE FLOW OF A
SINGLE CONSTITUENT IN THERMAL EQUILIBRIUM.

REFERENCE J.A. LANDONI, TO BE PUBLISHED

DECK NUMBER 9W-040

DETERMINATION OF RADIANT-INTERCHANGE CONFIGURATION FACTORS

DESCRIPTION GIVEN THE SPATIAL COORDINATES OF THE SOURCE, SUCH AS ANY GENERAL POLYGON, AND THE SPATIAL COORDINATES OF THE RECEIVER, WHICH MAY BE EITHER ANOTHER GENERAL POLYGON OR THE SILHOUETTE OF A GENERAL POLYHEDRON, THE PROGRAM WILL COMPUTE THE CONFIGURATION FACTOR FROM THE SOURCE TO THE RECEIVER.

REFERENCE K.A. TOUPS, A GENERAL COMPUTER PROGRAM FOR THE DETERMINATION OF RADIANT-INTERCHANGE CONFIGURATION FACTORS, S.I.S.D. SID 62-393, APRIL, 1962

DECK NUMBER 3W-682 NOT IN PRODUCTION FILE

STRZ

DESCRIPTION A FORTRAN PROGRAM FOR THE CALCULATION OF THE STEADY-STATE, ROTATIONALLY SYMMETRIC TEMPERATURE FIELD IN AN INHOMOGENEOUS CYLINDRICAL BODY, IN WHICH HEAT PRODUCTION, RADIATION IN NARROW GAPS AND HEAT CONDUCTION WITH TEMPERATURE AND DIRECTION DEPENDENT CONDUCTION COEFFICIENTS MAY OCCUR. THE BODY CAN BE DIVIDED INTO AT MOST 70 REGIONS OF CONSTANT HEAT PRODUCTION RATE AND CONSISTING OF ONE MATERIAL COMPOSITION. BOUNDARY CONDITIONS MAY BE CONSTANT TEMPERATURE, ISOLATION OR CONSTANT FLOW. THE NUMERICAL METHOD IS A TWO-LEVEL ITERATION PROCESS

REFERENCE S.H. BOONSTRA, F.W. HOFF, H.P. STRUCH, STRZ CODE, RCN-16 REACTOR CENTRUM NEDERLAND, PETTEN, AND IBM NETHERLANDS AMSTERDAM

DECK NUMBER 3W-843

A MULTI-CHANNEL, TWO-DIMENSIONAL, TWO PHASE FLOW
MODEL-AND CODE

DESCRIPTION PROGRAM COMPUTES THE AXIAL AND RADIAL COOLANT
DENSITY AND QUALITY PROFILES, THE AXIAL PRESSURE
PROFILE AND THE WEIGHT FLOW DISTRIBUTION FOR AN
OPEN MATRIX FLOW, BOILING WATER REACTOR.

REFERENCE D.E.SCRAMM AND R.F.BERLAND, A MULTI-CHANNEL, TWO-
DIMENSIONAL, TWO-PHASE FLOW MODEL AND IBM 7090 CODE.
NAA-SR-MEMO 9444, DECEMBER 1963.

DECK NUMBER 3W-795

A CODE FOR A COOLANT MIXING ANALYTICAL FLOW MODEL

DESCRIPTION THIS CODE IS A NUMERICAL TREATMENT OF CALCULATIONS
TO DETERMINE COOLANT MIXING IN CLOSE - PACKED
BUNDLES OF TWISTED FINNED TUBING.

REFERENCE M.HOFFMAN, A CODE FOR A COOLANT MIXING ANALYTICAL
FLOW MODEL, AMTD-139, AUG. 1962

DECK NUMBER 3W - 588

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XVII DATA REDUCTION CODES

AIPMAN I, II, III

DESCRIPTION THESE CODES FIND COUNTER RESOLVING TIME, REACTOR PERIOD, INVERSE PERIOD, REACTIVITY, AND CHI SQUARE GIVEN RAW COUNT RATE AND BACKGROUND COUNT RATE DATA.

REFERENCE H.R. RICHARDSON, AIPMAN I, II, AND III, NAA PROGRAM DESCRIPTION, JANUARY 1962
L.S. BELLER, UNPUBLISHED

DECK NUMBERS 3W-514 AIPMAN I
3W-520 AIPMAN II
3W-524 AIPMAN III

AIRCOMP II

DESCRIPTION FINDS REACTIVITY, TOTAL ENERGY RELEASE, AVERAGE LOGARITHMIC DECREMENT, TEMPERATURE AND VOID COMPENSATED REACTIVITY, AND NORMALIZES TO POWER GIVEN PUNCHED DATA FROM REACTOR TRANSIENTS. BACKWARDS KINETICS.

REFERENCE H.R. RICHARDSON, AIRCOMP II, NAA PROGRAM DESCRIPTION, DECEMBER 1960

DECK NUMBER 3W-369

FOIL CALIBRATION CODE

DESCRIPTION INTERCALIBRATES UP TO 192 FOILS WHICH ARE EXPOSED IN
A REACTOR IN GROUPS OF 24.

REFERENCE R.K.PASCHALL, UNPUBLISHED

DECK NUMBER 3W-477

AETRA

DESCRIPTION DATA PROCESSING SYSTEM TO ANALYZE PHYSICS EXPERIMENTS
ON AETR CRITICALS. INCORPORATES AIM-6 AND PERT TO
ANALYZE FISSION AND CAPTURE RATE AND RATIO,
OSCILLATOR, SPECTRA, AND DISTRIBUTED REACTIVITY
MEASUREMENTS. GROUP CROSS SECTIONS ARE ADJUSTED TO
GIVE AGREEMENT WITH EXPERIMENT.

REFERENCE J.S.TEMPLE, AETRA - DATA PROCESSING PROGRAM IN
FORTRAN FOR THE 709 OR 7090, NAA PROGRAM DESCRIPTION,
OCTOBER 1960
A.V.CAMPISE, AETR DATA PROCESSING PROGRAM, AI-MEMO
5778, DECEMBER 1960

DECK NUMBER 3W-660 - PROGRAM ON TAPE
3W-295 - 18 GROUP LIBRARY
3W-446 15 GROUP LIBRARY

CONT-CONTOURING OF HNPF DATA

DESCRIPTION DATA TAKEN AT THE HNPF SITE IS TRANSMITTED TO AI FOR REDUCTION AND ANALYSIS. THIS PROGRAM REDUCES THE DATA, COMPUTE RELATIVE POWER ACROSS THE CORE, CALCULATES FUEL ELEMENT EXPOSURE AND GENERATES CONTOUR PLOTS OF THE RELATIVE POWER AND/OR ELEMENT ACCUMULATED EXPOSURE.

REFERENCE J.C.DILLON AND R.M.MILLS, CALCULATING AND CONTOURING RELATIVE POWER AND FUEL ELEMENT EXPOSURE FOR THE HALLAM NUCLEAR POWER FACILITY (HNPF) USING THE 7094 AND SC-4020, NAA-SR-MEMO-9391, JAN. 1964
NAA-SID-63-171, G.A.MCCUE, FEB., 1963

DECK NUMBER 3W-828

FSM-1 BASIC

DESCRIPTION THE FSM-1 DATA REDUCTION PROGRAM CONSISTS OF THREE PARTS.

PART I IS A DATA REDUCTION AND ANALYSIS PROGRAM WHICH PERFORMS STATISTICAL CALCULATION AND NUMERICAL ANALYSIS OF DATA GATHERED ON PUNCHED PAPER TAPE. THE SIGNALS TO THE PAPER TAPE PUNCH ARE OBTAINED FROM REACTOR INSTRUMENTATION. ONE OF THE OUTPUT MEDIA FROM PART I IS A MAGNETIC TAPE. THIS TAPE IS USED AS THE INPUT TO PART II

DECK NUMBER 3W784

PART II IS THE IBSYS SORT PROGRAM
PART III IS A NORMALIZING AND GRAPHICAL DISPLAY PROGRAM. IN THIS PORTION OF THE FSM-1 PACKAGE, PLOTS OF THE VARIOUS PARAMETERS WHICH DESCRIBE THE SYSTEMS PERFORMANCE ARE OBTAINED.

DECK NUMBER 3W819

REFERENCE R.J.MIKELL AND G.T.CHANG, FSM-I, A DATA REDUCTION CODE, NAA-SR-MEMO-9440, FEB. 1964

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XVIII ENGINEERING CODES

PIPE STRESS CODE

DESCRIPTION FINDS FORCES AND MOMENTS OF TWO TO FOUR RESTRAINT
MULTIPLANE PIPING CONFIGURATIONS.

REFERENCES H.B.HOLZ AND M.TARPINIAN, DEVELOPMENT OF CODE FOR
PIPING FLEXIBILITY CALCULATIONS FOR THE IBM 704,
TDR-93, JULY 1957
M.TARPINIAN, PIPE STRESS CODE IN STANDARD FORTRAN,
FIB II, AMTD-168, SEPTEMBER 1962

DECK NUMBER 3W-621

PSA 2 -- PIPE STRESS ANALYSIS

DESCRIPTION TO COMPUTE THE REACTIONS AND STRESSES CAUSED BY
THERMAL EXPANSION AND LOADS IN A MULTI-ANCHOR PIPING
SYSTEM WHICH MAY CONTAIN LOOPS AND MAY BE PARTIALLY
RESTRAINED AT ANY POINT IN ANY DIRECTION.
ONE OF THE BEST CODES OF ITS KIND.

