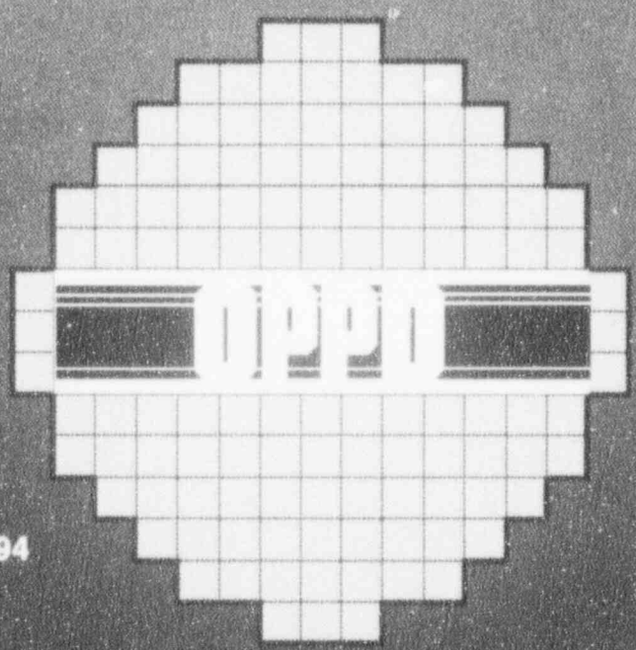
YANKEE

Theoretical Manual
and
User's Manual
for

Axial Shape Analyzer
for
SIMULATE-3 (ASAS)



April 19, 1994

YANKEE ENGINEERING SERVICES
Yankee Atomic Electric Company
580 Main Street
Bolton, Massachusetts 01740-1398

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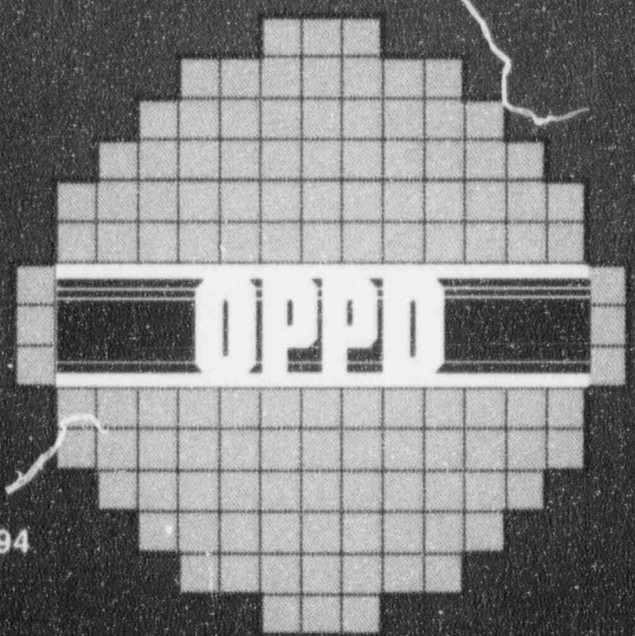

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ASAS
(AXIAL SHAPE ANALYZER FOR SIMULATE-3)
THEORETICAL MANUAL
AND
USER'S MANUAL

April 19, 1994

Yankee Atomic Electric Company

TABLE OF CONTENTS

DESCRIPTION	PAGE
LIST OF FIGURES	iii
THEORETICAL MANUAL	1
Abstract	1
Type of Problem Solved	1
User Support	1
Computer Code Description	2
Equations	5
USER'S MANUAL	12
Input Instructions - SIMULATE-3 Pin Power File	12
Input Instructions - Detector View Factor File	13
Input Instructions - User Input File	14
File Interface Names	22
Output File Descriptions	24
REFERENCES	115

LIST OF FIGURES

FIGURE NUMBER	DESCRIPTION	PAGE
1	ASAS and SIMULATE-3 Assembly Numbering Schemes	27
2	SIMULATE-3 Input File for Cycle 15 As-Built Depletion	28
3	SIMULATE-3 Input File for Cycle 15 BOC Xenon Oscillation	29
4	Axial Shape Index Versus Oscillation Time for Sample SIMULATE-3 Xenon Oscillation Case	30
5	SIMULATE-3 Input File for 3D Pin Power File Generation for the ASAS Sample Case	31
6	Suggested SIMULATE-3 CEA Insertion Cases for Setpoint Analysis	33
7	Sample View Factor File	34
8	Sample ASAS User Input File	40
9	Sample Procedure to Execute ASAS on a HP/UX UNIX Computer	41
10	Sample Procedure to Generate SIMULATE-3 and ASAS Input Files and Execute the Codes for the Flyspeck Analysis	42
11	Sample Script File to Execute Flyproc for 100 Timepoints	48
12	CONCAT.F - Sample Code to Concatenate and Sort Multiple CTS and ATS Files	50
13	Sample User Output File	54
14	Sample CTS Output File	91
15	Sample ATS Output File	92
16	Sample POSTSCRIPT Plots	108
17	POSTER.TOP - File Added to Top of ASAS Plot File Prior to Printing	110

THEORETICAL MANUAL

The theoretical manual contains an abstract which provides a summary of the ASAS code's capabilities, a description of the type of problem solved, a description of the computer code functions and subroutines, and a description of significant equations and numerical manipulations used.

Abstract

ASAS (Axial Shape Analyzer for SIMULATE-3) (pronounced 'ACES') is a FORTRAN 77 computer code which provides a link between the SIMULATE-3 advanced nodal theory computer code (Reference 1) and thermal-hydraulic and setpoint computer codes. ASAS adjusts SIMULATE-3 powers to accommodate user-supplied uncertainty factors, and writes select information to a user output file, a Core Transient Summary (CTS) file, an Axial Transient Summary (ATS) file, and a plot file (on option).

ASAS reads a user input file, a file containing pin-wise ex-core detector view factors, and a SIMULATE-3 3D pin power file. It calculates core average power related data and determines which assemblies from the SIMULATE-3 pin file to process based on options from the user input file. For each assembly processed, ASAS calculates additional data. The data produced by ASAS include axial shape, power peaking, and power-to-fuel-design-limit data, and are described in the Equations portion of the Theoretical Manual.

Type of Problem Solved

ASAS will process a 3D SIMULATE-3 pin power file containing up to 50 cases. The code was written explicitly for Fort Calhoun modelled in SIMULATE-3 as a quarter core.

User Support

Support for the ASAS code can be obtained by calling Yankee Atomic Electric Company at (508) 779-6711 X2039.

Computer Code Description

The subroutines and functions in ASAS are described in this section.

PROGRAM ASAS

The main portion of the code calls the system date and time subroutines, opens the user input and all the output files, and calls subroutines INPT, SPLSET, and MAIN.

SUBROUTINE INPT

This subroutine reads the user input file and the ex-core detector view factor file. It echos the user input and provides an edit of the data used in the run. Range and error checking of the input data is performed here as well. Subroutine INPT is called from PROGRAM ASAS.

SUBROUTINE SPLSET

This subroutine calculates the axial plane boundary interface locations as a fraction of core height, sets the $\bar{\bar{A}}$ array (defined in the Equations section of this manual) by calling subroutine ASET, and calls LUDCMP to perform a portion of the matrix solution of the equation $\bar{\bar{A}} * \bar{C} = \bar{B}$. Subroutine SPLSET is called from PROGRAM ASAS.

SUBROUTINE MAIN

This subroutine reads the SIMULATE-3 pin power file and calculates the core average parameters (see the Equations section of this manual for a description of these data). The core average axial shape is determined via a call to subroutine FITSUB. Subroutine MAIN then calls subroutines SELECT, CALC2D, and/or CALC3D to select the assemblies to be processed (based on user input options). For each assembly to be processed, subroutine MAIN calls subroutine PROCESS. Subroutine MAIN is called from PROGRAM ASAS.

SUBROUTINE SELECT

This subroutine is called from subroutine MAIN. It assigns the user-selected assemblies to be processed (entered via the SEL.ASS card in the User Input file) to their appropriate fuel types. These assemblies are also called the 'winning' assemblies. ASAS processes the winning assemblies by fuel type, then by assembly within that fuel type. For example, if assemblies 1, 10, and 39 are selected by via the SEL.ASS card, and the fuel types assigned to these assemblies via the LAY.DWN card are 2, 2, and 1, respectively, then the assemblies will be processed in the order 39, 1, then 10. Subroutine SELECT is called only if NSEL (entered via the SEL.ASS card) is greater than zero.

SUBROUTINE CALC2D

This subroutine is called from subroutine MAIN. If ICALC (entered via the CONTROL card) is equal to 2, then subroutine CALC2D determines assemblies to be processed in addition to those selected via subroutine SELECT. These assemblies are those which contain the maximum 2D pin and channel powers for each fuel type. Therefore for each fuel type, one or

two assemblies will be selected, depending on whether the maximum channel assembly is also the maximum 2D pin assembly.

SUBROUTINE CALC3D

This subroutine is called from subroutine MAIN. If ICALC (entered via the CONTROL card) is equal to 3, then subroutine CALC3D determines assemblies to be processed in addition to those selected via subroutine SELECT. These assemblies are those which contain the maximum pin and channel powers for each fuel type at each of the NPLANE axial planes, where NPLANE is set to 16 for the Fort Calhoun model in a data statement in the code. Therefore for each fuel type, from one to up to 2*NPLANE assemblies will be selected, depending on how many different assemblies contain these limiting locations.

SUBROUTINE FITSUB

This subroutine calculates the $\bar{B}$ vector in the equation $\bar{\bar{A}} * \bar{C} = \bar{B}$ by calling subroutine BSET for the area-preserving natural spline fit of the core average axial shape and the axial shape of each winning assembly. It then completes the solution of these equations for the vector $\bar{C}$ by calling subroutine LUBKSB. The coefficients $\bar{C}$ are then used to calculate the axial power shape over NPLFIT (entered via the CONTROL card) uniform axial planes. FITSUB then generates a plot of the input axial shape in histogram form, a smooth curve of the axial shape as determined from the fit coefficients $\bar{C}$, and the resulting output axial shape in histogram form. This subroutine is called from subroutine MAIN for the core average axial shape and from PROCESS for each winning assembly average axial shape.

SUBROUTINE PROCESS

This subroutine calculates all the winning assembly data described in the Equations section of this manual, and writes this data to the User Output file, the CTS file, and the ATS file. The axial data fit to NPLFIT planes is determined via a call to subroutine FITSUB. Subroutine PROCESS is called from subroutine MAIN.

SUBROUTINE ASET

Subroutine ASET determines the elements in the $\bar{\bar{A}}$ array from the NPLANE axial node boundaries. Subroutine ASET is called from subroutine SPLSET.

SUBROUTINE BSET

Subroutine BSET is called from subroutine FITSUB. It determines the elements in the $\bar{B}$ vector for either the core average axial shape or a winning assembly average axial shape.

SUBROUTINE LUDCMP

This subroutine is called from subroutine SPLSET. It decomposes a matrix $\bar{\bar{A}}$ into a lower triangular and an upper triangular matrix (called an LU decomposition). The matrix to be

decomposed is $\bar{\bar{A}}$, and the decomposed matrices are returned in the $\bar{\bar{A}}$ matrix.

This subroutine is used together with the LUBKSB subroutine to solve the matrix equation $\bar{\bar{A}} * \bar{C} = \bar{B}$. This subroutine is taken from Chapter 2.3 of Reference 2.

SUBROUTINE LUBKSB

This subroutine is called from subroutine FITSUB. It finds a $\bar{C}$ vector that solves the matrix equation $\bar{\bar{A}} * \bar{C} = \bar{B}$, with a decomposed lower triangular and upper triangular matrix, decomposed from an original $\bar{\bar{A}}$ matrix by the subroutine LUDCMP.

This subroutine is used together with the LUDCMP subroutine to solve the matrix equation $\bar{\bar{A}} * \bar{C} = \bar{B}$. This subroutine is taken from Chapter 2.3 of Reference 2.

SUBROUTINE HEADING

This subroutine prints a heading to the user output file. It calls subroutine HEAD1 and adds case specific data after the HEAD1 heading info.

SUBROUTINE HEAD1

This subroutine prints a heading to the user output file. This heading contains the program title, date, time, and page number.

SUBROUTINE POWPRN

This subroutine prints an assembly power distribution to the user output file.

FUNCTION LLEN

This function determines the length of a character string.

Equations

Note: In the theoretical and user's manual, and in the code itself, the indices I, J, K, L, M, and N mean the pin row number, pin column number, axial plane number, case number, fuel type number, and assembly number, respectively, unless noted otherwise in the manual or the computer code.

ASAS reads a user input file and a SIMULATE-3 3D pin power file containing from 1 to 50 cases. A select list of data which is read from the user input file follows.

- CAkWFT — The core average linear heat generation rate (LHGR) in kW/ft.
- $MLIM_M$ — The SAFDL on LHGR for fuel type M.
- FCALC — The calculational uncertainty factor.
- FTILT — The core tilt uncertainty factor.
- FGRID — The grid dip factor.
- FE — The engineering (i.e. fabrication) uncertainty factor.
- FCALOR — The plant calorimetric uncertainty factor.
- FDEP — The fuel deposition factor (fraction of energy deposited in fuel).
- FTRIP — The trip overshoot power uncertainty factor.
- FASI — The axial shape index (ASI) uncertainty factor.
- FRT_L — The radial peaking factor for case L.

ASAS reads a view factor file (the name of this file is defined in the user input file) for the pinwise ex-core detector view factors.

- $VUFAC_{I,J,N}$ — The ex-core detector view factor for pin row I, column J, assembly N.

ASAS reads the following information from the SIMULATE-3 pin power file for each case:

- XPO — The cycle average exposure in GWd/MtU (for xenon oscillation cases, this is the oscillation time in hours).
- EBAR — The core average exposure in GWd/MtU.
- PERCTP — The percent rated core power.
- PERCWT — The percent rated core flow.
- NOTWT — The number of notches of control rods inserted into core.
- FQ — The maximum 3D pin power including intranodal axial peaking (equal to the 4-pin edit in the SIMULATE-3 output file) (this does not include the grid dip factor FGRID).
- F-DELTA-H — The 2D radial pin peaking factor (this does not include the grid dip factor FGRID).
- A-O — The core average axial offset (the ASI is the negative of this).
- $PINPAV_{I,J,N}$ — The 2D pin powers for assembly N.
- $PINPOW_{I,J,K,N}$ — The 3D pin powers for assembly N.
- $SERIAL_N$ — The 6 digit serial number for assembly N.
- $NHPIN_N$ — The number of fuel rods in assembly N.

ASAS determines the following core average parameters for each case:

- $CORAX_K$ — The normalized core average axial power shape (NPLANE values).
- FZCORE — The core average axial peaking factor (determined as the maximum of the $CORAX_K$ values).
- KFZCOR — The axial plane of FZCORE.
- ASICOR — The core ASI (this is the negative of the axial offset read from the SIMULATE-3 pin file).

- ASIPER — The peripheral ex-core ASI.
- EXCORE — The ex-core response.
- $CORFIT_K$ — The normalized core average axial power shape fit to NPLFIT uniform axial planes.
- FZCFIT — The axial peaking factor from CORFIT (determined as the maximum of the $CORFIT_K$ values).
- KZCFIT — The axial plane of FZCFIT.
- ASICUN — The core average ASI with the ASI uncertainty factor FASI.
- ASIPUN — The peripheral ex-core ASI with the ASI uncertainty factor FASI.

For each case, the winning assemblies are selected via the SEL.ASS card and/or the ICALC = 2 or 3 option from the CONTROL card. For each winning assembly N, ASAS determines:

- $ASSAX_{K,N}$ — The normalized assembly average axial power shape.
- $FZASS_N$ — The assembly axial peaking factor (determined as the maximum of the $ASSAX_{K,N}$ values for assembly N).
- $KFZASS_N$ — The axial plane of $FZASS_N$.
- $ASIASS_N$ — The assembly average ASI.
- $ASIAUN_N$ — The assembly average ASI with the ASI uncertainty factor FASI.
- $PINADJ_{I,J,N}$ — The 2D pin powers, adjusted by the ratio of the local pin axial peak to the assembly axial peak. This is done so that use of the assembly peaking factor preserves the maximum 3D peak for each pin. PINADJ also includes the grid dip factor FGRID.
- $FDHASS_N$ — The maximum 2D pin peaking in the assembly, including the grid dip factor FGRID (determined as the maximum over I and J of $PINADJ_{I,J,N}$).
- $I2DASS_N$, $J2DASS_N$ — The location of the maximum 2D pin power in the assembly.
- $CHAMAX_N$ — The maximum 2D channel power in the assembly, including the grid dip factor FGRID (determined as the maximum 4-pin average power over I and J of $PINADJ_{I,J,N}$).
- $IC2D_N$, $JC2D_N$ — The location of the maximum 2D channel power in assembly N.
- $FQASS_N$ — The maximum 3D peaking in the assembly, including the grid dip factor FGRID.
- $IFQASS_N$, $JFQASS_N$ $KFQASS_N$ — The location within the assembly of the 3D peak.
- $LHRASS_N$ — The maximum LHGR in the assembly (kW/ft), including the grid dip factor FGRID.
- $PLASS_N$ — The power-to-fuel design limit (PFDL) for the assembly (w/o uncertainties), including the grid dip factor FGRID and the energy deposition factor FDEP.
- $FDHUNC_N$ — The maximum 2D pin peaking in the assembly, including the grid dip factor FGRID, the calculational uncertainty factor FCALC, and the azimuthal tilt uncertainty factor FTILT.
- $FQUNC_N$ — The maximum 3D peaking in the assembly, including the grid dip factor FGRID, the calculational uncertainty factor FCALC, and the azimuthal tilt uncertainty factor FTILT.
- $LHRUNC_N$ — The maximum LHGR in the assembly, including the grid dip factor FGRID, the calculational uncertainty factor FCALC, the azimuthal tilt uncertainty factor FTILT, the engineering uncertainty factor FE, and the calorimetric power uncertainty factor FCALOR.
- $PLUNC_N$ — The PFDL for the assembly, including the grid dip factor FGRID, the calculational uncertainty factor FCALC, the azimuthal tilt

uncertainty factor FTILT, the engineering uncertainty factor FE, the calorimetric power uncertainty factor FCALOR, the energy deposition factor FDEP, and the trip overshoot power uncertainty factor FTRIP.

- $ASIAUN_N$ The assembly average ASI with the ASI uncertainty factor FASI.
- $ASSFIT_{K,N}$ The normalized axial power shape fit to NPLFIT uniform axial planes.
- $FZAFIT_N$ The assembly axial peaking factor from $ASSFIT_{K,N}$ (determined as the maximum of the $ASSFIT_{K,N}$ values for assembly N)
- $KZAFIT_N$ The axial plane of $FZAFIT_N$.

The equations used to calculate the above parameters are defined below.

$CORAX_K$

$$CORAX_K = \frac{NPLANE * \sum_{I,J,N} PINPOW_{I,J,K,N} * WEIGHT_N}{\sum_{I,J,K,N} PINPOW_{I,J,K,N} * WEIGHT_N} \quad (1)$$

Where:
$WEIGHT_N$ is the assembly weighting factor contained in a data statement in ASAS. This factor is unity for all assemblies, except the quadrant boundary assemblies. The weighting factor for these assemblies is 0.5 and 0.25 for the core center assembly.

ASIPER

$$ASIPER = \frac{BOT - TOP}{BOT + TOP} \quad (2)$$

Where:

$$BOT = \sum_{I,J,K=1,8,N} PINPOW_{I,J,K,N} * VUFAC_{I,J,N} * WEIGHT_N \quad (3)$$

and

$$TOP = \sum_{I,J,K=9,16,N} PINPOW_{I,J,K,N} * VUFAC_{I,J,N} * WEIGHT_N \quad (4)$$

EXCORE

$$EXCORE = \frac{(BOT + TOP) * \sum_N NROD^2 * WEIGHT_N}{NPLANE * \sum_N NHPIN_N * WEIGHT_N} \quad (5)$$

Where NROD is the number of rods along one side of an assembly. It is set equal to 14 for Fort Calhoun in a data statement of the code.

CORFIT
The NPLFIT values of $CORFIT_K$ are determined from a natural spline fit of the $CORAX_K$ data (NPLANE values). The spline fit is determined using equations which preserve the average value over the interval, rather than forcing the curve through the input data coordinates. This is necessary to fit the normalized SIMULATE-3 axial power distributions because the axial powers are defined in SIMULATE-3 as the average powers over the axial intervals, not

the powers at the midpoint of the intervals. The conventional natural spline and the modified area-preserving natural spline fit processes are defined below.

Conventional Natural Spline

A conventional natural spline fit requires as input a set of coupled vectors $\bar{X}$ and $\bar{Y}$. It then generates a set of second order polynomial coefficients for a range surrounding each ordered data pair which define the curve in that range. The conditions required of these coefficients are defined below.

Condition # 1

$$F(X_K)=Y_K \tag{6}$$

or

$$C_{1,K}+C_{2,K}*X_K+C_{3,K}*X_K^2=Y_K \tag{7}$$

Condition #2
The curve is continuous over its entire range, or

$$F(X_{K+1/2})=F(X_{K+1-1/2}) \tag{8}$$

or

$$C_{1,K}+C_{2,K}*X_{K+1/2}+C_{3,K}*X_{K+1/2}^2=C_{1,K+1}+C_{2,K+1}*X_{K+1/2}+C_{3,K+1}*X_{K+1/2}^2 \tag{9}$$

Where:

$X_{K+1/2}$ represents the top boundary of node K, and
$X_{K+1-1/2}$ represents the bottom boundary of node K+1.

Note also that $X_{K+1/2} = X_{K+1-1/2}$ (10)

Condition #3
The slope is continuous throughout its entire range, or
the derivative at $X_{K+1/2}$ = the derivative at $X_{K+1-1/2}$, or

$$C_{2,K}+2*C_{3,K}*X_{K+1/2}=C_{2,K+1}+2*C_{3,K+1}*X_{K+1/2} \tag{11}$$

In order to provide sufficient conditions to solve the matrix of equations, two additional equations must be supplied. These are defined as a zero second derivative in the first and last intervals (known as a natural spline), or

$$2*C_{3,1}=0.0 \tag{12}$$

and

$$2*C_{3,NPLANE}=0.0 \tag{13}$$

The above equations define a matrix of equations which can be written as:

$$\bar{\bar{A}} * \bar{C} = \bar{B} \tag{14}$$

Where:

$\bar{\bar{A}}$ is a matrix of 3*NPLANE by 3*NPLANE elements defined by the $\bar{X}$ coordinate data,

$\bar{B}$ is a vector containing the constants in each equation which are defined from the $\bar{Y}$ data for the appropriate equations, and

$\bar{C}$ is a vector of 3*NPLANE elements containing the three quadratic fit coefficients for each of the NPLANE intervals. This vector is determined by standard matrix solution techniques (Reference 2).

Area-Preserving Natural Spline

The defining equations for the area-preserving natural spline fit are identical to those for the conventional natural spline, with one exception. The first condition is replaced with:

Condition #1
The average value from $X_{K-1/2}$ to $X_{K+1/2} = Y_K$, or

$$\frac{\int_{X_{K-1/2}}^{X_{K+1/2}} C_{1,K} + C_{2,K} * X + C_{3,K} * X^2 dX}{\int_{X_{K-1/2}}^{X_{K+1/2}} dX} = Y_K \tag{15}$$

or

$$\frac{C_{1,K} * (X_{K+1/2} - X_{K-1/2}) + 1/2 * C_{2,K} * (X_{K+1/2}^2 - X_{K-1/2}^2) + 1/3 * C_{3,K} * (X_{K+1/2}^3 - X_{K-1/2}^3)}{X_{K+1/2} - X_{K-1/2}} = Y_K \tag{16}$$

The elements of $\bar{\bar{A}}$ are determined in subroutine ASET, and the elements of $\bar{B}$ are determined in subroutine BSET. The elements of $\bar{C}$ are determined using the matrix solution subroutines LUDCMP and LUBKSB, which were obtained from Reference 2.

The coefficient vector $\bar{C}$ is used in subroutine FITSUB to calculate the average values of $CORFIT_K$ over the NPLFIT uniform axial planes using equation 16 to determine the average value. Note that the boundaries of the NPLFIT uniform axial planes do not necessarily line up exactly with the boundaries of the input NPLANE axial planes. Therefore subroutine FITSUB has logic to use the correct interval's coefficients, even if this means breaking the integration into two or more segments.

$ASSAX_{K,N}$

$$ASSAX_{K,N} = \frac{NPLANE * \sum_{I,J} PINPOW_{I,J,K,N}}{\sum_{I,J,K} PINPOW_{I,J,K,N}} \tag{17}$$

ASIASS

$$ASIASS_N = \frac{BOT_N - TOP_N}{BOT_N + TOP_N} \tag{18}$$

Where:

$$BOT_N = \sum_{I,J,K=1,8} PINPOW_{I,J,K,N} \tag{19}$$

and

$$TOP_N = \sum_{I,J,K=9,16} PINPOW_{I,J,K,N} \tag{20}$$

PINADJ

$$PINADJ_{I,J,N} = \frac{PINPAV_{I,J,N} * FZPIN_{I,J,N} * FGRID}{FZASS_N} \tag{21}$$

Where:

$$FZPIN_{I,J,N} = MAX_{over\ all\ K}\left[\frac{NPLANE * PINPOW_{I,J,K,N}}{\sum_K PINPOW_{I,J,K,N}}\right] \tag{22}$$

FDHASS

$$FDHASS_N = MAX_{over\ all\ I\ and\ J}\left[PINADJ_{I,J,N}\right] \tag{23}$$

CHAMAX

$$CHAMAX_N = MAX_{over\ all\ I\ and\ J}\left[0.25 * (PINADJ_{I,J,N} + PINADJ_{I+1,J,N} + PINADJ_{I,J+1,N} + PINADJ_{I+1,J+1,N})\right] \tag{24}$$

FQASS

$$FQASS_N = MAX_{over\ all\ I,\ J\ and\ K}\left[PINPOW_{I,J,N} * FGRID\right] \tag{25}$$

LHRASS

$$LHRASS_N = FQASS_N * CAKWFT \tag{26}$$

PLASS

$$PLASS_N = \frac{100.0 * MLIM_M}{LHRASS_N * FDEP} \tag{27}$$

FDHUNC

$$FDHUNC_N = FDHASS_N * FCALC * FTILT \tag{28}$$

FQUNC

$$FQUNC_N = FQASS_N * FCALC * FTILT \tag{29}$$

LHRUNC

$$LHRUNC_N = FQUNC_N * CAKWFT * FE * FCAL \tag{30}$$

PLUNC

$$PLUNC_N = \frac{100.0 * MLIM_M}{LHRUNC_N * FDEP} - FTRIP \tag{31}$$

ASIAUN

If $ASIASS_N$ *is less than FASI and greater than -FASI:* $ASIUNC_N = 0.0$

If $ASIASS_N$ *is greater than FASI:* $ASIUNC_N = ASIASS_N - FASI$ (32)

If $ASIASS_N$ *is less than -FASI:* $ASIUNC_N = ASIASS_N + FASI$

ASSFIT

The NPLFIT values of $ASSFIT_{K,N}$ are determined from the NPLANE values of $ASSAX_{K,N}$ using the same area-preserving natural spline fit process that was used to determine $CORFIT_K$.

The User's Manual provides input instructions for all input files to the code, describes the file linking names, and provides a description of the files generated by the code. A series of SIMULATE-3 input and ASAS input and output files is provided for one sample case.

INPUT INSTRUCTIONS

Three files are required for input to the ASAS code. These are a SIMULATE-3 pin power file, a detector view factor file, and a user input file. These are described below.

INPUT INSTRUCTIONS - SIMULATE-3 PIN POWER FILE

This file is generated by a SIMULATE-3 case. It must be a three-dimensional file containing pin powers only. Pin exposures must not exist on the file. This file may contain up to 50 cases. It is generated via the following SIMULATE-3 input card:

'PIN.FIL','ON','**filename**','ADD','3-D'/

Where **filename** is a user-selected name for the file.

Four files were used to generate the 3D SIMULATE-3 pin power file **s3Otest.p**, which was used in the ASAS sample case. These files are as follows:

s3Oc15s.i This input file is the BOC 15 model setup. This input file is not shown due to its large size. It is identical to the file **C15-HFP-BOC** which was provided to Yankee by OPPD, with the following modifications:

- The CRD.SEQ card was modified to provide spaces between the values for NOTCH(IGROUP,pass).
- The CRD.POS card was modified to provide spaces between the values for NPCR(ir,jr).
- The STA card was changed from **STA -1** to **STA**.

s3Oc15d.i This input file is the Cycle 15 as-built depletion, and is shown in Figure 2. This file is identical to the file **C15-DEP** which was provided to Yankee by OPPD, with the following modifications:

- The RES card was modified to accommodate the name of the restart file.
- A WRE card was added to create a restart at 500 MWd/MtU.

s3OABos.i This input file is the BOC 15 (500 MWd/MtU) oscillation and is shown in Figure 3. This file generates a restart every hour from 1 to 8 hours and every half hour from 8 through 80 hours. A xenon oscillation is induced by turning off doppler feedback via the SEG.TFU and TAB.TFU cards, and Bank 4 is inserted 40% at 75% power for 8 hours. At 8 hours, Bank 4 is withdrawn and power is returned to 100%. The axial shape index versus oscillation time resulting from this run is shown in Figure 4.

s3Otest.i This input file is the CEA insertion run which generates the SIMULATE-3 3D pin power file, and is shown in Figure 5. Two CEA insertion cases are selected from the 12 suggested CEA insertion cases shown in Figure 6. These cases were developed from the Power Dependent Insertion Limit (Figure 2 of the Cycle 15 Core Operating Limits Report) transmitted to Yankee from OPPD.

INPUT INSTRUCTIONS - DETECTOR VIEW FACTOR FILE

This file contains data for the relative contribution of each pin to the ex-core neutron detector, i.e. the view factor data. The format of this file is:

Parameter	Description
Card 1: Format (I3)	
IASS	Assembly number. This must be in the ASAS numerical order according to the Fort Calhoun ASAS numbering scheme, which is shown in Figure 1.
Card 2: Format (14F7.4)	
$VUFAC_{(1,J,IASS),J=1,14}$	Pinwise ex-core detector view factors for row 1 of assembly IASS
$VUFAC_{(2,J,IASS),J=1,14}$	Pinwise ex-core detector view factors for row 2 of assembly IASS
$VUFAC_{(3,J,IASS),J=1,14}$	Pinwise ex-core detector view factors for row 3 of assembly IASS
$VUFAC_{(4,J,IASS),J=1,14}$	Pinwise ex-core detector view factors for row 4 of assembly IASS
$VUFAC_{(5,J,IASS),J=1,14}$	Pinwise ex-core detector view factors for row 5 of assembly IASS
$VUFAC_{(6,J,IASS),J=1,14}$	Pinwise ex-core detector view factors for row 6 of assembly IASS
$VUFAC_{(7,J,IASS),J=1,14}$	Pinwise ex-core detector view factors for row 7 of assembly IASS
$VUFAC_{(8,J,IASS),J=1,14}$	Pinwise ex-core detector view factors for row 8 of assembly IASS
$VUFAC_{(9,J,IASS),J=1,14}$	Pinwise ex-core detector view factors for row 9 of assembly IASS
$VUFAC_{(10,J,IASS),J=1,14}$	Pinwise ex-core detector view factors for row 10 of assembly IASS
$VUFAC_{(11,J,IASS),J=1,14}$	Pinwise ex-core detector view factors for row 11 of assembly IASS
$VUFAC_{(12,J,IASS),J=1,14}$	Pinwise ex-core detector view factors for row 12 of assembly IASS
$VUFAC_{(13,J,IASS),J=1,14}$	Pinwise ex-core detector view factors for row 13 of assembly IASS
$VUFAC_{(14,J,IASS),J=1,14}$	Pinwise ex-core detector view factors for row 14 of assembly IASS

Card 2 is therefore entered 14 times for each assembly, and Card 1 and the 14 Cards 2 are entered 39 times, one set for each assembly.

A sample detector view factor file is shown in Figure 7. This file contains view factors for the safety channel detectors located at 21°. They have a flat weighting within each assembly, and were developed from data transmitted to Yankee from OPPD.

The user input file is entered using free format, except where noted. The input cards are identified by a seven character string at the left-most position of the card. The cards may be entered in any order except for the EXECUTE card, which terminates the input phase of the code and begins execution.

A sample user input file is shown in Figure 8. This file was used together with the files in Figures 2, 3, 5, and 7 to generate the sample output files in Figures 13 through 16.

The input cards and their default values are listed below:

TIT.RUN - Run Title

Description: Maximum 80 character title for the run

Card format:
TIT.RUN TITLE

Default: Blank title

CONTROL - Control Parameters

Description: This card contains selected integer control parameters for the run.

Card format:
CONTROL NFT,NCASE,ICALC,NPLFIT,IOUT,IPLT,IAZS

NFT — Number of fuel types (limit 9). ASAS determines the limiting assemblies for each fuel type if ICALC is 2 or 3, and groups the printing of the results according to fuel type.

NCASE — Number of cases in the run (limit 50). This must equal the number of cases on the SIMULATE-3 pin file.

ICALC — Limiting assembly selection option. This is performed in addition to the SEL.ASS assemblies.

- = 2 Select the assembly containing the limiting 3D pin power and the assembly containing the limiting 2D channel power from each fuel type. The limiting channel is determined as the maximum average four pin channel.
- = 3 Select the assembly containing the limiting pin power and the assembly containing the limiting channel power at each axial plane in the SIMULATE-3 pin file from each fuel type. The limiting channel is determined as the maximum average four pin channel integrated from the bottom of the core to the plane of interest.
- ≠ 2, ≠ 3 the only selection of assemblies is via the SEL.ASS card.

NPLFIT — Number of axial planes to fit the axial power shapes for printing to the CTS file (limit 50).

IOUT — Option to print standard/expanded data to the output file.

- = 0 Print the input echo, the input data used in the run, selected

assembly edits, and for each selected assembly the following.

Header information:

- XPO - cycle exposure,
- EBAR - core average exposure,
- POWER - power level in percent,
- FLOW - core flow in percent,
- NOTWT - total control rod steps inserted into the core,
- FQ - 3D pin peaking from the SIMULATE-3 pin file, which includes the axial intranodal peaking (this is also called the 4PIN edit in SIMULATE-3),
- F-DELTA-H - 2D radial pin peaking factor,
- INCORE ASI - In-core average axial shape index,
- PERIPHERAL ASI - Ex-core weighted axial shape index,
- TOTAL RELATIVE EXCORE SIGNAL,
- FUEL TYPE,
- ASSEMBLY NUMBER, and
- ASSEMBLY SERIAL NUMBER.

Adjusted 2D Pin Powers:

- 2D PIN POWERS. These are adjusted by the ratio of the assembly average axial peaking factor to the pin axial peaking factor in order to preserve the peak LHGR for each pin when using the core average axial shape. Also the grid dip factor FGRID is applied to these 2D pin powers.

Assembly Information:

- MAXIMUM 2D ONE PIN POWER
- MAXIMUM CHANNEL POWER
- MAXIMUM 3D ONE PIN POWER
- MAXIMUM LHGR
- MAXIMUM LHGR WITH UNCERTAINTY
- PL TO FUEL DESIGN SAFDL
- PL TO FUEL DESIGN SAFDL WITH UNCERTAINTIES
- ASSEMBLY AXIAL SHAPE INDEX
- ASSEMBLY AXIAL SHAPE INDEX WITH UNCERTAINTY

= 1 In addition to the above data, print the following for each selected assembly:

- PIN POWERS FOR THE LIMITING AXIAL PLANE
- FZ FACTORS - axial peaking factors for each pin in the assembly
- ASSEMBLY AVERAGE PEAKING FACTOR.
- 2D PIN POWERS - as read from the SIMULATE-3 pin file.