REFERENCE B.H. BOONSTRA, PSA 2, IBM NETHERLANDS

DECK NUMBER 3W-826

REDUNDANT STRUCTURE ANALYSIS

DESCRIPTION FINDS INTERNAL STRESS, LOADING AND DEFLECTION FOR
REDUNDANT STRUCTURES OF ALL TYPES.

REFERENCE FUSELAGE FRAME ANALYSIS PROGRAM, NA-57-1488,
MARCH, 1959 (LA DIVISION)

DECK NUMBER 1W-516

FORTRAN FRAME PROGRAM

DESCRIPTION CALCULATES INTERNAL LOADS AND STRESSES FOR A FUSELAGE FRAME OR A MULTI-SUPPORT BEAM. IF THE FRAME OR BEAM IS STATICALLY INDETERMINANT, THE METHOD OF MINIMUM STRAIN ENERGY IS USED FOR SOLUTION. THE EXTERNAL LOADS CAN BE IN ANY COMPLEX ARRANGEMENT OF CONCENTRATED LOADS, SHEAR FLOWS, AND PRESSURES. THE PROGRAM WILL ALSO CALCULATE STATIC DEFLECTIONS USING THE METHOD OF VIRTUAL WORK.

REFERENCE STRUCTURAL PROJECTS IBM MANUAL -FORTRAN FRAME PROGRAM, NA-62-854 SEP.1962

DECK NUMBER 3W-703

ROOT LOCUS PROGRAM

DESCRIPTION THE PROGRAM SOLVES THE EQUATIONS $1+KG(S)H(S)=0$ OR $1-KG(S)H(S)=0$, AND PRODUCES ANSWERS AS A FUNCTION OF THE GAIN K. THE TERM $G(S)H(S)$ WILL BE A POLYNOMIAL FRACTION IN TERMS OF S, HOWEVER FOR PROGRAM USE, THE NUMERATOR AND DENOMINATOR OF THE POLYNOMIAL FRACTION MUST BE FACTORED TO CONTAIN ONLY QUADRATIC OR LOWER DEGREE EXPRESSIONS AND TERMS IN S RAISED TO A POSITIVE POWER.

REFERENCE J.THOMPSON , ROOT LOCUS PROGRAM

DECK NUMBER 3W-786

BLOCK DIAGRAM ALGEBRA ABSTRACTION

DESCRIPTION TO PERFORM MULTIPLE ALGEBRAIC OPERATIONS ON TRANSFER FUNCTIONS EVALUATED OVER SOME FREQUENCY DOMAIN. BY THE EVALUATION OF THE FUNCTIONS USING COMPLEX FREQUENCIES, THE ROOT LOCUS (OF ANY PHASE) FOR A MULTILoop FEEDBACK SYSTEM MAY BE CALCULATED. THE PROGRAM IS ESPECIALLY APPLICABLE TO SERVOMECHANISM ANALYSIS AS THE OUTPUT CAN BE REAL AND IMAGINARY AND OR DECIBELS AND PHASE.

REFERENCE PHYLLIS HAIT, BLOCK DIAGRAM ALGEBRA ABSTRACTION, NAA PROGRAM DESCRIPTION

DECK NUMBER 3W-577

S-PLANE FREQUENCY RESPONSE PROGRAM

DESCRIPTION GIVEN AN S-PLANE TRANSFER FUNCTION AS THE RATIO OF TWO POLYNOMIALS (IN EITHER EXPANDED OR FACTORED FORM) AND ONE OR MORE FREQUENCY SETS (INITIAL, INCREMENTAL AND FINAL VALUES OF FREQUENCY IN RADIANS/SECOND), THIS PROGRAM EVALUATES THE FUNCTION FOR EACH FREQUENCY AND COMPUTES THE GAIN RATIO IN DECIBELS AND THE PHASE ANGLE IN DEGREES

REFERENCE J.C. LONG , S-PLANE FREQUENCY RESPONSE PROGRAM -- NAA ENGINEERING PROGRAM DESCRIPTION, SPACE AND INFORMATION SYSTEMS DIVISION

DECK NUMBER NOT ON FILE

UNBALANCE RESPONSE AND CRITICAL SPEEDS OF A ROTOR
WITH FLEXIBLE BEARING SUPPORTS

DESCRIPTION THE PROGRAM CALCULATES THE ROTOR DEFLECTION AND THE BENDING MOMENT CAUSED BY A SPECIFIED ROTOR UNBALANCE , AND THE CRITICAL SPEEDS WITH THEIR CORRESPONDING MODESHAPES WITHIN A GIVEN SPEED RANGE. THE SUPPORTS FOR THE ROTOR CONSIST OF A FLUID FILM BEARING ON A PEDESTAL, BOTH MEMBERS POSSESSING FLEXIBILITY AND DAMPING FOR TRANSLATORY AND ROTATIONAL MOTION. THE FLEXIBILITY AND THE DAMPING IS THE SAME IN ALL DIRECTIONS SO THAT EACH POINT OF THE ROTOR WILL WHIRL IN A CIRCULAR ORBIT AROUND ITS STEADY STATE POSITION.

REFERENCE J.W. LUND, IBM 704 COMPUTER PROGRAM, UNBALANCE RESPONSE AND CRITICAL SPEEDS OF A ROTOR WITH FLEXIBLE BEARING SUPPORTS, MTI-62TR3 FEB. 1962.

DECK NUMBER 9W-042

SHAFT ANALYSIS PROGRAM

DESCRIPTION ANALYZES A TURBOPUMP SHAFT HAVING TWO RIGID SUPPORTS AND TWO OVERHANGING ENDS. THE PROGRAM IS USED TO DETERMINE THE THREE LOWEST NATURAL FREQUENCIES AND THEIR CORRESPONDING MODE SHAPES. THE MOMENTS, DEFLECTIONS AND SLOPES DUE TO THE MASSES OF THE SHAFT AND DISCS ARE COMPUTED.

REFERENCE PHYLLIS HAIT, SHAFT ANALYSIS PROGRAM , NAA PROGRAM DESCRIPTION

DECK NUMBER NOT ON FILE

PROGRAM FOR HELICAL-ROTOR ELECTROMAGNETIC PUMP
DESIGN OPTIMIZATION

DESCRIPTION PROGRAM CALCULATES DIMENSIONS, ELECTRICAL PROPERTIES
, POWER LOSSES, WEIGHT OF STEEL AND COPPER, TOTAL
LENGTH OF COPPER WIRE FOR FIELD WINDING, EFFICIENCY,
AND HORSEPOWER OF DRIVE MOTOR FOR USE IN DESIGNING A
2, 4, OR 6 POLE HELICAL-ROTOR ELECTROMAGNETIC PUMP
FOR PUMPING NA, NAK OR OTHER LIQUID METALS.

REFERENCE M.R. REED, REVISED PROGRAM FOR HELICAL-ROTOR
ELECTROMAGNETIC PUMP DESIGN OPTIMIZATION, AI-TDR-
9131 OCTOBER 1963.

DECK NUMBER 9W-012

TURBO PUMP CODE

DESCRIPTION PROGRAM OBTAINS, FOR A GIVEN PRESSURE RATIO, DESIGN
SPEED, NUMBER OF STAGES, FLOW RATE, AND TEMPERATURE
INTO A PUMP, THE OVERALL EFFICIENCY AND POWER
REQUIRED AND THE HYDRAULIC DIAMETER OF EACH STAGE.

REFERENCE J.A. HESSLER, TURBO PUMP CODE, NAA-SR-MEMO-9524
FEBRUARY 1964

DECK NUMBER 3W-820

CYCLOPS-1

DESCRIPTION A GENERAL PURPOSE PROGRAM THAT PERFORMS A HEAT AND MASS BALANCE OF HEAT TRANSFER SYSTEMS COMPOSED OF PUMPS, TURBINES, SEPARATORS, HEAT EXCHANGERS, COMPRESSORS, AND FLOW THROTTLING DEVICES. THESE COMPONENTS MAY BE CONNECTED IN ANY DESIRED FASHION. THE HEAT TRANSFER FLUIDS THAT MAY BE USED ARE WATER, AIR, NITROGEN, AND PARA-HYDROGEN.

REFERENCE J. HESSLER AND L. R. BLUE, NOT PUBLISHED

DECK NUMBER 3W-834

WH58-THERMODYNAMIC PROPERTIES OF WATER AND STEAM

DESCRIPTION ALLOWS COMPUTATION OF VARIOUS THERMODYNAMIC PROPERTIES (ENTROPY, ENTHALPY, TEMPERATURE, PRESSURE, SPECIFIC VOLUME, QUALITY, AND VISCOSITY) OF STEAM AND WATER. CONSISTS OF 16 SUBROUTINES WHICH SHOULD BE USED AS A PACKAGE.

REFERENCE T. W. MARTIN, WH58 - THERMODYNAMIC PROPERTIES OF WATER AND STEAM WESTINGHOUSE ELECTRIC CORPORATION.

DECK NUMBER 3W-796

WH58E-MINIMUM ERROR ROUTINE FOR STEAM TABLE DISTRIBUTION

DESCRIPTION ALLOWS INSTALLATIONS NOT USING THE STANDARD ERROR FACILITIES OF THE FORTRAN MONITOR SYSTEM TO USE THE STEAM TABLE ROUTINES

DECK NUMBER 3W-796

WHHCL-ENTHALPY AND ENTROPY OF COMPRESSED LIQUID

DESCRIPTION COMPUTES ENTHALPY AND ENTROPY OF COMPRESSED LIQUID AS A FUNCTION OF PRESSURE AND TEMPERATURE. ENTHALPY IN BTU/LB. ENTROPY IN BTU/LB-F. TEMPERATURE RANGE (50,660). PRESSURE RANGE (.2,6500)

DECK NUMBER 3W-796

WHHSL-ENTHALPY OF SATURATED LIQUID

DESCRIPTION COMPUTES ENTHALPY OF SATURATED LIQUID AS A FUNCTION OF TEMPERATURE. ENTHALPY IN BTU/LB. TEMPERATURE IN FAHRENHEIT IN RANGE (50,705.4).

DECK NUMBER 3W-796

WHHSS ENTHALPY, ENTROPY, AND SPECIFIC VOLUME OF SUPERHEATED STEAM

DESCRIPTION COMPUTES THE ENTHALPY, ENTROPY, AND SPECIFIC VOLUME OF SUPERHEATED STEAM AS A FUNCTION OF PRESSURE AND TEMPERATURE. ENTHALPY IN BTU/LB, ENTROPY IN BTU/LB-F, SPECIFIC VOLUME IN FT³/LB. TEMPERATURES (F) IN THE RANGE (50,1601), PRESSURE (PSIA) IN THE RANGE (.2,5501).

DECK NUMBER 3W-796

WHHSV-ENTHALPY, ENTROPY, SPECIFIC VOLUME OF SATURATED VAPOR

DESCRIPTION COMPUTES ENTHALPY, ENTROPY, SPECIFIC VOLUME, AND TEMPERATURE ALONG THE SATURATED VAPOR LINE AS A FUNCTION OF PRESSURE. ENTHALPY IN BTU/LB, ENTROPY IN BTU/LB-F, SPECIFIC VOLUME IN FT³/LB, TEMPERATURE IN FAHRENHEIT. PRESSURE IN RANGE (.2,3206.2).

DECK NUMBER 3W-796

WHISD-ISENTROPIC PRESSURE CHANGE SUBROUTINE

DESCRIPTION DETERMINES QUALITIES, SPECIFIC VOLUMES, ENTHALPIES, ENTROPY, AND TEMPERATURE AT THE EXTREMITIES OF AN ISENTROPIC PROCESS GIVEN THE INLET AND EXIT PRESSURES AND EITHER INLET TEMPERATURE OR INLET ENTHALPY. ROUTINE OPERATES IN THE SUPERHEATED AND WET STEAM REGIONS TOGETHER OR IN THE COMPRESSED LIQUID REGION.

DECK NUMBER 3W-796

WHLDIR-LAGRANGIAN INTERPOLATION FOR STEAM TABLES

DESCRIPTION TO SUPPLY THE NECESSARY INTERPOLATION FACILITIES FOR CERTAIN WH STEAM TABLE ROUTINES. FOURTH ORDER SINGLE OR DOUBLE INTERPOLATION IS PERFORMED FOR TABLES OF ARGUMENTS FOR EQUAL INCREMENTS OF INDEPENDENT VARIABLE.

DECK NUMBER 3W-796

WHPSL-PRESSURE OF SATURATED LIQUID

DESCRIPTION COMPUTES PRESSURE OF SATURATED LIQUID AS A FUNCTION OF TEMPERATURE. PRESSURE IN PSIA. TEMPERATURE (F) IN RANGE (50, 705.4).

DECK NUMBER 3W-796

WHSSI-ENTHALPY OR ENTROPY IN LIQUID, SUPERHEATED,
OR WET REGIONS

DESCRIPTION GIVEN PRESSURE AND EITHER ENTHALPY OR ENTROPY, TO
FIND ENTROPY OR ENTHALPY AND TEMPERATURE. IN
ADDITION, SPECIFIC VOLUME AND QUALITY ARE CALCULATED
IN THE SUPERHEATED AND WET STEAM REGIONS.

DECK NUMBER 3W-796

WHSSL-ENTROPY OF SATURATED LIQUID

DESCRIPTION COMPUTES THE ENTROPY OF SATURATED LIQUID AS A
FUNCTION OF TEMPERATURE. ENTROPY IN BTU/LB-F.
TEMPERATURE (F) IN THE RANGE (50,705.4).

DECK NUMBER 3W-796

WHTSH-TEMPERATURE OF SATURATED LIQUID FROM
ENTHALPY

DESCRIPTION COMPUTE THE TEMPERATURE OF SATURATED LIQUID AS A
FUNCTION OF ENTHALPY. TEMPERATURE IN FAHRENHEIT.
ENTHALPY IN BTU/LB IN RANGE (18.07,870).

DECK NUMBER 3W-796

WHTSL-TEMPERATURE OF SATURATED LIQUID

DESCRIPTION COMPUTES THE TEMPERATURE OF SATURATED LIQUID AS A
FUNCTION OF PRESSURE. TEMPERATURE IN FAHRENHEIT.
PRESSURE IN PSIA. IN THE RANGE (1.2,3206.2).

DECK NUMBER 3W-796

WHVCL-SPECIFIC VOLUME OF COMPRESSED LIQUID

DESCRIPTION COMPUTES THE SPECIFIC VOLUME OF COMPRESSED LIQUID AS A FUNCTION OF PRESSURE AND TEMPERATURE. SPECIFIC VOLUME IN FT³/LB, TEMPERATURE IN FAHRENHEIT AND PRESSURE IN PSIA.

DECK NUMBER 3W-796

WHVISL-VISCOSITY OF LIQUID WATER

DESCRIPTION COMPUTES THE VISCOSITY OF LIQUID WATER AS A FUNCTION OF PRESSURE AND TEMPERATURE. VISCOSITY IN LB/FT-SEC, PRESSURE IN PSIA LESS THAN 6000, AND TEMPERATURE IN FAHRENHEIT IN THE RANGE (50,600).

DECK NUMBER 3W-796

WHVISV-VISCOSITY OF STEAM

DESCRIPTION COMPUTES VISCOSITY OF STEAM AS A FUNCTION OF PRESSURE AND TEMPERATURE. VISCOSITY IN LB/FT-SEC, PRESSURE IN PSIA, AND TEMPERATURE IN FAHRENHEIT.

DECK NUMBER 3W-796

WHVSL-SPECIFIC VOLUME OF SATURATED LIQUID

DESCRIPTION COMPUTES THE SPECIFIC VOLUME OF SATURATED LIQUID AS A FUNCTION OF TEMPERATURE. SPECIFIC VOLUME IN FT³/LB AND TEMPERATURE IN FAHRENHEIT IN THE RANGE (50,705.4).

DECK NUMBER 3W-796

STEAMER III

DESCRIPTION THE CODE DOES ANY ONE OF THREE ANALYSES ON SODIUM HEAT TRANSFER SYSTEMS. ONE IF A CONSTANT TEMPERATURE DROP ACROSS THE REACTOR IS REQUIRED, ANOTHER FOR REACTOR FLOW RATE CONTROLLED LINEARLY, AND ALSO IF A CONSTANT FLOW RATE IS DESIRED THROUGH THE REACTOR.

REFERENCE P.A.INMAN, STEAMER III , NAA PROGRAM DESCRIPTION

DECK NUMBER 3W-082

SUPERCRITICAL STEAM GENERATOR

DESCRIPTION PROGRAM DETERMINES A STEADY STATE TEMPERATURE DISTRIBUTION FOR A SUPERCRITICAL STEAM GENERATOR. A NODAL SOLUTION IS OBTAINED.

REFERENCE G.T.CHANG, SUPERCRITICAL STEAM GENERATOR, AMTD-103, NOV 1962

DECK NUMBER 3W-636

HELCO

DESCRIPTION PROGRAM CALCULATES THE ANGULAR MOMENTUM OF FLUIDS FLOWING AT A CONSTANT MASS FLOW RATE THROUGH A DOUBLE HELICAL PIPING SYSTEM.

REFERENCE J.G.MORGAN, HELCO - THE CALCULATION OF ANGULAR MOMENTUM OF FLUIDS FLOWING THROUGH A DOUBLE HELICAL PIPING SYSTEM.

DECK NUMBER 3W-765

ANGULAR MOMENTUM OF FLUIDS THROUGH PIPES

DESCRIPTION PROGRAM COMPUTES THE ANGULAR MOMENTUM OF FLUIDS
FLOWING THROUGH STRAIGHT PIPES AND CURVED PIPES WITH
A CONSTANT RADIUS OF CURVATURE.

REFERENCE J.G.MORGAN, ANGULAR MOMENTUM OF FLUIDS FLOWING
THROUGH PIPES, NAA-SR-MEMO-9172, NOVEMBER 1963.