IPLT = 0 Don't generate the POSTSCRIPT plot file

= 1 Generate the POSTSCRIPT plot file. This file contains a plot of three sets of data for the core average and each assembly processed. These three sets of data are:

- The SIMULATE-3 NPLANE plane normalized axial power distributions in histogram form,
- The axial power distribution reallocated to the NPLFIT axial planes in histogram form, and
- A smooth curve of the axial power distribution calculated from the area preserving natural spline fit coefficients.

IATS = 0 Generate 1D core average axial power data only for the ATS file. This consists of the core average axial power in NPLFIT axial

planes.

= 1 Generate 1D and 3D power data for the ATS file. This consists of the core average and assembly average axial power in NPLFIT axial planes, and the adjusted 2D pin powers for the limiting assembly. One set of data is printed for each winning assembly of each case.

Default:
CONTROL 1,1,1,40,0,0,0

FUE.LIM - Fuel Type Name and LHGR SAFDL

Description: This card contains the fuel design limit on linear heat generation rate and the corresponding fuel type name. One FUE.LIM card is entered for each fuel type, and the card should be entered NFT times; once for each fuel type.

Card format:
FUE.LIM M,$MLIM_M$,$ATYPE_M$

M	Fuel type number.
$MLIM_M$	LHGR SAFDL (kW/ft) for fuel type M.
$ATYPE_M$	Maximum 5 character name for fuel type M.

Default:
MLIM = 21 kW/ft for all fuel types,
ATYPE = 'ALL ' for all fuel types.

LAY.DWN - Fuel Type by Assembly Laydown

Description: This card specifies the fuel type by assembly laydown according to the ASAS quarter core assembly numbering scheme shown in Figure 1.

Card Format:
LAY.DWN
26x,2i4/
16x,5i4/ Note that this format is an
12x,6i4/ upper left quarter core laydown
12x,6i4/
12x,6i4/
8x,7i4/
8x,7i4

IAFT(i),i=1,39 Assembly fuel type by assembly position

Default: IAFT = 1 for all assemblies

VUE.FIL - Ex-core Detector Pin View Factor File Name

Description: This card contains the name of the file which has the ex-core neutron detector view factors by pin. This name must include the path name if the file does not exist on the working directory of the run.

Card Format:
VUE.FIL DETFIL

DETFIL	Maximum 80 character name of file containing the ex-core neutron detector view factors

Default:
VUE.FIL VUFAC

UNC.FAC - Uncertainty Factors

Description: This card contains the uncertainty factors.

Card Format:
UNC.FAC FCALC,FTILT,FGRID,FE,FCALOR,FDEP,FTRIP,FASI

FCALC	Calculational uncertainty factor
FTILT	Azimuthal tilt uncertainty factor
FGRID	Grid dip axial shape penalty factor
FE	Engineering (i.e. fabrication) uncertainty factor
FCALOR	Calorimetric power uncertainty factor
FDEP	Fuel deposition factor (fraction of energy deposited in the fuel)
FTRIP	Trip overshoot power uncertainty factor (% power)
FASI	Axial shape uncertainty factor (%)

Default:
UNC.FAC 1.0,1.0,1,0,1.0,1.0,1.0,0.0,0.0

COR.LHR - Core Average Linear Heat Generation Rate

Description: This card contains the core average linear heat generation rate (kW/ft). This is used to calculate the maximum LHGR and the PFDL. CAkWFT should include an appropriate axial fuel densification factor, if applicable.

Card Format:
COR.LHR CAkWFT

CAkWFT	Core average linear heat generation rate (kW/ft)

Default:
COR.LHR 6.0

TIT.CAS - Radial Peaking Limit and Case Title

Description: This card contains the radial peaking limit and the case title.

Card Format:
TIT.CAS L,FRT_L,$CASEID_L$

L	Case number (limit 50)
FRT_L	Radial peaking limit for case L (this can be printed to the CTS file)
$CASEID_L$	Maximum 60 character title of case L. The first 8 characters of CASEID(L) are used as part of the case identifier in the CTS file along with the 1 digit fuel type number and the 1 digit sequence number for that assembly.

Default:
FRT = 1.5 for all cases
CASEID is blank for all cases

SEL.ASS - User-Selected Assemblies

Description: This card contains up to ten user-selected assemblies to be processed, in addition to those determined from the ICALC=2 and ICALC=3 options.

Card Format:
SEL.ASS NSEL,$ISEL_{N,N=1,NSEL}$

NSEL	Number of user-selected assemblies (limit 10). Note, a limit of 9 assemblies per fuel type exists in order to accommodate the printing of the CASEID to the CTS file.
$ISEL_{N,N=1,NSEL}$	User-selected assembly numbers

Default:
SEL.ASS 0

SIM.FIL - SIMULATE-3 Pin File Name

Description: This card contains the name of the SIMULATE-3 3D pin power file. This name must include the path name if the file does not exist on the working directory of the run.

Card Format:
SIM.FIL SIMPIN

SIMPIN	Maximum 80 character name of SIMULATE-3 3D pin power file.

Default:
SIM.FIL PINFILE

EDT.REQ - CTS File Edit Requests

Description: This card contains the parameters to be written to the CTS file. The case number and case ID are written to the first two fields. This card provides the user the flexibility to define additional edits.

Card Format:
EDT.REQ $AREQ_{NREQ}$

$AREQ_{NREQ}$	10 character edit request enclosed in quotes

EDT.REQ is entered up to 12 times, once for each edit request. NREQ is incremented for each entry of EDT.REQ. The allowable values for AREQ are:

Core Average Edits

"POWER "	Power level (%)
"FZ-FISS " or "FZ-THRM "	Axial peaking factor of the core
"FZLOC-FISS" or "FZLOC-THRM"	Plane of axial peaking factor of the core
"ASI-FISS " or "ASI-CORE "	In-core average axial shape index
"ASI-PER "	Peripheral ex-core axial shape index
"EXCORE RES"	Ex-core detector response
"ASI-COR-UN"	In-core average axial shape index - includes the uncertainty factor FASI
"ASI-PER-UN"	Peripheral ex-core average axial shape index - includes the uncertainty factor FASI

Winning Assembly Edits

"ASSEMBLY #"	Assembly number.
"ASI-ASS "	Axial shape index of the assembly.
"FZ-ASS "	Axial peaking factor of the assembly.
"FZLOC-ASS "	Plane of axial peaking factor of the assembly.
"F-DELH "	Maximum 2-D power in the assembly - includes the factor FGRID.
"F-DELH LOC"	Location of F-DELH - This is a 6 digit integer XXYYZZ, where XX is the

row, YY is the column, and ZZ is the assembly.

"FQ-FISS " or "FQ-THRM "	Peak 3D power in the assembly, includes the factor FGRID.
"LHGR "	Maximum linear heat generation rate in the assembly, includes the factor FGRID.
"PFDL-NO UN"	Power fraction to design limit with no uncertainty factors (only factors FGRID and FDEP are applied).
"ASI-ASS-UN"	Axial shape index of the assembly - includes the uncertainty factor FASI.
"F-DELH UNC"	Maximum 2-D power in the assembly with the factor FGRID, and uncertainty factors FCALC and FTILT.
"FQ W/UNC "	Peak 3D power in the assembly with the factor FGRID, and the uncertainty factors FCALC and FTILT.
"LHGR W/UNC"	Maximum linear heat generation rate in the assembly with the factor FGRID, and the uncertainty factors FCALC, FTILT, FE, and FCALOR.
"PFDL " or "PFDL W/UNC"	Power fraction-to-design limit with the factor FGRID, and the uncertainty factors FCALC, FTILT, FE, and FCALOR.

Default:

NREQ=6, and

EDT.REQ "POWER "
EDT.REQ "ASI-FISS "
EDT.REQ "PFDL "
EDT.REQ "FZ-FISS "
EDT.REQ "FZLOC-FISS"
EDT.REQ "FQ-FISS "

EXECUTE - Execute Case

Description: Upon reading this card, the code terminates the reading of data from the input file and executes the run.

Format:
EXECUTE

Default:
None

COMMENT - Comment Card

Description: This card allows for comments to be included in the input file. They are not processed by the code.

Format:
COMMENT STRING

STRING	A character string of any length

Default:
None

FILE INTERFACE NAMES AND SCRIPT FILES

File Interface Names

The file interfaces for the ASAS code are listed below. ASAS is executed by typing the name of the executable, and appropriate manipulation of the ASAS file names.

ASAS File Interfaces

ASAS File Name	Description	INPUT/ OUTPUT FILE	ASAS UNIT #
USERIN	User input file	Input	1
DETFIL[1]	View factor file	Input	9
SIMPIN[1]	SIMULATE-3 3D pin power file	Input	8
USEROT	User output file	Output	2
CTSFIL	CTS file	Output	3
ATSFIL	ATS file	Output	4
PLTFIL[2]	POSTER7 plot file	Output	10

[1] These names are variables in the code. The names of these files are defined via the user input file cards VUE.FIL and SIM.FIL.
[2] This file is generated only if IPLT=1 in the CONTROL card of the user input file.

Script Files

Two script files are available to execute the ASAS code. The first such script file is **ASAPROC**, and is shown in Figure 9. It executes the code in a stand-alone fashion. The script file is executed with the command **ASAPROC $1<cr>**, where **$1** is a user supplied ID, and <cr> is a carriage return.

For example, in the sample case, $1 is **TEST1**. Therefore the user input file is **ASATEST1.IN**, and the output files are **ASATEST1.OUT**, **ASATEST1.CTS**, **ASATEST1.ATS**, and **ASATEST1.PLT**.

The second script file is **FLYPROC**, and is shown in Figure 10. This script file generates a SIMULATE-3 CEA insertion input file, calls the script file to execute SIMULATE-3, then generates an A^{2}AS input file and executes ASAS for that case. **FLYPROC** is set up to generate a 1D ATS file, and processes only one user-selected assembly. It was developed by Yankee and OPPD to execute on the OPPD HP DOMAIN workstation, and execute the SIMULATE-3 case on the OPPD IBM computer.

FLYPROC is executed with the command **FLYPROC $1 $2 $3 $4 $5<cr>**
where:
$1 is the loading pattern identifier,
$2 is the time in cycle life (B for BOC, in which case COR.BOR is set to 956 ppm; M for MOC, n which case COR.BOR is set to 586 ppm; and E for EOC, in which case COR.BOR is set to -88 ppm),
$3 is the two digit sequence number of the run (typically starting at 00 and ending at 99),
$4 is the oscillation time in hours (for the purposes of selecting the appropriate restart), and
$5 is the cycle number.

FLYPROC is submitted for 100 time points by the script file **Abocsub**, which is shown in Figure 11. These time points were selected from the axial shape index plot shown in Figure 4.

Auxiliary Code

An auxiliary computer code **CONCAT.F** is shown in Figure 12. This code concatenates multiple CTS and ATS files into a master CTS and ATS file, sorts the cases, and changes the Case ID's for use by OPPD's safety analysis codes. This code was developed by OPPD.

The four output files are described below. Three of these files are shown in Figures 13 through 15 for the sample case, and Figure 16 shows several of the plots generated with the ASAS output plot file.

User Output File

This file is in a format for readability by the user. The contents of this file are controlled by the IOUT option. The following information is printed if IOUT is 0 or 1:
The input echo, the input data used in the run, selected assembly edits, and for each selected assembly the following:

- XPO - cycle exposure,
- EBAR - core average exposure,
- POWER - power level in percent,
- FLOW - core flow in percent,
- NOTWT - total control rod steps inserted into the core,
- FQ - 3D pin peaking from the SIMULATE-3 pin file, which includes the axial intranodal peaking (this is also called the 4PIN edit in SIMULATE-3),
- F-DELTA-H - 2D radial pin peaking factor,
- INCORE ASI - In-core average axial shape index,
- PERIPHERAL ASI - Ex-core weighted axial shape index,
- TOTAL RELATIVE EXCORE SIGNAL,
- FUEL TYPE,
- ASSEMBLY NUMBER, and
- ASSEMBLY SERIAL NUMBER.

Adjusted 2D Pin Powers:

- 2D PIN POWERS. These are adjusted by the ratio of the assembly average axial peaking factor to the pin axial peaking factor in order to preserve the peak LHGR for each pin when using the core average axial shape. Also the grid dip factor FGRID is applied to these 2D pin powers.

Assembly Information:

- MAXIMUM 2D ONE PIN POWER
- MAXIMUM 2D ONE PIN POWER WITH UNCERTAINTIES
- MAXIMUM CHANNEL POWER
- MAXIMUM 3D ONE PIN POWER
- MAXIMUM 3D ONE PIN POWER WITH UNCERTAINTIES
- MAXIMUM LHGR
- MAXIMUM LHGR WITH UNCERTAINTY
- PL TO FUEL DESIGN SAFDL
- PL TO FUEL DESIGN SAFDL WITH UNCERTAINTIES
- ASSEMBLY AXIAL SHAPE INDEX
- ASSEMBLY AXIAL SHAPE INDEX WITH UNCERTAINTY

If IOUT is equal to 1, then the following additional data are printed for each winning assembly:

- PIN POWERS FOR THE LIMITING AXIAL PLANE
- FZ FACTORS - axial peaking factors for each pin in the assembly
- ASSEMBLY AVERAGE PEAKING FACTOR.
- 2D PIN POWERS - as read from the SIMULATE-3 pin file.

The sample case user output file is shown in Figure 13.

Core Transient Output File (CTS File)

This file contains one header card and a card of data for each winning assembly in each case. The format of the file is determined by the user via the EDT.REQ input cards.

The first field provides the case number, and the second field provides a 10 character CASEID delimited by double quotes ("). The first 8 characters of the CASEID is the first 8 characters of the case title provided by the user via the TIT.CAS card; the ninth character is the fuel type of the winning assembly number (1-9 - thus the limit on 9 for NFT in the CONTROL card); and the tenth character is the winning assembly sequence number (hopefully less than 9, or ASAS will terminate execution with an error message).

Subsequent fields, from 1 to 12 additional fields, are defined via the EDT.REQ cards. The allowable edit requests are provided in the Input Instructions - User Input File section of this manual.

The format of this file is (I5,3X,A12,1X,NE15.6), where N is the number of data requests.

For edit requests "FZLOC-FISS", "FZLOC-THRM", "ASSEMBLY #", or "F-DELH LOC", the field is written in (I9,6X) format instead of (E15.6) format.

The CTS output file for the sample case is shown in Figure 14.

Axial Transient Output File (ATS File)

This file contains one set of data for each winning assembly of each case. This data consists of the following:

- The number of axial nodes written in format (I5).
- The number of fields on file written in format (I5). If IATS=0, this is 1. If IATS=1, this is 2.
- The case number written in format (I5).
- The 10 digit Case ID delimited by double quotes ("). The first 8 characters of the Case ID is the first 8 characters of the case title provided by the user via the TIT.CAS card; the ninth character is the fuel type of the winning assembly number (1-9 - thus the limit on 9 for NFT in the CONTROL card); and the tenth character is the winning assembly sequence number (hopefully less than 9, or ASAS will terminate execution with an error message). This is written in format (1X,A12).
- The percent full power written in format (F11.3).
- The Core Average ASI written in format (E15.5).
- The Radial Peaking Factor (read from User Input via the TIT.CAS card). This is written in format (F11.5).

- The Axial Peaking Factor determined as the maximum plane of the core average axial shape fit to NPLFIT planes. This is written in format (F11.5).

- The Assembly Peaking Factor determined as the maximum plane of the assembly average axial shape fit to NPLFIT planes. This is written in format (F11.5).

- The assembly number (according to the Figure 1 numbering scheme), written in format (I5).

- The reason for selection of the assembly, delimited in double quotes and written in format (1X,A16).

- The header card for the axial power shape data.
  If IATS=1, it reads:
  "K" "RPOW-HPTH " "ASS-AXIAL"
  If IATS=0, it reads:
  "K" "RPOW-HPTH "
  These character strings are delimited in double quotes and written in format (1X,A3,2X,A12,2X,A12)

- The axial plane and the core average axial power shape (and the assembly average axial power shape if IATS=1) fit to NPLFIT axial planes, written in format (I4,2F12.5), with axial plane 1 the bottom, and axial plane NPLFIT the top.

- If IATS=1, the header card for the 2D radial pin powers for the winning assembly. This card is:
  ASSEMBLY 2D PIN POWERS and is written in format (A22).

- If IATS=1, the 2D radial pin powers, written format (14F8.4).

The ATS output file for the sample case is shown in Figure 15.

Plot File

This file contains POSTSCRIPT plot commands to generate one plot for the core average axial shape and each winning assembly for each case run. Each plot contains a histogram of the NPLANE axial plane data, a smooth fit generated from the area-preserving natural spline fit coefficients, and a histogram of the resulting NPLFIT axial plane data. This file is generated on option (IPLT=1 in the CONTROL card of the user input file). In order to plot this, a POSTSCRIPT plot file is required, and the file POSTER.TOP must be added to the top of the plot file. Two of the plots from the sample case are shown in Figure 16 and POSTER.TOP is shown in Figure 17.

Figure 1
ASAS and SIMULATE-3 Assembly Numbering Schemes

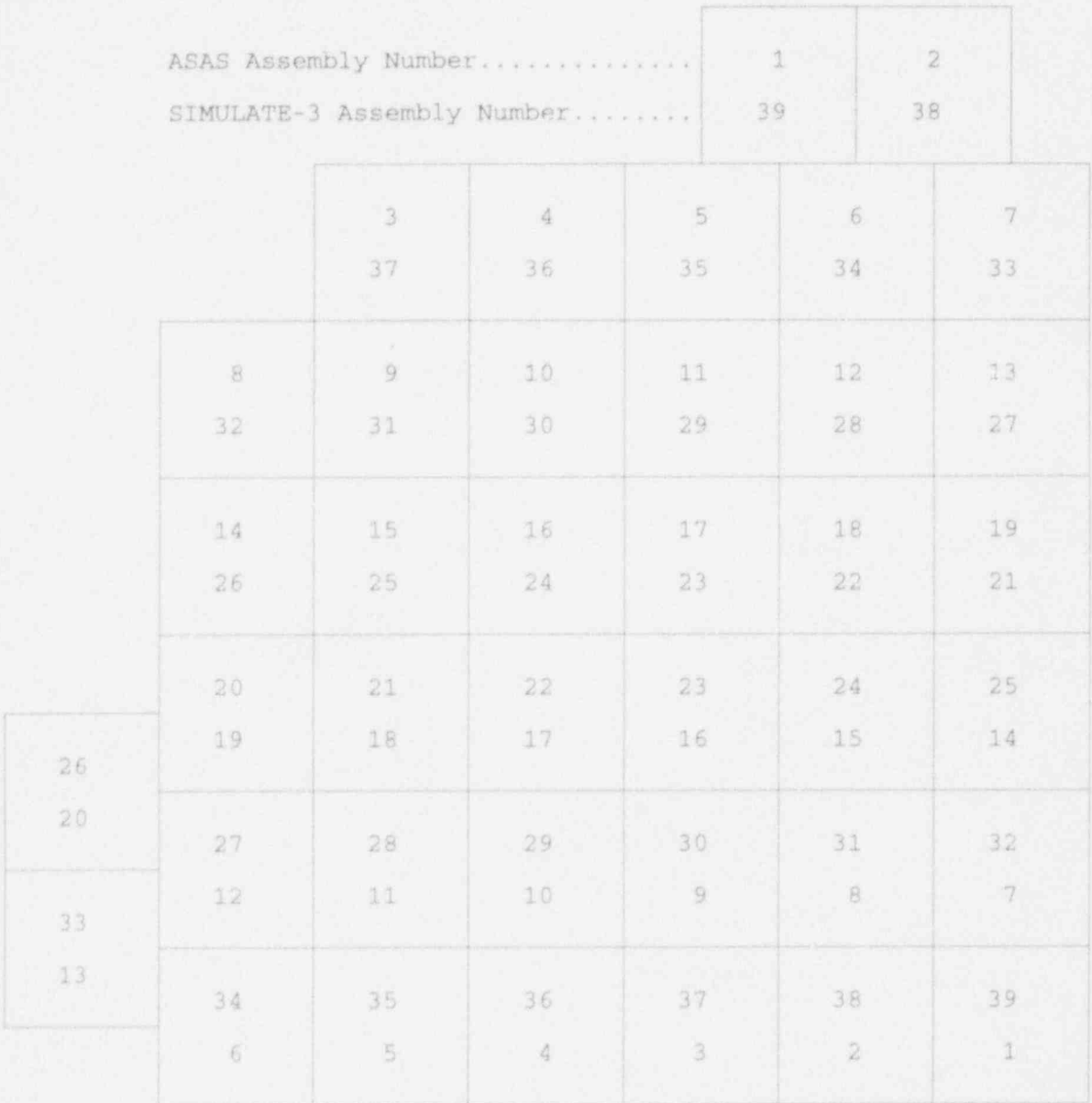

Figure 2
SIMULATE-3 Input File for Cycle 15 As-Built Depletion

```
'COM' THIS IS A 3-D DEPLETION FOR CYCLE 15 ASBUILT
'TIT.CAS' 'CYCLE 15 ASBUILT DEPLETION'/
'RES' '/RPG3/Sp/OPPD/s3Oc15a.r',0.0/

'ITE.BOR',850.0/
'DEP.STA' 'AVE' 0.0,0.25,0.50,-0.5,7.0,-0.5,12.0,-0.5,14.0,14.2/
'COR.OPE' 100./
'PRI.STA' 50*' '/
'PRI.STA' '2RPF' '2RPD' '2EXP' '2KINF'/
'PIN.EDT' 50*' '/
'PIN.EDT' 'ON' 'SUMM' '2PIN' '2KWF' '2FLO' '2P/R' '2XPO'/
'PIN.SUM' '3RR2' '3RPF' '3PIN' '3EXP'/
'ITE.LIM',1.0000,1,0.0000005,0.000005,,,,40/
'WRE','/RPG3/Sp/OPPD/s3Oc15d.r',0.50,6.00,14.20/
'STA'/
'END'/
```

Figure 3
SIMULATE-3 Input File for Cycle 15 BOC Xenon Oscillation

```
'TIT.RUN' 'S3OABos'/
'DIM.CAL' 16 2 2 1/
'COR.SYM','MIR'/
'TIT.CAS','C15 500 MWD/MT 1000 PPM, BANK 4 INSERTED 40% NO DOPPLER 75% POWER'/
'RES', '/RPGI/Sp/OPPD/s3Oc15d.r',0.500/
'COR.OPE',75.0/
'COR.BOR',1000./
'ITE.KEF'/
'COR.TIN',543.00/
'DEP.HRS','AVE' 0.0 -1.0 8.0/
'CRD.SEQ' 4,   756/*BANK 4 40% inserted (60% of 1260 = 756)
'SEG.TFU',0,850.00,0.0,0.0,0/
'TAB.TFU' 1 0 'EXP' 10 'POW' 1

      0.0  2.0  5.0 10.0 15.0 20.0 30.0 40.0 50.0 60.0

 1.0   0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0/
'PRI.STA', 50*' '/
'PIN.EDT','OFF'/
'PRI.STA','OFF'/
'PIN.SUM' 50*'   '/
'BAT.EDT','OFF'/
'ERR.CHE','PERMIT'/
'WRE','/PUB/spinnesp/OPPD/s3OABos.r',-8.0/
'STA'/
'TIT.CAS','C15 BOC (500 MWD/MT) 1000 PPM, ARO, 100% POWER 8-50 HOUR OSCILLATION'/
'COR.OPE',100.0/
'COR.TIN',543.00/
'DEP.HRS','AVE' 8.0,-0.5,50.0/
'CRD.SEQ' 4,   1260/*BANK 4 100% withdrawn
'WRE','/PUB/spinnesp/OPPD/s3OABos.r',-50.0/
'STA'/
'TIT.CAS','C15 BOC (500 MWD/MT) 1000 PPM, ARO, 100% POWER 50-80 HOUR OSCILLATION'/
'DEP.HRS','AVE' 50.0,-0.5,80.0/
'WRE','/PUB/spinnesp/OPPD/s3OABos.r',-80.0/
'STA'/
'END'/
```

Figure 4
Axial Shape Index Versus Oscillation Time
for Sample SIMULATE-3 Xenon Oscillation Case

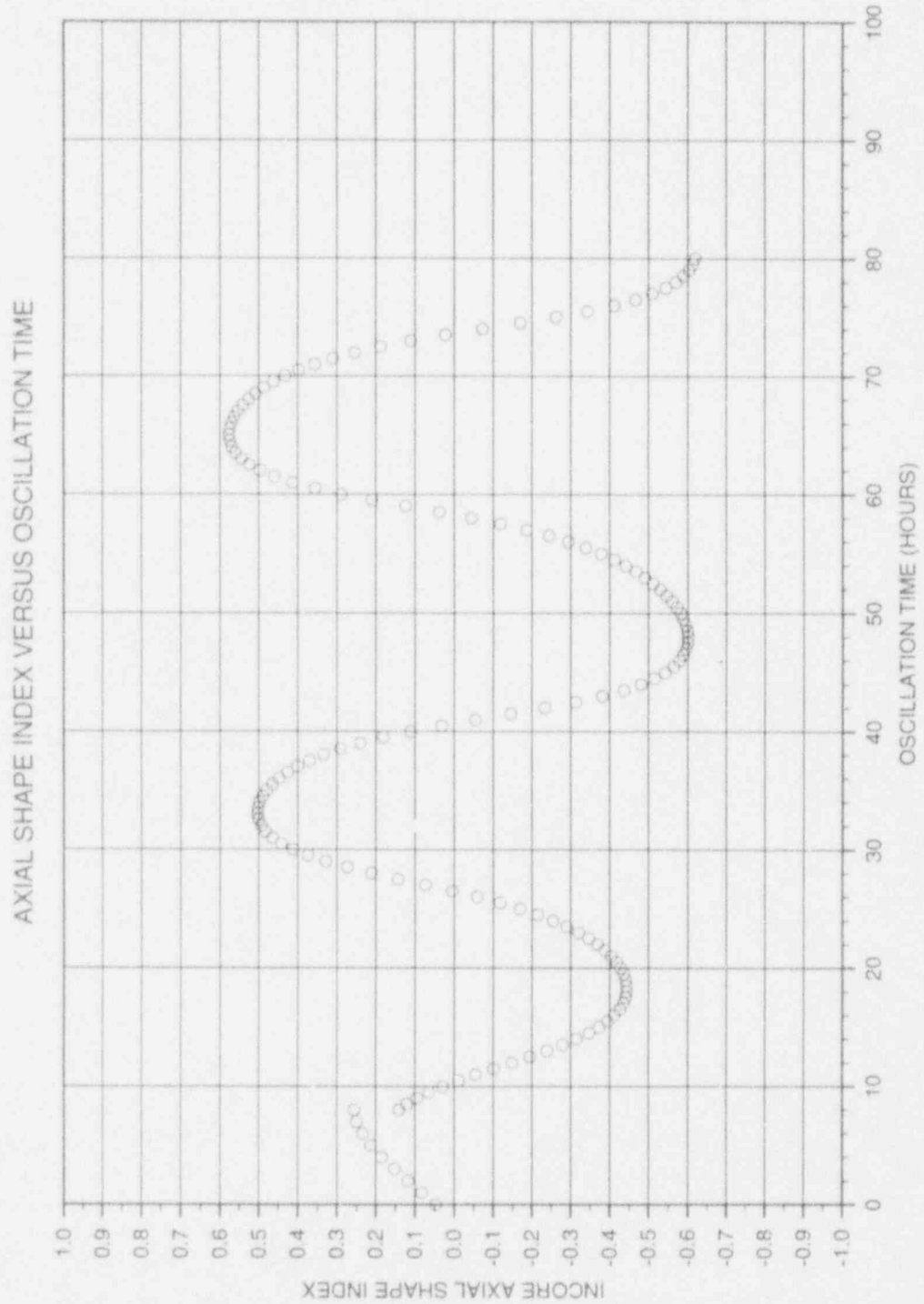

Figure 5
SIMULATE-3 Input File for 3D Pin Power File Generation
for the ASAS Sample Case
Page 1 of 2

```
'TIT.RUN' 'S3OTEST'/
'TIT.CAS','C15 500 MWD/MT 1000 PPM, 10.5 HOURS, 100% POWER, ARO, PDIL A'/
'RES','/PUB/spinnesp/OPPD/s3OABos.r',10.5/
'DEF.FPD',0/
'COR.OPE',100.0/
'COR.BOP',1000./
'ITE.KEF'/
'COR.TIN',543.00/
'SEG.TFU' 1 .000000E+00 324.93 -29.21 /
'SEG.TFU' 2 .000000E+00 324.93 -29.21 /
'SEG.TFU' 3 .000000E+00 324.93 -29.21 /
'SEG.TFU' 4 .000000E+00 324.93 -29.21 /
'SEG.TFU' 5 .000000E+00 324.93 -29.21 /
'SEG.TFU' 6 .000000E+00 324.93 -29.21 /
'SEG.TFU' 7 .000000E+00 324.93 -29.21 /
'SEG.TFU' 8 .000000E+00 324.93 -29.21 /
'SEG.TFU' 9 .000000E+00 324.93 -29.21 /
'SEG.TFU' 10 .000000E+00 283.74 -25.96 /
'SEG.TFU' 11 .000000E+00 283.74 -25.96 /
'SEG.TFU' 12 .000000E+00 283.74 -25.96 /
'SEG.TFU' 13 .000000E+00 283.74 -25.96 /
'SEG.TFU' 14 .000000E+00 283.74 -25.96 /
'SEG.TFU' 15 .000000E+00 283.74 -25.96 /
'SEG.TFU' 16 .000000E+00 283.74 -25.96 /
'SEG.TFU' 17 .000000E+00 324.93 -29.21 /
'SEG.TFU' 18 .000000E+00 324.93 -29.21 /
'SEG.TFU' 19 .000000E+00 324.93 -29.21 /
'SEG.TFU' 20 .000000E+00 320.1 -24.73 /
'SEG.TFU' 21 .000000E+00 320.1 -24.73 /
'SEG.TFU' 22 .000000E+00 320.1 -24.73 /
'SEG.TFU' 23 .000000E+00 320.1 -24.73 /
'SEG.TFU' 24 .000000E+00 320.1 -24.73 /
'SEG.TFU' 25 .000000E+00 320.1 -24.73 /
'SEG.TFU' 26 .000000E+00 320.1 -24.73 /
'SEG.TFU' 27 .000000E+00 320.1 -24.73 /
'SEG.TFU' 28 .000000E+00 320.1 -24.73 /
'SEG.TFU' 29 .000000E+00 283.74 -25.96 /
'SEG.TFU' 30 .000000E+00 283.74 -25.96 /
'SEG.TFU' 31 .000000E+00 283.74 -25.96 /
'SEG.TFU' 32 .000000E+00 283.74 -25.96 /
'SEG.TFU' 33 .000000E+00 283.74 -25.96 /
'SEG.TFU' 34 .000000E+00 283.74 -25.96 /
'SEG.TFU' 35 .000000E+00 283.74 -25.96 /
'SEG.TFU' 36 .000000E+00 283.74 -25.96 /
'SEG.TFU' 37 .000000E+00 283.74 -25.96 /
'SEG.TFU' 38 .000000E+00 324.93 -29.21 /
'SEG.TFU' 39 .000000E+00 324.93 -29.21 /
'SEG.TFU' 40 .000000E+00 324.93 -29.21 /
'TAB.TFU' 1 1 'EXP' 10 'POW' 1
 .000000E+00 2.0 5.0 10.0 15.0 20.0 30.0 40.0 50.0 60.0
 1.0 61.27 54.04 53.87 33.07 16.16 .45 -28.39 -57.29 -70.43 -70.62 /
'TAB.TFU' 1 2/
'TAB.TFU' 1 3/
'TAB.TFU' 1 4/
'TAB.TFU' 1 5/
'TAB.TFU' 1 6/
'TAB.TFU' 1 7/
'TAB.TFU' 1 8/
'TAB.TFU' 1 9/
'TAB.TFU' 1 17/
'TAB.TFU' 1 18/
'TAB.TFU' 1 19/
'TAB.TFU' 1 38/
'TAB.TFU' 1 39/
'TAB.TFU' 1 40/
'TAB.TFU' 2 20 'EXP' 10 'POW' 1
 .000000E+00 2.0 5.0 10.0 15.0 20.0 30.0 40.0 50.0 60.0
 1.0 49.02 56.15 50.65 35.32 22.3 10.78 -9.67 -29.48 -42.75 -43.56 /
'TAB.TFU' 2 21/
'TAB.TFU' 2 22/
'TAB.TFU' 2 23/
'TAB.TFU' 2 24/
'TAB.TFU' 2 25/
'TAB.TFU' 2 26/
'TAB.TFU' 2 27/
'TAB.TFU' 2 28/
'TAB.TFU' 3 10 'EXP' 10 'POW' 1
 .000000E+00 2.0 5.0 10.0 15.0 20.0 30.0 40.0 50.0 60.0
 1.0 68.74 52.91 63.7 31.47 8.16 -17.51 -52.77 -57.87 -59.28 -57.4 /
'TAB.TFU' 3 11/
'TAB.TFU' 3 12/
'TAB.TFU' 3 13/
'TAB.TFU' 3 14/
'TAB.TFU' 3 15/
'TAB.TFU' 3 16/
'TAB.TFU' 3 29/
'TAB.TFU' 3 30/
'TAB.TFU' 3 31/
'TAB.TFU' 3 32/
'TAB.TFU' 3 33/
'TAB.TFU' 3 34/
'TAB.TFU' 3 35/
'TAB.TFU' 3 36/
```

Figure 5
SIMULATE-3 Input File for 3D Pin Power File Generation
for the ASAS Sample Case
Page 2 of 2

```
'TAB.TFU' 3 37/
'COM'
'COM'    PASS    1    2    3    4    5    6    7    8    9   10   11
'CRD.SEQ' 1, 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260/* BANK 1
'CRD.SEQ' 2, 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260/* BANK 2
'CRD.SEQ' 3, 1260 1260 1260 1260 1218 1057  896  735  574  413  268/* BANK 3
'CRD.SEQ' 4, 1260  945  784  623  462  301  140    0    0    0    0/* BANK 4
'CRD.SEQ' 5, 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260/* BANK A
'CRD.SEQ' 6, 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260/* BANK B
'CRD.SEQ' 7, 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260/* BANK N
'CRD.SEQ' 8, 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260/* HAFNIUM RODS
'CRD.PAS', 8,1/
'PIN.FIL','ON','PINFILE','ADD','3-D'/
'PRI.STA', 50*' '/
'PIN.EDT','ON',,'2PIN'/
'STA'/
'TIT.CAS','C15 500 MWD/MT 1000 PPM, 10.5 HOURS,  20% POWER, BANK 3 AT  574, FOIL J'/
'COR.OPE', 20.0/
'COR.TIN',535.10/
'CRD.PAS',8,9/
'STA'/
'END'/
```