DECK NUMBER 3W-752 - PIPE COORDINATES FIXED
3W-794 - PIPE COORDINATES VARY RANDOMLY WITHIN A
TOLERANCE ZONE

VINCE-TOM CODE

DESCRIPTION PROGRAM PERFORMS A THERMOELEMENT ANALYSIS. GIVEN HOT
AND COLD JUNCTION TEMPERATURES, THERMOELECTRIC
MATERIAL PROPERTIES, AND DESIRED ELECTRICAL OUTPUT
CHARACTERISTICS, IT CALCULATES THE NUMBER AND SIZE
OF THE THERMOELEMENTS, THE REQUIRED THERMAL INPUT,
THERMOELECTRIC EFFICIENCY, AND THE ELECTRICAL
CHARACTERISTICS OF THE GENERATOR.

REFERENCE T.S.BUSTARD, W.C.LYON, TOM (THERMOELEMENT
OPTIMIZATION METHOD) MND-P-2372, MARTIN COMPANY

DECK NUMBER 3W-649 - NOT IN PRODUCTION FILE .

H0SS-III

DESCRIPTION PROGRAM SOLVES STEADY STATE FLOW PROBLEMS IN PIPING SYSTEMS REQUIRING THREE DIMENSIONAL GEOMETRY. THE CODE IS BASED ON THE PERTURBATION METHOD PROPOSED BY PROF. HARDY CRUSS.

REFERENCE J.G. MORGAN, A.T. STELL, H0SS III, AMTD-204, APR 1963.

DECK NUMBER 3W-731

HYREP

DESCRIPTION THE PROGRAM DETERMINES THE HYDROGEN REDISTRIBUTION EQUILIBRIUM PRESSURE IN A FUEL ELEMENT UNDER THE ASSUMPTION THAT THE INTEGRATED EQUILIBRIUM H/ZR IS EQUAL TO THE INITIAL VALUE OF H/ZR.

REFERENCE R.F. BERLAND, HYREP. AMTD-207, JUNE 1963.

DECK NUMBER 3W-776

SCOPE

DESCRIPTION SCOPE ESTIMATES THE DISTRIBUTION OF SYSTEM CONVERTER RESISTANCE FROM THERMOCOUPLE RESISTANCES AND VOLTAGE AND POWER FROM THERMOCOUPLE OR MODULE RESISTANCES AND VOLTAGES. THE PROGRAM USES A MONTE CARLO TECHNIQUE TO BUILD CONVERTERS FROM INPUT DATA.

REFERENCE G.H. BEERS, R.F. BERLAND, SCOPE, A PROGRAM TO COMPUTE SYSTEM CONVERTER RESISTANCE, VOLTAGE, AND POWER ESTIMATE USING MONTE CARLO SIMULATION. AMTD-187, MARCH 1963

DECK NUMBER 3W-589

SEPARATE SOURCE PUMP

DESCRIPTION THIS CODE COMPUTES THE OPTIMUM MAGNETIC FLUX FOR SEPARATE SOURCE PUMPS OF SPECIFIED DIMENSIONS AND SPECIFIED OUTPUTS (FLOW RATE AND PRESSURE HEAD). FOR THIS MAGNETIC FLUX THE CODE COMPUTES THE CURRENT AND POWER REQUIRED AND THE MAGNET WEIGHT. THE HYDRAULIC PRESSURE LOSS IN THE PUMP IS ALSO COMPUTED.

REFERENCE NAA-SR-MEMO-9332

DECK NUMBER 3W821

A CODE FOR EVALUATION AND PLOTTING OF ACTUATOR AND LOAD RESPONSE

DESCRIPTION THIS PROGRAM EVALUATES ANALYTICAL FUNCTIONS WHICH REPRESENT LOAD RESPONSES FOR STEP INPUTS FOR TORQUE DISPLACEMENTS OF A CONSTANT TORQUE ACTUATOR

REFERENCE M. HOFFMAN, A CODE FOR EVALUATION AND PLOTTING OF ACTUATOR AND LOAD RESPONSE, AMTD-211, JUNE 1963

DECK NUMBER 3W-767

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XIX REACTOR ECONOMICS CODES

TEEPP AND TEEPCRT

DESCRIPTION TEEPP (TRUE ECONOMIC EVALUATION OF POWER PLANTS) INCORPORATES NUMEROUS PARAMETERS INTO A THOROUGH ECONOMIC STUDY USING ACCEPTED UTILITY ACCOUNTING PRACTICES. THESE PARAMETERS INCLUDE VARIOUS NUCLEAR AND FOSSIL FUEL PLANT INFORMATION ESTABLISHED OVER A LIFETIME IN YEARS. TEEPCRT TAKES OUTPUT FROM TEEPP AND GRAPHS TOTAL ENERGY COSTS VS YEARS OVER A LIFETIME.

REFERENCE R.H.SHUDE AND G.H.BEERS, TEEP AND TEEPCRT AMTD-183 NOV. 1962

DECK NUMBER TEEP 3W-609
TEEPCRT 3W-481

BANEC - BALANCED NUCLEAR ECONOMY CODE

DESCRIPTION PROGRAM CALCULATES U.S. URANIUM REQUIREMENTS, UTILIZATION AND PLUTONIUM PRODUCTION, FOR THE NEXT CENTURY UNDER A VARIETY OF ECONOMIC CONDITIONS AND REACTOR CHARACTERISTICS.

REFERENCE L.R.BLUE, E.G.LOWELL, A.N.NICKOLS, BANEC--BALANCED NUCLEAR ECONOMY CODE AMTD-210 MAY 1963

DECK NUMBER 3W-701

ELECTRIC UTILITIES SURVEY PROGRAM

DESCRIPTION THE PROGRAM COMPUTES THE PERCENTAGE FIRED AND THE AVERAGE COST OF EACH FUEL BURNED UP FOR ANY ELECTRIC UTILITY SYSTEM IN THE U.S. FOR ANY PERIOD OF YEARS, NOT TO EXCEED 16. ALSO COMPUTES THE AVERAGE FUEL COST FOR EACH STATION, WHICH IS EXPRESSED NUMERICALLY IN TERMS OF BOTH ENERGY INPUT AND ELECTRICAL OUTPUT. SYSTEM FUEL COSTS ARE GRAPHED AS A FUNCTION OF TIME.

REFERENCE G.H.BEERS, ELECTRIC UTILITIES SURVEY PROGRAM.
AMTD-175 SEP 1962

DECK NUMBER 3W-518

CAPACITY AND GROWTH FOR U.S. ELECTRIC UTILITIES
PROGRAM

DESCRIPTION USING SYSTEM CAPACITY AND SYSTEM PEAK DEMAND, INFORMATION FOR ANY PERIOD OF YEARS, RANGING FROM 1952 TO 1971, THE PROGRAM CALCULATES THE RATE OF GROWTH OF EACH OF THESE VARIABLES AND GRAPHS BOTH THE POINTS GIVEN AND THE TREND.

REFERENCE G.H.BEERS, R.H.SHUDE, CAPACITY AND GROWTH PROGRAM
FOR U.S. ELECTRIC UTILITIES. AMTD-176 OCT 1962

DECK NUMBER 3W-617

PSYCHO - A FUEL CYCLE COST CODE

DESCRIPTION PROGRAM CALCULATES FUEL CYCLE COSTS FOR URANIUM
CARBIDE FUELED SODIUM GRAPHITE REACTORS

REFERENCE J.S.TEMPLE, PSYCHO-A FUEL CYCLE COST CODE, AMTD-155
JULY 1962

DECK NUMBER 3W-593

NUCLEAR POWER REACTOR FUEL CYCLE COST CALCULATIONS

DESCRIPTION THE PROGRAM COMPUTES THE NUCLEAR FUEL CYCLE COSTS
FOR POWER REACTORS CONTAINING FROM ONE TO TEN
REGIONS OR ZONES. NUCLEAR FUEL CYCLE COSTS IN
DOLLARS PER YEAR, AND IN MILLS PER KILOWATT-HOUR
ARE COMPUTED AND TABULATED FOR EACH REGION OF A
MULTIREGION REACTOR CORE, ON THE BASIS OF AEC-LEASED
NUCLEAR FUEL MATERIAL AND OF PRIVATELY-OWNED NUCLEAR
FUEL MATERIAL.

REFERENCE KAISER ENGINEERS, KAISER FUELCYCLE CODE

DECK NUMBER 3W-777

X 12-3

COST CALCULATIONS FOR POWER REACTORS

DESCRIPTION PROGRAM EVALUATES THE COST OF ELECTRICITY OR
PLUTONIUM PRODUCED BY A REACTOR. FOR FURTHER
INFORMATION SEE REFERENCE (1).

REFERENCE J.HEESTAND AND L.T.WOS, COST FUNCTION STUDIES FOR
POWER REACTORS, ANL-6442 NOVEMBER 1961.

DECK NUMBER 3W-561

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XX MANAGEMENT SYSTEMS CODES

PERT-AINAP

DESCRIPTION PERT-AINAP IS THE GENERALIZED PERT PROGRAM IMPLEMENTED AND USED BY ATOMICS INTERNATIONAL. IT IS BASED ON THE N.A.A. PERT-MARK III SYSTEM ORIGINATED AND MAINTAINED BY LOS ANGELES DIVISION. PERT-AINAP CONSISTS OF (1) PERT-TIME COMPUTATIONS WITH RESULTANT PRINTED OUTPUT BY MEANS OF A REPORT-WRITER IN THE PROGRAM, (2) MANPOWER-REQUIREMENT ACCUMULATIONS AND SUMMATIONS DISPLAYED ON SC-4020 GRAPHS, (3) A PRICE ROUTINE WHICH CALCULATES AND SUMMARIZES THE DIRECT AND BURDEN COSTS ASSOCIATED WITH MANPOWER LOADING, AND (4) THE NAP (NETWORK AUTO-PLOT) ROUTINE TO AUTOMATICALLY DRAW THE PERT NETWORK PICTURE UTILIZING THE SC-4020.

PERT-AINAP COMPRISES 17 CHAIN-LINKS WHICH ARE MADE UP OF FORTRAN II AND FAP CODED ROUTINES. IT OPERATES UNDER THE FIR III MONITOR AND REQUIRES THE COMFORT SUBROUTINES AND THE SC-4020 SUBROUTINES.

REFERENCE AI-MEMO-9324, PERT-AINAP USERS MANUAL, DEC. 1963

DECK NUMBER PROGRAM ON TAPE

NAP (NETWORK AUTOMATIC PLOTTING)

DESCRIPTION THE NAP PROGRAM ACCEPTS SUITABLY FORMATED AND ORDERED OUTPUT FROM A PERT PROGRAM, PERFORMS A PICTORIAL ANALYSIS, AND GENERATES SC-4020 CODING TO DRAW THE PERT NETWORK.

THIS PROGRAM COMPRISES THREE FORTRAN-TWO CHAIN LINKS, AND OPERATES AS A CONTINUATION OPTION WITHIN THE PERT-AINAP SYSTEM. IT IS EXPLICITLY COMPATIBLE WITH NORTH AMERICAN AVIATION, INC., PERT-MARK III SYSTEMS.

REFERENCE I.FRIEDMAN, ET.AL, NAP-NETWORK AUTOMATIC PLOTTING, AI-64-MEMO-15, JAN, 1964

DECK NUMBER PROGRAM ON TAPE

PERT-MAN

DESCRIPTION THIS PROGRAM PROCESSES DATA GENERATED FROM AI-PERT TO PRODUCE AUTOMATIC GRAPHIC DISPLAYS, VIA THE SC 4020, OF MANPOWER REQUIREMENTS AS A FUNCTION OF TIME OVER THE LIFE OF A PERT NETWORK. THE MAXIMUM NETWORK LIFE PERMITTED IN THIS PROGRAM IS TEN YEARS. THE PERT-MAN PROGRAM IS PART OF THE AI-PERT SYSTEM. THIS PROGRAM IS WRITTEN IN FORTRAN II FOR THE 32 K STORAGE, IBM 7094 .

REFERENCE NAA-SR-MEMO 9309 - PERT-MAN, A PROGRAM FOR AUTOMATIC PLOTTING OF FORECASTED MANPOWER REQUIREMENTS FOR A PERT NETWORK, I.R.FRIEDMAN AND L.R.BLUE, OCTOBER, 1963
AI-MEMO 9324 - PERT-AINAP USERS MANUAL, INFORMATION AND COMPUTING SYSTEMS , MATHEMATICS AND COMPUTER APPLICATIONS GROUP ,ATOMICS INTERNATIONAL DECEMBER, 1963

DECK NUMBER CHAIN TAPE AVAIL (AI-PERT SYSTEM) AT DEPT/792

PERT-PRICE

DESCRIPTION THIS PROGRAM PROCESSES AN OUTPUT DATA TAPE GENERATED BY THE PERT-MAN PROGRAM. THE PROGRAM APPLIES CONVERSION FACTORS FOR DIRECT LABOR AND BURDEN CHARGES. REPORTS ARE GENERATED SHOWING DOLLAR VALUES LISTED BY MONTH FOR EACH YEAR OF A PERT NETWORK FOR EACH PROJECT AND EACH ORGANIZATION.

REFERENCE NAA-SR-MEMO 9365 - PERT-PRICE, A PROGRAM FOR PRICING OF FORECASTED MANPOWER REQUIREMENTS FROM A PERT NETWORK, L.R. BLUE AND I.R. FRIEDMAN, JANUARY, 1964.
AI-MEMO 9324 - PERT-AINAP USERS MANUAL, INFORMATION AND COMPUTING SYSTEMS, MATHEMATICS AND COMPUTER APPLICATIONS GROUP, ATOMICS INTERNATIONAL, DECEMBER, 1963
NAA-SR-MEMO 9309-PERT-MAN, A PROGRAM FOR AUTOMATIC PLOTTING OF FORECASTED MANPOWER REQUIREMENTS FOR A PERT NETWORK, I.R. FRIEDMAN AND L.R. BLUE, OCTOBER, 1963

DECK NUMBER CHAIN TAPE AVAIL (AI-PERT SYSTEM) AT DEPT/792

SIMPRT - A MONTE CARLO TECHNIQUE FOR PERT NETWORKS

DESCRIPTION SIMPRT IS A MODIFICATION OF NAA, INC., PERT MARK III CODE TO PROVIDE FOR COMPUTATION OF THE PERT NETWORK BY A MONTE CARLO TECHNIQUE

REFERENCE J.L. UNDERWOOD, SIMPRT - A MONTE CARLO TECHNIQUE FOR COMPUTATION OF THE PERT NETWORK, AI-MEMO-8939, SEPT. 1963

DECK NUMBER NOT ON FILE

LINEAR EXTRAPOLATION WITH CONFIDENCE INTERVALS FOR
BUDGET FORECASTING

DESCRIPTION THIS PROGRAM WILL PERFORM LINEAR LEASTS SQUARES
CURVE FITTING TO ACTUAL CUMULATIVE COST VERSUS BASE
PERCENT DATA IN ORDER TO
(1)PREDICT COSTS FOR THE REST OF THE YEAR
(2)PLOT ACTUALS, FIT AND CONFIDENCE BAND
(3)PREDICT COSTS TO MET A FIXED TARGET

REFERENCE AMTD 173, AMTD 172 (BUDGET FORECASTING STUDY), SEPT. 1962
C. J. POTRATZ AND J. C. DILLON

DECK NUMBER 3W 623

PREVIEW (PERSONNEL REVIEW)

DESCRIPTION THIS PROGRAM SUMMARIZES IN ONE FORM THE CURRENT
PERSONNEL DATA NEEDED FOR REVIEWS BY FIRST LINE
SUPERVISION. A SIMILAR OUTPUT IS GENERATED FOR
SECOND LINE SUPERVISION.

REFERENCE AI-TDR 9146, OCTOBER 1963, J. C. DILLON

DECK NUMBER 3W-806 NOT ON FILE AT D792

PEER-PROJECT ESTIMATING AND EVALUATION ROUTINE

DESCRIPTION PEER IS A PROGRAM FOR PRICING LABOR AND NON-LABOR ESTIMATES FOR PROJECT PROPOSALS. THE PROGRAM WILL ALSO PRODUCE AT THE OPTION OF THE USER GROUP LABOR LOADS, GRAPHICAL DISPLAY AND/OR LEVEL OF INDENTURE SUMS.

REFERENCE J.C.DILLON, PEER- PROJECT ESTIMATING AND EVALUATION REPORTING, AI-64-MEMO-64, APRIL, 1964

DECK NUMBER 9W-041 + DATA DECKS, 9W-044, 9W-045, 9W-046

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XX1 MISCELLANEOUS CODES

RESTORE 1, RE ENTERING SNAP TRAJECTORY, OBLATE ROTATING EARTH

DESCRIPTION PROGRAM INTEGRATES THE EQUATIONS OF MOTION FOR A POINT MASS SPHERE IN A THREE DIMENSIONAL SPACE IN THE VICINITY OF THE EARTH. THE SPHERE IS SUBJECTED TO THE FORCES OF ATMOSPHERIC DRAG AND GRAVITY WHILE MOVING RELATIVE TO A ROTATING OBLATE EARTH WHICH IS ATTACHED AN ATMOSPHERE WITH PROPERTIES THAT ARE A FUNCTION OF ALTITUDE ALONE. THE DIFFERENTIAL EQUATIONS ARE WRITTEN FOR A COORDINATE SYSTEM FIXED IN A ROTATING EARTH AND ARE THEREFORE EARTH-RELATIVE

REFERENCE V.D.SANDERS AND R.D.BRUNELL, TO BE PUBLISHED

DECK NUMBER 3W-799

PRECISION DETERMINATION OF LATTICE CONSTANTS

DESCRIPTION THE USE OF X-RAY DIFFRACTION DATA FOR OBTAINING LATTICE CONSTANTS IN A LEAST SQUARES METHOD, APPLYING SYSTEMATIC ERRORS.

REFERENCE W.L.KORST, I.R.TANNENBAUM AND K.T.MILLER, PRECISION DETERMINATION OF LATTICE CONSTANTS, NAA-SR-6206, MARCH 1961.

DECK NUMBER GW-335

1209/MET135 D SPACE

DESCRIPTION D SPACE GENERATES INDICES (HKL), TESTS FOR SPACE-GROUP EXTINCTIONS, AND CALCULATES D , $1/D^2$, $\sin \theta$, $\sin^2 \theta$, $\sin^2 \theta / \lambda^2$, AND θ FOR ANY CRYSTAL SYSTEM AND SPACE GROUP, REQUIRING ONLY THE UNIT CELL PARAMETERS AS DATA INPUT. OPTIONAL CALCULATIONS ARE
(1) THE SINGLE CRYSTAL ANGLE SETTINGS, ϕ , χ
(2) VARIOUS LORENTZ AND LORENTZ-POLARIZATION CORRECTIONS.