Figure 6
Suggested SIMULATE-3 CEA Insertion Cases
For Setpoint Analysis

PDIL Case	Power Level	Inlet Temp (°F)	CEA Positions
A	100	543.0	ARO
B	100	543.0	Bank 4 at 945
C	90	543.0	Bank 4 at 945
D	80	543.0	Bank 4 at 784
E	70	543.0	Bank 4 at 623
F	60	541.4	Bank 4 at 462, Bank 3 at 1218
G	50	539.9	Bank 4 at 301, Bank 3 at 1057
H	40	538.3	Bank 4 at 140, Bank 3 at 896
I	30	536.7	Bank 3 at 735
J	20	535.1	Bank 3 at 574
K	10	533.6	Bank 3 at 413
L	1	532.16	Bank 3 at 268
-	0	532.0	Bank 3 at 252

Figure 7
Sample View Factor File
Page 1 of 6

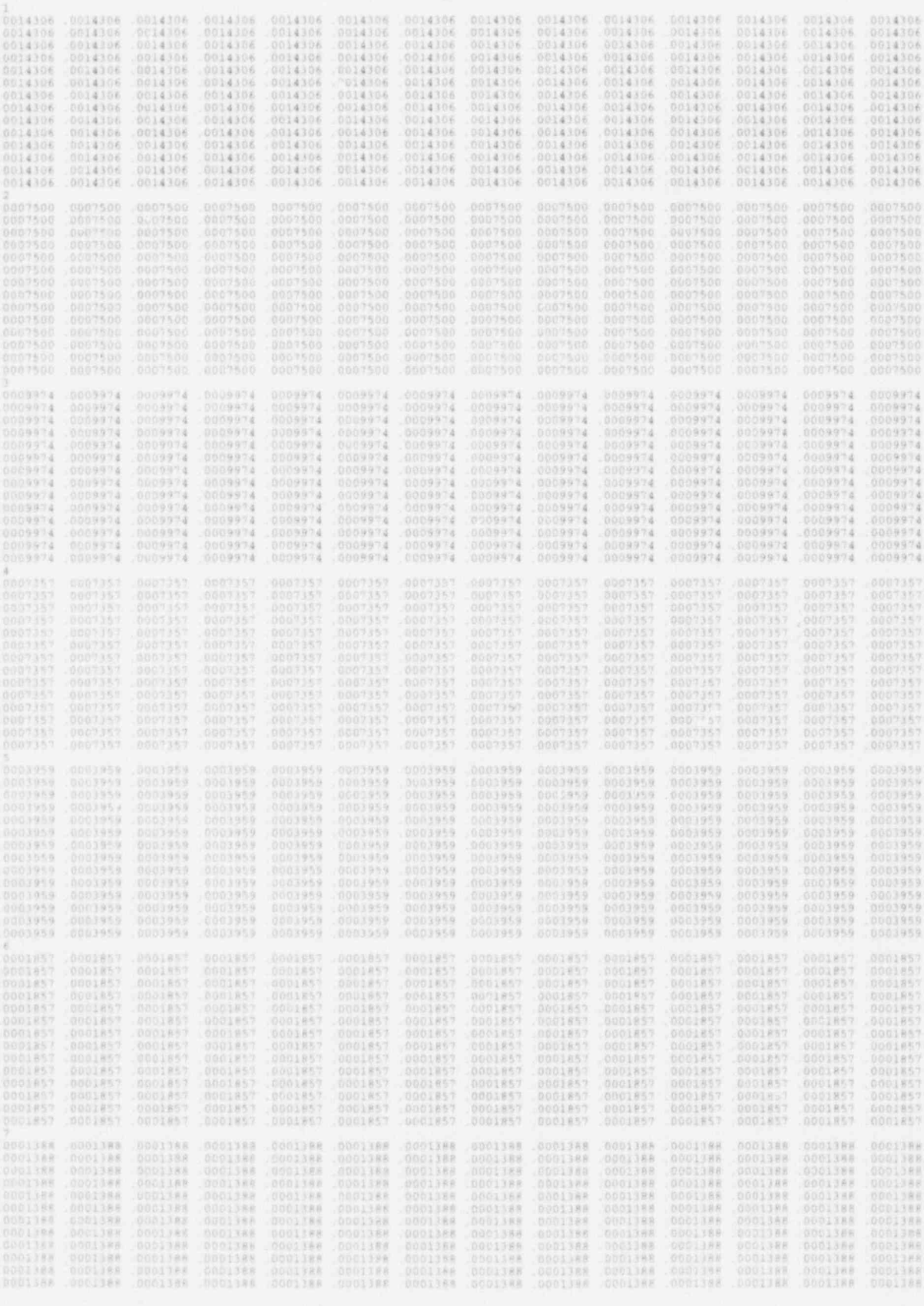

Figure 7
Sample View Factor File
Page 2 of 6

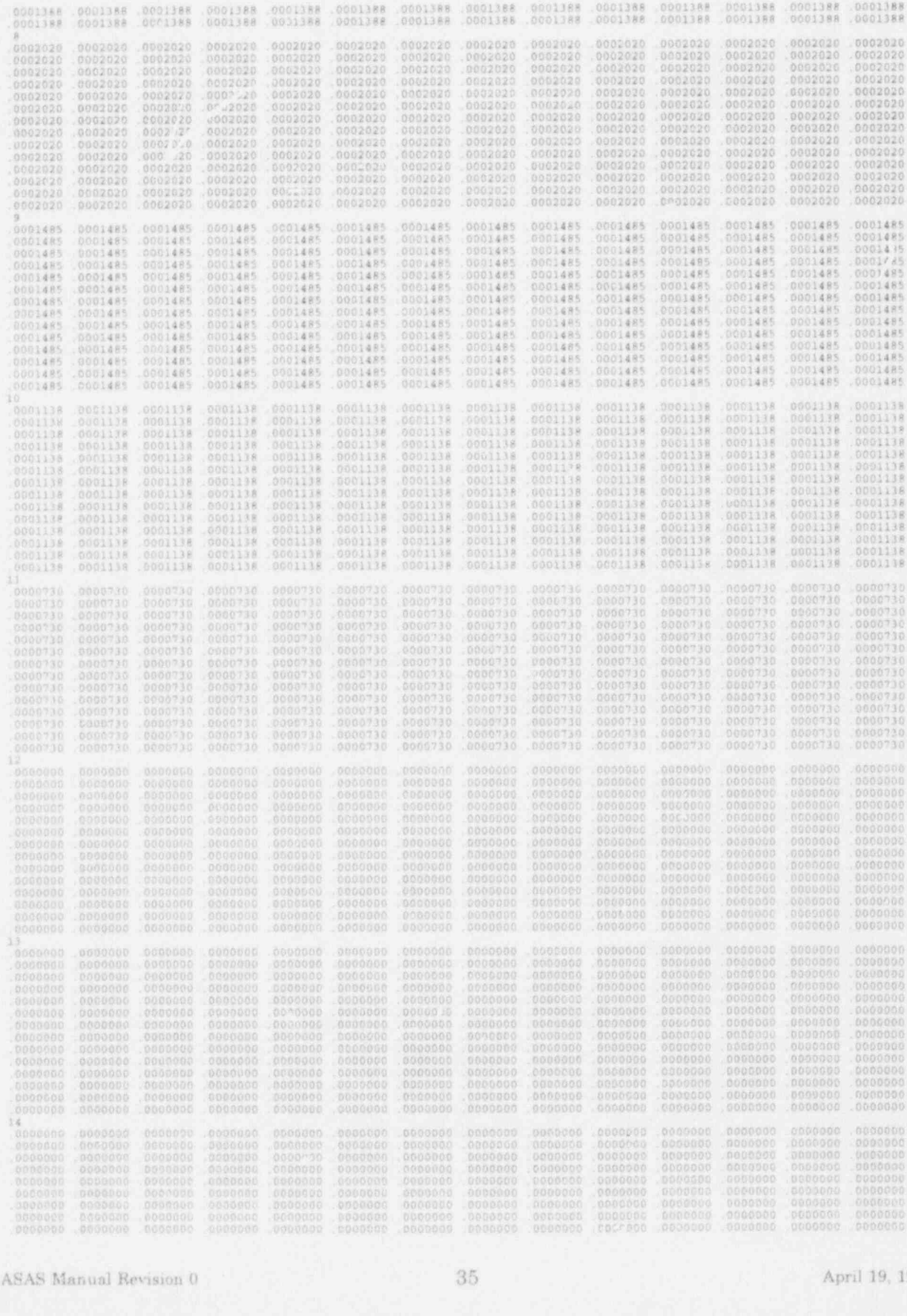

Figure 7
Sample View Factor File
Page 3 of 6

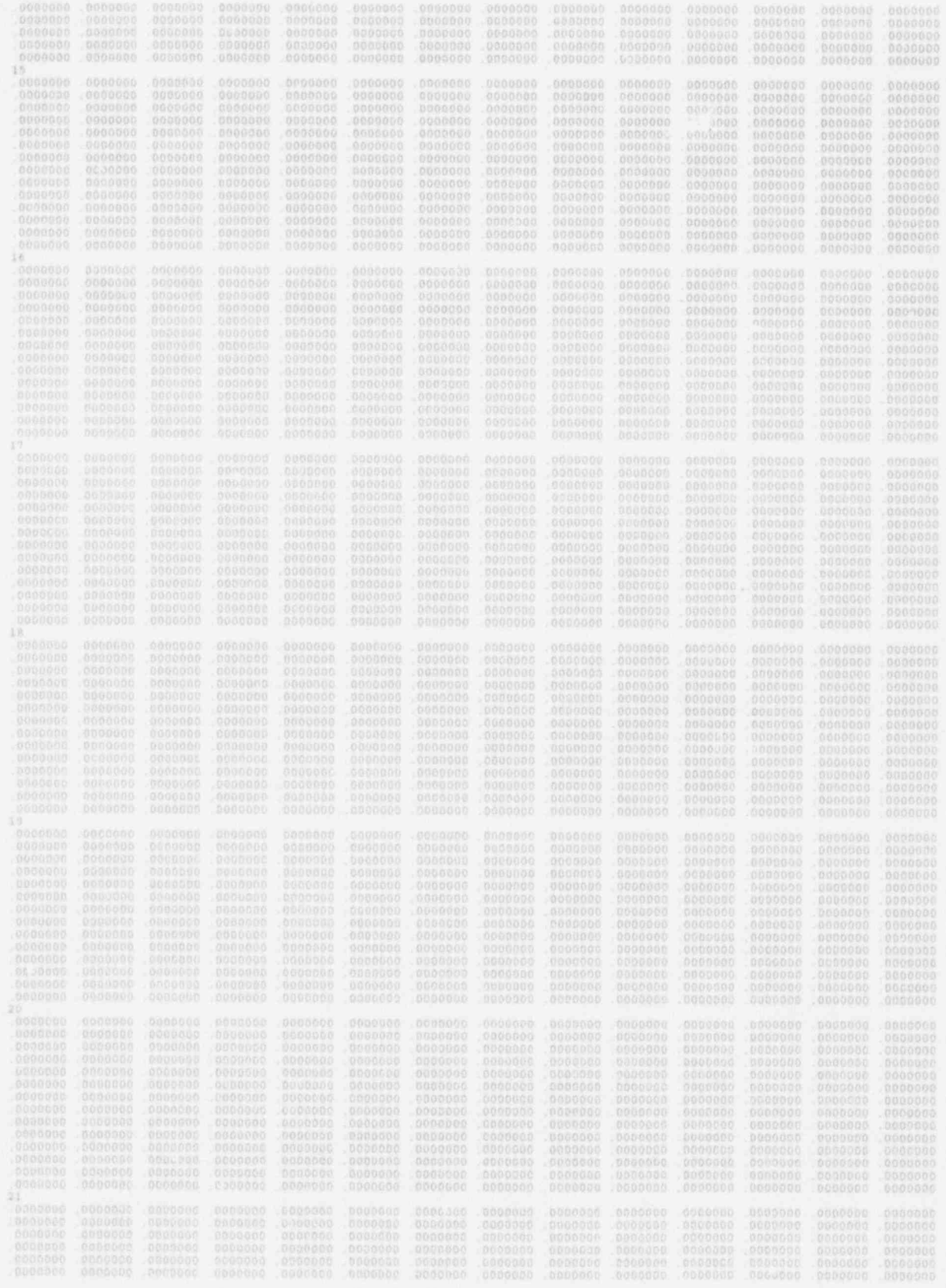

Figure 7
Sample View Factor File
Page 4 of 6

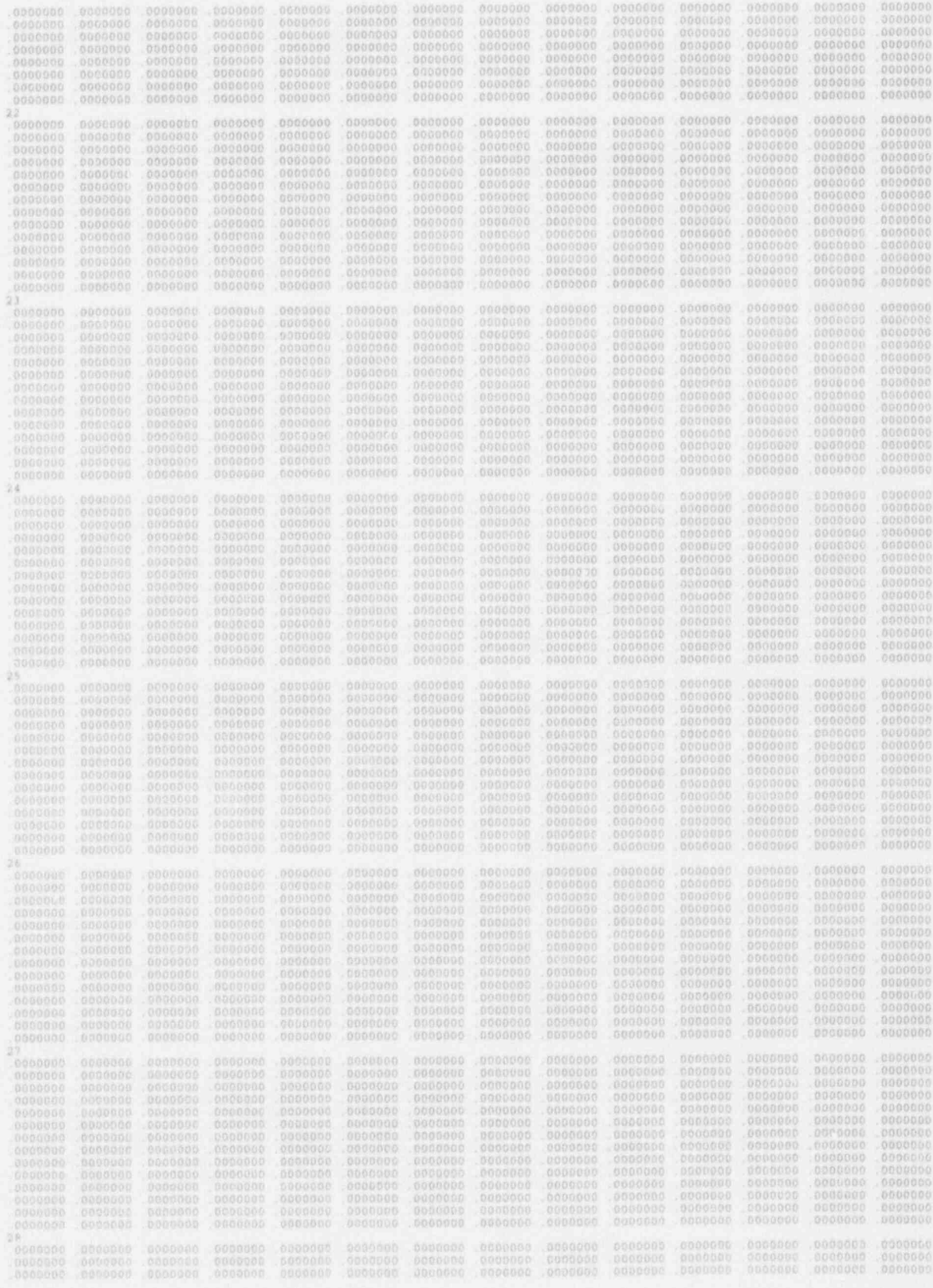

Figure 7
Sample View Factor File
Page 5 of 6

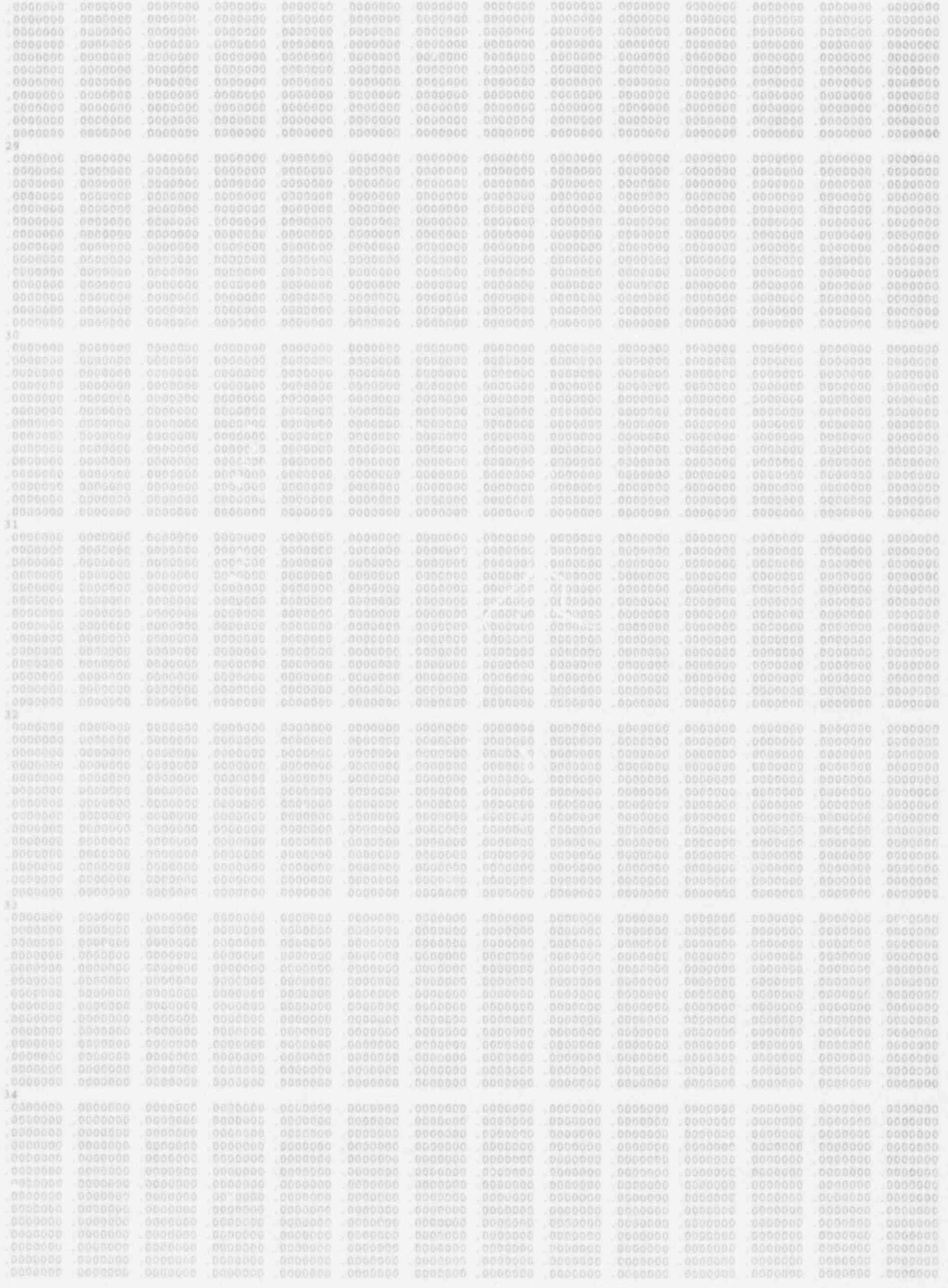

Figure 7
Sample View Factor File
Page 6 of 6

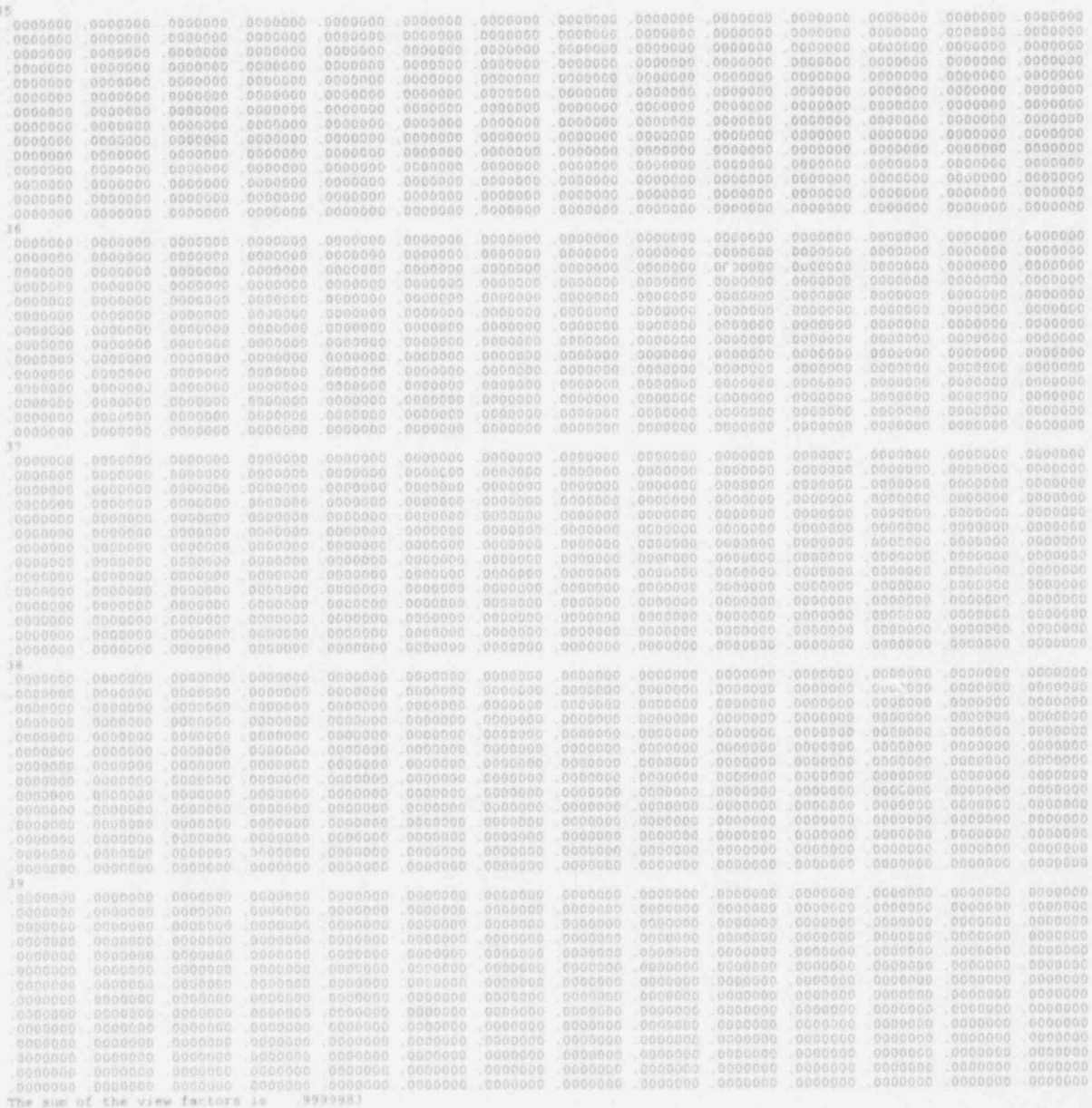

Figure 8
Sample ASAS User Input File

```
TIT.RUN Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
CONTROL 2 2 3 40 1 1 1
FUE.LIM 1 15.0 'TYPE1'
FUE.LIM 2 16.0 'TYPE2'
LAY.DWN                                1   2
                          1   2   1   2   1
                      2   1   2   1   2   1
                      1   2   1   2   1   2
                      2   1   2   1   2   1
                  1   2   1   2   1   2   1
                  2   1   2   1   2   1   2
VUE.FIL fagen1.out
COMMENT fcalc ftilt fgrid   fe    fcalor fdep   ftrip fasi
UNC.FAC 1.10  1.03  1.0075  1.03  1.02   0.975  3.0   .04
COR.LHR 6.00
TIT.CAS  1 1.7700 'B-10.5-A  PDIL CASE 1 -  100% POWER, ARO'
TIT.CAS  2 2.3320 'B-10.5-J  PDIL CASE 2 -   20% POWER, BANK 3 AT 574'
SEL.ASS  3  1 10 39
SIM.FIL /RPG3/Ep/OPPD/a30test.p
EDT.REQ 'ASI-ASS    '
EDT.REQ 'ASI-PER    '
EDT.REQ 'ASI-CORE   '
EDT.REQ 'PPDL       '
EDT.REQ 'LHGR W/UNC'
EDT.REQ 'F2LOC-FISS'
EDT.REQ 'ASSEMBLY #'
EDT.REQ 'EXCORE RES'
EXECUTE
```

Figure 9
Sample Procedure to Execute ASAS on a HP/UX UNIX Computer

```
#! /bin/ksh
#
#     ASAPROC
#
#     Script file to execute the ASAS code
#
#     This script file is executed by typing the following:
#     asaproc $1 <cr>
#     where:
#     $1 is a user supplied ID for the run (for example, 001), and
#     <cr> is carriage return.
#
#     The files associated with the run are therefore:
#     asa$1.in  - user input file (e.g. asa001.in)
#     asa$1.out - user output file (e.g. asa001.out)
#     asa$1.cts - CTS output file (e.g. asa001.cts)
#     asa$1.ats - ATS output file (e.g. asa001.ats)
#     asa$1.plt - POSTSCRIPT plot file (e.g. asa001.plt)
#
      OLD='pwd'
      day=$OLD/asa$1.day
      out="$OLD/asa$1.out"
      in="$OLD/asa$1.in"
      cts="$OLD/asa$1.cts"
      ats="$OLD/asa$1.ats"
      plt="$OLD/asa$1.plt"
      test -f $day && rm $day
      echo '1' >$day 2>$day
      echo " ********************************************************** >>$day 2>>$day
      echo " " >>$day 2>>$day
      echo " " >>$day 2>>$day
      echo " " >>$day 2>>$day
      echo " " >>$day 2>>$day
      echo " Script File to Run ASAS Version 0" >>$day 2>>$day
      echo " " >>$day 2>>$day
      echo " The start date and time is 'date'" >>$day 2>>$day
      echo " " >>$day 2>>$day
#     echo " The username is 'uname -n'" >>$day 2>>$day
      echo " " >>$day 2>>$day
      echo " The       input  file is $in" >>$day 2>>$day
      echo " " >>$day 2>>$day
      echo " The user output file is $out" >>$day 2>>$day
      echo " " >>$day 2>>$day
      echo " The output cts  file is $cts" >>$day 2>>$day
      echo " " >>$day 2>>$day
      echo " The output ats  file is $ats" >>$day 2>>$da,
      echo " " >>$day 2>>$day
#
#
       test -f $out && rm $out >>$day 2>>$day
       test -f CTSFIL && rm CTSFIL >>$day 2>>$day
       test -f ATSFIL && rm ATSFIL >>$day 2>>$day
#
# run job under tmp space on HP workstation
#
#     RUNDIR="/tmp/ASA.$$" >>$day 2>>$day
#     mkdir $RUNDIR >>$day 2>>$day
      RUNDIR='pwd' >>$day 2>>$day
      echo " The run time directory is $RUNDIR" >>$day 2>>$day
      echo " " >>$day 2>>$day
      echo " " >>$day 2>>$day
      cd $RUNDIR >>$day 2>>$day
      cp $in USERIN >>$day 2>>$day
      ln -s out.$1 USEROT >>$day 2>>$day
      ln -s $cts CTSFIL >>$day 2>>$day
      ln -s $ats ATSFIL >>$day 2>>$day
      ln -s $plt PLTFIL >>$day 2>>$day
#
#     execute ASAS
#
      asas 2>>$day
#
#
# normal termination
#
#   cd $OLD >>$day 2>>$day
      rm USEROT >>$day 2>>$day
      rm CTSFIL >>$day 2>>$day
      rm ATSFIL >>$day 2>>$day
      rm PLTFIL >>$day 2>>$day
      echo " The finish date and time is 'date'" >>$day 2>>$day
      echo " " >>$day 2>>$day
      echo " ********************************************************** >>$day 2>>$day
      cat out.$1 $day >$out 2>>$day
      rm out.$1
```

Figure 10
Sample Procedure to Generate SIMULATE-3 and ASAS Input Files
And Execute the Codes for the Flyspeck Analysis
Page 1 of 6

```
#! /bin/ksh
#
# TITLE:
#@(#) flyproc v1.0 Executes SIMULATE-3 and ASAS Codes
#Auth: 03/15/94 MEC, 03/23/94 KBS
# Modified by TAH for Fort Calhoun Cycle 15 4/12/94
#
# COPYRIGHT 1994 YANKEE ATOMIC ELECTRIC COMPANY
#
#     Script file to create user input files for SIMULATE-3 and ASAS
#     and execute the codes for the flyspeck analysis
#
#     This script file is executed by typing the following:
#     flyproc $1 $2 $3 $4 $5 <cr>
#     where:
#     $1 - $5 are explained below.
#     <cr> is carriage return.
#
#     The SIMULATE-3 files associated with the run are those
#     generated by the s3v402b script file, and are:
#     s3O$1$2$3.i - Input file (e.g. s3OAB00.i)
#     s3O$1$2$3.o - Output file (e.g. s3OAB00.o)
#     s3O$1$2$3.p - Pin Power file (e.g. s3OAB00.p)
#     s3O$1$2$3.d - Dayfile (e.g. s3OAR00.d)
#
#     The ASAS files associated with the run are therefore:
#     asa$1$2$3.in  - user input file (e.g. asaAB00.in)
#     asa$1$2$3.out - user output file (e.g. asaAB00.out)
#     asa$1$2$3.cts - CTS output file (e.g. asaAB00.cts)
#     asa$1$2$3.ats - ATS output file (e.g. asaAB00.ats)
#     asa$1$2$3.plt - POSTSCRIPT plot file (e.g. asaAB00.plt)
#     asa$1$2$3.day - Dayfile (e.g. asaAB00.day)
#     (the above examples correspond to loading pattern A, BOC,
#      sequence 00)
#
# MINOR Script File
#
# DESCRIPTION:
#
#         Creates user input files for and Executes SIMULATE-3 and ASAS
#         for the flyspeck analysis
#
# VARIABLES USED:
# INLINE VARIABLES:
# GLOBAL:
# LOCAL:
# $1 - Loading Pattern Case Identifier: ($LPCI)
#              'A' short previous cycle length
#              'B' nominal previous cycle length
#              'C' long previous cycle length
#
# $2 - Time in Cycle Life (Alphabetic) ($ATICL)
#              'B' for BOC; $BOR =  956 ppm
#              'M' for MOC; $BOR =  586 ppm
#              'E' for EOC; $BOR =  -88 ppm
#
# $3 - Sequence Number ($SEQ)
#              00 through 99
#
# $4 - Oscillation Time in Hours ($OSCH)
#
# $5 - Cycle number ($CYC)
#
# EXTERNAL SUBROUTINES CALLED:
#
# INITIALIZATION/SETUP:
#set -x
errflg=0
#
# HELP:
#
     if [ "$1" = "h" ] || [ "$1" = "-h" ] || [ "$1" = "" ]
     then
     more >&2 <<EOF

HELP FOR PROCEDURE/SCRIPT FILE $0

   WHO:          Omaha Public Power District - Fort Calhoun
   WHAT:         Creates user input files for SIMULATE-3 and ASAS and
                 executes the codes for the flyspeck analysis
   WHY:
   WHEN:         For the Flyspeck analysis
   WHERE:        From any directory where the user has rwx permission.
   HOW:          $0  LPCI ATICL SEQ OSCH CYC

  LPCI    - Loading Pattern Case Identifier:
              'A' short previous cycle length
              'B' nominal previous cycle length
              'C' long previous cycle length
```

Figure 10
Sample Procedure to Generate SIMULATE-3 and ASAS Input Files
And Execute the Codes for the Flyspeck Analysis
Page 2 of 6

```
  ATICL  - Time in Cycle Life (Alphabetic)
               'B' for BOC; BOR =  956 ppm; NTICL = 1
               'M' for MOC; BOR =  586 ppm; NTICL = 2
               'E' for EOC; BOR =  -88 ppm; NTICL = 3

  SEQ    - Sequence Number
               00 through 99

  OSCH   - Oscillation Time in Hours

  ICYC   - Cycle number

EOF
    exit 1
    fi
#
#  Set variables
#
    LPCI=$1
    ATICL=$(2)OC
    TIL=$2
    SEQ=$3
    OSCH=$4
    CYC=$5

    if   [ $ATICL = "BOC" ] ; then
         BOR=956
    elif [ $ATICL = "MOC" ] ; then
         BOR=586
    elif [ $ATICL = "EOC" ] ; then
         BOR=-88
    fi
#
# RUN SECTION:
#
    ASASDIR="/tmp/ASAS.$$"
    IBMOUT="/net/ibm/user/tom/asas/simulate/output"
    IBMIN="/net/ibm/user/tom/asas/simulate/input"
    OLD='pwd'
    day=$OLD/asa$LPCI$TIL$SEQ.day
    test -f $day && rm $day
    out="$OLD/asa$LPCI$TIL$SEQ.out"
    in="$OLD/asa$LPCI$TIL$SEQ.in"
    cts="$OLD/asa$LPCI$TIL$SEQ.cts"
    ats="$OLD/asa$LPCI$TIL$SEQ.ats"
    plt="$OLD/asa$LPCI$TIL$SEQ.plt"
#
# Generate Header Information
#
# Initialize variables
#
   if [ $ADMIN_NODE = "" ] ; then
     ADMIN_NODE="//zoomie"
   fi
   bin_dir="$ADMIN_NODE/user/studsvik/bin"
   scripts_dir="$ADMIN_NODE/user/studsvik/scripts"
   lgstdat='date'
   PID='echo $$'
   HOSTNAME='/bin/hostname'
   grp='/bsd4.3/usr/ucb/groups'
   JOBID='${scripts_dir}/jobid | tr A-Z a-z'
   JOBNAME=$JOBID
   ver sys5.3 uname -n > ___temp1
   ver sys5.3 uname -m > ___temp2
   NODEID='cat ___temp1'
   NODETYPE='cat ___temp2'
   rm ___temp1 ___temp2
#
# Setup the header
#
    cat $scripts_dir/Logo > $day
    echo " " >> $day 2>>$day
    echo "1" >> $day 2>> $day
    echo " " >> $day 2>> $day
    echo "                Date/Time          : $lgstdat" >> $day 2>> $day
    echo " " >> $day 2>> $day
    echo "                User               : $USER" >> $day 2>> $day
#   echo "                Group              : $grp[1]" >> $day 2>> $day
#   echo "                Organization       : $ORGANISATION" >> $day 2>> $day
    echo " " >> $day 2>> $day
    echo "                Job Id             : $JOBID" >> $day 2>> $day
    echo " " >> $day 2>> $day
    echo "                Node Name          : ///'/etc/hostname'" >> $day 2>> $day
    echo "                Node Id            : $NODEID" >> $day 2>> $day
    echo "                Cpu Type           : $NODETYPE" >> $day 2>> $day
    echo "                Operating" >> $day 2>> $day
    echo "                System             : 'bldt | /bsd4.3/bin/grep revision'" >> $day 2>> $day
    echo " " >> $day 2>> $day
    echo "                Process ID         : $PID" >> $day 2>> $day
    echo " " >> $day 2>> $day
```