REFERENCE W.H.MULLER, E.F.H. MEYER, S.H. SIMONSEN ,
CRYSTALLOGRAPHIC D-SPACE COMPUTER PROGRAM ANL 6519

DECK NUMBER 3W-706

CODE FOR EVALUATING SPECIAL INTEGRAL FUNCTIONS
USEFUL IN MAKING SELF ABSORPTION CALCULATIONS IN
EXPERIMENTS INVOLVING MOSSBAUER EFFECT

DESCRIPTION -PROGRAM EVALUATES THREE FUNCTIONS AND AN INTEGRAL
WHICH ARE USEFUL IN MAKING SELF-ABSORPTION
CORRECTIONS IN EXPERIMENTS INVOLVING MOSSBAUER
EFFECT

REFERENCE R.D.BRUNELL, TITLE IS THE SAME TITLE OF CODE,
AMTD-150

DECK NUMBER 3W-595

WATER HAMMER CODE

DESCRIPTION PROGRAM COMPUTES THE EXCESS PRESSURE DUE TO -WATER HAMMER- FOR SINGLE PIPE LINES WITHOUT WATER HAMMER SURGE VOLUMES.

REFERENCE R.D. BRUNELL, CODE FOR COMPUTATION OF PRESSURE BUILD-UP DUE TO WATER HAMMER, AMTD-151

DECK NUMBER 3W-590

MANGE

DESCRIPTION MANGE IS A SPECIAL PURPOSE SUBROUTINE TO READ AND TRANSLATE ROW BINARY CARDS OR READ BINARY TAPE. ITS PURPOSE IS TO MAKE AVAILABLE THE ABILITY TO USE ROW BINARY CARDS OR BINARY TAPE AS DIRECT INPUT TO NAA FIB III MONITOR CODES

REFERENCE M.HOFFMAN, TO BE PUBLISHED

DECK NUMBER 3W - 827

ISRCH

DESCRIPTION A ROUTINE TO DETERMINE THE INDEX OF THE TABLE ENTRY WHICH IS THE GREATEST LOWER BOUND TO A GIVEN VALUE. THIS ROUTINE USES THE BINARY SEARCH TECHNIQUE AND IS WRITTEN IN FAP. FOR A TABLE CONTAINING 1024 ENTRIES, THE MAXIMUM EXECUTION TIME ON AN IBM 7094 IS APPROXIMATELY 0.3 MILLISECONDS. TWO ENTRY POINTS ARE PROVIDED TO ALLOW FOR ASCENDING OR DESCENDING TABLES

REFERENCE RA BLAINE, ISRCH A BINARY SEARCH FORTRAN FUNCTION SUBPROGRAM, NAA-SR-TDR-9721 (APRIL, 1964)

DECK NUMBER 3W-842

GOLD

DESCRIPTION A CODE WHICH CALCULATES AND PLOTS IN OPTIONAL GROUPINGS, THE SUM OF THE DERIVATIVES OF GAUSSIAN FUNCTION, LORENTZIAN FUNCTIONS, OR BOTH. GRID DIMENSIONS ARE CONTROLLED BY INPUT.

REFERENCE K W MEDEIROS AND W A YOUNG, NAA-SR-MEMO 9624, APRIL, 1964

DECK NUMBER 3W-742

GLAD

DESCRIPTION A CODE WHICH CALCULATES AND PLOTS, IN OPTIONAL GROUPINGS, GAUSSIAN AND LORENTZIAN ABSORPTION AND DERIVATIVE CURVES, SET ENVELOPES AND TOTAL ENVELOPE. ONLY TOTAL ENVELOPE IS PRINTED. GRID DIMENSIONS ARE CONTROLLED BY INPUT TO THE PROGRAM.

REFERENCE K W MEDEIROS AND W A YOUNG, GLAD, NAA-SR-MEMO 9623, MARCH, 1964

DECK NUMBER 3W-741

ROBIN

DESCRIPTION SUBROUTINE WHICH PUNCHES ROW BINARY CARDS ON IBM COLUMN BINARY EQUIPMENT FROM DATA STORED IN CORE

REFERENCE KATHARINE W. MEDEIROS, ROBIN - A ROW BINARY PUNCH SUBROUTINE FOR THE IBM 7094, NAA-SR TDR 9549, MARCH, 1964

DECK NUMBER 3W-833

FIREO

DESCRIPTION A SUBROUTINE THAT PROVIDES THE FACILITY FOR READING
INTEGER DATA INTO SPECIFIED ELEMENTS OF AN ARRAY

REFERENCE NAA-SR-TDR-9683,R.MIKELL,G.CHANG, FIREO

DECK NUMBER 3W-852

MEJOP

DESCRIPTION MISCELLANEOUS JOB PROCESSING ON THE IBM 1401. THE
FOLLOWING OPERATIONS ARE PERFORMED.(1) REPRODUCING-
UP TO 99 TIMES-, (2) LISTING -UP TO 99 TIMES-, (3)
BLANKING, (4) RE-SEQUENCING, (5) PREPARE DECK FOR
PRODUCTION STATUS.

REFERENCE M.TARPINIAN, MEJOP, AMTD-243, JUNE, 1963

DECK NUMBER ON FILE AT D/792

3 ROUTINES FOR MULT, DIV, AND INVERSION OF COMPLEX NOS

DESCRIPTION MPY, DVD, AND INV ARE 3 GENERAL PURPOSE SUBROUTINES FOR THE MULTIPLICATION, DIVISION, AND INVERSION OF COMPLEX NUMBERS. THEIR PURPOSE IS TO MINIMIZE MACHINE USAGE FOR THESE CALCULATIONS.

REFERENCE M. HOFFMAN AND K. W. MEDEIROS, THREE ROUTINES FOR THE MULTIPLICATION, DIVISION AND INVERSION OF COMPLEX NUMBERS, NAA-SR-MEMO-9102, OCT. 1963

DECK NUMBER 3W - 805

FLOPUN - A FLOCO CARD PUNCHING CODE

DESCRIPTION FLOPUN IS A GENERAL PURPOSE SUBROUTINE FOR CARD OUTPUT IN FLOCO CARD IMAGE FORM. ITS PURPOSE IS TO MAKE AVAILABLE THE ABILITY TO AUTOMATICALLY OBTAIN OUTPUT DATA FROM A. I. CODES IN FLOCO FORM FOR INPUT TO THE NUMEROUS FLOCO CODES

REFERENCE FLOCO II MANUAL, CARLSON, B., KAZEK, C., LEE, C., LOS ALAMOS SCIENTIFIC LABORATORY, T-1-186, M. HOFFMAN, FLOPUN - A FLOCO CARD PUNCHING CODE, AMTD-193, JAN. 1963

DECK NUMBER 3W - 711

AREPORT - ARES OUTPUT IN REPORT FORM

DESCRIPTION TO PROVIDE A TABULATION OF NORMALIZED ARES PUNCHED - CARD OUTPUT IN REPORT FORM. WRITTEN FOR IBM1401

REFERENCE M. HOFFMAN, K. W. MEDEIROS, AND R. N. MAC DONALD, AREPORT - ARES OUTPUT IN REPORT FORM, AMTD-209, MAY 1963

DECK NUMBER 3W - 766

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XXII MATHEMATICAL CODES AND SUBROUTINES
A.- POLYNOMIALS, SPECIAL AND ELEMENTARY FUNCTIONS

ROOTS AND POWERS OF COMPLEX NUMBERS

DESCRIPTION THIS SUBROUTINE COMPUTES ANY ROOT OR POWER OF A
COMPLEX NUMBER.

REFERENCE J.G. MORGAN, GENERAL SUBROUTINE FOR COMPUTING ROOTS
AND POWERS OF COMPLEX NUMBERS, AMTD-182, NOV. 1962

DECK NUMBER 3W-689

CUBIC EQUATION SOLVER

DESCRIPTION THIS SUBROUTINE SOLVES THE GENERAL CUBIC EQUATION.

REFERENCE A.N. NICKOLS, R.H. SHUDDE, SOLUTION OF THE CUBIC
EQUATION. AMTD-206, MAY 1963

DECK NUMBER 3W-750

ERROR FUNCTION SUBROUTINE

DESCRIPTION A SUBROUTINE FOR EVALUATING THE ERROR FUNCTION FOR
ANY NON-NEGATIVE VALUE OF X.

REFERENCE R.H. SHUDDE, ERROR FUNCTION SUBROUTINE, AMTD-147,
JUNE 1962.