Figure 10
Sample Procedure to Generate SIMULATE-3 and ASAS Input Files
And Execute the Codes for the Flyspeck Analysis
Page 3 of 6

```
      echo '            Submit Node        : //$HOSTNAME' >> $day 2>> $day
      echo '            Directory          : $PWD' >> $day 2>> $day
      echo ' ' >> $day 2>> $day
      echo ' ' >> $day 2>> $day
      echo ' ' >> $day 2>> $day
#
      echo ' The ASAS run time directory  is $ASASDIR' >>$day 2>>$day
      echo ' ' >>$day 2>>$day
      echo ' The      input  file is $in' >>$day 2>>$day
      echo ' The user output file is $out' >>$day 2>>$day
      echo ' The output cts  file is $cts' >>$day 2>>$day
      echo ' The output ats  file is $ats' >>$day 2>>$day
      echo ' The output plot file is $plt' >>$day 2>>$day
      echo ' ' >>$day 2>>$day
#
# Remove any old files
#
      test -f $out && rm $out >>$day 2>>$day
      test -f CTSFIL && rm CTSFIL >>$day 2>>$day
      test -f ATSFIL && rm ATSFIL >>$day 2>>$day
      test -f PLTFIL && rm PLTFIL >>$day 2>>$day
      test -f $in && rm $in >>$day 2>>$day
      test -f $out && rm $out >>$day 2>>$day
      test -f $cts && rm $cts >>$day 2>>$day
      test -f $ats && rm $ats >>$day 2>>$day
      test -f $out && rm $plt >>$day 2>>$day
      test -f $in.Z && rm $in.Z >>$day 2>>$day
      test -f $out.Z && rm $out.Z >>$day 2>>$day
      test -f $cts.Z && rm $cts.Z >>$day 2>>$day
      test -f $ats.Z && rm $ats.Z >>$day 2>>$day
      test -f $out.Z && rm $plt.Z >>$day 2>>$day
      test -f s3O$LPCI$TIL$SEQ.d && rm s3O$LPCI$TIL$SEQ.d >>$day 2>>$day
      test -f s3O$LPCI$TIL$SEQ.d.Z && rm s3O$LPCI$TIL$SEQ.d.Z >>$day 2>>$day
      test -f ${IBMIN}/s3O$LPCI$TIL$SEQ.1 && rm ${IBMIN}/s3O$LPCI$TIL$SEQ.1 >>$day 2>>$day
      test -f ${IBMIN}/s3O$LPCI$TIL$SEQ.1.Z && rm ${IBMIN}/s3O$LPCI$TIL$SEQ.1.Z >>$day 2>>$day

      mkdir $ASASDIR >>$day 2>>$day
      cat << EOF1 > ${IBMIN}/s3O$LPCI$TIL${SEQ}.1 2>>$day
'TIT.RUN','s3O$LPCI$TIL${SEQ}'/
'DIM.CAL' 16 2 2 1/
'COR.SYM','MIR'/
'TIT.CAS','C$CYC LP $LPC1, $ATICL $BOR PPM, $OSCH HRS, 100% POWER, ARO, FDIL A'/
'RES','s3O$LPCI${TIL}ne.r',$OSCH/
'DEP.FPD',0/
'COR.OPE',100.0/
'COR.BOR',${BOR}/
'ITE.KEF'/
'COR.TIN',543.00/
'SEG.TFU' 1 .000000E+00 324.93 -29.21 /
'SEG.TFU' 2 .000000E+00 324.93 -29.21 /
'SEG.TFU' 3 .000000E+00 324.93 -29.21 /
'SEG.TFU' 4 .000000E+00 324.93 -29.21 /
'SEG.TFU' 5 .000000E+00 324.93 -29.21 /
'SEG.TFU' 6 .000000E+00 324.93 -29.21 /
'SEG.TFU' 7 .000000E+00 324.93 -29.21 /
'SEG.TFU' 8 .000000E+00 324.93 -29.21 /
'SEG.TFU' 9 .000000E+00 324.93 -29.21 /
'SEG.TFU' 10 .000000E+00 283.74 -25.96 /
'SEG.TFU' 11 .000000E+00 283.74 -25.96 /
'SEG.TFU' 12 .000000E+00 283.74 -25.96 /
'SEG.TFU' 13 .000000E+00 283.74 -25.96 /
'SEG.TFU' 14 .000000E+00 283.74 -25.96 /
'SEG.TFU' 15 .000000E+00 283.74 -25.96 /
'SEG.TFU' 16 .000000E+00 283.74 -25.96 /
'SEG.TFU' 17 .000000E+00 324.93 -29.21 /
'SEG.TFU' 18 .000000E+00 324.93 -29.21 /
'SEG.TFU' 19 .000000E+00 324.93 -29.21 /
'SEG.TFU' 20 .000000E+00 320.1 -24.73 /
'SEG.TFU' 21 .000000E+00 320.1 -24.73 /
'SEG.TFU' 22 .000000E+00 320.1 -24.73 /
'SEG.TFU' 23 .000000E+00 320.1 -24.73 /
'SEG.TFU' 24 .000000E+00 320.1 -24.73 /
'SEG.TFU' 25 .000000E+00 320.1 -24.73 /
'SEG.TFU' 26 .000000E+00 320.1 -24.73 /
'SEG.TFU' 27 .000000E+00 320.1 -24.73 /
'SEG.TFU' 28 .000000E+00 320.1 -24.73 /
'SEG.TFU' 29 .000000E+00 283.74 -25.96 /
'SEG.TFU' 30 .000000E+00 283.74 -25.96 /
'SEG.TFU' 31 .000000E+00 283.74 -25.96 /
'SEG.TFU' 32 .000000E+00 283.74 -25.96 /
'SEG.TFU' 33 .000000E+00 283.74 -25.96 /
'SEG.TFU' 34 .000000E+00 283.74 -25.96 /
'SEG.TFU' 35 .000000E+00 283.74 -25.96 /
'SEG.TFU' 36 .000000E+00 283.74 -25.96 /
'SEG.TFU' 37 .000000E+00 283.74 -25.96 /
'SEG.TFU' 38 .000000E+00 324.93 -29.21 /
'SEG.TFU' 39 .000000E+00 324.93 -29.21 /
'SEG.TFU' 40 .000000E+00 324.93 -29.21 /
'TAB.TFU' 1 1 'EXP' 10 'POW' 1
 .000000E+00 2.0 5.0 10.0 15.0 20.0 30.0 40.0 50.0 60.0
```

Figure 10
Sample Procedure to Generate SIMULATE-3 and ASAS Input Files
And Execute the Codes for the Flyspeck Analysis
Page 4 of 6

```
 1.0 61.27 54.04 53.87 33.07 16.16 .45 -28.39 -57.29 -70.43 -70.62 /
'TAB.TFU' 1 2/
'TAB.TFU' 1 3/
'TAB.TFU' 1 4/
'TAB.TFU' 1 5/
'TAB.TFU' 1 6/
'TAB.TFU' 1 7/
'TAB.TFU' 1 8/
'TAB.TFU' 1 9/
'TAB.TFU' 1 17/
'TAB.TFU' 1 18/
'TAB.TFU' 1 19/
'TAB.TFU' 1 38/
'TAB.TFU' 1 39/
'TAB.TFU' 1 40/
'TAB.TFU' 2 20 'EXP' 10 'POW' 1
 .000000E+00 2.0 5.0 10.0 15.0 20.0 30.0 40.0 50.0 60.0
 1.0 49.02 56.15 50.65 35.32 22.3 10.78 -9.67 -29.48 -42.75 -43.56 /
'TAB.TFU' 2 21/
'TAB.TFU' 2 22/
'TAB.TFU' 2 23/
'TAB.TFU' 2 24/
'TAB.TFU' 2 25/
'TAB.TFU' 2 26/
'TAB.TFU' 2 27/
'TAB.TFU' 2 28/
'TAB.TFU' 3 10 'EXP' 10 'POW' 1
 .000000E+00 2.0 5.0 10.0 15.0 20.0 30.0 40.0 50.0 60.0
 1.0 60.74 53.91 63.7 31.47 8.16 -17.51 -52.77 -57.87 -59.28 -57.4 /
'TAB.TFU' 3 11/
'TAB.TFU' 3 12/
'TAB.TFU' 3 13/
'TAB.TFU' 3 14/
'TAB.TFU' 3 15/
'TAB.TFU' 3 16/
'TAB.TFU' 3 29/
'TAB.TFU' 3 30/
'TAB.TFU' 3 31/
'TAB.TFU' 3 32/
'TAB.TFU' 3 33/
'TAB.TFU' 3 34/
'TAB.TFU' 3 35/
'TAB.TFU' 3 36/
'TAB.TFU' 3 37/
'COM'
'COM'    PASS     1    2    3    4    5    6    7    8    9   10   11
'CRD.SEQ' 1, 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260/* BANK 1
'CRD.SEQ' 2, 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260/* BANK 2
'CRD.SEQ' 3, 1260 1260 1260 1260 1218 1057  896  735  574  413  268/* BANK 3
'CRD.SEQ' 4, 1260  945  784  623  462  301  140    0    0    0    0/* BANK 4
'CRD.SEQ' 5, 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260/* BANK A
'CRD.SEQ' 6, 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260/* BANK B
'CRD.SEQ' 7, 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260 1260/* BANK N
'CRD.SEQ' 8,    0    0    0    0    0    0    0    0    0    0    0/* HAFNIUM RODS
'CRD.PAS', 8.1/
'PIN.FIL','ON','PINFILE','ADD','3-D'/
'PRI.STA', 50*' '/
'PIN.EDT','ON',,'2PIN'/
'ERR.CHK','PERMIT'/
'PIN.SUM' 50*' '/
'STA'/
'TIT.CAS','C5CYC LP $LPCI, $ATICL $HOR PPM, $OSCH HRS, P=100%, B4 AT 945, PDIL B'/
'COR.OPE',100.0/
'COR.TIN',543.00/
'CRD.PAS',8.2/
'STA'/
'TIT.CAS','C5CYC LP $LPCI, $ATICL $HOR PPM, $OSCH HRS, P= 90%, B4 AT 945, PDIL C'/
'COR.OPE', 90.0/
'COR.TIN',543.00/
'CRD.PAS',8.2/
'STA'/
'TIT.CAS','C5CYC LP $LPCI, $ATICL $HOR PPM, $OSCH HRS, P= 80%, B4 AT 784, PDIL D'/
'COR.OPE', 80.0/
'COR.TIN',543.00/
'CRD.PAS',8.3/
'STA'/
'TIT.CAS','C5CYC LP $LPCI, $ATICL $HOR PPM, $OSCH HRS, P= 70%, B4 AT 623, PDIL E'/
'COR.OPE', 70.0/
'COR.TIN',543.00/
'CRD.PAS',8.4/
'STA'/
'TIT.CAS','C5CYC LP $LPCI, $ATICL $HOR PPM, $OSCH HRS, P= 60%, B4 AT 462, B3 AT 1218, PDIL F'/
'COR.OPE', 60.0/
'COR.TIN',541.40/
'CRD.PAS',8.5/
'STA'/
'TIT.CAS','C5CYC LP $LPCI, $ATICL $HOR PPM, $OSCH HRS, P= 50%, B4 AT 301, B3 AT 1057, PDIL G'/
'COR.OPE', 50.0/
'COR.TIN',539.90/
'CRD.PAS',8.6/
```

Figure 10
Sample Procedure to Generate SIMULATE-3 and ASAS Input Files
And Execute the Codes for the Flyspeck Analysis
Page 5 of 6

```
'STA'/
'TIT.CAS','C$CYC LP $LPCI, $ATICL $BOR PPM, $OSCH HRS, P= 40%, B4 AT 140, B3 AT  896, PDIL H'/
'COR.OPE', 40.0/
'COR.TIN',538.30/
'CRD.PAS',8,7/
'STA'/
'TIT.CAS','C$CYC LP $LPCI, $ATICL $BOR PPM, $OSCH HRS, P= 30%, B3 AT  735, PDIL I'/
'COR.OPE', 30.0/
'COR.TIN',536.70/
'CRD.PAS',8,8/
'STA'/
'TIT.CAS','C$CYC LP $LPCI, $ATICL $BOR PPM, $OSCH HRS, P= 20%, B3 AT  574, PDIL J'/
'COR.OPE', 20.0/
'COR.TIN',535.10/
'CRD.PAS',8,9/
'STA'/
'TIT.CAS','C$CYC LP $LPCI, $ATICL $BOR PPM, $OSCH HRS, P= 10%, B3 AT  413, PDIL K'/
'COR.OPE', 10.0/
'COR.TIN',533.60/
'CRD.PAS',8,10/
'STA'/
'TIT.CAS','C$CYC LP $LPCI, $ATICL $BOR PPM, $OSCH HRS, P=  1%, B3 AT  252, PDIL L'/
'COR.OPE',  1.0/
'COR.TIN',532.16/
'CRD.PAS',8,11/
'STA'/
'END'/
EOF1
#
#  Execute SIMULATE-3
#
#    s3v402b -h s3O$LPCI$TIL$SEQ -t /RPG3/Sp/OPPD/Oppd/t3oppd$CYC.1 -l t -e n -r all >>$day 2>>$day

     rsh bigBlue /user/tom/com/s3asas s3O$LPCI$TIL${SEQ}.i s3O$LPCI${TIL}os.r >>$day 2>>$day

#
# copy files from IBM to HP and rename to script names
#

     mv ${IBMIN}/s3O$LPCI$TIL${SEQ}.i s3O$LPCI$TIL${SEQ}.i >>$day 2>>$day
     mv ${IBMOUT}/s3O$LPCI$TIL${SEQ}.i.out s3O$LPCI$TIL${SEQ}.o >>$day 2>>$day
     mv ${IBMOUT}/s3O$LPCI$TIL${SEQ}.i.sum s3O$LPCI$TIL${SEQ}.s >>$day 2>>$day

#
#  Create Mongoose Input
#

#
# run job under tmp space on HP workstation
#
     cd $ASASDIR
     ln -s $in USERIN >>$day 2>>$day
     ln -s out.$LPCI$TIL$SEQ USEROT >>$day 2>>$day
     ln -s $cts CTSFIL >>$day 2>>$day
     ln -s $ats ATSFIL >>$day 2>>$day
     ln -s $plt PLTFIL >>$day 2>>$day
     mv ${IBMOUT}/s3O$LPCI$TIL${SEQ}.i.pin s3O$LPCI$TIL${SEQ}.p >>$day 2>>$day

     cat << EOF2 > $in 2>>$day
TIT.RUN C$CYC LP $LPCI, $ATICL $BOR PPM, $OSCH HRS - Run asa$LPCI$TIL$SEQ
CONTROL 1 12 2 40.0 0.0 0
FUE.LIM 1 22.0 'ALL'
VUE.FIL $OLD/facgen1.out
COMMENT fcaic ftilt fgrid  fe   fcal fdep  ftrip fasi
UNC.FAC 1.038 1.030 1.0075 1.00 1.00 0.975  0.0   .00
COR.LHR 6.057
TIT.CAS  1 1.7700 '$TIL-$OSCH-A  PDIL CASE A - 100% POWER, ARO'
TIT.CAS  2 1.9400 '$TIL-$OSCH-B  PDIL CASE B - 100% POWER, BANK 4 AT  945'
TIT.CAS  3 1.9500 '$TIL-$OSCH-C  PDIL CASE C -  90% POWER, BANK 4 AT  945'
TIT.CAS  4 1.9500 '$TIL-$OSCH-D  PDIL CASE D -  80% POWER, BANK 4 AT  784'
TIT.CAS  5 1.9500 '$TIL-$OSCH-E  PDIL CASE E -  70% POWER, BANK 4 AT  623'
TIT.CAS  6 2.0700 '$TIL-$OSCH-F  PDIL CASE F -  60% POWER, BANK 4 AT  462, BANK 3 AT 1218'
TIT.CAS  7 2.1900 '$TIL-$OSCH-G  PDIL CASE G -  50% POWER, BANK 4 AT  301, BANK 3 AT 1057'
TIT.CAS  8 2.2300 '$TIL-$OSCH-H  PDIL CASE H -  40% POWER, BANK 4 AT  140, BANK 3 AT  896'
TIT.CAS  9 2.2500 '$TIL-$OSCH-I  PDIL CASE I -  30% POWER, BANK 3 AT  735'
TIT.CAS 10 2.2600 '$TIL-$OSCH-J  PDIL CASE J -  20% POWER, BANK 3 AT  574'
TIT.CAS 11 2.2900 '$TIL-$OSCH-K  PDIL CASE K -  10% POWER, BANK 3 AT  413'
TIT.CAS 12 2.2900 '$TIL-$OSCH-L  PDIL CASE L -   1% POWER, BANK 3 AT  268'
SEL.ASS  1 28
SIM.FIL s3O$LPCI$TIL${SEQ}.p
EDT.REQ 'POWER     '
EDT.REQ 'ASI-FISS  '
EDT.REQ 'PFDL      '
EDT.REQ 'FI-FISS   '
EDT.REQ 'FILOC-FISS'
EDT.REQ 'FQ-FISS   '
EDT.REQ 'FE-THRM   '
EDT.REQ 'FELOC-THRM'
EDT.REQ 'FQ-THRM   '
EXECUTE
```

Figure 10
Sample Procedure to Generate SIMULATE-3 and ASAS Input Files
And Execute the Codes for the Flyspeck Analysis
Page 6 of 6

```
EOF2
#
# Execute ASAS
#
    //tom/user/tom/asas/Rev1/asas >> $day 2>>$day
#
# Remove SIMULATE-3 pin file
#
    test -f s3O$LPCI$TIL${SEQ}.p && rm s3O$LPCI$TIL${SEQ}.p >> $day 2>>$day
#
# normal termination
#
    test -f USEROT && rm USEROT >>$day 2>>$day
    test -f CTSFIL && rm CTSFIL >>$day 2>>$day
    test -f ATSFIL && rm ATSFIL >>$day 2>>$day
    test -f PLTFIL && rm PLTFIL >>$day 2>>$day
    echo ' The finish date and time is `date`' >>$day 2>>$day
    echo ' '
    echo ' ************************************************************' >>$day 2>>$day
    cat out.$LPCI$TIL$SEQ $day >$out 2>>$day
    test -f out.$LPCI$TIL${SEQ} && rm out.$LPCI$TIL${SEQ}
    cd $OLD
    rm -r $ASASDIR
#
# Check that files exist and then compress
# Deleted $plt file because it isn't being generated
  for each in \
  $out \
  $ats \
  $cts \
  $day \
  s3O$LPCI$TIL$SEQ.i \
  s3O$LPCI$TIL$SEQ.o
  do
  test -f $each
  if [ "$?" != "0"  ] ; then
          echo "ERROR: FILE $each NOT FOUND"
          echo "flyproc ABORTED"
          exit
      else
          compress $each
  fi
  done
#
# EXIT:
#
    exit 0
```

Figure 11
Sample Script File to Execute Flyproc for 100 Timepoints
Page 1 of 2

```
flyproc A B 00 10.5 15
flyproc A B 01 11.0 15
flyproc A B 02 11.5 15
flyproc A B 03 12.0 15
flyproc A B 04 12.5 15
flyproc A B 05 13.0 15
flyproc A B 06 13.5 15
flyproc A B 07 14.0 15
flyproc A B 08 14.5 15
flyproc A B 09 15.0 15
flyproc A B 10 15.5 15
flyproc A B 11 16.0 15
flyproc A B 12 16.5 15
flyproc A B 13 17.0 15
flyproc A B 14 17.5 15
flyproc A B 15 18.0 15
flyproc A B 16 18.5 15
flyproc A B 17 19.0 15

flyproc A B 18 23.5 15
flyproc A B 19 24.0 15
flyproc A B 20 24.5 15
flyproc A B 21 25.0 15
flyproc A B 22 25.5 15
flyproc A B 23 26.0 15
flyproc A B 24 26.5 15
flyproc A B 25 27.0 15
flyproc A B 26 27.5 15
flyproc A B 27 28.0 15
flyproc A B 28 28.5 15
flyproc A B 29 29.0 15
flyproc A B 30 29.5 15
flyproc A B 31 30.0 15
flyproc A B 32 30.5 15
flyproc A B 33 31.0 15
flyproc A B 34 31.5 15
flyproc A B 35 32.0 15
flyproc A B 36 32.5 15
flyproc A B 37 33.0 15

flyproc A B 38 39.0 15
flyproc A B 39 39.5 15
flyproc A B 40 40.0 15
flyproc A B 41 40.5 15
flyproc A B 42 41.0 15
flyproc A B 43 41.5 15
flyproc A B 44 42.0 15
flyproc A B 45 42.5 15
flyproc A B 46 43.0 15
flyproc A B 47 43.5 15
flyproc A B 48 44.0 15
flyproc A B 49 44.5 15
flyproc A B 50 45.0 15
flyproc A B 51 45.5 15
flyproc A B 52 46.0 15
flyproc A B 53 46.5 15
flyproc A B 54 47.0 15
flyproc A B 55 47.5 15
flyproc A B 56 48.0 15
flyproc A B 57 48.5 15
flyproc A B 58 49.0 15

flyproc A B 59 54.5 15
flyproc A B 60 55.0 15
flyproc A B 61 55.5 15
flyproc A B 62 56.0 15
flyproc A B 63 56.5 15
flyproc A B 64 57.0 15
flyproc A B 65 57.5 15
flyproc A B 66 58.0 15
flyproc A B 67 58.5 15
flyproc A B 68 59.0 15
flyproc A B 69 59.5 15
flyproc A B 70 60.0 15
flyproc A B 71 60.5 15
flyproc A B 72 61.0 15
flyproc A B 73 61.5 15
flyproc A B 74 62.0 15
flyproc A B 75 62.5 15
flyproc A B 76 63.0 15
flyproc A B 77 63.5 15
flyproc A B 78 64.0 15
flyproc A B 79 64.5 15
flyproc A B 80 65.0 15
flyproc A B 81 65.5 15
flyproc A B 82 66.0 15

flyproc A B 83 72.0 15
flyproc A B 84 72.5 15
flyproc A B 85 73.0 15
flyproc A B 86 73.5 15
flyproc A B 87 74.0 15
```

Figure 11
Sample Script File to Execute Flyproc for 100 Timepoints
Page 2 of 2

```
flyproc A B 88 74.5 15
flyproc A B 89 75.0 15
flyproc A B 90 75.5 15
flyproc A B 91 76.0 15
flyproc A B 92 76.5 15
flyproc A B 93 77.0 15
flyproc A B 94 77.5 15
flyproc A B 95 78.0 15
flyproc A B 96 78.5 15
flyproc A B 97 79.0 15
flyproc A B 98 79.5 15
flyproc A B 99 80.0 15
```

Figure 12
Sample Code to Concatenate and Sort Multiple CTS and ATS Files
Page 1 of 4

```
      program concat
      integer*4 ISHOST,getpid_,getuid_,process_id,flag
      character*8 NAME,TTIME
      character*10 TDATE
      character*32 HNAME
      character*4 dummy
      character*3 opt
      character*1 separator
      character*6 caselabel,casetest
      character*132 inputdir,outputfile,inputfile,currentdir
      character*12 columnlabel(15),rodconfigurationlabel(200,20)
      character*12 rodnewconfigurationlabel(20),filename
      character*132 headerrecord(20),outputctsfile,outputatsfile
      integer case,configuration,column,location(2,20,200)
      integer numberofheaderrecords,i,j,k,startingfilenumber
      integer endingfilenumber,filenumber,blank,blank2
      integer axi<1>odes,fields,casenumber,cases
      integer*4 readstatus
      real data(15,20,300),percentpower(200,20),axialshapeindex(200,20)
      real radialpeakingfactor(200,20),axialpeakingfactor(200,20)
      real axialdata(200,20,50)
      write (*,'(a,$)') 'Enter the directory containing the files to pro
     *cess: '
      read (*,'(a80)') inputdir
 2000 write (*,'(a,$)') 'Is this an ats or cts file concatanation: '
      read (*,'(a3)') opt
      write (*,'(a,$)') 'Enter the starting file number to process: '
      read (*,'(i2)') startingfilenumber
      write (*,'(a,$)') 'Enter the ending file number to process: '
      read (*,'(i2)') endingfilenumber
      write (*,'(a,$)') 'Enter the name of the output file (extensions w
     *ill be added): '
      read (*,'(a80)') outputfile
      blank=index(outputfile,' ')
      dummy='.cts'
      outputctsfile=outputfile(1:blank-1)//dummy
      dummy='.ats'
      outputatsfile=outputfile(1:blank-1)//dummy

C Data Initialization

      separator='/'
      configuration=1
      filenumber=startingfilenumber
      DATA rodnewconfigurationlabel/'4-00-BOC  ','4-25-BOC  ',
     *'4-25-BOC  ','4-38-BOC  ','4-51-BOC  ','4-63-BOC  ',
     *'4-76-BOC  ','4-89-BOC  ','3-41-BOC  ','3-54-BOC  ',
     *'3-67-BOC  ','3-79-BOC  ',8*' '/
      if (opt.eq.'ats') goto 10000
      if (opt.ne.'cts') then
        write (*,'(a)') 'Concatanation Option not ats or cts please rest
     *art'
      goto 2000
      endif

C Open the output file

      open (unit=11 ,file=outputctsfile,status='UNKNOWN',
     *      iostat= readstatus,err=1200)

C Construct the name of the file to process for cts files

   10 filename(1:5)='asaAB'
      write (filename(6:7),'(i2.2)') filenumber
      filename(8:11)='.cts'
      if (inputdir.eq.'') then
        flag=getcwd_(currentdir)
        blank=index(currentdir,' ')
        inputdir(1:blank-1)=currentdir
      endif
      blank=index(inputdir,' ')
      inputfile(1:blank-1)=inputdir
      inputfile(blank:blank)=separator
      inputfile(blank+1:132)=filename
C     write (*,*) 'Processing filename = ',inputfile

C Opening the data file to read in data

      open (unit=10,file=inputfile,status='OLD',iostat=readstatus,err=11
     *00)

C Read the header records until a CASE statement is reached

   20 read (10,'(1x,a6)',end=1000) caselabel
      if (caselabel.ne.'*CASE') goto 20

C Read the data labels on the CASE statement line

      backspace(10)
      read (10,'(1x,a6,1x,10(a12,3x))') caselabel,(columnlabel(i),i=1,10
     *)
```

Figure 12
Sample Code to Concatenate and Sort Multiple CTS and ATS Files
Page 2 of 4

```
C Read in the data records until the end-of-file is reached

   30 read (10,'(i5,3x,a12,3x,f9.3,4x,1p,3e15.6,19,6x,2e15.6,19,6x,
     *e15.6)',end=1000)
     *configuration,rodconfigurationlabel(filenumber,configuration),
     *(data(column,configuration,filenumber+1),column=1,4),
     *location(1,configuration,filenumber+1),
     *(data(column,configuration,filenumber+1),column=5,6),
     *location(2,configuration,filenumber+1),
     *data(7,configuration,filenumber+1)
      configuration=configuration+1
      goto 30

 1000 filenumber=filenumber+1
      close (10)
      if (filenumber.le.endingfilenumber) goto 10

C**********************************
C End of Files reached printout file
C**********************************

C Write the Header Records

      write (11,'(a)') ' "Header Records"   8'
      write (11,'(a)') ' "File Version Number"   1'
      blank=index(inputdir,' ')
      blank2=index(outputfile,' ')
      write (11,'(a,a,a,a,a)') ' "Original Path Name" "',
     *      inputdir(1:blank-1),'/',outputfile(1:blank2-1),'"'
      process_id=getpid_()
      ISHOST=hostnm_(HNAME)
      CALL getlog_(NAME)
      blank=index(HNAME,' ')
      write (11,'(a,a,a)') ' "Machine" "',HNAME(1:blank-1),'"'
      blank=index(NAME,' ')
      write (11,'(a,a,a)') ' "User" "',NAME(1:blank-1),'"'
      write (11,'(a,i5,a)') ' "JOBID" "',process_id,'"'
      CALL XDATE(TDATE)
      CALL XTIME(TTIME)
      write (11,'(a,a,a)') ' "Date" "',TDATE,'"'
      write (11,'(a,a,a)') ' "Time" "',TTIME,'"'
      write (11,'(a)') ' "Program" "ASAS 1.0 MOD 1"'
      write (11,'(a)')'    11                "Names"'
      write (11,'(i5,13x,a7)') configuration-1,
     *     '"Files"'
      do 60 i=1,configuration-1
        write (11,'(i5,13x,a12)') endingfilenumber-startingfilenumber+1,
     *       '"Timepoints"'
        write (11,'(1x,a6,1x,10(a12,3x))') caselabel,(columnlabel(k),k=1
     *,10)
        do 50 j=1,endingfilenumber
   50     write (11,'(i5,3x,a12,3x,f9.3,4x,1p,3e15.6,19,6x,2e15.6,19,6x,
     *    e15.6)')
     *    j,rodconfigurationlabel(j,i),
     *    (data(column,i,j),column=1,4),
     *    location(1,i,j),
     *    (data(column,i,j),column=5,6),
     *    location(2,i,j),
     *    data(7,i,j)

   60     write (11,'(i5,3x,a12,3x,f9.3,4x,1p,3e15.6,19,6x,
     *    2e15.6,19,6x,e15.6)')
     *    j,rodnewconfigurationlabel(i),
     *    (data(column,i,j),column=1,4),
     *    location(1,i,j),
     *    (data(column,i,j),column=5,6),
     *    location(2,i,j),
     *    data(7,i,j)

      close (11)
      goto 9999

 1100 blank=index(inputfile,' ')
      write (*,*) "Error opening input file: ",inputfile(1:blank-1),
     ** check filename"
      goto 9999

 1200 blank=index(outputctsfile,' ')
      write (*,*) "Error opening CTS output file: ",
     *outputctsfile(1:blank-1)," check filename"
      goto 9999

 1300 blank=index(outputatsfile,' ')
      write (*,*) "Error opening ATS output file: ",
     *outputatsfile(1:blank-1)," check filename"
      goto 9999

C**************************************
C This is the ATS file processing section
C**************************************
```

Figure 12
Sample Code to Concatenate and Sort Multiple CTS and ATS Files
Page 3 of 4

```
C Open the output file

10000 open (unit=11,file=outputatsfile,status='UNKNOWN',
     *      iostat=readstatus,err=1300)

C Construct the name of the file to process for cts files

      ',lenumber=startingfilenumber
  110 filename(1:5)='asaAB'
      write (filename(6:7),'(i2.2)') filenumber
      filename(8:11)='.ats'
      if (inputdir.eq.'') then
        flag=getcwd_(currentdir)
        blank=index(currentdir,' ')
        inputdir(1:blank-1)=currentdir
      endif
      blank=index(inputdir,' ')
      inputfile(1:blank-1)=inputdir
      inputfile(blank:blank)=separator
      inputfile(blank+1:132)=filename
C     write (*,*) 'Processing filename = ',inputfile

C Opening the data file to read in data

      open (unit=10,file=inputfile,status='OLD',iostat=readstatus,err=11
     *00)

C Read the header records

  120 read (10,'(i5)',end=3000) axialnodes
      read (10,'(i5)',end=3000) fields
      read (10,'(i5)',end=3000) casenumber
      read (10,'(1x,a12)',end=3000)
     *      rodconfigurationlabel(filenumber,casenumber)
      read (10,'(f11.3)',end=3000) percentpower(filenumber,casenumber)
      read (10,'(e15.5)',end=3000) axialshapeindex(filenumber,
     *      casenumber)
      read (10,'(f11.5)',end=3000) radialpeakingfactor(filenumber,
     *      casenumber)
      read (10,'(f11.5)',end=3000) axialpeakingfactor(filenumber,
     *      casenumber)
      read (10,'(a132)',end=3000) headerrecord(1)

C Read in the data records until the end-of-file is reached

      do 130 i=1,axialnodes
  130 read (10,'(4x,f12.5)',end=3000) axialdata(filenumber,casenumber,i)
      goto 120

 3000 filenumber=filenumber+1
      if (filenumber.le.endingfilenumber) goto 110

C Write out the ats file

      write (11,'(a)') ' "Header Records"   8'
      write (11,'(a)') ' "File Version Number"   1'
      blank=index(inputdir,' ')
      blank2=index(outputfile,' ')
      write (11,'(a,a,a,a,a)') ' "Original Path Name" "',
     *      inputdir(1:blank-1),'/',outputfile(1:blank2-1),'"'
      process_id=getpid_()
      ISHOST=hostnm_(HNAME)
      CALL getlog_(NAME)
      blank=index(HNAME,' ')
      write (11,'(a,a,a)') ' "Machine" "',HNAME(1:blank-1),'"'
      blank=index(NAME,' ')
      write (11,'(a,a,a)') ' "User" "',NAME(1:blank-1),'"'
      write (11,'(a,i5,a)') ' "JOBID" "',process_id,'"'
      CALL XDATE(TDATE)
      CALL XTIME(TTIME)
      write (11,'(a,a,a)') ' "Date" "',TDATE,'"'
      write (11,'(a,a,a)') ' "Time" "',TTIME,'"'
      write (11,'(a)') ' "Program" "ASAS 1.0 MOD 1"'
      write (11,'(i5,15x,a13)') axialnodes,'"Axial Nodes"'
      write (11,'(i5,15x,a16)') fields,'"Fields on File"'
      cases=endingfilenumber-startingfilenumber+1

      do 200 j=1,casenumber
        do 200 i=1,cases
          filenumber=startingfilenumber+i-1
          write (11,'(i5,15x,a13)') (j-1)*cases+i,'"Case Number"'
          write (11,'(1x,a12,7x,a9)')
     *          rodnewconfigurationlabel(j),'"Case ID"'
          write (11,'(f11.3,9x,a20)') percentpower(filenumber,j),
     *          '"Percent Full Power"'
          write (11,'(2x,e13.6,5x,a18)') axialshapeindex(filenumber,j),
     *          '"Core Average ASI"'
          write (11,'(3x,f8.5,9x,a28)')
     *          radialpeakingfactor(filenumber,j),
     *          '"Radial Peaking Factor (FR)"'
          write (11,'(3x,f8.5,9x,a22)')
```

Figure 12
Sample Code to Concatenate and Sort Multiple CTS and ATS Files
Page 4 of 4

```
     *          axialpeakingfactor(filenumber,j),
     *          ''Axial Peaking Factor''
          write (11,'(a132)') headerrecord(1)
            do 200 k=1,axialnodes
 200          write (11,'(i4,4x,f8.6)') k,axialdata(filenumber,j,k)

 9999 close (11)
      end

C
C*************************************************************************
      SUBROUTINE XDATE(ADATE)
      CHARACTER*10 ADATE,ID
      DIMENSION IDT(3)
      CALL IDATE(IDT(1),IDT(2),IDT(3))
      WRITE(ID,'(I2.2,I2.2,I4.4)')IDT(2),IDT(1),IDT(3)
      WRITE(ADATE,'(A4,''/'',A2,''/'',A2)') ID(5:8),ID(1:2),ID(3:4)
      RETURN
      END
C
C*************************************************************************
      SUBROUTINE XTIME(ATIME)
      CHARACTER*8 ATIME
      DIMENSION ITM(3)
      CALL ITIME(ITM(1),ITM(2),ITM(3))
      WRITE(ATIME,10)ITM(1),ITM(2),ITM(3)
 10   FORMAT(I2.2,':',I2.2,':',I2.2)
      RETURN
      END
```