DECK NUMBER 3W-400

ROOTS OF POLYNOMIALS

DESCRIPTION	EXTRACTS REAL AND COMPLEX ROOTS OF A POLYNOMIAL. MAXIMUM DEGREE IS 99. PROGRAM OPERATES IN DOUBLE PRECISION
REFERENCE	CONTACT MATH. AND COMP. APPL. GROUP
DECK NUMBER	3W-415

ROOTS OF POLYNOMIALS SUBROUTINE

DESCRIPTION	THIS SUBROUTINE FINDS THE REAL AND COMPLEX ROOTS OF A POLYNOMIAL (MAXIMUM DEGREE = 36). PROGRAM OPERATES IN DOUBLE PRECISION.
REFERENCE	CONTACT MATH. AND COMP. APPL. GROUP
DECK NUMBER	3W-844

TABLES OF EXPONENTIALS

DESCRIPTION	THESE TABLES CONSIST OF FIVE TABLES FOR EXP(+X) AND EXP(-X), WITH 100 STEPS EACH OF SIZE, 1.0
	.01
	.0001
	.000001
	.00000001
	THE TABLES PROVIDE AN EASY AND QUICK METHOD OF FINDING EXP(+X) OR EXP(-X), WHEN X CONTAINS MANY SIGNIFICANT FIGURES.
REFERENCE	L.R. BLUE, NAA-SR-TDR- , TABLES OF THE EXPONENTIAL FUNCTIONS EXP(+X) AND EXP(-X), 4-64.
DECK NUMBER	3W-860

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XXII MATHEMATICAL CODES AND SUBROUTINES
B.- MATRICES, VECTORS, SIMULTANEOUS LINEAR EQUATIONS

SIM E Q

DESCRIPTION PROGRAM SOLVES LINEAR SIMULTANEOUS EQUATIONS.
MAXIMUM NUMBER=75. THIS ROUTINE MAY ALSO BE USED TO
COMPUTE THE INVERSE OF A MATRIX.

REFERENCE J.S.TEMPLE, SIM E Q . AMTD-161,A.I.

DECK NUMBER 3W-612

SOLUTION OF AN OVERDETERMINED SYSTEM OF
SIMULTANEOUS EQUATIONS

DESCRIPTION PROGRAM SOLVES M EQUATIONS IN N UNKNOWN, N LESS
THAN OR EQUAL TO M, BY THE METHOD OF LEAST SQUARES.

REFERENCE A.N.NICKOLS,R.H.SHUDE, SOLUTION OF AN
OVERDETERMINED SYSTEM OF SIMULTANEOUS EQUATIONS.
AMTD-162,A.I.

DECK NUMBER 3W-633

SOLUTION OF SIMULTANEOUS COMPLEX EQUATIONS

DESCRIPTION PROGRAM SOLVES M COMPLEX LINEAR EQUATIONS IN N
UNKNOWN, WHERE N IS LESS THAN OR EQUAL TO M.

REFERENCE R.H. SHUDE,A. NICKOLS, SOLUTION OF SIMULTANEOUS
COMPLEX EQUATIONS. AMTD-179 ,A.I.

DECK NUMBER 3W-627

SUBROUTINE EVALUE

DESCRIPTION SUBROUTINE EVALUE DETERMINES THE CHARACTERISTIC
ROOTS (EIGENVALUES) OF A REAL, SYMMETRIC MATRIX.
THE ASSOCIATED EIGENVECTORS CAN ALSO BE DETERMINED.

REFERENCE J.R.WHITNEY , SUBROUTINE EVALUE , NAA PROGRAM
DESCRIPTION JANUARY 1961

DECK NUMBER 3W-790 SINGLE PRECISION DECK
3W-791 DOUBLE PRECISION DECK

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1

NEWTON-COTES QUADRATURE

2

ADAMS-MOULTON, RUNGE-KUTTA INTEGRATION

XXII MATHEMATICAL CODES AND SUBROUTINES
C.- SOLUTION OF DIFF EQNS, QUADRATURE METHODS

QUADRATURE OF OSCILLATORY FUNCTIONS BY THE FILON
METHOD

DESCRIPTION	A QUADRATURE SUBROUTINE FOR INTEGRATING OSCILLATORY FUNCTIONS.
REFERENCE	R.H.SHUDE, QUADRATURE OF OSCILLATORY FUNCTIONS BY THE FILON METHOD , AMTD-144, JUNE 1962
DECK NUMBER	3W-398

GAUSSIAN QUADRATURE ROUTINE

DESCRIPTION	AN OPEN QUADRATURE SUBROUTINE
REFERENCE	R.H.SHUDE, GAUSSIAN QUADRATURE ROUTINE ,AMTD-146 SEP. 1962
DECK NUMBER	3W-399

NEWTON-COTES CLOSED QUADRATURE ROUTINE

DESCRIPTION	A CLOSED QUADRATURE SUBROUTINE
REFERENCE	J.G.MORGAN, NEWTON-COTES CLOSED QUADRATURE ROUTINE. AMTD-158, AUGUST 1962
DECK NUMBER	3W-607

RW INT, ADAMS-MOULTON, RUNGE-KUTTA INTEGRATION

DESCRIPTION

A SUBROUTINE WHICH INTEGRATES A SET OF N
SIMULTANEOUS, FIRST ORDER DIFFERENTIAL EQUATIONS.
THE USER HAS THE OPTION OF USING EITHER A FOURTH
ORDER RUNGE-KUTTA METHOD OR THE FOURTH ORDER
ADAMS-MOULTON METHOD WITH FIXED VARIABLE SIZE.
THERE IS ALSO A VARIABLE STEP-SIZE MODE.

REFERENCE

R. CAUSEY AND W. L. FRANK, RW-INT, ADAMS-MOULTON, RUNGE-
KUTTA INTEGRATION, RAMO-WOOLDRIDGE CORP.

DECK NUMBER

3W-619 CONTACT MATH. AND COMP. APPL. GROUP FOR USE

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XXII MATHEMATICAL CODES AND SUBROUTINES
D.- INTERPOLATION, APPROXIMATION, STATISTICAL ANALYSIS

LEAST SQUARES CURVE FITTING WITH TRANSFORMATION
OF INPUT DATA

DESCRIPTION PERFORMS LEAST SQUARES POLYNOMIAL CURVE FITTING OF A
SET OF OBSERVED RESULTS BY ONE OF THREE METHODS

1. ORDINARY LEAST SQUARES
2. FRACTIONAL RESIDUALS
3. ARBITRARILY WEIGHTED LEAST SQUARES.

COMPUTES RMS DEVIATION OF THE COEFFICIENTS AND OF
THE ENTIRE FIT. PROVIDES FOR THE TRANSFORMATION OF
INPUT DATA AND ALSO PROVIDES GRAPHIC DISPLAY.

REFERENCES R.H. SHUDDE, LEAST SQUARES CURVE FITTING WITH
TRANSFORMATION OF INPUT DATA. AMTD-135, JUNE 1962

DECK NUMBER 3W-596

DOUBLE PRECISION LEAST SQUARES CURVE FITTING

DESCRIPTION PERFORMS LEAST SQUARES POLYNOMIAL CURVE FITTING OF A
SET. OF OBSERVED RESULTS BY ONE OF THREE METHODS

1. ORDINARY LEAST SQUARES
2. FRACTIONAL RESIDUALS
3. ARBITRARILY WEIGHTED LEAST SQUARES

COMPUTES RMS DEVIATION OF THE COEFFICIENTS AND OF
ENTIRE FIT. ALSO PROVIDES GRAPHICAL DISPLAY.

REFERENCE R.H. SHUDDE, DOUBLE PRECISION LEAST SQUARES CURVE
FITTING, AMTD-136, JUNE 1962

DECK NUMBER 3W-597

GENERAL TRANSCENDENTAL LEAST SQUARES FITTING

DESCRIPTION

PROGRAM GIVES A WEIGHTED LEAST SQUARES FIT TO THE FOLLOWING DISTRIBUTIONS.

HYPERBOLIC SINE
COSINE
BESSEL FUNCTION JO
SINE + A CONSTANT
HYPERBOLIC COSINE
SINE SQUARED
COSINE SQUARED
SINE

REFERENCE

A. NICKOLS, GENERAL TRANSCENDENTAL LEAST SQUARES FITTING, NAA PROGRAM DESCRIPTION, AUGUST 1960

DECK NUMBER

3W-346

ITERATIVE LEAST SQUARES TO A SUM OF EXPONENTIALS

DESCRIPTION

GIVEN A DISCRETE SET OF PTS (X,Y). THE FUNCTION $Y = A(1)EXP(B(1)X) + \dots + A(K)EXP(B(K)X)$, K LESS THAN 11, IS FITTED BY ITERATIVE WEIGHTED LEAST SQUARES. PROGRAM HAS ABILITY TO HOLD PARAMETERS FIXED.

REFERENCE

A. NICKOLS, ITERATIVE LEAST SQUARES TO A SUM OF EXPONENTIALS, NAA PROGRAM DESCRIPTION, AUGUST 1960

DECK NUMBER

3W-347

LEAST-SQUARES POLYNOMIAL CURVE FIT PROGRAM

DESCRIPTION A POLYNOMIAL OF DEGREE 6 OR LESS, IS FITTED TO A SPECIFIED NUMBER OF DATA POINTS USING THE METHOD OF LEAST SQUARES. THE DEGREE OF THE POLYNOMIAL MAY BE SPECIFIED OR THE PROGRAM MAY BE DIRECTED TO FIND THE BEST POLYNOMIAL (DEFINED IN A STATISTICAL SENSE). AN OPTION FOR CRT IS PROVIDED.