Figure 13
Sample User Output File
Page 1 of 37

```
1         PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                PAGE    1
          A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE


******** INPUT ECHO *********


TIT.RUN Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
CONTROL 2 2 3 40 1 1 1
FUE.LIM 1 15.0 'TYPE1'
FUE.LIM 2 16.0 'TYPE2'
LAY.UWN                                1   2
                              1   2   1   2   1
                          2   1   2   1   2   1
                              1   2   1   2   1   2
                              2   1   2   1   2   1
                        1     2   1   2   1   2   1
                        2     1   2   1   2   1   2
VUE.FIL facgen1.out
COMMENT fcalc ftilt fgrid   fe    fcalor fdep   ftrip fasi
UNC.FAC 1.10  1.03  1.0075  1.03  1.02   0.975  3.0   .04
COR.LHR 6.00
TIT.CAS  1 1.7700 'B-10.5-A  PDIL CASE A - 100% POWER, ARO'
TIT.CAS  2 2.3320 'B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 574'
SEL.ASS  3  1 10 39
SIM.FIL /RPG3/Sp/OPPD/s30test.p
EDT.REQ 'ASI-ASS    '
EDT.REQ 'ASI-PER    '
EDT.REQ 'ASI-CORE   '
EDT.REQ 'PPDL       '
EDT.REQ 'LHGR W/UNC'
EDT.REQ 'FZLOC-FISS'
EDT.REQ 'ASSEMBLY #'
EDT.REQ 'EXCORE RES'
EXECUTE


******** END OF INPUT ECHO *********
```

Figure 13
Sample User Output File
Page 2 of 37

```
1         PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                PAGE    2
          A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE

 LISTING OF DATA TO BE USED FOR THIS RUN:

 RUN TITLE = Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest

 CONTROL PARAMETERS:
  NUMBER OF FUEL TYPES            =   2
  NUMBER OF CASES IN RUN          =   2
  ASSEMBLY SELECTION OPTION       =   3
  NUMBER OF PLANES FOR AXIAL FIT  =  40
  SHORT/LONG OUTPUT OPTION        =   1
  GENERATE PLOT FILE (0/1)        =   1
  1D/3D ATS OUTPUT OPTION (0/1)   =   1

 FUEL LIMITS DATA:
 FUEL     LHGR
 TYPE     SAFDL      FUEL
  #      (KW/FT)     TYPE
 ----    -------    ------
   1      15.00      TYPE1
   2      16.00      TYPE2

 FUEL TYPE NUMBER LAYDOWN DATA:
                                1   2
                      1   2   1   2   1
                  2   1   2   1   2   1
                  1   2   1   2   1   2
                  2   1   2   1   2   1
              1   2   1   2   1   2   1
              2   1   2   1   2   1   2

 NAME OF FILE CONTAINING DETECTOR VIEW FACTORS  = facgen1.out

 UNCERTAINTY FACTOR DATA:
  CALCULATIONAL UNCERTAINTY FACTOR (FCALC)                =  1.1000
  AZIMUTHAL TILT UNCERTAINTY FACTOR (FTILT)               =  1.0300
  GRID DIP FACTOR (FGRID)                                 =  1.0075
  ENGINEERING (FABRICATION) FACTOR (FE)                   =  1.0300
  CALORIMETRIC POWER UNCERTINTY FACTOR (FCALOR)           =  1.0200
  FUEL ENERGY DEPOSITION FACTOR (FDEP)                    =   .9750
  TRIP OVERSHOOT POWER UNCERTAINTY FACTOR (FTRIP)         =  3.0000 % POWER
  PERIPHERAL ASI       UNCERTAINTY FACTOR (FASI)          =   .0400 DELTA ASI

 CORE AVERAGE LHGR =  6.0000 KW/FT

 CASE TITLES AND RADIAL PEAKING FACTORS
        RADIAL
 CASE   PEAKING
  #     FACTOR    CASE TITLE
 ----   -------   ------------------
   1    1.7700    B-10.5-A  FDIL CASE A -  100% POWER, ARO
   2    2.3320    B-10.5-J  FDIL CASE J -  20% POWER, BANK 3 AT 574

 USER-SELECTED ASSEMBLIES =   1 10 19
```

Figure 13
Sample User Output File
Page 3 of 37

```
1          PROGRAM ASAS VERSION 1. REV DATE 4/12/94.    TODAY'S DATE IS 04/12/94. THE TIME IS 08:19:49                PAGE    3
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE

 LISTING OF DATA TO BE USED FOR THIS RUN (CONTINUED):

 SIMULATE-3 PIN FILE NAME = /RPG3/Sp/OPPD/s3Otest.p

 REQUESTED EDITS FOR THE CTS FILE:

 ASI-ASS
 ASI-PEP
 ASI-CORE
 PPDL
 LHGR W/UNC
 FILOC-FISS
 ASSEMBLY #
 EXCORE RES

 FLAT-WEIGHTED ASSEMBLY-AVERAGE VIEW FACTORS:
                                        .28040   .14700
                    .19549   .14420   .07760   .03640   .02720
              .03959   .02911   .02230   .01431   .00000   .00000
              .00000   .00000   .00000   .00000   .00000   .00000
              .00000   .00000   .00000   .00000   .00000   .00000
    .00000    .00000   .00000   .00000   .00000   .00000   .00000
    .00000    .00000   .00000   .00000   .00000   .00000   .00000
 WEIGHTED SUM OF FACTORS =   .99999
 MAXREC,MAXSTA,MAXPIN,MAXHED,IAFUL =  1419    2  256   15   13
```

Figure 13
Sample User Output File


```
1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49          PAGE    4
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME : /RPG3/Sp/OPPD/s30test.p
           RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID       : B-10.5-A  PDIL CASE A - 100% POWER, ARO

           XPO   = 10.500   GWD/MT,       EBAR = 16.119 GWD/MT, POWER = 100.00%, FLOW     = 100.00%
           NOTWT =   15120. STEPS INSERTED, FQ =  2.000, F-DELTA-H =  1.653,  INCORE ASI =   .0078,  PERIPHERAL ASI =   .0023
           TOTAL RELATIVE EXCORE SIGNAL        =  .4425

 TOTAL FUEL   PINS IN QUARTER CORE =  5804.0
 TOTAL OF ALL PINS IN QUARTER CORE =  6517.0

           EDIT OF ASSEMBLY NUMBERS TO BE PROCESSED (AND REASONS FOR SELECTION) FOR FUEL TYPE:
            TYPE1          TYPE2
            -----          -----

              1             10
         USER SELECT   USER SELECT

             18             39
         FQ-PLANE 1    USER SELECT

             16             35
         FQ-PLANE 2    FQ-PLANE 1

             25             19
         FQ-PLANE 16   FQ-PLANE 16
```

Figure 13
Sample User Output File
Page 5 of 37

```
1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94    TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                PAGE    5
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME  : /RPG3/Sp/OPPD/s30test.p
           RUN TITLE      : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID        : B-10.5-A  PDIL CASE A - 100% POWER, ARO

           XPO    = 10.500   GWD/MT,        EBAR = 16.119 GWD/MT, POWER = 100.00%, FLOW     = 100.00%
           NOTWT =   15120. STEPS INSERTED, FQ =  2.000, F-DELTA-H =  1.653,  INCORE ASI =   .0078,  PERIPHERAL ASI =   .0023
           TOTAL RELATIVE EXCORE SIGNAL       =  .4425

           FUEL TYPE : TYPE1
           PIN POWERS FOR LIMITING LHGR PLANE  8 FOR ASSEMBLY  1,SERIAL NUMBER OMN012
                 1       2       3       4       5       6       7       8       9       10      11      12      13      14
        1     .0565   .0591   .0630   .0668   .0704   .0744   .0804   .0825   .0814   .0828   .0845   .0862   .0879   .0918
        2     .0644   .0709   .0780   .0828   .0849   .0865   .0888   .0910   .0938   .0981   .1025   .1043   .1039   .1054
        3     .0757   .0854   ----    ----    .1021   .1014   .1020   .1045   .1095   .1169   ----    ----    .1230   .1219
        4     .0892   .1000   ----    ----    .1186   .1176   .1181   .1208   .1266   .1350   ----    ----    .1412   .1393
        5     .1052   .1137   .1239   .1307   .1333   .1354   .1374   .1405   .1456   .1513   .1574   .1593   .1571   .1572
        6     .1259   .1293   .1364   .1431   .1493   .1563   .1632   .1672   .1685   .1697   .1721   .1737   .1741   .1763
        7     .1559   .1495   .1527   .1588   .1668   .1793   ----    ----    .1957   .1920   .1924   .1936   .1945   .1973
        8     .1800   .1724   .1754   .1817   .1901   .2046   ----    ----    .2219   .2162   .2164   .2177   .2194   .2242
        9     .1964   .1987   .2073   .2155   .2225   .2305   .2370   .2416   .2441   .2455   .2485   .2504   .2507   .2544
       10     .2253   .2349   .2509   .2600   .2600   .2595   .2580   .2617   .2721   .2831   .2952   .2978   .2916   .2911
       11     .2636   .2795   ----    ----    .3040   .2942   .2899   .2939   .3080   .3296   ----    ----    .3412   .3340
       12     .3085   .3232   ----    ----    .3437   .3324   .3294   .3347   .3489   .3731   ----    ----    .3879   .3813
       13     .3592   .3628   .3766   .3818   .3767   .3738   .3785   .3865   .3956   .4118   .4302   .4361   .4303   .4344
       14     .4228   .4128   .4142   .4166   .4195   .4279   .4495   .4633   .4603   .4667   .4761   .4835   .4894   .5053


           FZ FACTORS FOR ASSEMBLY  1, SERIAL NUMBER OMN012
                 1       2       3       4       5       6       7       8       9       10      11      12      13      14
        1   1.1460  1.1412  1.1380  1.1363  1.1359  1.1363  1.1375  1.1362  1.1331  1.1305  1.1286  1.1276  1.1276  1.1277
        2   1.1440  1.1389  1.1345  1.1334  1.1355  1.1363  1.1361  1.1349  1.1329  1.1300  1.1256  1.1246  1.1269  1.1270
        3   1.1435  1.1368  ----    ----    1.1333  1.1362  1.1364  1.1352  1.1328  1.1276  ----    ----    1.1242  1.1265
        4   1.1445  1.1376  ----    ----    1.1340  1.1371  1.1368  1.1357  1.1335  1.1283  ----    ----    1.1251  1.1274
        5   1.1469  1.1426  1.1376  1.1361  1.1380  1.1380  1.1365  1.1354  1.1345  1.1322  1.1284  1.1276  1.1297  1.1300
        6   1.1503  1.1467  1.1443  1.1424  1.1406  1.1375  1.1326  1.1313  1.1342  1.1393  1.1349  1.1343  1.1339  1.1328
        7   1.1548  1.1498  1.1473  1.1448  1.1416  1.1347  ----    ----    1.1322  1.1373  1.1382  1.1381  1.1370  1.1353
        8   1.1565  1.1518  1.1497  1.1475  1.1445  1.1376  ----    ----    1.1347  1.1399  1.1409  1.1409  1.1401  1.1391
        9   1.1553  1.1525  1.1503  1.1486  1.1472  1.1439  1.1384  1.1372  1.1408  1.1422  1.1419  1.1416  1.1415  1.1405
       10   1.1548  1.1520  1.1468  1.1456  1.1483  1.1484  1.1467  1.1456  1.1453  1.1435  1.1390  1.1384  1.1417  1.1422
       11   1.1558  1.1499  ----    ----    1.1469  1.1521  1.1513  1.1502  1.1485  1.1425  ----    ----    1.1404  1.1446
       12   1.1581  1.1523  ----    ----    1.1493  1.1541  1.1547  1.1541  1.1519  1.1456  ----    ----    1.1439  1.1482
       13   1.1613  1.1589  1.1537  1.1526  1.1560  1.1577  1.1578  1.1576  1.1560  1.1510  1.1482  1.1478  1.1517  1.1528
       14   1.1643  1.1630  1.1613  1.1602  1.1603  1.1607  1.1611  1.1617  1.1596  1.1578  1.1564  1.1562  1.1568  1.1572

           ASSEMBLY AXIAL PEAKING FACTOR   =  1.1463 (FROM 16 PLANE DATA)
```

Figure 13
Sample User Output File
Page 6 of 37

```
1       PROGRAM ASAS VERSION 1. REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94. THE TIME IS 08:39:49                    PAGE    6
        A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
        PIN FILE NAME : /RPG3/Sp/OPPD/a30test.p
        RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
        CASE ID       : B-10.5-A  PDIL CASE A - 100% POWER, ARO

        XPO   = 10.500   GWD/MT.        EBAR = 16.119 GWD/MT, POWER = 100.00%, FLOW     = 100.00%
        NOTWI =   15120. STEPS INSERTED, FQ =  2.000, F-DELTA-H =  1.653,  INCORE ASI =   .0078,  PERIPHERAL ASI =   .0023
        TOTAL RELATIVE EXCORE SIGNAL        =  .4425

        FUEL TYPE : TYPE1
        2D PIN POWERS FOR ASSEMBLY  1, SERIAL NUMBER OMN012
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
     1    .0496   .0519   .0556   .0590   .0621   .0656   .0708   .0727   .0720  .0732  .0751  .0767  .0782  .0816
     2    .0565   .0623   .0688   .0732   .0748   .0761   .0782   .0802   .0829  .0869  .0913  .0930  .0923  .0937
     3    .0664   .0753   ----    ----    .0902   .0892   .0898   .0920   .0966  .1039  ----   ----   .1096  .1082
     4    .0781   .0879   ----    ----    .1047   .1034   .1039   .1064   .1117  .1198  ----   ----   .1257  .1236
     5    .0918   .0995   .1089   .1151   .1172   .1190   .1209   .1237   .1283  .1337  .1396  .1414  .1391  .1391
     6    .1095   .1127   .1192   .1253   .1309   .1375   .1441   .1478   .1486  .1495  .1516  .1531  .1535  .1556
     7    .1352   .1300   .1331   .1387   .1461   .1580   ----    ----    .1729  .1688  .1690  .1701  .1710  .1737
     8    .1559   .1497   .1526   .1583   .1661   .1798   ----    ----    .1955  .1897  .1896  .1908  .1924  .1968
     9    .1702   .1724   .1802   .1876   .1940   .2015   .2082   .2124   .2140  .2149  .2176  .2193  .2196  .2231
    10    .1951   .2039   .2188   .2270   .2265   .2260   .2250   .2284   .2376  .2476  .2591  .2616  .2554  .2549
    11    .2281   .2431   ----    ----    .2651   .2556   .2519   .2555   .2681  .2885  ----   ----   .2992  .2918
    12    .2664   .2805   ----    ----    .2990   .2880   .2853   .2900   .3029  .3256  ----   ----   .3391  .3321
    13    .3093   .3131   .3265   .3313   .3259   .3229   .3269   .3339   .3422  .3571  .3747  .3799  .3736  .3768
    14    .3632   .3550   .3567   .3591   .3615   .3686   .3871   .3988   .3970  .4031  .4117  .4182  .4231  .4367

        FUEL TYPE : TYPE1
        ADJUSTED 2D PIN POWERS FOR ASSEMBLY  1, SERIAL NUMBER OMN012 (INCLUDES GRID DIP FACTOR OF 1.0075)
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
     1    .0500   .0521   .0556   .0589   .0620   .0655   .0708   .0726   .0717  .0728  .0745  .0760  .0775  .0809
     2    .0568   .0624   .0686   .0729   .0747   .0760   .0781   .0800   .0825  .0863  .0903  .0919  .0914  .0928
     3    .0667   .0752   ----    ----    .0898   .0891   .0897   .0918   .0962  .1029  ----   ----   .1083  .1072
     4    .0786   .0879   ----    ----    .1043   .1034   .1038   .1062   .1112  .1188  ----   ----   .1243  .1224
     5    .0926   .0999   .1089   .1149   .1172   .1190   .1207   .1235   .1279  .1330  .1385  .1402  .1381  .1381
     6    .1107   .1136   .1198   .1258   .1312   .1374   .1435   .1469   .1481  .1492  .1512  .1527  .1530  .1550
     7    .1371   .1314   .1342   .1396   .1466   .1576   ----    ----    .1720  .1687  .1691  .1701  .1709  .1734
     8    .1584   .1515   .1542   .1597   .1671   .1798   ----    ----    .1950  .1900  .1902  .1914  .1928  .1970
     9    .1728   .1747   .1822   .1894   .1956   .2026   .2083   .2123   .2146  .2157  .2184  .2201  .2203  .2236
    10    .1981   .2064   .2206   .2285   .2286   .2281   .2268   .2300   .2392  .2488  .2594  .2617  .2563  .2558
    11    .2317   .2457   ----    ----    .2672   .2586   .2548   .2583   .2707  .2897  ----   ----   .2998  .2935
    12    .2712   .2840   ----    ----    .3020   .2922   .2895   .2942   .3067  .3279  ----   ----   .3410  .3351
    13    .3157   .3189   .3310   .3356   .3311   .3286   .3326   .3397   .3477  .3619  .3781  .3813  .3782  .3818
    14    .3716   .3628   .3641   .3662   .3687   .3761   .3950   .4072   .4046  .4102  .4185  .4250  .4302  .4441

        MAXIMUM 2D ONE PIN POWER          =    .4441 AT ROW 14 COLUMN 14
        MAXIMUM 2D ONE PIN POWER W/UNC    =    .5032          ( .4441 X 1.1000 X 1.0300)
        MAXIMUM CHANNEL POWER             =    .4086 AT ROW 13 COLUMN 13
        MAXIMUM 3D ONE PIN POWER          =    .5051 AT ROW 14 COLUMN 14 (INCLUDES GRID DIP FACTOR OF 1.0075)
        MAXIMUM 3D ONE PIN POWER W/UNC    =    .5768          ( .5091 X 1.1000 X 1.0300)
        MAXIMUM LHGR                      =   3.0548 KW/FT ( .5091 X 6.0000)
        MAXIMUM LHGR W/UNCERTAINTY        =   3.6362 KW/FT ( .5768 X 6.0000 X 1.0300 X 1.0200)
        FL TO 15.00 KW/FT W/O UNC         = 503.6236         ( 15.00 X 100.00 /( 3.0548 X  .9750))
        FL TO 15.00 KW/FT W/UNCERTAINTY = 420.0959         ( 15.00 X 100.00 /( 3.6362 X  .9750) = 3.0000)
        ASSEMBLY AXIAL SHAPE INDEX        =   -.0155
        ASSEMBLY AXIAL SHAPE INDEX W/UNC=    .0000

        NORMALIZED ASSEMBLY AXIAL POWER SHAPE:
        NODE              1       2       3       4       5       6       7       8
        AXIAL POWER     .6720   .8292   .9307  1.0109  1.0583  1.1052  1.1232  1.1463
        NODE              9      10      11      12      13      14      15      16
        AXIAL POWER    1.1402  1.1417  1.1145  1.0947  1.0435   .9873   .8778   .7244
```

Figure 13
Sample User Output File
Page 7 of 37

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1       PROGRAM ASAS VERSION 1, REV DATE 4/12/94    TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                PAGE    7
        A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
        PIN FILE NAME : /RPG3/Sp/OPPD/s30test.p
        RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - ssatest
        CASE ID       : B-10.5-A  PDIL CASE A - 100% POWER, ARO

        XPO   = 10.500   GWD/MT,        EBAR = 16.119 GWD/MT, POWER = 100.00%, FLOW     = 100.00%
        NOTWT =   15120. STEPS INSERTED, FQ =  2.000, F-DELTA-H =  1.653,  INCORE ASI =   .0078,  PERIPHERAL ASI =   .0023
        TOTAL RELATIVE EXCORE SIGNAL      =  .4425

        FUEL TYPE : TYPE1
        PIN POWERS FOR LIMITING LHGR PLANE  8 FOR ASSEMBLY 18,SERIAL NUMBER OMS027
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
     1   1.5877  1.4293  1.7106  1.5957  1.7028  1.7207  1.7110  1.7154  1.7318  1.7184  1.6139  1.7317  1.4454  1.5940
     2   1.4578  1.7445  1.5732  1.6924  1.6531  1.7220  1.7177  1.7214  1.7322  1.6684  1.7124  1.5941  1.7644  1.4607
     3   1.7414  1.5910    ----    ----  1.7357  1.7797  1.7488  1.7521  1.7908  1.7535    ----    ----  1.6133  1.7710
     4   1.6572  1.7237    ----    ----  1.6269  1.7920  1.7775  1.7811  1.8043  1.6478    ----    ----  1.7530  1.6691
     5   1.7784  1.6915  1.7566  1.6348  1.8423  1.8156  1.8086  1.8123  1.8289  1.8656  1.6632  1.7924  1.7253  1.7947
     6   1.7956  1.7670  1.8074  1.8076  1.8225  1.8555  1.6395  1.6429  1.8691  1.8460  1.8402  1.8469  1.8066  1.8234
     7   1.7775  1.7638  1.7811  1.7994  1.8225  1.6459    ----    ----  1.6563  1.8438  1.8303  1.8202  1.8073  1.8174
     8   1.7789  1.7664  1.7847  1.8038  1.8277  1.6518    ----    ----  1.6630  1.8501  1.8361  1.8256  1.8119  1.8211
     9   1.8031  1.7781  1.8215  1.8238  1.8406  1.8755  1.6587  1.6631  1.8914  1.8675  1.8609  1.8667  1.8244  1.8388
    10   1.7901  1.7112  1.7808  1.6610  1.8743  1.8492  1.8438  1.8486  1.8659  1.9031  1.6964  1.8261  1.7561  1.8224
    11   1.6789  1.7526    ----    ----  1.6677  1.8396  1.8269  1.8317  1.8563  1.6936    ----    ----  1.7974  1.7077
    12   1.7963  1.6270    ----    ----  1.7922  1.8415  1.8121  1.8167  1.8578  1.8190    ----    ----  1.6673  1.8253
    13   1.4943  1.7940  1.6247  1.7542  1.7196  1.7955  1.7934  1.7979  1.8108  1.7446  1.7885  1.6629  1.8366  1.5186
    14   1.6421  1.4797  1.7761  1.6638  1.7815  1.8051  1.7962  1.8007  1.8199  1.8059  1.6951  1.8160  1.5149  1.6725


        FZ FACTORS FOR ASSEMBLY 18, SERIAL NUMBER OMS027
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
     1   1.1956  1.1903  1.1931  1.1896  1.1941  1.1957  1.1958  1.1958  1.1954  1.1936  1.1886  1.1918  1.1887  1.1939
     2   1.1904  1.1924  1.1901  1.1939  1.1901  1.1947  1.1954  1.1953  1.1944  1.1894  1.1929  1.1888  1.1909  1.1887
     3   1.1934  1.1903    ----    ----  1.1948  1.1949  1.1954  1.1953  1.1945  1.1942    ----    ----  1.1889  1.1920
     4   1.1950  1.1942    ----    ----  1.1907  1.1943  1.1952  1.1951  1.1939  1.1902    ----    ----  1.1931  1.1888
     5   1.1947  1.1905  1.1950  1.1908  1.1937  1.1943  1.1939  1.1938  1.1941  1.1933  1.1902  1.1943  1.1896  1.1937
     6   1.1962  1.1951  1.1951  1.1943  1.1943  1.1935  1.1896  1.1895  1.1933  1.1940  1.1939  1.1946  1.1945  1.1955
     7   1.1962  1.1957  1.1955  1.1952  1.1938  1.1895    ----    ----  1.1895  1.1937  1.1950  1.1952  1.1953  1.1956
     8   1.1959  1.1954  1.1953  1.1950  1.1937  1.1894    ----    ----  1.1895  1.1936  1.1949  1.1952  1.1952  1.1956
     9   1.1952  1.1942  1.1943  1.1937  1.1938  1.1930  1.1892  1.1893  1.1930  1.1938  1.1937  1.1943  1.1942  1.1951
    10   1.1929  1.1889  1.1937  1.1897  1.1927  1.1935  1.1932  1.1932  1.1935  1.1927  1.1898  1.1938  1.1891  1.1932
    11   1.1875  1.1920    ----    ----  1.1893  1.1931  1.1942  1.1942  1.1931  1.1895    ----    ----  1.1924  1.1880
    12   1.1902  1.1875    ----    ----  1.1930  1.1933  1.1940  1.1941  1.1934  1.1932    ----    ----  1.1880  1.1908
    13   1.1866  1.1890  1.1872  1.1914  1.1879  1.1928  1.1937  1.1938  1.1930  1.1882  1.1918  1.1877  1.1895  1.1872
    14   1.1916  1.1865  1.1897  1.1867  1.1917  1.1935  1.1938  1.1939  1.1937  1.1920  1.1871  1.1902  1.1870  1.1918

        ASSEMBLY AXIAL PEAKING FACTOR   =   1.1926 (FROM 16 PLANE DATA)
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Figure 13
Sample User Output File
Page 8 of 37

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1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94. THE TIME IS 08:19:49                    PAGE    8
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME : /RPGJ/Sp/OPPD/a30test.p
           RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID       : B-10.5-A  PDIL CASE A - 100% POWER, ARO

           XPO   = 10.500   GWD/MT,        EBAR = 16.119 GWD/MT, POWER = 100.00%, FLOW     = 100.00%
           NOTWT =   15120, STEPS INSERTED, FQ =  2.000, F-DELTA-H =  1.653,  INCORE ASI =   .0078,  PERIPHERAL ASI =   .0023
           TOTAL RELATIVE EXCORE SIGNAL        =  .4425

           FUEL TYPE : TYPE1
           2D PIN POWERS FOR ASSEMBLY 18, SERIAL NUMBER OMS027
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
             1  1.3279  1.2009  1.4337  1.3415  1.4259  1.4391  1.4308  1.4345  1.4487  1.4397  1.3578  1.4530  1.2160  1.3351
             2  1.2246  1.4630  1.3218  1.4176  1.3891  1.4413  1.4369  1.4401  1.4503  1.4028  1.4355  1.3409  1.4816  1.2288
             3  1.4784  1.3366    ----    ----  1.4527  1.4894  1.4629  1.4660  1.4992  1.4684    ----    ----  1.3569  1.4858
             4  1.3926  1.4434    ----    ----  1.3663  1.5005  1.4872  1.4903  1.5112  1.3829    ----    ----  1.4692  1.4040
             5  1.4861  1.4209  1.4699  1.3729  1.5434  1.5202  1.5149  1.5181  1.5317  1.5634  1.3975  1.5008  1.4504  1.5035
             6  1.5011  1.4785  1.5124  1.5134  1.5260  1.5547  1.3782  1.3811  1.5663  1.5460  1.5413  1.5461  1.5125  1.5253
             7  1.4859  1.4752  1.4898  1.5055  1.5267  1.3837    ----    ----  1.3925  1.5446  1.5317  1.5229  1.5121  1.5201
             8  1.4875  1.4777  1.4931  1.5095  1.5312  1.3887    ----    ----  1.3981  1.5500  1.5366  1.5273  1.5159  1.5233
             9  1.5087  1.4889  1.5252  1.5279  1.5419  1.5721  1.3947  1.3984  1.5853  1.5644  1.5590  1.5630  1.5278  1.5386
            10  1.5006  1.4393  1.4919  1.3962  1.5714  1.5494  1.5452  1.5483  1.5634  1.5956  1.4258  1.5296  1.4768  1.5274
            11  1.4138  1.4703    ----    ----  1.4023  1.5419  1.5298  1.5338  1.5558  1.4239    ----    ----  1.5074  1.4375
            12  1.5092  1.3701    ----    ----  1.5023  1.5432  1.5176  1.5214  1.5567  1.5244    ----    ----  1.4035  1.5328
            13  1.2593  1.5089  1.3685  1.4724  1.4476  1.5052  1.5023  1.5060  1.5179  1.4683  1.5007  1.4001  1.5439  1.2792
            14  1.3781  1.2471  1.4928  1.4021  1.4950  1.5125  1.5046  1.5083  1.5246  1.5150  1.4279  1.5257  1.2763  1.4033

           FUEL TYPE : TYPE1
           ADJUSTED 2D PIN POWERS FOR ASSEMBLY 18, SERIAL NUMBER OMS027 (INCLUDES GRID DIP FACTOR OF 1.0075)
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
             1  1.3413  1.2075  1.4451  1.3481  1.4385  1.4537  1.4455  1.4491  1.4630  1.4517  1.3634  1.4630  1.2211  1.3466
             2  1.2316  1.4738  1.3290  1.4298  1.3965  1.4548  1.4511  1.4542  1.4634  1.4095  1.4467  1.3467  1.4905  1.2340
             3  1.4906  1.3441    ----    ----  1.4664  1.5035  1.4774  1.4804  1.5129  1.4814    ----    ----  1.3629  1.4961
             4  1.4001  1.4562    ----    ----  1.3744  1.5139  1.5016  1.5047  1.5243  1.3904    ----    ----  1.4809  1.4101
             5  1.4999  1.4290  1.4840  1.3811  1.5564  1.5338  1.5280  1.5310  1.5451  1.5761  1.4051  1.5143  1.4576  1.5162
             6  1.5169  1.4927  1.5269  1.5271  1.5397  1.5675  1.3851  1.3879  1.5790  1.5595  1.5546  1.5603  1.5263  1.5405
             7  1.5017  1.4901  1.5047  1.5202  1.5397  1.3905    ----    ----  1.3993  1.5577  1.5463  1.5378  1.5269  1.5354
             8  1.5028  1.4923  1.5077  1.5239  1.5441  1.3954    ----    ----  1.4049  1.5630  1.5512  1.5421  1.5307  1.5385
             9  1.5233  1.5021  1.5388  1.5407  1.5550  1.5844  1.4013  1.4050  1.5978  1.5777  1.5721  1.5770  1.5413  1.5534
            10  1.5123  1.4457  1.5044  1.4032  1.5834  1.5622  1.5576  1.5617  1.5763  1.6078  1.4331  1.5427  1.4836  1.5396
            11  1.4184  1.4806    ----    ----  1.4089  1.5541  1.5434  1.5474  1.5682  1.4308    ----    ----  1.5184  1.4427
            12  1.5175  1.3745    ----    ----  1.5141  1.5557  1.5309  1.5348  1.5695  1.5367    ----    ----  1.4086  1.5420
            13  1.2624  1.5156  1.3725  1.4820  1.4528  1.5168  1.5151  1.5189  1.5298  1.4739  1.5109  1.4048  1.5516  1.2829
            14  1.3872  1.2500  1.5004  1.4056  1.5051  1.5250  1.5174  1.5212  1.5375  1.5256  1.4320  1.5341  1.2798  1.4129

           MAXIMUM 2D ONE PIN POWER          =   1.6078 AT ROW 10 COLUMN 10
           MAXIMUM 2D ONE PIN POWER W/UNC    =   1.8216       (1.6078 X 1.1000 X 1.0300)
           MAXIMUM CHANNEL POWER             =   1.5899 AT ROW  9 COLUMN  9
           MAXIMUM 3D ONE PIN POWER          =   1.9174 AT ROW 10 COLUMN 10 (INCLUDES GRID DIP FACTOR OF 1.0075)
           MAXIMUM 3D ONE PIN POWER W/UNC    =   2.1724       (1.9174 X 1.1000 X 1.0300)
           MAXIMUM LHGR                      =  11.5042 KW/FT (1.9174 X 6.0000)
           MAXIMUM LHGR W/UNCERTAINTY        =  13.6938 KW/FT (2.1724 X 6.0000 X 1.0300 X 1.0200)
           FL TO 15.00 KW/FT W/O UNC         = 133.7298       ( 15.00 X 100.00 /(11.5042 X  .9750))
           FL TO 15.00 KW/FT W/UNCERTAINTY   = 109.3469       ( 15.00 X 100.00 /(13.6938 X  .9750) - 3.0000)
           ASSEMBLY AXIAL SHAPE INDEX        =   .0151
           ASSEMBLY AXIAL SHAPE INDEX W/UNC  =   .0000

           NORMALIZED ASSEMBLY AXIAL POWER SHAPE:
           NODE                1       2       3       4       5       6       7       8
           AXIAL POWER       .5505   .8389   .9876  1.0830  1.1245  1.1700  1.1738  1.1926
           NODE                9      10      11      12      13      14      15      16
           AXIAL POWER      1.1703  1.1662  1.1225  1.0941  1.0232   .9475   .7916   .5636
```

Figure 13
Sample User Output File
Page 9 of 37

```
1          PROGRAM ASAS VERSION 1. REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94. THE TIME IS 08:19:49                    PAGE    9
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME : /RPG3/Sp/OPPD/a30test.p
           RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID       : B-10.5-A  PDIL CASE A - 100% POWER, ARO

           XPO   = 10.500   GWD/MT.        EBAR = 16.119 GWD/MT. POWER = 100.00%. FLOW     = 100.00%
           NOTWT =  15120. STEPS INSERTED. FQ =  2.000. F-DELTA-H =  1.653.  INCORE ASI =   .0078.  PERIPHERAL ASI =   .0023
           TOTAL RELATIVE EXCORE SIGNAL       =  .4425

           FUEL TYPE : TYPE1
           PIN POWERS FOR LIMITING LHGR PLANE  8 FOR ASSEMBLY 16,SERIAL NUMBER OMS019
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
         1  1.4140  1.3226  1.6547  1.7210  1.7129  1.7199  1.7209  1.7321  1.7608  1.7866  1.8311  1.7998  1.4766  1.6314
         2  1.3176  1.6398  1.5223  1.6896  1.6610  1.7342  1.7375  1.7471  1.7700  1.7237  1.7831  1.6393  1.8088  1.5057
         3  1.6433  1.5178   ----    ----  1.7748  1.8100  1.7776  1.7854  1.8408  1.8300   ----    ----  1.6530  1.8508
         4  1.7047  1.6805   ----    ----  1.8273  1.8566  1.8177  1.8237  1.8825  1.8737   ----    ----  1.8062  1.8918
         5  1.6931  1.6489  1.7676  1.8243  1.9275  1.8622  1.8919  1.8965  1.8833  1.9675  1.8814  1.8459  1.7533  1.8527
         6  1.6976  1.7194  1.8008  1.8519  1.8606  1.7975  1.8856  1.8899  1.8165  1.8934  1.9005  1.8669  1.8093  1.8317
         7  1.6979  1.7219  1.7679  1.8128  1.8902  1.8857   ----    ----  1.9052  1.9223  1.8561  1.8246  1.7964  1.8030
         8  1.7097  1.7324  1.7770  1.8204  1.8986  1.8912   ----    ----  1.9101  1.9260  1.8588  1.8264  1.7974  1.8032
         9  1.7381  1.7563  1.8343  1.8820  1.8866  1.8206  1.9062  1.9095  1.8323  1.9062  1.9105  1.8742  1.8142  1.8344
        10  1.7640  1.7116  1.8260  1.8767  1.9755  1.9024  1.9276  1.9293  1.9101  1.9902  1.8984  1.8586  1.7621  1.8583
        11  1.8084  1.7718   ----    ----  1.8933  1.9145  1.8667  1.8676  1.9200  1.9040   ----    ----  1.8190  1.9007
        12  1.7768  1.6281   ----    ----  1.8598  1.8840  1.8395  1.8399  1.8876  1.8679   ----    ----  1.6690  1.8639
        13  1.4543  1.7897  1.6450  1.8073  1.7616  1.8228  1.8115  1.8113  1.8249  1.7678  1.8193  1.6658  1.8318  1.5219
        14  1.5950  1.4718  1.8170  1.8673  1.8381  1.8257  1.8068  1.8057  1.8258  1.8417  1.8771  1.8367  1.5026  1.6591