REFERENCE A.A.DANDURAND, LEAST SQUARES POLYNOMIAL CURVE FIT PROGRAM WITH SC-4020 OUTPUT OPTION, NAA PROGRAM DESCRIPTION, MARCH 1963

DECK NUMBER 3W-254

LEAST SQUARES CURVE FIT SUBROUTINE

DESCRIPTION A POLYNOMIAL OF DEGREE 6 OR LESS IS FITTED TO A SPECIFIED NUMBER OF DATA POINTS USING THE METHOD OF LEAST SQUARES. THE DEGREE OF THE POLYNOMIAL MAY BE SPECIFIED OR THE PROGRAM MAY BE DIRECTED TO FIND THE BEST POLYNOMIAL (DEFINED IN A STATISTICAL SENSE).

REFERENCE A.A.DANDURAND, LEAST SQUARES CURVE FIT SUBROUTINE, NAA PROGRAM DESCRIPTION

DECK NUMBER 3W-857

DAND-DANDURAND LEAST SQUARES ROUTINE

DESCRIPTION THE LEAST SQUARES POLYNOMIAL CURVE FIT PROGRAM
WRITTEN BY A.A.DANDURAND OF ROCKETDYNE HAS BEEN
EXTENDED TO A SUBROUTINE. IN THIS ROUTINE, THE DEGREE
FIT OF THE POLYNOMIAL MAY BE SPECIFIED OR A
STATISTICALLY BEST POLYNOMIAL MAY BE FOUNDED. THE
CRT DISPLAY OPTION OF THE ORIGINAL PROGRAM IS
RETAINED WITH THE EXCEPTION THAT THE MAXIMUM NUMBER
OF DATA POINT IS REDUCED TO 150.

REFERENCE NAA TDR NO. 9638

DECK NUMBER 3W837

DITT

DESCRIPTION DOUBLE INTERPOLATION SUBROUTINE. FORWARD
INTERPOLATION USED TWICE AND REPEATED TWICE.

REFERENCE CONTACT MATH. AND COMP. APPL. GROUP

DECK NUMBER NOT IN PRODUCTION FILE

WRAP- WEIGHTED REGRESSION ANALYSIS PROGRAM

DESCRIPTION PERFORMS MULTIPLE LINEAR REGRESSION ANALYSIS ON 80
OR LESS INDEPENDENT VARIABLES, 25 OR LESS DEPENDENT
VARIABLES. AUTOMATICALLY DELETES NON-SIGNIFICANT
VARIABLES ON BASIS OF EITHER FIXED F RATIO OR
FIXED PROBABILITY LEVEL.

REFERENCE M.D.FIMPLE, WRAP- WEIGHTED REGRESSION ANALYSIS
PROGRAM, SANDIA CORP, 1961 DEC

DECK NUMBER NOT IN PRODUCTION FILE

MULTIPLE CORRELATION COMPUTER PROGRAM

DESCRIPTION PROGRAM PERFORMS MULTIPLE CORRELATIONS OF THE FORM
$$X_1 = B_1 + B_2 \cdot X_2 + B_3 \cdot X_3 + \dots + B_N \cdot X_N + E$$
 WHERE X_1 IS THE
DEPENDENT VARIABLE, $X_2, \dots, X_N$ ARE INDEPENDENT
VARIABLE FUNCTIONS, E IS A NORMALLY DISTRIBUTED
RANDOM VARIABLE WITH ZERO MEAN, AND THE CONSTANTS
 $B_1, \dots, B_N$ ARE TO BE STATISTICALLY ESTIMATED FROM THE
DATA.

REFERENCE H. KASPAR, RESEARCH MULTIPLE CORRELATION COMPUTER
PROGRAM, RM 621-351 18 MARCH 1960

DECK NUMBER 55-201

NON-LINEAR LEAST SQUARES ESTIMATION PROGRAM

DESCRIPTION GIVEN A FUNCTION WITH AT MOST 20 INDEPENDENT
VARIABLES AND AT MOST 10 PARAMETERS, AND GIVEN A
SET OF OBSERVATIONS, THE PROGRAM COMPUTES THE
LEAST SQUARES ESTIMATES OF THE PARAMETERS.

REFERENCE R. L. BERGGREN, NON-LINEAR LEAST SQUARES ESTIMATION
PROGRAM, ROCKÉTOYNE

DECK NUMBER NOT IN PRODUCTION FILE

SYNTHETIC EXPERIMENT DESIGN AND OPTIMIZATION

DESCRIPTION

IT IS OFTEN EXPENSIVE AND/OR TIME CONSUMING TO DER-
FORM LARGE PARAMETER SURVEYS EITHER EMPIRICALLY OR
ANALYTICALLY. THIS PROGRAM CAN BE USED TO REDUCE THE
NUMBER OF EXPERIMENTS NEEDED TO EVALUATE A MANY
PARAMETER PROBLEM TO A REASONABLE NUMBER. THE RESULTS
OF THE EXPERIMENT ARE USED TO FIND A SIMPLE RELA-
TION BETWEEN THE SEVERAL INDEPENDENT VARIABLES AND
A DEPENDENT VARIABLE. THIS RELATION CAN THEN BE USED
TO FIND AN OPTIMUM OR FOR FURTHER EVALUATION.

REFERENCE

J.C.DILLON, SYNTHETIC EXPERIMENT DESIGN AND
OPTIMIZATION, AI-MEMO-4955, FEB. 1960

DECK NUMBER

3W-157, 3W-158, 3W-209, 3W-210

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XXIII GRAPHICAL DISPLAY CODES AND SUBROUTINES

BELGRAPH

DESCRIPTION A PROGRAM WHICH PLOTS VARIABLE GRAPHS - LINEAR
AND/OR SEMI-LOG, WITH AND/OR WITHOUT STANDARD
DEVIATION, POINTS AND LINE FROM INPUT DATA (SC-4020)

REFERENCE K W MEDEIROS, BELGRAPH, NAA-SR-TDR 9686, APRIL, 1964

DECK NUMBER 3W-708

PLOTR - A GENERALIZED PLOTTING CODE

DESCRIPTION PLOTR IS A EFFICIENT AND VERSATILE SUBROUTINE FOR
PRODUCING CRT GRAPHS. THIS ROUTINE USES AICRT3 AND
FORED (SC-4020)

REFERENCE R.N.GASCOIGNE, PLOTR - A GENERALIZED PLOTTING CODE,
NAA-SR-TDR-8912, AUG. 1963

DECK NUMBER 9W-006

POLPLT - A POLAR PLOTTING SUBROUTINE

DESCRIPTION POLPLT IS A GENERAL PURPOSE SUBROUTINE FOR THE
DISPLAYING OF OUTPUT DATA IN POLAR COORDINATE FORM.
ITS PURPOSE IS TO MAKE AVAILABLE THE ABILITY TO
AUTOMATICALLY PLOT POLAR GRAPHS AS DIRECT COMPUTER
OUTPUT - (SC-4020)

REFERENCE M.HOFFMAN AND K.W.MEDEIROS, POLPLT - A POLAR
PLOTTING SUBROUTINE, NAA-SR-TDR-9432, JAN. 1964

DECK NUMBER 3W - 713

SPRNTV - A CODE TO PRINT FLTG PT NOS. ON SC4020

DESCRIPTION SPRNTV IS AN IBM 7094 FORTRAN SUBROUTINE WHICH PRINTS A FLOATING POINT NUMBER AND ITS LABEL ON A SC4020 GRAPH.

REFERENCE M.HOFFMAN, SPRNTV - A CODE TO PRINT FLOATING POINT NUMBERS ON SC-4020 GRAPHS, AMTD-246, JUNE 1963

DECK NUMBER 3W - 773

AICRT 3

DESCRIPTION AICRT3 IS A GENERAL PURPOSE SUBROUTINE FOR THE DISPLAYING OF OUTPUT DATA IN GRAPHICAL FORM. ITS PURPOSE IS TO MAKE AVAILABLE THE ABILITY TO AUTOMATICALLY PLOT GRAPHS AS DIRECT COMPUTER OUTPUT. ALLOWS FOR LOG OR LINEAR SCALES, SORTING OF DATA, CONNECTION OF DATA BY STRAIGHT LINES. (SC-4020)

REFERENCE M.HOFFMAN AND W.A.RHOADES, AICRT3 A GENERAL CODE FOR DISPLAY OF DIGITAL DATA, NAA-SR-MEMO-9069, OCT. 1963

DECK NUMBER 3W-715

AICRT 4

DESCRIPTION AICRT 4 IS A GENERAL PURPOSE SUBROUTINE FOR THE DISPLAYING OF OUTPUT DATA IN GRAPHICAL FORM. ITS PURPOSE IS TO MAKE AVAILABLE THE ABILITY TO AUTOMATICALLY PLOT GRAPHS AS A DIRECT COMPUTER OUTPUT. IT IS IDENTICAL TO AICRT 3 EXCEPT FOR THE CAPABILITY OF HOLLERITH ARRAY SPECIFICATION FOR TITLE LABELING. (SC-4020)

REFERENCE M.HOFFMAN AND W.A.RHOADES, AICRT 4 - A GENERAL CODE FOR DISPLAY OF DIGITAL DATA, NAA-SR-MEMO-9070, OCT. 1963

DECK NUMBER 3W-801