           FZ FACTORS FOR ASSEMBLY 16, SERIAL NUMBER OMS019
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
         1  1.2083  1.2036  1.2080  1.2092  1.2094  1.2100  1.2095  1.2093  1.2094  1.2083  1.2075  1.2058  1.2010  1.2055
         2  1.2036  1.2070  1.2052  1.2094  1.2056  1.2095  1.2099  1.2096  1.2087  1.2042  1.2075  1.2027  1.2040  1.2006
         3  1.2081  1.2054   ----    ----  1.2106  1.2097  1.2100  1.2097  1.2087  1.2090   ----    ----  1.2017  1.2045
         4  1.2095  1.2098   ----    ----  1.2110  1.2100  1.2099  1.2096  1.2089  1.2091   ----    ----  1.2055  1.2052
         5  1.2099  1.2061  1.2110  1.2113  1.2101  1.2090  1.2093  1.2088  1.2076  1.2078  1.2080  1.2068  1.2011  1.2049
         6  1.2106  1.2101  1.2103  1.2105  1.2092  1.2056  1.2095  1.2091  1.2041  1.2066  1.2067  1.2055  1.2046  1.2051
         7  1.2102  1.2108  1.2108  1.2106  1.2097  1.2098   ----    ----  1.2081  1.2068  1.2065  1.2056  1.2048  1.2043
         8  1.2103  1.2107  1.2106  1.2104  1.2095  1.2095   ----    ----  1.2078  1.2064  1.2061  1.2052  1.2044  1.2038
         9  1.2105  1.2099  1.2099  1.2099  1.2085  1.2048  1.2086  1.2081  1.2029  1.2053  1.2054  1.2041  1.2031  1.2036
        10  1.2096  1.2056  1.2103  1.2104  1.2089  1.2076  1.2076  1.2071  1.2057  1.2057  1.2057  1.2044  1.1985  1.2022
        11  1.2090  1.2091   ----    ----  1.2094  1.2080  1.2077  1.2071  1.2061  1.2061   ----    ----  1.2018  1.2013
        12  1.2075  1.2045   ----    ----  1.2085  1.2072  1.2071  1.2066  1.2052  1.2051   ----    ----  1.1970  1.1996
        13  1.2028  1.2060  1.2039  1.2076  1.2032  1.2066  1.2066  1.2060  1.2046  1.1997  1.2026  1.1974  1.1984  1.1947
        14  1.2074  1.2027  1.2067  1.2074  1.2071  1.2072  1.2061  1.2055  1.2052  1.2036  1.2024  1.2002  1.1950  1.1994

           ASSEMBLY AXIAL PEAKING FACTOR   =   1.2067 (FROM 16 PLANE DATA)
```

Figure 13
Sample User Output File
Page 10 of 37

```
1          PROGRAM ASAS VERSION 1. REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94. THE TIME IS 08:19:49                    PAGE   10
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME : /RPG3/Sp/OPPD/s3Otest.p
           RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID       : 8-10.5-A  PDIL CASE A - 100% POWER, ARO

           XPO    = 10.500   GWD/MT.        EBAR = 16.119 GWD/MT, POWER = 100.00%, FLOW     = 100.00%
           NOTWT =   15120. STEPS INSERTED, FQ =  2.000, F-DELTA-H =  1.653,  INCORE ASI =   .0078,  PERIPHERAL ASI =   .0023
           TOTAL RELATIVE EXCORE SIGNAL       =  .4425

           FUEL TYPE : TYPE1
           2D PIN POWERS FOR ASSEMBLY 16, SERIAL NUMBER OMS019
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
         1  1.1702  1.0989  1.3698  1.4233  1.4163  1.4214  1.4228  1.4323  1.4560  1.4787  1.5164  1.4926  1.2295  1.3532
         2  1.0948  1.3587  1.2631  1.3970  1.3778  1.4339  1.4361  1.4443  1.4644  1.4314  1.4767  1.3631  1.5024  1.2542
         3  1.3603  1.2592    ----    ----  1.4661  1.4863  1.4692  1.4759  1.5229  1.5137    ----    ----  1.3755  1.5366
         4  1.4095  1.3891    ----    ----  1.5089  1.5343  1.5023  1.5077  1.5572  1.5497    ----    ----  1.4983  1.5697
         5  1.3994  1.3672  1.4597  1.5061  1.5928  1.5403  1.5645  1.5689  1.5595  1.6290  1.5574  1.5296  1.4598  1.5376
         6  1.4023  1.4208  1.4879  1.5299  1.5387  1.4909  1.5589  1.5631  1.5087  1.5692  1.5749  1.5486  1.5020  1.5199
         7  1.4029  1.4222  1.4602  1.4974  1.5625  1.5587    ----    ----  1.5770  1.5929  1.5385  1.5134  1.4909  1.4971
         8  1.4127  1.4309  1.4678  1.5040  1.5681  1.5636    ----    ----  1.5815  1.5965  1.5411  1.5154  1.4923  1.4979
         9  1.4358  1.4516  1.5161  1.5555  1.5611  1.5111  1.5771  1.5806  1.5232  1.5815  1.5850  1.5564  1.5079  1.5241
        10  1.4584  1.4197  1.5087  1.5505  1.6341  1.5754  1.5962  1.5983  1.5863  1.6507  1.5745  1.5432  1.4703  1.5457
        11  1.4958  1.4654    ----    ----  1.5655  1.5848  1.5457  1.5471  1.5919  1.5786    ----    ----  1.5135  1.5822
        12  1.4715  1.3517    ----    ----  1.5388  1.5606  1.5239  1.5249  1.5662  1.5500    ----    ----  1.3943  1.5538
        13  1.2091  1.4840  1.3664  1.4966  1.4641  1.5107  1.5013  1.5019  1.5150  1.4736  1.5128  1.3912  1.5285  1.2738
        14  1.3210  1.2237  1.5058  1.5465  1.5227  1.5123  1.4980  1.4979  1.5150  1.5302  1.5612  1.5303  1.2574  1.3833

           FUEL TYPE : TYPE1
           ADJUSTED 2D PIN POWERS FOR ASSEMBLY 16, SERIAL NUMBER OMS019 (INCLUDES GRID DIP FACTOR OF 1.0075)
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
         1  1.1806  1.1043  1.3816  1.4370  1.4302  1.4360  1.4368  1.4462  1.4702  1.4917  1.5289  1.5027  1.2329  1.3621
         2  1.1002  1.3692  1.2711  1.4107  1.3869  1.4480  1.4508  1.4588  1.4779  1.4392  1.4888  1.3687  1.5102  1.2572
         3  1.3721  1.2673    ----    ----  1.4818  1.5113  1.4842  1.4907  1.5370  1.5279    ----    ----  1.3802  1.5453
         4  1.4234  1.4031    ----    ----  1.5257  1.5502  1.5177  1.5227  1.5718  1.5644    ----    ----  1.5081  1.5795
         5  1.4137  1.3768  1.4759  1.5232  1.6094  1.5548  1.5796  1.5835  1.5724  1.6427  1.5708  1.5412  1.4639  1.5469
         6  1.4174  1.4356  1.5035  1.5462  1.5535  1.5008  1.5744  1.5780  1.5167  1.5809  1.5868  1.5588  1.5107  1.5294
         7  1.4176  1.4377  1.4761  1.5136  1.5782  1.5744    ----    ----  1.5908  1.6050  1.5498  1.5235  1.4999  1.5054
         8  1.4275  1.4465  1.4837  1.5199  1.5836  1.5790    ----    ----  1.5948  1.6081  1.5520  1.5249  1.5007  1.5056
         9  1.4512  1.4664  1.5315  1.5713  1.5752  1.5201  1.5915  1.5944  1.5299  1.5916  1.5952  1.5648  1.5148  1.5316
        10  1.4729  1.4291  1.5246  1.5669  1.6494  1.5884  1.6095  1.6109  1.5948  1.6617  1.5851  1.5518  1.4713  1.5515
        11  1.5099  1.4704    ----    ----  1.5808  1.5985  1.5586  1.5593  1.6031  1.5897    ----    ----  1.5188  1.5870
        12  1.4835  1.3594    ----    ----  1.5528  1.5730  1.5359  1.5362  1.5761  1.5596    ----    ----  1.3935  1.5563
        13  1.2142  1.4943  1.3735  1.5090  1.4709  1.5219  1.5125  1.5123  1.5237  1.4760  1.5190  1.3908  1.5394  1.2707
        14  1.3318  1.2288  1.5171  1.5591  1.5347  1.5244  1.5086  1.5077  1.5245  1.5377  1.5673  1.5335  1.2546  1.3852

           MAXIMUM 2D ONE PIN POWER          =   1.6617 AT ROW 10 COLUMN 10
           MAXIMUM 2D ONE PIN POWER W/UNC    =   1.8827       (1.6617 X 1.1000 X 1.0300)
           MAXIMUM CHANNEL POWER             =   1.6123 AT ROW 10 COLUMN  9
           MAXIMUM 3D ONE PIN POWER          =   2.0051 AT ROW 10 COLUMN 10 (INCLUDES GRID DIP FACTOR OF 1.0075)
           MAXIMUM 3D ONE PIN POWER W/UNC    =   2.2718       (2.0051 X 1.1000 X 1.0300)
           MAXIMUM LHGR                      =  12.0305 KW/FT (2.0051 X 6.0000)
           MAXIMUM LHGR W/UNCERTAINTY        =  14.3203 KW/FT (2.2718 X 6.0000 X 1.0300 X 1.0200)
           PL TO 15.00 KW/FT W/O UNC         = 127.8799       ( 15.00 X 100.00 /(12.0305 X  .9750))
           PL TO 15.00 KW/FT W/UNCERTAINTY = 104.4323         ( 15.00 X 100.00 /(14.3203 X  .9750) - 3.0000)
           ASSEMBLY AXIAL SHAPE INDEX        =    .0273
           ASSEMBLY AXIAL SHAPE INDEX W/UNC=    .0000

           NORMALIZED ASSEMBLY AXIAL POWER SHAPE:
           NODE                1       2       3       4       5       6       7       8
           AXIAL POWER       .5199   .8407  1.0066  1.1088  1.1500  1.1932  1.1922  1.2067
           NODE                9      10      11      12      13      14      15      16
           AXIAL POWER      1.1790  1.1707  1.1216  1.0889  1.0123   .9301   .7639   .5154
```

Figure 13
Sample User Output File
Page 11 of 37

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1          PROGRAM ASAS VERSION 1. REV DATE 4/12/94.    TODAY'S DATE IS 04/12/94. THE TIME IS 08:19:49                PAGE   11
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME  : /RPGJ/Sp/OP/D/s3Otest.p
           RUN TITLE      : Fort Calhoun Cycle 15 BOC 10.5 Hours - Asatest
           CASE ID        : B-10.5-A  PDIL CASE A - 100% POWER, ARO

           XPO   = 10.500  GWD/MT.        EBAR = 16.119 GWD/MT. POWER = 100.00%. FLOW     = 100.00%
           NOTWT =  15120. STEPS INSERTED. FQ =  2.000. F-DELTA-H =  1.653.  INCORE ASI =   .0078.  PERIPHERAL ASI =   .0023
           TOTAL RELATIVE EXCORE SIGNAL       =  .4425

           FUEL TYPE : TYPE1
           PIN POWERS FOR LIMITING LHGR PLANE  8 FOR ASSEMBLY 25,SERIAL NUMBER OMS034
                1      2      3      4      5      6      7      8      9     10     11     12     13     14
         1  1.6673 1.5157 1.8169 1.6909 1.7974 1.7761 1.5991 1.5991 1.7761 1.7974 1.6909 1.8169 1.5157 1.6673
         2  1.5097 1.8222 1.6460 1.7626 1.6934 1.7616 1.7347 1.7347 1.7616 1.6934 1.7626 1.6460 1.8222 1.5097
         3  1.7995 1.6370   ----   ---- 1.6152 1.7868 1.7705 1.7705 1.7868 1.6152   ----   ---- 1.6370 1.7995
         4  1.6638 1.7417   ----   ---- 1.6258 1.7986 1.7834 1.7834 1.7986 1.6258   ----   ---- 1.7417 1.6638
         5  1.7560 1.6617 1.5940 1.6148 1.8366 1.8109 1.7990 1.7990 1.8109 1.8366 1.6148 1.5940 1.6617 1.7560
         6  1.7214 1.7159 1.7507 1.7737 1.7982 1.8309 1.6161 1.6161 1.8309 1.7982 1.7737 1.7507 1.7159 1.7214
         7  1.5361 1.6766 1.7222 1.7465 1.7741 1.6051   ----   ---- 1.6051 1.7741 1.7465 1.7222 1.6765 1.5361
         8  1.5246 1.6664 1.7124 1.7371 1.7645 1.5947   ----   ---- 1.5947 1.7645 1.7371 1.7124 1.6664 1.5246
         9  1.6829 1.6788 1.7141 1.7377 1.7620 1.7939 1.5819 1.5819 1.7939 1.7620 1.7377 1.7141 1.6788 1.6829
        10  1.6883 1.5986 1.5346 1.5558 1.7719 1.7477 1.7362 1.7362 1.7477 1.7719 1.5558 1.5346 1.5986 1.6883
        11  1.5727 1.6497   ----   ---- 1.5434 1.7099 1.6957 1.6957 1.7099 1.5434   ----   ---- 1.6497 1.5727
        12  1.6764 1.5261   ----   ---- 1.5109 1.6741 1.6594 1.6594 1.6741 1.5109   ----   ---- 1.5261 1.6764
        13  1.3885 1.6772 1.5160 1.6265 1.5636 1.6292 1.6050 1.6050 1.6292 1.5636 1.6265 1.5160 1.6772 1.3885
        14  1.5277 1.3824 1.6579 1.5437 1.6443 1.6267 1.4636 1.4636 1.6267 1.6443 1.5437 1.6579 1.3824 1.5277


           FZ FACTORS FOR ASSEMBLY 25. SERIAL NUMBER OMS034
                1      2      3      4      5      6      7      8      9     10     11     12     13     14
         1  1.1906 1.1897 1.1889 1.1854 1.1902 1.1909 1.1860 1.1860 1.1909 1.1902 1.1854 1.1889 1.1857 1.1906
         2  1.1853 1.1873 1.1850 1.1888 1.1841 1.1895 1.1897 1.1897 1.1895 1.1841 1.1888 1.1850 1.1873 1.1853
         3  1.1880 1.1845   ----   ---- 1.1840 1.1884 1.1900 1.1900 1.1884 1.1840   ----   ---- 1.1845 1.1880
         4  1.1839 1.1877   ----   ---- 1.1837 1.1877 1.1893 1.1893 1.1877 1.1837   ----   ---- 1.1877 1.1839
         5  1.1880 1.1823 1.1827 1.1830 1.1866 1.1876 1.1875 1.1875 1.1876 1.1866 1.1830 1.1827 1.1823 1.1880
         6  1.1879 1.1869 1.1864 1.1863 1.1868 1.1860 1.1825 1.1825 1.1860 1.1868 1.1863 1.1864 1.1869 1.1879
         7  1.1822 1.1863 1.1872 1.1871 1.1860 1.1818   ----   ---- 1.1818 1.1860 1.1871 1.1872 1.1863 1.1822
         8  1.1811 1.1855 1.1864 1.1864 1.1853 1.1808   ----   ---- 1.1808 1.1853 1.1864 1.1864 1.1855 1.1811
         9  1.1854 1.1845 1.1840 1.1840 1.1846 1.1837 1.1800 1.1800 1.1837 1.1846 1.1840 1.1840 1.1845 1.1854
        10  1.1838 1.1780 1.1784 1.1788 1.1827 1.1838 1.1837 1.1837 1.1838 1.1827 1.1788 1.1784 1.1780 1.1838
        11  1.1778 1.1818   ----   ---- 1.1781 1.1825 1.1840 1.1840 1.1825 1.1781   ----   ---- 1.1818 1.1778
        12  1.1805 1.1769   ----   ---- 1.1768 1.1817 1.1833 1.1833 1.1817 1.1768   ----   ---- 1.1769 1.1805
        13  1.1763 1.1784 1.1761 1.1803 1.1757 1.1814 1.1817 1.1817 1.1814 1.1757 1.1803 1.1761 1.1784 1.1763
        14  1.1809 1.1755 1.1790 1.1755 1.1807 1.1816 1.1765 1.1765 1.1816 1.1807 1.1755 1.1790 1.1755 1.1809

           ASSEMBLY AXIAL PEAKING FACTOR   =   1.1839 (FROM 16 PLANE DATA)
```

Figure 13
Sample User Output File
Page 12 of 37

```
1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94.    TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                    PAGE   12
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME    : /RPG3/Sp/OPPD/s30test.p
           RUN TITLE        : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID          : B-10.5-A  PDIL CASE A - 100% POWER, ARO

           XPO    = 10.500   GWD/MT,          EBAR = 16.119 GWD/MT, POWER = 100.00%, FLOW     = 100.00%
           NOTWT =   15120  STEPS INSERTED, FQ =  2.000, F-DELTA-H =  1.653,  INCORE ASI =   .0078,  PERIPHERAL ASI =   .0023
           TOTAL RELATIVE EXCORE SIGNAL        =  .4425

           FUEL TYPE : TYPE1
           2D PIN POWERS FOR ASSEMBLY 25, SERIAL NUMBER OMS034
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1   1.4004  1.2784  1.5282  1.4264  1.5102  1.4915  1.3483  1.3483  1.4915  1.5102  1.4264  1.5282  1.2784  1.4004
        2   1.2736  1.5348  1.3891  1.4826  1.4301  1.4809  1.4581  1.4581  1.4809  1.4301  1.4826  1.3891  1.5348  1.2736
        3   1.5147  1.3820    ----    ----  1.3643  1.5035  1.4878  1.4878  1.5035  1.3643    ----    ----  1.3820  1.5147
        4   1.4054  1.4665    ----    ----  1.3735  1.5143  1.4996  1.4996  1.5143  1.3735    ----    ----  1.4665  1.4054
        5   1.4781  1.4055  1.3478  1.3650  1.5478  1.5249  1.5150  1.5150  1.5249  1.5478  1.3650  1.3478  1.4055  1.4781
        6   1.4491  1.4456  1.4756  1.4952  1.5151  1.5438  1.3667  1.3667  1.5438  1.5151  1.4952  1.4756  1.4456  1.4491
        7   1.2994  1.4133  1.4506  1.4712  1.4959  1.3582    ----    ----  1.3582  1.4959  1.4712  1.4506  1.4133  1.2994
        8   1.2908  1.4057  1.4433  1.4642  1.4887  1.3505    ----    ----  1.3505  1.4887  1.4642  1.4433  1.4057  1.2908
        9   1.4197  1.4174  1.4477  1.4676  1.4874  1.5155  1.3406  1.3406  1.5155  1.4874  1.4676  1.4477  1.4174  1.4197
       10   1.4262  1.3571  1.3023  1.3198  1.4981  1.4763  1.4668  1.4668  1.4763  1.4981  1.3198  1.3023  1.3571  1.4262
       11   1.3353  1.3959    ----    ----  1.3101  1.4460  1.4321  1.4321  1.4460  1.3101    ----    ----  1.3959  1.3353
       12   1.4201  1.2967    ----    ----  1.2838  1.4167  1.4023  1.4023  1.4167  1.2838    ----    ----  1.2967  1.4201
       13   1.1804  1.4233  1.2889  1.3780  1.3300  1.3790  1.3582  1.3582  1.3790  1.3300  1.3780  1.2889  1.4233  1.1804
       14   1.2937  1.1760  1.4063  1.3132  1.3926  1.3767  1.2440  1.2440  1.3767  1.3926  1.3132  1.4063  1.1760  1.2937

           FUEL TYPE : TYPE1
           ADJUSTED 2D PIN POWERS FOR ASSEMBLY 25, SERIAL NUMBER OMS034 (INCLUDES GRID DIP FACTOR OF 1.0075)
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1   1.4188  1.2899  1.5461  1.4389  1.5296  1.5115  1.3608  1.3608  1.5115  1.5296  1.4389  1.5461  1.2899  1.4188
        2   1.2847  1.5506  1.4007  1.4999  1.4411  1.4991  1.4762  1.4762  1.4991  1.4411  1.4999  1.4007  1.5506  1.2847
        3   1.5314  1.3930    ----    ----  1.3746  1.5205  1.5066  1.5066  1.5205  1.3746    ----    ----  1.3930  1.5314
        4   1.4159  1.4821    ----    ----  1.3835  1.5306  1.5176  1.5176  1.5306  1.3835    ----    ----  1.4821  1.4159
        5   1.4943  1.4141  1.3565  1.3741  1.5629  1.5410  1.5309  1.5309  1.5410  1.5629  1.3741  1.3565  1.4141  1.4943
        6   1.4649  1.4602  1.4898  1.5094  1.5302  1.5581  1.3753  1.3753  1.5581  1.5302  1.5094  1.4898  1.4602  1.4649
        7   1.3072  1.4267  1.4656  1.4862  1.5097  1.3659    ----    ----  1.3659  1.5097  1.4862  1.4656  1.4267  1.3072
        8   1.2974  1.4181  1.4573  1.4782  1.5016  1.3571    ----    ----  1.3571  1.5016  1.4782  1.4573  1.4181  1.2974
        9   1.4321  1.4287  1.4587  1.4787  1.4994  1.5266  1.3462  1.3462  1.5266  1.4994  1.4787  1.4587  1.4287  1.4321
       10   1.4367  1.3604  1.3059  1.3239  1.5079  1.4873  1.4775  1.4775  1.4873  1.5079  1.3239  1.3059  1.3604  1.4367
       11   1.3383  1.4039    ----    ----  1.3134  1.4551  1.4430  1.4430  1.4551  1.3134    ----    ----  1.4039  1.3383
       12   1.4266  1.2987    ----    ----  1.2857  1.4247  1.4121  1.4121  1.4247  1.2857    ----    ----  1.2987  1.4266
       13   1.1816  1.4273  1.2901  1.3841  1.3306  1.3864  1.3658  1.3658  1.3864  1.3306  1.3841  1.2901  1.4273  1.1816
       14   1.3000  1.1764  1.4109  1.3137  1.3993  1.3843  1.2455  1.2455  1.3843  1.3993  1.3137  1.4109  1.1764  1.3000

           MAXIMUM 2D ONE PIN POWER          =   1.5629 AT ROW  5 COLUMN  5
           MAXIMUM 2D ONE PIN POWER W/UNC    =   1.7708       (1.5629 X 1.1000 X 1.0300)
           MAXIMUM CHANNEL POWER             =   1.5481 AT ROW  5 COLUMN  5
           MAXIMUM 3D ONE PIN POWER          =   1.8503 AT ROW  5 COLUMN  5 (INCLUDES GRID DIP FACTOR OF 1.0075)
           MAXIMUM 3D ONE PIN POWER W/UNC    =   2.0964       (1.8503 X 1.1000 X 1.0300)
           MAXIMUM LHGR                      =  11.1021 KW/FT (1.8503 X 6.0000)
           MAXIMUM LHGR W/UNCERTAINTY        =  13.2151 KW/FT 12.0964 X 6.0000 X 1.0300 X 1.0200)
           PL TO 15.00 KW/FT W/O UNC         = 138.5741       ( 15.00 X 100.00 /(11.1021 X  .9750))
           PL TO 15.00 KW/FT W/UNCERTAINTY = 113.4165         ( 15.00 X 100.00 /(13.2151 X  .9750) - 3.0000)
           ASSEMBLY AXIAL SHAPE INDEX        =   .0055
           ASSEMBLY AXIAL SHAPE INDEX W/UNC=     .0000

           NORMALIZED ASSEMBLY AXIAL POWER SHAPE:
           NODE              1       2       3       4       5       6       7       8
           AXIAL POWER     .5610   .8314   .9746  1.0672  1.1086  1.1554  1.1621  1.1839
           NODE              9      10      11      12      13      14      15      16
           AXIAL POWER    1.1654  1.1648  1.1253  1.1015  1.0347   .9626   .8094   .5922
```

Figure 13
Sample User Output File
Page 13 of 37

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1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                    PAGE   13
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME  : /RPG3/Sp/OPPD/a30test.p
           RUN TITLE      : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID        : B-10.5-A  PDIL CASE A - 100% POWER, ARO

           XPO   = 10.500   GWD/MT,        EBAR = 16.119 GWD/MT, POWER = 100.00%, FLOW     = 100.00%
           NOTWT =  15120. STEPS INSERTED, FQ =  2.000, F-DELTA-H =  1.653,  INCORE ASI =   .0078,  PERIPHERAL ASI =   .0023
           TOTAL RELATIVE EXCORE SIGNAL       =  .4425

           FUEL TYPE : TYPE2
           PIN POWERS FOR LIMITING LHGR PLANE  8 FOR ASSEMBLY 10,SERIAL NUMBER OMR013
                1       2       3       4       5       6       7       8       9      10      11      12      13      14
         1   1.0085  1.0313  1.1565  1.1937  1.2144  1.2297  1.2520  1.2756  1.3227  1.3806  1.4356  1.4678  1.3656  1.4016
         2   1.0077  1.1409  1.1528  1.2006  1.2443  1.2366  1.2450  1.2661  1.3272  1.4104  1.4440  1.4615  1.5230  1.3971
         3   1.1131  1.1350    ----    ----  1.2580  1.2739  1.2717  1.2935  1.3669  1.4289    ----    ----  1.5090  1.5509
         4   1.1376  1.1697    ----    ----  1.2888  1.3090  1.3114  1.3328  1.4025  1.4596    ----    ----  1.5470  1.5750
         5   1.1503  1.2043  1.2359  1.2795  1.3432  1.3464  1.3765  1.4013  1.4361  1.5131  1.5174  1.5414  1.5724  1.5782
         6   1.1609  1.1924  1.2464  1.2939  1.3404  1.4084  1.4250  1.4558  1.4957  1.4933  1.5166  1.5350  1.5425  1.5801
         7   1.1796  1.1990  1.2425  1.2942  1.3677  1.4221    ----    ----  1.5099  1.5119  1.4969  1.5111  1.5349  1.5974
         8   1.2116  1.2269  1.2695  1.3194  1.3942  1.4517    ----    ----  1.5442  1.5418  1.5223  1.5337  1.5567  1.6196
         9   1.2643  1.2914  1.3445  1.3902  1.4322  1.4977  1.5128  1.5477  1.5817  1.5797  1.5997  1.6146  1.6164  1.6537
        10   1.3304  1.3817  1.4102  1.4507  1.5117  1.4997  1.5220  1.5493  1.5836  1.6646  1.6643  1.6820  1.7011  1.7079
        11   1.3979  1.4245    ----    ----  1.5237  1.5297  1.5149  1.5357  1.6095  1.6701    ----    ----  1.7377  1.7618
        12   1.4492  1.4607    ----    ----  1.5607  1.5595  1.5391  1.5564  1.6338  1.6972    ----    ----  1.7451  1.7906
        13   1.5377  1.5473  1.5420  1.5837  1.6151  1.5849  1.5784  1.5948  1.6511  1.7324  1.7630  1.7608  1.8253  1.8519
        14   1.4432  1.4598  1.6212  1.6479  1.6510  1.6515  1.6673  1.6853  1.7172  1.7683  1.8171  1.8364  1.6788  1.7290


           FZ FACTORS FOR ASSEMBLY 10, SERIAL NUMBER OMR013
                1       2       3       4       5       6       7       8       9      10      11      12      13      14
         1   1.1917  1.1930  1.1914  1.1923  1.1941  1.1956  1.1967  1.1971  1.1974  1.1973  1.1975  1.1980  1.2012  1.1996
         2   1.1923  1.1905  1.1904  1.1916  1.1937  1.1960  1.1970  1.1966  1.1975  1.1976  1.1975  1.1986  1.1986  1.2012
         3   1.1896  1.1894    ----    ----  1.1926  1.1953  1.1969  1.1966  1.1967  1.1965    ----    ----  1.1990  1.1985
         4   1.1897  1.1897    ----    ----  1.1925  1.1950  1.1968  1.1960  1.1964  1.1961    ----    ----  1.1985  1.1985
         5   1.1908  1.1911  1.1910  1.1917  1.1930  1.1954  1.1957  1.1953  1.1962  1.1964  1.1968  1.1979  1.1994  1.1991
         6   1.1916  1.1929  1.1930  1.1936  1.1948  1.1947  1.1938  1.1946  1.1961  1.1970  1.1981  1.1989  1.2001  1.1998
         7   1.1924  1.1935  1.1944  1.1951  1.1948  1.1934    ----    ----  1.1954  1.1970  1.1984  1.1996  1.1998  1.1999
         8   1.1934  1.1940  1.1948  1.1952  1.1952  1.1946    ----    ----  1.1964  1.1976  1.1986  1.1996  1.1998  1.2002
         9   1.1937  1.1945  1.1945  1.1951  1.1959  1.1961  1.1957  1.1962  1.1979  1.1980  1.1986  1.1993  1.2005  1.2000
        10   1.1940  1.1944  1.1940  1.1945  1.1955  1.1972  1.1975  1.1973  1.1978  1.1978  1.1988  1.1992  1.2008  1.2000
        11   1.1944  1.1944    ----    ----  1.1958  1.1977  1.1989  1.1982  1.1982  1.1987    ----    ----  1.2000  1.1993
        12   1.1951  1.1952    ----    ----  1.1966  1.1983  1.1997  1.1991  1.1988  1.1989    ----    ----  1.2009  1.1997
        13   1.1983  1.1959  1.1962  1.1966  1.1980  1.1993  1.1998  1.1993  1.2000  1.2004  1.1998  1.2009  1.1999  1.2019
        14   1.1972  1.1986  1.1965  1.1969  1.1979  1.1988  1.1995  1.1999  1.1996  1.1997  1.1991  1.1996  1.2019  1.2003

           ASSEMBLY AXIAL PEAKING FACTOR   =   1.1969 (FROM 16 PLANE DATA)
```

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1       PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                    PAGE   14
        A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
        PIN FILE NAME : /RPG3/Sp/OPPD/s3Otest.p
        RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
        CASE ID       : B-10.5-A  PDIL CASE A - 100% POWER, ARO

        XPO   = 10.500   GWD/MT.        EBAR = 16.119 GWD/MT, POWER = 100.00%, FLOW     = 100.00%
        NOTWT =  15120. STEPS INSERTED, FQ =  2.000, F-DELTA-H =  1.653,  INCORE ASI =   .0078,  PERIPHERAL ASI =   .0023
        TOTAL RELATIVE EXCORE SIGNAL       =  .4425

        FUEL TYPE : TYPE2
        2D PIN POWERS FOR ASSEMBLY 10, SERIAL NUMBER OMR013
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
    1    .8462   .8644   .9708  1.0011  1.0169  1.0286  1.0462  1.0656  1.1046  1.1530  1.1988  1.2251  1.1369  1.1684
    2    .8452   .9583   .9684  1.0075  1.0424  1.0339  1.0401  1.0581  1.1083  1.1776  1.2059  1.2193  1.2706  1.1631
    3    .9357   .9542    ----    ----  1.0548  1.0658  1.0625  1.0810  1.1423  1.1943    ----    ----  1.2585  1.2941
    4    .9562   .9832    ----    ----  1.0808  1.0954  1.0958  1.1144  1.1722  1.2204    ----    ----  1.2908  1.3141
    5    .9660  1.0311  1.0377  1.0736  1.1260  1.1263  1.1511  1.1723  1.2006  1.2647  1.2678  1.2867  1.3109  1.3162
    6    .9742   .9996  1.0447  1.0840  1.1219  1.1789  1.1937  1.2187  1.2504  1.2475  1.2659  1.2803  1.2853  1.3170
    7    .9892  1.0046  1.0403  1.0829  1.1447  1.1916    ----    ----  1.2631  1.2631  1.2491  1.2597  1.2793  1.3313
    8   1.0152  1.0276  1.0625  1.1039  1.1665  1.2152    ----    ----  1.2908  1.2874  1.2700  1.2785  1.2974  1.3494
    9   1.0591  1.0811  1.1257  1.1633  1.1975  1.2521  1.2652  1.2939  1.3204  1.3186  1.3347  1.3463  1.3465  1.3781
   10   1.1142  1.1567  1.1815  1.2145  1.2645  1.2526  1.2710  1.2940  1.3220  1.3898  1.3883  1.4025  1.4166  1.4232
   11   1.1704  1.1926    ----    ----  1.2742  1.2772  1.2636  1.2817  1.3432  1.3933    ----    ----  1.4481  1.4690
   12   1.2126  1.2222    ----    ----  1.3043  1.3014  1.2828  1.2980  1.3628  1.4156    ----    ----  1.4531  1.4925
   13   1.1497  1.2939  1.2891  1.3235  1.3482  1.3215  1.3155  1.3297  1.3759  1.4431  1.4695  1.4663  1.5212  1.3743
   14   1.2056  1.2179  1.3550  1.3767  1.3783  1.3776  1.3900  1.4045  1.4316  1.4740  1.5153  1.5308  1.3968  1.4405

        FUEL TYPE : TYPE2
        ADJUSTED 2D PIN POWERS FOR ASSEMBLY 10, SERIAL NUMBER OMR013 (INCLUDES GRID DIP FACTOR OF 1.0075)
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
    1    .8489   .8681   .9735  1.0048  1.0222  1.0351  1.0538  1.0737  1.1133  1.1621  1.2084  1.2355  1.1495  1.1798
    2    .8483   .9603   .9703  1.0106  1.0474  1.0409  1.0480  1.0658  1.1172  1.1872  1.2155  1.2302  1.2820  1.1760
    3    .9370   .9553    ----    ----  1.0589  1.0723  1.0705  1.0888  1.1506  1.2028    ----    ----  1.2702  1.3055
    4    .9576   .9846    ----    ----  1.0848  1.1019  1.1039  1.1219  1.1805  1.2286    ----    ----  1.3022  1.3258
    5    .9683  1.0137  1.0403  1.0770  1.1307  1.1333  1.1586  1.1795  1.2088  1.2737  1.2773  1.2974  1.3235  1.3284
    6    .9772  1.0037  1.0491  1.0892  1.1283  1.1855  1.1995  1.2254  1.2590  1.2570  1.2766  1.2921  1.2983  1.3301
    7    .9929  1.0092  1.0459  1.0894  1.1513  1.1971    ----    ----  1.2710  1.2727  1.2600  1.2719  1.2920  1.3446
    8   1.0198  1.0327  1.0686  1.1106  1.1735  1.2220    ----    ----  1.2998  1.2978  1.2814  1.2910  1.3103  1.3632
    9   1.0642  1.0870  1.1318  1.1702  1.2055  1.2607  1.2734  1.3028  1.3313  1.3297  1.3465  1.3591  1.3606  1.3920
   10   1.1198  1.1630  1.1875  1.2211  1.2725  1.2624  1.2812  1.3041  1.3329  1.4012  1.4009  1.4158  1.4318  1.4376
   11   1.1766  1.1990    ----    ----  1.2826  1.2876  1.2752  1.2927  1.3548  1.4058    ----    ----  1.4627  1.4830
   12   1.2198  1.2295    ----    ----  1.3137  1.3127  1.2955  1.3101  1.3752  1.4286    ----    ----  1.4689  1.5072
   13   1.1596  1.3025  1.2979  1.3331  1.3595  1.3341  1.3286  1.3424  1.3898  1.4582  1.4840  1.4822  1.5365  1.3904
   14   1.2148  1.2288  1.3647  1.3871  1.3897  1.3901  1.4034  1.4186  1.4455  1.4885  1.5295  1.5458  1.4131  1.4554

        MAXIMUM 2D ONE PIN POWER          =   1.5458 AT ROW 14 COLUMN 12
        MAXIMUM 2D ONE PIN POWER W/UNC    =   1.7514       (1.5458 X 1.1000 X 1.0300)
        MAXIMUM CHANNEL POWER             =   1.5104 AT ROW 13 COLUMN 11
        MAXIMUM 3D ONE PIN POWER          =   1.8502 AT ROW 14 COLUMN 12 (INCLUDES GRID DIP FACTOR OF 1.0075)
        MAXIMUM 3D ONE PIN POWER W/UNC    =   2.0962       (1.8502 X 1.1000 X 1.0300)
        MAXIMUM LHGR                      =  11.1010 KW/FT (1.8502 X 6.0000)
        MAXIMUM LHGR W/UNCERTAINTY        =  13.2139 KW/FT (2.0962 X 6.0000 X 1.0300 X 1.0200)
        FL TO 16.00 KW/FT W/O UNC         = 147.8264       ( 16.00 X 100.00 /(11.1010 X  .9750))
        FL TO 16.00 KW/FT W/UNCERTAINTY   = 121.1895       ( 16.00 X 100.00 /(13.2139 X  .9750) - 3.0000)
        ASSEMBLY AXIAL SHAPE INDEX        =    .0206
        ASSEMBLY AXIAL SHAPE INDEX W/UNC  =    .0000

        NORMALIZED ASSEMBLY AXIAL POWER SHAPE
        NODE                1       2       3       4       5       6       7       8
        AXIAL POWER       .5273   .8446   .9996  1.0960  1.1376  1.1803  1.1822  1.1969
        NODE                9      10      11      12      13      14      15      16
        AXIAL POWER     1.1729  1.1653  1.1208  1.0911  1.0209   .9445   .7870   .5328
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Figure 13
Sample User Output File
Page 15 of 37

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1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94. THE TIME IS 08:19:49                    PAGE   15
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME  : /RPG1/Sp/OPPD/s10test.p
           RUN TITLE      : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID        : B-10.5-A  PDIL CASE A - 100% POWER, ARO

           XPO.  = 10.500   GWD/MT.        EBAR = 16.119 GWD/MT.  POWER = 100.00%,  FLOW     = 100.00%
           NOTWT =   15120. STEPS ASENTED. FQ =  2.000,  F-DELTA-H =  1.653,  INCORE ASI =   .0078,  PERIPHERAL ASI =   .0023
           TOTAL RELATIVE EXCORE SIGNAL       =  .4425

           FUEL TYPE : TYPE2
           PIN POWERS FOR LIMITING LHGR PLANE  8 FOR ASSEMBLY 39,SERIAL NUMBER OMS026
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1   1.4752  1.3313  1.6026  1.5001  1.6077  1.6270  1.6156  1.6156  1.6270  1.6077  1.5001  1.6026  1.3313  1.4752
        2   1.3320  1.6123  1.4622  1.5813  1.5466  1.6138  1.6072  1.6072  1.6138  1.5466  1.5813  1.4622  1.6123  1.3320
        3   1.6041  1.4629    ----    ----  1.6153  1.6558  1.6238  1.6238  1.6558  1.6153    ----    ----  1.4629  1.6041
        4   1.5021  1.5827    ----    ----  1.5040  1.6569  1.6396  1.6396  1.6569  1.5040    ----    ----  1.5827  1.5021
        5   1.6102  1.5485  1.6165  1.5045  1.6964  1.6695  1.6592  1.6592  1.6695  1.6964  1.5045  1.6165  1.5485  1.6102
        6   1.6297  1.6160  1.6573  1.6579  1.6699  1.6968  1.4947  1.4947  1.6968  1.6699  1.6579  1.6573  1.6160  1.6297
        7   1.6181  1.6094  1.6254  1.6407  1.6599  1.4950    ----    ----  1.4950  1.6599  1.6407  1.6254  1.6094  1.6181
        8   1.6181  1.6094  1.6254  1.6407  1.6599  1.4950    ----    ----  1.4950  1.6599  1.6407  1.6254  1.6094  1.6181
        9   1.6297  1.6160  1.6573  1.6579  1.6699  1.6968  1.4947  1.4947  1.6968  1.6699  1.6579  1.6573  1.6160  1.6297
       10   1.6102  1.5485  1.6165  1.5045  1.6964  1.6695  1.6592  1.6592  1.6695  1.6964  1.5045  1.6165  1.5485  1.6102
       11   1.5021  1.5827    ----    ----  1.5040  1.6569  1.6396  1.6396  1.6569  1.5040    ----    ----  1.5827  1.5021
       12   1.6041  1.4629    ----    ----  1.6153  1.6558  1.6238  1.6238  1.6558  1.6153    ----    ----  1.4629  1.6041
       13   1.3320  1.6123  1.4622  1.5813  1.5466  1.6138  1.6072  1.6072  1.6138  1.5466  1.5813  1.4622  1.6123  1.3320
       14   1.4752  1.3313  1.6026  1.5001  1.6077  1.6270  1.6156  1.6156  1.6270  1.6077  1.5001  1.6026  1.3313  1.4752


           FZ FACTORS FOR ASSEMBLY 39, SERIAL NUMBER OMS026
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1   1.1779  1.1722  1.1760  1.1728  1.1783  1.1803  1.1807  1.1807  1.1803  1.1783  1.1728  1.1760  1.1722  1.1779
        2   1.1723  1.1749  1.1728  1.1775  1.1739  1.1794  1.1803  1.1803  1.1794  1.1739  1.1775  1.1728  1.1749  1.1723
        3   1.1761  1.1729    ----    ----  1.1791  1.1796  1.1804  1.1804  1.1796  1.1791    ----    ----  1.1729  1.1761
        4   1.1729  1.1776    ----    ----  1.1748  1.1791  1.1802  1.1802  1.1791  1.1748    ----    ----  1.1776  1.1729
        5   1.1785  1.1741  1.1791  1.1748  1.1784  1.1793  1.1790  1.1790  1.1793  1.1784  1.1748  1.1791  1.1741  1.1785
        6   1.1805  1.1795  1.1797  1.1792  1.1793  1.1785  1.1743  1.1743  1.1785  1.1793  1.1792  1.1797  1.1795  1.1805
        7   1.1808  1.1805  1.1805  1.1803  1.1791  1.1743    ----    ----  1.1743  1.1791  1.1803  1.1805  1.1805  1.1808
        8   1.1808  1.1805  1.1805  1.1803  1.1791  1.1743    ----    ----  1.1743  1.1791  1.1803  1.1805  1.1805  1.1808
        9   1.1805  1.1795  1.1797  1.1792  1.1793  1.1785  1.1743  1.1743  1.1785  1.1793  1.1792  1.1797  1.1795  1.1805
       10   1.1785  1.1741  1.1791  1.1748  1.1784  1.1793  1.1790  1.1790  1.1793  1.1784  1.1748  1.1791  1.1741  1.1785
       11   1.1729  1.1776    ----    ----  1.1748  1.1791  1.1802  1.1802  1.1791  1.1748    ----    ----  1.1776  1.1729
       12   1.1761  1.1729    ----    ----  1.1791  1.1796  1.1804  1.1804  1.1796  1.1791    ----    ----  1.1729  1.1761
       13   1.1723  1.1749  1.1728  1.1775  1.1739  1.1794  1.1803  1.1803  1.1794  1.1739  1.1775  1.1728  1.1749  1.1723
       14   1.1779  1.1722  1.1760  1.1728  1.1783  1.1803  1.1807  1.1807  1.1803  1.1783  1.1728  1.1760  1.1722  1.1779

           ASSEMBLY AXIAL PEAKING FACTOR   =   1.1776 (FROM 16 PLANE DATA)
```

```
1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94    TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                    PAGE   16
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME  : /RPG3/Sp/OPPD/a3Otest.p
           RUN TITLE      : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID        : B-10.5-A  PDIL CASE A - 100% POWER, ARO

           XPO   = 10.500   GWD/MT,        EBAR = 16.119 GWD/MT, POWER = 100.00%, FLOW     = 100.00%
           NOTWT =   15120. STEPS INSERTED, FQ =  2.000, F-DELTA-H =  1.653,  INCORE ASI =   .0078,  PERIPHERAL ASI =   .0023
           TOTAL RELATIVE EXCORE SIGNAL       =  .4425

           FUEL TYPE : TYPE2
           2D PIN POWERS FOR ASSEMBLY 39, SERIAL NUMBER OMS026
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1   1.2524  1.1357  1.3628  1.2791  1.3644  1.3784  1.3684  1.3684  1.3784  1.3644  1.2791  1.3628  1.1357  1.2524
        2   1.1362  1.3723  1.2467  1.3429  1.3175  1.3684  1.3617  1.3617  1.3684  1.3175  1.3429  1.2467  1.3723  1.1362
        3   1.3640  1.2473    ----    ----  1.3700  1.4037  1.3756  1.3756  1.4037  1.3700    ----    ----  1.2473  1.3640
        4   1.2807  1.3440    ----    ----  1.2802  1.4053  1.3892  1.3892  1.4053  1.2802    ----    ----  1.3440  1.2807
        5   1.3664  1.3189  1.3709  1.2806  1.4396  1.4157  1.4073  1.4073  1.4157  1.4396  1.2806  1.3709  1.3189  1.3664
        6   1.3805  1.3700  1.4049  1.4060  1.4160  1.4398  1.2729  1.2729  1.4398  1.4160  1.4060  1.4049  1.3700  1.3805
        7   1.3703  1.3633  1.3769  1.3901  1.4078  1.2731    ----    ----  1.2731  1.4078  1.3901  1.3769  1.3633  1.3703
        8   1.3703  1.3633  1.3769  1.3901  1.4078  1.2731    ----    ----  1.2731  1.4078  1.3901  1.3769  1.3632  1.3703
        9   1.3805  1.3700  1.4049  1.4060  1.4160  1.4398  1.2729  1.2729  1.4398  1.4160  1.4060  1.4049  1.3700  1.3805
       10   1.3664  1.3189  1.3709  1.2806  1.4396  1.4157  1.4073  1.4073  1.4157  1.4396  1.2806  1.3709  1.3189  1.3664
       11   1.2807  1.3440    ----    ----  1.2802  1.4053  1.3892  1.3892  1.4053  1.2802    ----    ----  1.3440  1.2807
       12   1.3640  1.2473    ----    ----  1.3700  1.4037  1.3756  1.3756  1.4037  1.3700    ----    ----  1.2473  1.3640
       13   1.1362  1.3723  1.2467  1.3429  1.3175  1.3684  1.3617  1.3617  1.3684  1.3175  1.3429  1.2467  1.3723  1.1362
       14   1.2524  1.1357  1.3628  1.2791  1.3644  1.3784  1.3684  1.3684  1.3784  1.3644  1.2791  1.3628  1.1357  1.2524

           FUEL TYPE : TYPE2
           ADJUSTED 2D PIN POWERS FOR ASSEMBLY 39, SERIAL NUMBER OMS026 (INCLUDES GRID DIP FACTOR OF 1.0075)
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1   1.2621  1.1389  1.3710  1.2833  1.3754  1.3919  1.3822  1.3822  1.3919  1.3754  1.2833  1.3710  1.1389  1.2621
        2   1.1395  1.3793  1.2509  1.3528  1.3232  1.3806  1.3750  1.3750  1.3806  1.3232  1.3528  1.2509  1.3793  1.1395
        3   1.3724  1.2515    ----    ----  1.3819  1.4165  1.3892  1.3892  1.4165  1.3819    ----    ----  1.2515  1.3724
        4   1.2851  1.3540    ----    ----  1.2867  1.4175  1.4027  1.4027  1.4175  1.2867    ----    ----  1.3540  1.2851
        5   1.3776  1.3247  1.3829  1.2872  1.4513  1.4283  1.4195  1.4195  1.4283  1.4513  1.2872  1.3829  1.3247  1.3776
        6   1.3942  1.3825  1.4179  1.4184  1.4287  1.4517  1.2788  1.2788  1.4517  1.4287  1.4184  1.4179  1.3825  1.3942
        7   1.3843  1.3768  1.3906  1.4037  1.4201  1.2790    ----    ----  1.2790  1.4201  1.4037  1.3906  1.3768  1.3843
        8   1.3843  1.3768  1.3906  1.4037  1.4201  1.2790    ----    ----  1.2790  1.4201  1.4037  1.3906  1.3768  1.3843
        9   1.3942  1.3825  1.4179  1.4184  1.4287  1.4517  1.2788  1.2788  1.4517  1.4287  1.4184  1.4179  1.3825  1.3942
       10   1.3776  1.3247  1.3829  1.2872  1.4513  1.4283  1.4195  1.4195  1.4283  1.4513  1.2872  1.3829  1.3247  1.3776
       11   1.2851  1.3540    ----    ----  1.2867  1.4175  1.4027  1.4027  1.4175  1.2867    ----    ----  1.3540  1.2851
       12   1.3724  1.2515    ----    ----  1.3819  1.4165  1.3892  1.3892  1.4165  1.3819    ----    ----  1.2515  1.3724
       13   1.1395  1.3793  1.2509  1.3528  1.3232  1.3806  1.3750  1.3750  1.3806  1.3232  1.3528  1.2509  1.3793  1.1395
       14   1.2621  1.1389  1.3710  1.2833  1.3754  1.3919  1.3822  1.3822  1.3919  1.3754  1.2833  1.3710  1.1389  1.2621

           MAXIMUM 2D ONE PIN POWER          =   1.4517 AT ROW  6 COLUMN  6
           MAXIMUM 2D ONE PIN POWER W/UNC    =   1.6447       (1.4517 X 1.1000 X 1.0300)
           MAXIMUM CHANNEL POWER             =   1.4400 AT ROW  5 COLUMN  5
           MAXIMUM 3D ONE PIN POWER          =   1.7095 AT ROW  6 COLUMN  6 (INCLUDES GRID DIP FACTOR OF 1.0075)
           MAXIMUM 3D ONE PIN POWER W/UNC    =   1.9369       (1.7095 X 1.1000 X 1.0300)
           MAXIMUM LHGR                      =  10.2573 KW/FT (1.7095 X 6.0000)
           MAXIMUM LHGR W/UNCERTAINTY        =  12.2096 KW/FT (1.9369 X 6.0000 X 1.0300 X 1.0200)
           PL TO 16.00 KW/FT W/O UNC         = 159.9862       ( 16.00 X 100.00 /(10.2573 X  .9750))
           PL TO 16.00 KW/FT W/UNCERTAINTY   = 131.4050       ( 16.00 X 100.00 /(12.2096 X  .9750) - 3.0000)
           ASSEMBLY AXIAL SHAPE INDEX        =   -.0046
           ASSEMBLY AXIAL SHAPE INDEX W/UNC=     .0000

           NORMALIZED ASSEMBLY AXIAL POWER SHAPE:
           NODE                1       2       3       4       5       6       7       8
           AXIAL POWER       .5446   .8278   .9676  1.0551  1.0950  1.1429  1.1524  1.1778
           NODE                9      10      11      12      13      14      15      16
           AXIAL POWER      1.1629  1.1660  1.1296  1.1116  1.0507   .9860   .8337   .5964
```

Figure 13
Sample User Output File
Page 17 of 37

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1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94    TODAY'S DATE IS 04/12/94. THE TIME IS 08:19:49                    PAGE   17
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME  : /RPG1/Sp/OPPD/s30test.p
           RUN TITLE      : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID        : E-10.5-A  PDIL CASE A - 100% POWER, ARO

           XPO   = 10.500   GWD/MT.        EBAR = 16.119 GWD/MT. POWER = 100.00%, FLOW     = 100.00%
           NOYWT =   15120. STEPS INSERTED. FQ =  2.000, F-DELTA-H =  1.653.  INCORE ASI =   .0078.  PERIPHERAL ASI =   .0023
           TOTAL RELATIVE EXCORE SIGNAL       =  .4425

           FUEL TYPE : TYPE2
           PIN POWERS FOR LIMITING LHGR PLANE  8 FOR ASSEMBLY 35,SERIAL NUMBER OMS020
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
             1  1.5076  1.3957  1.7272  1.7779  1.7533  1.7468  1.7373  1.7451  1.7736  1.7996  1.8459  1.8164  1.4896  1.6349
             2  1.3836  1.7047  1.5685  1.7269  1.6865  1.7515  1.7488  1.7563  1.7783  1.7325  1.7945  1.6518  1.8199  1.4997
             3  1.7023  1.5592    ----    ----  1.7924  1.8223  1.7871  1.7945  1.8504  1.8419    ----    ----  1.6674  1.8459
             4  1.7443  1.7086    ----    ----  1.8375  1.8643  1.8255  1.8330  1.8942  1.8897    ----    ----  1.8290  1.8938
             5  1.7132  1.6614  1.7756  1.8288  1.9302  1.8646  1.8967  1.9047  1.8954  1.9867  1.9070  1.8767  1.7815  1.8625
             6  1.7002  1.7178  1.7965  1.8464  1.8551  1.7939  1.8853  1.8938  1.8256  1.9107  1.9267  1.8999  1.8424  1.8495
             7  1.6842  1.7071  1.7528  1.7979  1.8762  1.8743    ----    ----  1.9068  1.9330  1.8765  1.8540  1.8307  1.8318
             8  1.6842  1.7071  1.7528  1.7979  1.8762  1.8743    ----    ----  1.9068  1.9330  1.8765  1.8540  1.8307  1.8318
             9  1.7002  1.7178  1.7965  1.8464  1.855*  1.7939  1.8853  1.8938  1.8256  1.9107  1.9267  1.8999  1.8424  1.8495
            10  1.7132  1.6614  1.7756  1.8288  1.9302  1.8646  1.8967  1.9047  1.8954  1.9867  1.9070  1.8767  1.7815  1.8625
            11  1.7443  1.7086    ----    ----  1.8375  1.8643  1.8255  1.8330  1.8942  1.8897    ----    ----  1.8290  1.8938
            12  1.7023  1.5592    ----    ----  1.7924  1.8223  1.7871  1.7945  1.8504  1.8419    ----    ----  1.6674  1.8459
            13  1.3836  1.7047  1.5685  1.7269  1.6865  1.7515  1.7488  1.7563  1.7783  1.7325  1.7945  1.6518  1.8199  1.4997
            14  1.5076  1.3957  1.7272  1.7779  1.7533  1.7468  1.7373  1.7451  1.7736  1.7996  1.8459  1.8164  1.4896  1.6349


           FZ FACTORS FOR ASSEMBLY 35, SERIAL NUMBER OMS020
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
             1  1.2024  1.1973  1.2015  1.2024  1.2023  1.2028  1.2023  1.2022  1.2023  1.2011  1.2004  1.1988  1.1938  1.1984
             2  1.1975  1.2003  1.1981  1.2022  1.1980  1.2020  1.2025  1.2023  1.2012  1.1966  1.2002  1.1954  1.1970  1.1935
             3  1.2021  1.1985    ----    ----  1.2033  1.2024  1.2027  1.2025  1.2016  1.2019    ----    ----  1.1953  1.1983
             4  1.2034  1.2031    ----    ----  1.2040  1.2030  1.2030  1.2028  1.2022  1.2027    ----    ----  1.2000  1.1998
             5  1.2038  1.1993  1.2042  1.2045  1.2034  1.2023  1.2028  1.2025  1.2015  1.2020  1.2026  1.2018  1.1962  1.2003
             6  1.2046  1.2037  1.2039  1.2039  1.2027  1.1991  1.2034  1.2032  1.1983  1.2014  1.2020  1.2012  1.2006  1.2012
             7  1.2043  1.2044  1.2043  1.2042  1.2035  1.2037    ----    ----  1.2030  1.2022  1.2023  1.2019  1.2014  1.2009
             8  1.2043  1.2044  1.2043  1.2042  1.2035  1.2037    ----    ----  1.2030  1.2022  1.2023  1.2019  1.2014  1.2009
             9  1.2046  1.2037  1.2037  1.2039  1.2027  1.1991  1.2034  1.2032  1.1983  1.2014  1.2020  1.2012  1.2006  1.2012
            10  1.2038  1.1993  1.2042  1.2045  1.2034  1.2023  1.2028  1.2025  1.2015  1.2020  1.2026  1.2018  1.1962  1.2003
            11  1.2034  1.2031    ----    ----  1.2040  1.2030  1.2030  1.2028  1.2022  1.2027    ----    ----  1.2000  1.1998
            12  1.2021  1.1985    ----    ----  1.2033  1.2024  1.2027  1.2025  1.2016  1.2019    ----    ----  1.1953  1.1983
            13  1.1975  1.2003  1.1981  1.2022  1.1980  1.2020  1.2025  1.2023  1.2012  1.1966  1.2002  1.1954  1.1970  1.1935
            14  1.2024  1.1973  1.2015  1.2024  1.2023  1.2028  1.2023  1.2022  1.2023  1.2011  1.2004  1.1988  1.1938  1.1984

           ASSEMBLY AXIAL PEAKING FACTOR   =  1.2014 (FROM 16 PLANE DATA)
```

Figure 13
Sample User Output File
Page 18 of 37

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1          PROGRAM ASAS VERSION 1. REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94. THE TIME IS 08:19:49                    PAGE   18
           A CODE TO CREATE NOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME  : /RPG3/Sp/OPPD/s3Otest.p
           RUN TITLE      : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID        : B-10.5-A  PDIL CASE A - 100% POWER, ARO

           XPO   = 10.500   GWD/MT.        EBAR = 16.119 GWD/MT, POWER = 100.00%, FLOW     = 100.00%
           NOTWT =   15120. STEPS INSERTED, FQ =  2.000, F-DELTA-H =  1.653,  INCORE ASI =   .0078,  PERIPHERAL ASI =   .0023
           TOTAL RELATIVE EXCORE SIGNAL       =  .4425

           FUEL TYPE : "  'E2
           2D PIN POWERS FOR ASSEMBLY 35, SERIAL NUMBER OM8020
                1       2       3       4       5       6       7       8       9      10      11      12      13      14
         1   1.2538  1.1657  1.4376  1.4787  1.4582  1.4522  1.4450  1.4516  1.4752  1.4982  1.5377  1.5152  1.2477  1.3642
         2   1.1555  1.4202  1.3091  1.4364  1.4078  1.4572  1.4544  1.4608  1.4804  1.4479  1.4951  1.3818  1.5203  1.2566
         3   1.4162  1.3010    ----    ----  1.4898  1.5155  1.4859  1.4923  1.5400  1.5324    ----    ----  1.3950  1.5404
         4   1.4495  1.4202    ----    ----  1.5261  1.5497  1.5174  1.5240  1.5756  1.5712    ----    ----  1.5241  1.5784
         5   1.4232  1.3852  1.4745  1.5183  1.6040  1.5508  1.5770  1.5840  1.5775  1.6529  1.5857  1.5616  1.4892  1.5517
         6   1.4114  1.4272  1.4925  1.5337  1.5424  1.4961  1.5666  1.5740  1.5235  1.5905  1.6030  1.5817  1.5345  1.5397
         7   1.3985  1.4174  1.4554  1.4930  1.5590  1.5570    ----    ----  1.5850  1.6079  1.5608  1.5426  1.5238  1.5253
         8   1.3985  1.4174  1.4554  1.4930  1.5590  1.5570    ----    ----  1.5850  1.6079  1.5608  1.5426  1.5238  1.5253
         9   1.4114  1.4272  1.4925  1.5337  1.5424  1.4961  1.5666  1.5740  1.5235  1.5905  1.6030  1.5817  1.5345  1.5397
        10   1.4232  1.3852  1.4745  1.5183  1.6040  1.5508  1.5770  1.5840  1.5775  1.6529  1.5857  1.5616  1.4892  1.5517
        11   1.4495  1.4202    ----    ----  1.5261  1.5497  1.5174  1.5240  1.5756  1.5712    ----    ----  1.5241  1.5784
        12   1.4162  1.3010    ----    ----  1.4898  1.5155  1.4859  1.4923  1.5400  1.5324    ----    ----  1.3950  1.5404
        13   1.1555  1.4202  1.3091  1.4364  1.4078  1.4572  1.4544  1.4608  1.4804  1.4479  1.4951  1.3818  1.5203  1.2566
        14   1.2538  1.1657  1.4376  1.4787  1.4582  1.4522  1.4450  1.4516  1.4752  1.4982  1.5377  1.5152  1.2477  1.3642

           FUEL TYPE : TYPE2
           ADJUSTED 2D PIN POWERS FOR ASSEMBLY 35, SERIAL NUMBER OM8020 (INCLUDES GRID DIP FACTOR OF 1.0075)
                1       2       3       4       5       6       7       8       9      10      11      12      13      14
         1   1.2642  1.1704  1.4484  1.4909  1.4702  1.4648  1.4569  1.4634  1.4873  1.5091  1.5479  1.5232  1.2491  1.3710
         2   1.1603  1.4295  1.3153  1.4481  1.4143  1.4688  1.4665  1.4728  1.4912  1.4529  1.5048  1.3851  1.5261  1.2576
         3   1.4275  1.3075    ----    ----  1.5031  1.5281  1.4987  1.5049  1.5517  1.5446    ----    ----  1.3982  1.5480
         4   1.4628  1.4328    ----    ----  1.5409  1.5634  1.5308  1.5371  1.5885  1.5847    ----    ----  1.5337  1.5881
         5   1.4367  1.3932  1.4890  1.5336  1.6186  1.5636  1.5905  1.5972  1.5894  1.6660  1.5991  1.5737  1.4939  1.5618
         6   1.4258  1.4405  1.5065  1.5483  1.5557  1.5043  1.5810  1.5881  1.5309  1.6023  1.6157  1.5933  1.5450  1.5510
         7   1.4124  1.4316  1.4699  1.5077  1.5734  1.5717    ----    ----  1.5990  1.6209  1.5736  1.5547  1.5352  1.5361
         8   1.4124  1.4316  1.4699  1.5077  1.5734  1.5717    ----    ----  1.5990  1.6209  1.5736  1.5547  1.5352  1.5361
         9   1.4258  1.4405  1.5065  1.5483  1.5557  1.5043  1.5810  1.5881  1.5309  1.6023  1.6157  1.5933  1.5450  1.5510
        10   1.4367  1.3932  1.4890  1.5336  1.6186  1.5636  1.5905  1.5972  1.5894  1.6660  1.5991  1.5737  1.4939  1.5618
        11   1.4628  1.4328    ----    ----  1.5409  1.5634  1.5308  1.5371  1.5885  1.5847    ----    ----  1.5337  1.5881
        12   1.4275  1.3075    ----    ----  1.5031  1.5281  1.4987  1.5049  1.5517  1.5446    ----    ----  1.3982  1.5480
        13   1.1603  1.4295  1.3153  1.4481  1.4143  1.4688  1.4665  1.4728  1.4912  1.4529  1.5048  1.3851  1.5261  1.2576
        14   1.2642  1.1704  1.4484  1.4909  1.4702  1.4648  1.4569  1.4634  1.4873  1.5091  1.5479  1.5232  1.2491  1.3710

           MAXIMUM 2D ONE PIN POWER          =   1.6660 AT ROW  5 COLUMN 10
           MAXIMUM 2D ONE PIN POWER W/UNC    =   1.8876        (1.6660 X 1.1000 X 1.0300)
           MAXIMUM CHANNEL POWER             =   1.6208 AT ROW  5 COLUMN 10
           MAXIMUM 3D ONE PIN POWER          =   2.0016 AT ROW  5 COLUMN 10 (INCLUDES GRID DIP FACTOR OF 1.0075)
           MAXIMUM 3D ONE PIN POWER W/UNC    =   2.2679        (2.0016 X 1.1000 X 1.0300)
           MAXIMUM LHGR                      =  12.0099 KW/FT (2.0016 X 6.0000)
           MAXIMUM LHGR W/UNCERTAINTY        =  14.2957 KW/FT (2.2679 X 6.0000 X 1.0300 X 1.0200)
           PL TO 16.00 KW/FT W/O UNC         = 136.6398        ( 16.00 X 100.00 /(12.0099 X  .9750))
           PL TO 16.00 KW/FT W/UNCERTAINTY   = 111.7916        ( 16.00 X 100.00 /(14.2957 X  .9750) - 3.0000)
           ASSEMBLY AXIAL SHAPE INDEX        =   .0239
           ASSEMBLY AXIAL SHAPE INDEX W/UNC  =   .0000

           NORMALIZED ASSEMBLY AXIAL POWER SHAPE:
           NODE                1       2       3       4       5       6       7       8
           AXIAL POWER       .5314   .8453  1.0015  1.0997  1.1409  1.1850  1.1856  1.2014
           NODE                9      10      11      12      13      14      15      16
           AXIAL POWER      1.1753  1.1680  1.1203  1.0886  1.0140   .9355   .7762   .5312
```

Figure 13
Sample User Output File
Page 19 of 37

```
1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94. THE TIME IS 08:19:49                    PAGE   19
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME : /RPG3/Sp/OPPD/s3Otest.p
           RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID       : B-10.5-A  PDIL CASE A - 100% POWER, ARO

           XPO   = 10.500   GWD/MT,        EBAR = 16.119 GWD/MT, POWER = 100.00%, FLOW     = 100.00%
           NOTWT =   15120. STEPS INSERTED, FQ =  2.000, F-DELTA-H =  1.653,  INCORE ASI =    .0078,  PERIPHERAL ASI =    .0023
           TOTAL RELATIVE EXCORE SIGNAL        =  .4425

           FUEL TYPE : TYPE2
           PIN POWERS FOR LIMITING LHGR PLANE  8 FOR ASSEMBLY 19,SERIAL NUMBER OMR021
                1       2       3       4       5       6       7       8       9      10      11      12      13      14
         1  1.5404  1.5144  1.6273  1.6132  1.5988  1.5765  1.5768  1.5768  1.5765  1.5988  1.6132  1.6273  1.5144  1.5404
         2  1.5486  1.6703  1.6235  1.6292  1.6371  1.5848  1.5563  1.5563  1.5848  1.6371  1.6292  1.6235  1.6703  1.5486
         3  1.6875  1.6464    ----    ----  1.6365  1.6116  1.5680  1.5680  1.6116  1.6365    ----    ----  1.6464  1.6875
         4  1.6896  1.6688    ----    ----  1.6409  1.6315  1.5892  1.5892  1.6315  1.6409    ----    ----  1.6688  1.6896
         5  1.6873  1.6897  1.6656  1.6535  1.6913  1.6454  1.6367  1.6367  1.6454  1.6913  1.6535  1.6656  1.6897  1.6873
         6  1.6733  1.6452  1.6496  1.6533  1.6547  1.6948  1.6495  1.6495  1.6948  1.6547  1.6533  1.6496  1.6452  1.6733
         7  1.6794  1.6211  1.6103  1.6156  1.6511  1.6547    ----    ----  1.6547  1.6511  1.6156  1.6103  1.6211  1.6794
         8  1.6841  1.6209  1.6081  1.6128  1.6518  1.6594    ----    ----  1.6594  1.6518  1.6128  1.6081  1.6209  1.6841
         9  1.6907  1.6587  1.6618  1.6657  1.6679  1.7124  1.6743  1.6743  1.7124  1.6679  1.6657  1.6618  1.6587  1.6907
        10  1.7227  1.7222  1.6961  1.6835  1.7215  1.6760  1.6741  1.6741  1.6760  1.7215  1.6835  1.6961  1.7222  1.7227
        11  1.7451  1.7215    ----    ----  1.6872  1.6768  1.6357  1.6357  1.6768  1.6872    ----    ----  1.7215  1.7451
        12  1.7664  1.7205    ----    ----  1.6994  1.6706  1.6253  1.6253  1.6706  1.6994    ----    ----  1.7205  1.7664
        13  1.6414  1.7711  1.7176  1.7182  1.7201  1.6587  1.6222  1.6222  1.6587  1.7201  1.7182  1.7176  1.7711  1.6414
        14  1.6649  1.6348  1.7556  1.7322  1.7076  1.6706  1.6505  1.6505  1.6706  1.7076  1.7322  1.7556  1.6348  1.6649


           FZ FACTORS FOR ASSEMBLY 19,  SERIAL NUMBER OMR021
                1       2       3       4       5       6       7       8       9      10      11      12      13      14
         1  1.1749  1.1758  1.1743  1.1750  1.1757  1.1765  1.1777  1.1777  1.1765  1.1757  1.1750  1.1743  1.1758  1.1749
         2  1.1766  1.1752  1.1751  1.1757  1.1770  1.1789  1.1795  1.1795  1.1789  1.1770  1.1757  1.1751  1.1752  1.1766
         3  1.1755  1.1756    ----    ----  1.1774  1.1793  1.1803  1.1803  1.1793  1.1774    ----    ----  1.1756  1.1755
         4  1.1766  1.1766    ----    ----  1.1776  1.1795  1.1804  1.1804  1.1795  1.1776    ----    ----  1.1766  1.1766
         5  1.1775  1.1781  1.1780  1.1778  1.1786  1.1796  1.1796  1.1794  1.1796  1.1786  1.1778  1.1780  1.1781  1.1775
         6  1.1784  1.1802  1.1801  1.1799  1.1797  1.1784  1.1774  1.1774  1.1784  1.1797  1.1799  1.1801  1.1802  1.1784
         7  1.1795  1.1806  1.1810  1.1807  1.1795  1.1773    ----    ----  1.1773  1.1795  1.1807  1.1810  1.1806  1.1795
         8  1.1796  1.1802  1.1805  1.1801  1.1794  1.1774    ----    ----  1.1774  1.1794  1.1801  1.1805  1.1802  1.1796
         9  1.1783  1.1800  1.1797  1.1798  1.1794  1.1782  1.1777  1.1777  1.1782  1.1794  1.1798  1.1797  1.1800  1.1783
        10  1.1778  1.1782  1.1780  1.1781  1.1784  1.1795  1.1797  1.1797  1.1795  1.1784  1.1781  1.1780  1.1782  1.1778
        11  1.1771  1.1769    ----    ----  1.1779  1.1796  1.1802  1.1802  1.1796  1.1779    ----    ----  1.1769  1.1771
        12  1.1762  1.1765    ----    ----  1.1775  1.1792  1.1801  1.1801  1.1792  1.1775    ----    ----  1.1765  1.1762
        13  1.1774  1.1760  1.1760  1.1762  1.1772  1.1789  1.1789  1.1789  1.1789  1.1772  1.1762  1.1760  1.1760  1.1774
        14  1.1760  1.1767  1.1751  1.1755  1.1759  1.1760  1.1767  1.1767  1.1760  1.1759  1.1755  1.1751  1.1767  1.1760

           ASSEMBLY AXIAL PEAKING FACTOR   =   1.1780 (FROM 16 PLANE DATA)
```

```
1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                    PAGE   20
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME  : /RPG3/Sp/OPPD/s30test.p
           RUN TITLE      : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID        : B-10.5-A  PDIL CASE A - 100% POWER, ARO

           XPO   = 10.500   GWD/MT,        EBAR = 16.119 GWD/MT, POWER = 100.00%, FLOW     = 100.00%
           NOTWT =   15120, STEPS INSERTED, FQ =  2.000, F-DELTA-H =  1.653,  INCORE ASI =   .0078,  PERIPHERAL ASI =   .0023
           TOTAL RELATIVE EXCORE SIGNAL       =  .4425

           FUEL TYPE : TYPE2
           2D PIN POWERS FOR ASSEMBLY 19, SERIAL NUMBER OMR021
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1   1.3111  1.2879  1.3858  1.3730  1.3599  1.3400  1.3389  1.3389  1.3400  1.3599  1.3730  1.3858  1.2879  1.3111
        2   1.3162  1.4212  1.3816  1.3857  1.3909  1.3443  1.3195  1.3195  1.3443  1.3909  1.3857  1.3816  1.4212  1.3162
        3   1.4356  1.4005    ----    ----  1.3899  1.3666  1.3285  1.3285  1.3666  1.3899    ----    ----  1.4005  1.4356
        4   1.4361  1.4183    ----    ----  1.3935  1.3832  1.3463  1.3463  1.3832  1.3935    ----    ----  1.4183  1.4361
        5   1.4329  1.4343  1.4139  1.4038  1.4350  1.3949  1.3877  1.3877  1.3949  1.4350  1.4038  1.4139  1.4343  1.4329
        6   1.4200  1.3940  1.3979  1.4012  1.4026  1.4382  1.4010  1.4010  1.4382  1.4026  1.4012  1.3979  1.3940  1.4200
        7   1.4239  1.3731  1.3635  1.3683  1.3999  1.4055    ----    ----  1.4055  1.3999  1.3683  1.3635  1.3731  1.4239
        8   1.4277  1.3735  1.3623  1.3667  1.4006  1.4094    ----    ----  1.4094  1.4006  1.3667  1.3623  1.3735  1.4277
        9   1.4349  1.4057  1.4086  1.4119  1.4142  1.4535  1.4217  1.4217  1.4535  1.4142  1.4119  1.4086  1.4057  1.4349
       10   1.4627  1.4617  1.4399  1.4290  1.4609  1.4210  1.4191  1.4191  1.4210  1.4609  1.4290  1.4399  1.4617  1.4627
       11   1.4826  1.4627    ----    ----  1.4324  1.4214  1.3860  1.3860  1.4214  1.4324    ----    ----  1.4627  1.4826
       12   1.5018  1.4625    ----    ----  1.4432  1.4167  1.3772  1.3772  1.4167  1.4432    ----    ----  1.4625  1.5018
       13   1.3941  1.5060  1.4605  1.4608  1.4611  1.4070  1.3760  1.3760  1.4070  1.4611  1.4608  1.4605  1.5060  1.3941
       14   1.4157  1.3893  1.4940  1.4735  1.4521  1.4205  1.4027  1.4027  1.4205  1.4521  1.4735  1.4940  1.3893  1.4157

           FUEL TYPE : TYPE2
           ADJUSTED 2D PIN POWERS FOR ASSEMBLY 19, SERIAL NUMBER OMR021 (INCLUDES GRID DIP FACTOR OF 1.0075)
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1   1.3175  1.2952  1.3918  1.3798  1.3674  1.3484  1.3487  1.3487  1.3484  1.3674  1.3798  1.3918  1.2952  1.3175
        2   1.3245  1.4285  1.3885  1.3934  1.4002  1.3555  1.3311  1.3311  1.3555  1.4002  1.3934  1.3885  1.4285  1.3245
        3   1.4433  1.4082    ----    ----  1.3996  1.3784  1.3411  1.3411  1.3784  1.3996    ----    ----  1.4082  1.4433
        4   1.4451  1.4273    ----    ----  1.4035  1.3954  1.3592  1.3592  1.3954  1.4035    ----    ----  1.4273  1.4451
        5   1.4431  1.4452  1.4246  1.4142  1.4466  1.4073  1.3998  1.3998  1.4073  1.4466  1.4142  1.4246  1.4452  1.4431
        6   1.4311  1.4071  1.4109  1.4141  1.4153  1.4495  1.4108  1.4108  1.4495  1.4153  1.4141  1.4109  1.4071  1.4311
        7   1.4364  1.3865  1.3773  1.3818  1.4122  1.4152    ----    ----  1.4152  1.4122  1.3818  1.3773  1.3865  1.4364
        8   1.4404  1.3863  1.3758  1.3794  1.4128  1.4192    ----    ----  1.4192  1.4128  1.3794  1.3758  1.3863  1.4404
        9   1.4461  1.4187  1.4213  1.4247  1.4265  1.4646  1.4321  1.4321  1.4646  1.4265  1.4247  1.4213  1.4187  1.4461
       10   1.4734  1.4730  1.4507  1.4399  1.4724  1.4335  1.4319  1.4319  1.4335  1.4724  1.4399  1.4507  1.4730  1.4734
       11   1.4925  1.4724    ----    ----  1.4431  1.4341  1.3990  1.3990  1.4341  1.4431    ----    ----  1.4724  1.4925
       12   1.5108  1.4716    ----    ----  1.4535  1.4288  1.3901  1.3901  1.4288  1.4535    ----    ----  1.4716  1.5108
       13   1.4039  1.5148  1.4690  1.4695  1.4711  1.4186  1.3874  1.3874  1.4186  1.4711  1.4695  1.4690  1.5148  1.4039
       14   1.4240  1.3983  1.5015  1.4815  1.4605  1.4288  1.4117  1.4117  1.4288  1.4605  1.4815  1.5015  1.3983  1.4240

           MAXIMUM 2D ONE PIN POWER          =   1.5148 AT ROW 13 COLUMN  2
           MAXIMUM 2D ONE PIN POWER W/UNC    =   1.7162       (1.5148 X 1.1000 X 1.0300)
           MAXIMUM CHANNEL POWER             =   1.4868 AT ROW 11 COLUMN 13
           MAXIMUM 3D ONE PIN POWER          =   1.7844 AT ROW 13 COLUMN  2 (INCLUDES GRID DIP FACTOR OF 1.0075)
           MAXIMUM 3D ONE PIN POWER W/UNC    =   2.0217       (1.7844 X 1.1000 X 1.0300)
           MAXIMUM LHGR                      =  10.7061 KW/FT (1.7844 X 6.0000)
           MAXIMUM LHGR W/UNCERTAINTY        =  12.7438 KW/FT (2.0217 X 6.0000 X 1.0300 X 1.0200)
           PL TO 16.00 KW/FT W/O UNC         = 153.2793       ( 16.00 X 100.00 /(10.7061 X  .9750))
           PL TO 16.00 KW/FT W/UNCERTAINTY = 125.7704         ( 16.00 X 100.00 /(12.7438 X  .9750) - 3.0000)
           ASSEMBLY AXIAL SHAPE INDEX        =    .0074
           ASSEMBLY AXIAL SHAPE INDEX W/UNC=     .0000

           NORMALIZED ASSEMBLY AXIAL POWER SHAPE:
           NODE                1       2       3       4       5       6       7       8
           AXIAL POWER       .5675   .8509   .9797  1.0655  1.1071  1.1514  1.1592  1.1780
           NODE                9      10      11      12      13      14      15      16
           AXIAL POWER      1.1608  1.1573  1.1194  1.0938  1.0307   .9634   .8242   .5912
```

Figure 13
Sample User Output File
Page 21 of 37

```
1         PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49              PAGE   21
          A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
          PIN FILE NAME : /RPG3/Sp/OPPD/s30test.p
          RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
          CASE ID       : B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 574

          XPO   = 10.500  GWD/MT,        EBAR = 16.119 GWD/MT, POWER =  20.00%, FLOW    = 100.00%
          NOTWT =   24164. STEPS INSERTED, FQ =  2.628, F-DELTA-H =  1.890,  INCORE ASI =   .2058,  PERIPHERAL ASI =   .1549
          TOTAL RELATIVE EXCORE SIGNAL        =  .4347

 TOTAL FUEL   PINS IN QUARTER CORE =  5804.0
 TOTAL OF ALL PINS IN QUARTER CORE =  6517.0

          EDIT OF ASSEMBLY NUMBERS TO BE PROCESSED (AND REASONS FOR SELECTION) FOR FUEL TYPE:
           TYPE1         TYPE2
           -----         -----

             1             10
        USER SELECT   USER SELECT

            13             39
        FQ-PLANE 1    USER SELECT

            16             35
        FQ-PLANE 3    FQ-PLANE 1

            11
        FQ-PLANE 16

            18
        CH-PLANE 2
```

```
1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                    PAGE   22
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME  : /RPG3/Sp/OPPD/s30test.p
           RUN TITLE      : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID        : B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 574

           XPO   = 10.500   GWD/MT,        EBAR = 16.119 GWD/MT, POWER =  20.00%, FLOW     = 100.00%
           NOTWT =  24164, STEPS INSERTED, FQ =  2.628, F-DELTA-H =  1.890,  INCORE ASI =   .2058,  PERIPHERAL ASI =   .1549
           TOTAL RELATIVE EXCORE SIGNAL       =  .4347

           FUEL TYPE : TYPE1
           PIN POWERS FOR LIMITING LNGR PLANE  6 FOR ASSEMBLY  1,SERIAL NUMBER OMN012
                1       2       3       4       5       6       7       8       9       10      11      12      13      14
         1   .0634   .0666   .0714   .0760   .0801   .0848   .0917   .0942   .0932   .0947   .0971   .0992   .1013   .1058
         2   .0724   .0803   .0886   .0944   .0970   .0990   .1019   .1046   .1080   .1130   .1183   .1206   .1202   .1222
         3   .0853   .0969   ----    ----    .1168   .1164   .1174   .1204   .1264   .1351   ----    ----    .1427   .1416
         4   .1007   .1136   ----    ----    .1359   .1352   .1361   .1395   .1464   .1563   ----    ----    .1642   .1622
         5   .1188   .1292   .1414   .1496   .1531   .1558   .1585   .1625   .1686   .1755   .1827   .1852   .1830   .1834
         6   .1422   .1471   .1559   .1641   .1716   .1801   .1884   .1935   .1955   .1972   .2002   .2025   .2032   .2061
         7   .1762   .1702   .1747   .1824   .1920   .2069   ----    ----    .2274   .2235   .2244   .2262   .2275   .2310
         8   .2036   .1967   .2014   .2094   .2199   .2372   ----    ----    .2590   .2529   .2535   .2555   .2577   .2636
         9   .2224   .2272   .2385   .2488   .2578   .2678   .2760   .2820   .2857   .2878   .2918   .2945   .2952   .2999
        10   .2556   .2689   .2890   .3007   .3017   .3019   .3010   .3061   .3190   .3326   .3472   .3510   .3441   .3439
        11   .2998   .3207   ----    ----    .3531   .3428   .3387   .3443   .3616   .3877   ----    ----    .4034   .3954
        12   .3516   .3713   ----    ----    .3998   .3879   .3854   .3927   .4104   .4396   ----    ----    .4596   .4523
        13   .4102   .4176   .4358   .4436   .4390   .4368   .4433   .4541   .4658   .4859   .5088   .5167   .5106   .5162
        14   .4844   .4762   .4805   .4852   .4900   .5012   .5275   .5453   .5429   .5516   .5641   .5739   .5818   .6018


           FZ FACTORS FOR ASSEMBLY  1, SERIAL NUMBER OMN012
                1       2       3       4       5       6       7       8       9       10      11      12      13      14
         1  1.2513  1.2492  1.2471  1.2463  1.2467  1.2479  1.2491  1.2476  1.2442  1.2412  1.2389  1.2381  1.2387  1.2393
         2  1.2518  1.2506  1.2447  1.2437  1.2482  1.2502  1.2507  1.2496  1.2468  1.2426  1.2358  1.2350  1.2399  1.2413
         3  1.2531  1.2476  ----    ----    1.2447  1.2513  1.2521  1.2511  1.2479  1.2389  ----    ----    1.2364  1.2422
         4  1.2558  1.2498  ----    ----    1.2462  1.2526  1.2530  1.2520  1.2494  1.2406  ----    ----    1.2385  1.2443
         5  1.2600  1.2576  1.2509  1.2493  1.2533  1.2540  1.2528  1.2518  1.2511  1.2483  1.2420  1.2416  1.2466  1.2478
         6  1.2648  1.2630  1.2607  1.2588  1.2571  1.2532  1.2472  1.2461  1.2506  1.2527  1.2526  1.2523  1.2524  1.2518
         7  1.2694  1.2671  1.2648  1.2623  1.2588  1.2500  ----    ----    1.2481  1.2555  1.2572  1.2575  1.2568  1.2552
         8  1.2721  1.2700  1.2683  1.2661  1.2628  1.2541  ----    ----    1.2519  1.2593  1.2612  1.2616  1.2610  1.2602
         9  1.2716  1.2708  1.2690  1.2674  1.2661  1.2623  1.2556  1.2547  1.2599  1.2623  1.2623  1.2625  1.2629  1.2623
        10  1.2723  1.2702  1.2640  1.2631  1.2674  1.2681  1.2666  1.2658  1.2659  1.2640  1.2584  1.2582  1.2633  1.2647
        11  1.2741  1.2675  ----    ----    1.2652  1.2717  1.2724  1.2718  1.2700  1.2625  ----    ----    1.2618  1.2680
        12  1.2773  1.2706  ----    ----    1.2685  1.2757  1.2771  1.2769  1.2746  1.2667  ----    ----    1.2664  1.2729
        13  1.2812  1.2792  1.2731  1.2724  1.2774  1.2803  1.2811  1.2815  1.2798  1.2764  1.2708  1.2709  1.2767  1.2787
        14  1.2851  1.2845  1.2832  1.2825  1.2831  1.2844  1.2851  1.2865  1.2844  1.2826  1.2816  1.2820  1.2831  1.2843

           ASSEMBLY AXIAL PEAKING FACTOR   =   1.2662 (FROM 16 PLANE DATA)
```

Figure 13
Sample User Output File
Page 23 of 37

```
1       PROGRAM ASAS VERSION 1, REV DATE 4/12/94    TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                    PAGE   23
        A CODE TO CREATE NOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
        PIN FILE NAME  : /RPG3/Sp/OPPD/s3Otest.p
        RUN TITLE      : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
        CASE ID        : B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 574

        XPO   = 10.500   GWD/MT.        EBAR = 16.119 GWD/MT, POWER =  20.00%, FLOW     = 100.00%
        MOTWT =   24164. STEPS INSERTED, FQ =  2.628, F-DELTA-H =  1.890,  INCORE ASI =   .2058,  PERIPHERAL ASI =   .1549
        TOTAL RELATIVE EXCORE SIGNAL        =  .4347

        FUEL TYPE : TYPE1
        2D PIN POWERS FOR ASSEMBLY  1, SERIAL NUMBER OMN012
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
  1     .0507   .0533   .0572   .0609   .0642   .0679   .0734   .0755   .0749   .0763   .0784   .0801   .0817   .0853
  2     .0578   .0642   .0712   .0759   .0777   .0792   .0814   .0837   .0866   .0910   .0957   .0976   .0970   .0984
  3     .0681   .0777   ----    ----    .0939   .0930   .0937   .0963   .1013   .1090   ----    ----    .1154   .1140
  4     .0802   .0909   ----    ----    .1090   .1079   .1086   .1114   .1172   .1260   ----    ----    .1326   .1304
  5     .0943   .1028   .1130   .1197   .1221   .1243   .1265   .1298   .1348   .1406   .1471   .1492   .1468   .1470
  6     .1124   .1165   .1236   .1304   .1365   .1437   .1511   .1553   .1563   .1574   .1599   .1617   .1623   .1646
  7     .1388   .1343   .1382   .1445   .1526   .1655   ----    ----    .1822   .1780   .1785   .1798   .1810   .1841
  8     .1600   .1549   .1588   .1654   .1741   .1891   ----    ----    .2069   .2008   .2010   .2025   .2044   .2092
  9     .1749   .1788   .1879   .1963   .2036   .2122   .2199   .2248   .2267   .2280   .2311   .2333   .2337   .2376
 10     .2009   .2117   .2287   .2380   .2380   .2381   .2376   .2418   .2520   .2631   .2759   .2789   .2724   .2719
 11     .2353   .2530   ----    ----    .2791   .2695   .2662   .2708   .2847   .3071   ----    ----    .3197   .3119
 12     .2753   .2923   ----    ----    .3152   .3041   .3018   .3076   .3220   .3471   ----    ----    .3629   .3554
 13     .3202   .3264   .3423   .3487   .3436   .3412   .3460   .3544   .3639   .3807   .4004   .4066   .3999   .4037
 14     .3769   .3708   .3745   .3784   .3819   .3902   .4105   .4239   .4226   .4300   .4401   .4477   .4535   .4686

        FUEL TYPE : TYPE1
        ADJUSTED 2D PIN POWERS FOR ASSEMBLY  1, SERIAL NUMBER OMN012 (INCLUDES GRID DIP FACTOR OF 1.0075)
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
  1     .0505   .0530   .0568   .0604   .0637   .0675   .0730   .0750   .0742   .0754   .0773   .0789   .0806   .0842
  2     .0576   .0639   .0705   .0751   .0772   .0788   .0810   .0832   .0859   .0899   .0941   .0959   .0957   .0972
  3     .0679   .0771   ----    ----    .0930   .0926   .0934   .0958   .1005   .1075   ----    ----    .1136   .1127
  4     .0801   .0904   ----    ----    .1081   .1076   .1083   .1110   .1165   .1243   ----    ----    .1306   .1291
  5     .0945   .1028   .1125   .1190   .1218   .1240   .1261   .1293   .1341   .1397   .1454   .1474   .1456   .1459
  6     .1132   .1171   .1240   .1306   .1366   .1433   .1499   .1540   .1556   .1569   .1593   .1611   .1617   .1640
  7     .1402   .1354   .1390   .1451   .1528   .1646   ----    ----    .1809   .1779   .1786   .1799   .1810   .1838
  8     .1620   .1565   .1602   .1666   .1749   .1887   ----    ----    .2061   .2012   .2017   .2033   .2051   .2098
  9     .1769   .1807   .1898   .1980   .2051   .2131   .2196   .2244   .2273   .2290   .2321   .2343   .2348   .2386
 10     .2033   .2140   .2300   .2392   .2401   .2402   .2385   .2436   .2539   .2646   .2763   .2792   .2738   .2736
 11     .2385   .2552   ----    ----    .2809   .2727   .2695   .2740   .2877   .3085   ----    ----    .3210   .3147
 12     .2797   .2955   ----    ----    .3181   .3087   .3066   .3125   .3265   .3498   ----    ----    .3657   .3599
 13     .3264   .3322   .3468   .3530   .3493   .3476   .3527   .3613   .3706   .3886   .4049   .4111   .4063   .4107
 14     .3854   .3789   .3823   .3861   .3899   .3988   .4197   .4339   .4319   .4389   .4488   .4566   .4629   .4788

        MAXIMUM 2D ONE PIN POWER            =    .4788 AT ROW 14 COLUMN 14
        MAXIMUM 2D ONE PIN POWER W/UNC      =    .5435       ( .4788 X 1.1000 X 1.0300)
        MAXIMUM CHANNEL POWER               =    .4397 AT ROW 13 COLUMN 13
        MAXIMUM 3D ONE PIN POWER            =    .6063 AT ROW 14 COLUMN 14 (INCLUDES GRID DIP FACTOR OF 1.0075)
        MAXIMUM 3D ONE PIN POWER W/UNC      =    .6870       ( .6063 X 1.1000 X 1.0300)
        MAXIMUM LHGR                        =   3.6379 KW/FT ( .6063 X 6.0000)
        MAXIMUM LHGR W/UNCERTAINTY          =   4.3304 KW/FT ( .6870 X 6.0000 X 1.0300 X 1.0200)
        PL TO 15.00 KW/FT W/O UNC           = 422.8934       ( 15.00 X 100.00 /( 3.6379 X  .9750))
        PL TO 15.00 KW/FT W/UNCERTAINTY     = 353.2741       ( 15.00 X 100.00 /( 4.3304 X  .9750) - 3.0000)
        ASSEMBLY AXIAL SHAPE INDEX          =    .1508
        ASSEMBLY AXIAL SHAPE INDEX W/UNC    =    .1108

        NORMALIZED ASSEMBLY AXIAL POWER SHAPE:
        NODE            1       2       3       4       5       6       7       8
        AXIAL POWER   .8452   1.0410  1.1582  1.2373  1.2603  1.2662  1.2228  1.1754
        NODE            9      10      11      12      13      14      15      16
        AXIAL POWER  1.0959   1.0310   .9525   .8955   .8272   .7677   .6750   .5486
```

Figure 13
Sample User Output File
Page 24 of 37

```
1       PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                    PAGE   24
        A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
        PIN FILE NAME : /RPG3/Sp/OPPD/s30test.p
        RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
        CASE ID       : B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 574

        XPO   = 10.500   GWD/MT,        ERAP = 16.119 GWD/MT, POWER =  20.00%, FLOW     = 100.00%
        NOTWT =   24164. STEPS INSERTED, FQ =  2.628, F-DELTA-H =  1.890,  INCORE ASI =   .2058,  PERIPHERAL ASI =   .1549
        TOTAL RELATIVE EXCORE SIGNAL        =  .4347

        FUEL TYPE : TYPE1
        PIN POWERS FOR LIMITING LHGR PLANE  5 FOR ASSEMBLY 13,SERIAL NUMBER OMS013
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1   1.7593  1.5845  1.8858  1.7638  1.8985  1.9193  1.9052  1.9052  1.9193  1.8985  1.7638  1.8858  1.5845  1.7593
        2   1.6166  1.9237  1.7816  1.9391  1.8461  1.9231  1.9178  1.9178  1.9231  1.8461  1.9391  1.7816  1.9237  1.6166
        3   1.9528  1.8085    ----    ----  2.0134  2.0098  1.9672  1.9672  2.0098  2.0134    ----    ----  1.8085  1.9528
        4   1.8507  1.9947    ----    ----  1.8975  2.0456  2.0201  2.0201  2.0456  1.8975    ----    ----  1.9947  1.8507
        5   2.0176  1.9240  2.0674  1.9226  2.1287  2.0931  2.0824  2.0824  2.0931  2.1287  1.9226  2.0674  1.9240  2.0176
        6   2.0661  2.0311  2.0916  2.1009  2.1218  2.1673  1.9521  1.9521  2.1673  2.1218  2.1009  2.0916  2.0311  2.0661
        7   2.0777  2.0536  2.0766  2.1047  2.1416  1.9807    ----    ----  1.9807  2.1416  2.1047  2.0766  2.0536  2.0777
        8   2.1049  2.0802  2.1034  2.1317  2.1698  2.0103    ----    ----  2.0103  2.1698  2.1317  2.1034  2.0802  2.1049
        9   2.1532  2.1177  2.1808  2.1910  2.2127  2.2614  2.0404  2.0404  2.2614  2.2127  2.1910  2.1808  2.1177  2.1532
        10  2.1656  2.0689  2.2215  2.0678  2.2863  2.2480  2.2373  2.2373  2.2480  2.2863  2.0678  2.2215  2.0689  2.1656
        11  2.0485  2.2091    ----    ----  2.1021  2.2628  2.2343  2.2343  2.2628  2.1021    ----    ----  2.2091  2.0485
        12  2.2260  2.0665    ----    ----  2.2962  2.2899  2.2413  2.2413  2.2899  2.2962    ----    ----  2.0665  2.2260
        13  1.9019  2.2648  2.0993  2.2817  2.1723  2.2589  2.2517  2.2517  2.2589  2.1723  2.2817  2.0993  2.2648  1.9019
        14  2.1343  1.9264  2.2902  2.1426  2.3024  2.3257  2.3077  2.3077  2.3257  2.3024  2.1426  2.2902  1.9264  2.1343


        FZ FACTORS FOR ASSEMBLY 13, SERIAL NUMBER OMS013
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1   1.3426  1.3363  1.3412  1.3376  1.3445  1.3470  1.3476  1.3476  1.3470  1.3445  1.3376  1.3412  1.3363  1.3426
        2   1.3386  1.3417  1.3382  1.3442  1.3406  1.3474  1.3489  1.3489  1.3474  1.3406  1.3442  1.3382  1.3417  1.3386
        3   1.3452  1.3399    ----    ----  1.3478  1.3497  1.3513  1.3513  1.3497  1.3478    ----    ----  1.3399  1.3452
        4   1.3431  1.3475    ----    ----  1.3449  1.3515  1.3529  1.3529  1.3515  1.3449    ----    ----  1.3475  1.3431
        5   1.3517  1.3457  1.3513  1.3468  1.3522  1.354)  1.3540  1.3540  1.3541  1.3522  1.3468  1.3513  1.3457  1.3517
        6   1.3564  1.3547  1.3554  1.3556  1.3563  1.3553  1.3500  1.3500  1.3553  1.3563  1.3556  1.3554  1.3547  1.3564
        7   1.3599  1.3592  1.3602  1.3601  1.3594  1.3527    ----    ----  1.3527  1.3594  1.3601  1.3602  1.3592  1.3599
        8   1.3634  1.3627  1.3638  1.3637  1.3630  1.3559    ----    ----  1.3559  1.3630  1.3637  1.3638  1.3627  1.3634
        9   1.3667  1.3650  1.3659  1.3661  1.3668  1.3658  1.3599  1.3599  1.3658  1.3668  1.3661  1.3659  1.3650  1.3667
        10  1.3680  1.3617  1.3681  1.3631  1.3695  1.3715  1.3718  1.3718  1.3715  1.3695  1.3631  1.3681  1.3617  1.3680
        11  1.3650  1.3705    ----    ----  1.3682  1.3758  1.3775  1.3775  1.3758  1.3682    ----    ----  1.3705  1.3650
        12  1.3741  1.3692    ----    ----  1.3789  1.3813  1.3831  1.3831  1.3813  1.3789    ----    ----  1.3692  1.3741
        13  1.3736  1.3785  1.3751  1.3821  1.3784  1.3862  1.3880  1.3880  1.3862  1.3784  1.3821  1.3751  1.3785  1.3736
        14  1.3859  1.3797  1.3862  1.3826  1.3907  1.3939  1.3946  1.3946  1.3939  1.3907  1.3826  1.3862  1.3797  1.3859

        ASSEMBLY AXIAL PEAKING FACTOR   =  1.3613 (FROM 16 PLANE DATA)
```

```
1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                    PAGE   25
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME : /RPG3/Sp/OPPD/s30test.p
           RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID       : B-10.5-J  PDIL CASE J -  20% POWER  BANK 3 AT 574

           XPO   = 10.500   GWD/MT.        EBAR = 16.119 GWD/MT, POWER =  20.00 , FLOW    = 100.00%
           NOTWT =   24164. STEPS INSERTED, PQ =  2.628, F-DELTA-H =  1.890,  CORE ASI =   .2058,  PERIPHERAL ASI =   .1549
           TOTAL RELATIVE EXCORE SIGNAL        =  .4347

           FUEL TYPE : TYPE1
           2D PIN POWERS FOR ASSEMBLY 13, SERIAL NUMBER OMS013
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1   1.3131  1.1889  1.4089  1.3217  1.4145  1.4268  1.4157  1.4157  1.4268  1.4145  1.3217  1.4089  1.1889  1.3131
        2   1.2105  1.4365  1.3342  1.4449  1.3797  1.4291  1.4234  1.4234  1.4291  1.3797  1.4449  1.3342  1.4365  1.2105
        3   1.4539  1.3523    ----    ----  1.4956  1.4905  1.4571  1.4571  1.4905  1.4956    ----    ----  1.3523  1.4539
        4   1.3800  1.4821    ----    ----  1.4129  1.5148  1.4942  1.4942  1.5148  1.4129    ----    ----  1.4821  1.3800
        5   1.4936  1.4313  1.5309  1.4292  1.5751  1.5466  1.5386  1.5386  1.5466  1.5751  1.4292  1.5309  1.4313  1.4936
        6   1.5233  1.4995  1.5433  1.5501  1.5646  1.5996  1.4473  1.4473  1.5996  1.5646  1.5501  1.5433  1.4995  1.5233
        7   1.5278  1.5108  1.5267  1.5474  1.5754  1.4650    ----    ----  1.4650  1.5754  1.5474  1.5267  1.5108  1.5278
        8   1.5438  1.5265  1.5423  1.5632  1.5919  1.4828    ----    ----  1.4828  1.5919  1.5632  1.5423  1.5265  1.5438
        9   1.5754  1.5514  1.5966  1.6039  1.6189  1.6557  1.5004  1.5004  1.6557  1.6189  1.6039  1.5966  1.5514  1.5754
       10   1.5830  1.5193  1.6238  1.5170  1.6695  1.6391  1.6310  1.6310  1.6391  1.6695  1.5170  1.6238  1.5193  1.5830
       11   1.5007  1.6119    ----    ----  1.5363  1.6447  1.6220  1.6220  1.6447  1.5363    ----    ----  1.6119  1.5007
       12   1.6199  1.5093    ----    ----  1.6652  1.6579  1.6204  1.6204  1.6579  1.6652    ----    ----  1.5093  1.6199
       13   1.3846  1.6430  1.5266  1.6508  1.5760  1.6295  1.6223  1.6223  1.6295  1.5760  1.6508  1.5266  1.6430  1.3846
       14   1.5400  1.3962  1.6522  1.5497  1.6556  1.6685  1.6548  1.6548  1.6685  1.6556  1.5497  1.6522  1.3962  1.5400

           FUEL TYPE : TYPE1
           ADJUSTED 2D PIN POWERS FOR ASSEMBLY 13, SERIAL NUMBER OMS013 (INCLUDES GRID DIP FACTOR OF 1.0075)
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1   1.3048  1.1758  1.3985  1.3084  1.4075  1.4224  1.4119  1.4119  1.4224  1.4075  1.3084  1.3985  1.1758  1.3048
        2   1.1993  1.4264  1.3214  1.4375  1.3689  1.4251  1.4210  1.4210  1.4251  1.3689  1.4375  1.3214  1.4264  1.1993
        3   1.4475  1.3410    ----    ----  1.4919  1.4888  1.4572  1.4572  1.4888  1.4919    ----    ----  1.3410  1.4475
        4   1.3718  1.4780    ----    ----  1.4063  1.5152  1.4961  1.4961  1.5152  1.4063    ----    ----  1.4780  1.3718
        5   1.4942  1.4256  1.5311  1.4245  1.5763  1.5499  1.5419  1.5419  1.5499  1.5763  1.4245  1.5311  1.4256  1.4942
        6   1.5292  1.5034  1.5482  1.5552  1.5706  1.6045  1.4460  1.4460  1.6045  1.5706  1.5552  1.5482  1.5034  1.5292
        7   1.5377  1.5199  1.5369  1.5577  1.5850  1.4666    ----    ----  1.4666  1.5850  1.5577  1.5369  1.5199  1.5377
        8   1.5579  1.5395  1.5567  1.5777  1.6059  1.4879    ----    ----  1.4879  1.6059  1.5777  1.5567  1.5395  1.5579
        9   1.5936  1.5673  1.6140  1.6216  1.6376  1.6736  1.5101  1.5101  1.6736  1.6376  1.6216  1.6140  1.5673  1.5936
       10   1.6027  1.5312  1.6442  1.5304  1.6921  1.6638  1.6558  1.6558  1.6638  1.6921  1.5304  1.6442  1.5312  1.6027
       11   1.5161  1.6350    ----    ----  1.5557  1.6747  1.6536  1.6536  1.6747  1.5557    ----    ----  1.6350  1.5161
       12   1.6475  1.5294    ----    ----  1.6994  1.6948  1.6588  1.6588  1.6948  1.6994    ----    ----  1.5294  1.6475
       13   1.4076  1.6762  1.5537  1.6887  1.6077  1.6718  1.6665  1.6665  1.6718  1.6077  1.6887  1.5537  1.6762  1.4076
       14   1.5796  1.4257  1.6950  1.5857  1.7040  1.7213  1.7080  1.7080  1.7213  1.7040  1.5857  1.6950  1.4257  1.5796

           MAXIMUM 2D ONE PIN POWER          =   1.7213 AT ROW 14 COLUMN  6
           MAXIMUM 2D ONE PIN POWER W/UNC    =   1.9502       (1.7213 X 1.1000 X 1.0300)
           MAXIMUM CHANNEL POWER             =   1.6919 AT ROW 13 COLUMN  6
           MAXIMUM 3D ONE PIN POWER          =   2.3432 AT ROW 14 COLUMN  6 (INCLUDES GRID DIP FACTOR OF 1.0075)
           MAXIMUM 3D ONE PIN POWER W/UNC    =   2.6548       (2.3432 X 1.1000 X 1.0300)
           MAXIMUM LHGR                      =  14.0589 KW/FT (2.3432 X 6.0000)
           MAXIMUM LHGR W/UNCERTAINTY        =  16.7347 KW/FT (2.6548 X 6.0000 X 1.0300 X 1.0200)
           PL TO 15.00 KW/FT W/O UNC         = 109.4297       ( 15.00 X 100.00 /(14.0589 X  .9750))
           PL TO 15.00 KW/FT W/UNCERTAINTY   =  88.9323       ( 15.00 X 100.00 /(16.7347 X  .9750 - 3.0000))
           ASSEMBLY AXIAL SHAPE INDEX        =   .1956
           ASSEMBLY AXIAL SHAPE INDEX W/UNC  =   .1556

           NORMALIZED ASSEMBLY AXIAL POWER SHAPE:
           NODE                1       2       3       4       5       6       7       8
           AXIAL POWER       .6943   1.0619  1.2424  1.3448  1.3613  1.3606  1.2867  1.2129
           NODE                9      10      11      12      13      14      15      16
           AXIAL POWER      1.0975  1.0171   .9235   .8648   .7873   .7208   .6021   .4223
```

Figure 13
Sample User Output File
Page 26 of 37

```
1       PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94. THE TIME IS 08:19:49                    PAGE   26
        A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
        PIN FILE NAME : /RPG3/Sp/GPPD/s30test.p
        RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
        CASE ID       : B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 574

        XPO   = 10.500   GWD/MT.        EBAR = 16.119 GWD/MT, POWER =  20.00%, FLOW     = 100.00%
        NOTWT =  24164, STEPS INSERTED, FQ =  2.628, F-DELTA-H =  1.890,  INCORE ASI =    2058,  PERIPHERAL ASI =   .1549
        TOTAL RELATIVE EXCORE SIGNAL          =  .4347

        FUEL TYPE : TYPE1
        PIN POWERS FOR LIMITING LHGR PLANE  6 FOR ASSEMBLY 16,SERIAL NUMBER OMS019
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
     1  1.4886  1.4131  1.8028  1.9035  1.9142  1.9409  1.9620  1.9914  2.0349  2.0774  2.1422  2.1102  1.7295  1.9236
     2  1.4079  1.7811  1.6815  1.8938  1.8681  1.9689  1.9879  2.0143  2.0532  2.0081  2.0998  1.9299  2.1257  1.7711
     3  1.7915  1.6773    ----    ----  2.0264  2.0726  2.0444  2.0674  2.1488  2.1559    ----    ----  1.9544  2.1888
     4  1.8880  1.8858    ----    ----  2.1048  2.1387  2.1045  2.1245  2.2055  2.2183    ----    ----  2.1470  2.2440
     5  1.8962  1.8582  2.0213  2.1031  2.2254  2.1575  2.2051  2.2226  2.2142  2.3258  2.2399  2.1979  2.0740  2.1976
     6  1.9216  1.9578  2.0671  2.1370  2.1577  2.0908  2.2233  2.2392  2.1395  2.2401  2.2533  2.2169  2.1454  2.1747
     7  1.9436  1.9776  2.0401  2.1045  2.2075  2.2257    ----    ----  2.2730  2.2828  2.2040  2.1653  2.1332  2.1459
     8  1.9754  2.0070  2.0667  2.1285  2.2291  2.2451    ----    ----  2.2869  2.2941  2.2126  2.1718  2.1379  2.1488
     9  2.0206  2.0492  2.1529  2.2155  2.2274  2.1514  2.2795  2.2893  2.1798  2.2745  2.2814  2.2386  2.1611  2.1854
    10  2.0654  2.0081  2.1655  2.2355  2.3481  2.2614  2.2980  2.3047  2.2828  2.3855  2.2866  2.2341  2.1000  2.2166
    11  2.1329  2.1039    ----    ----  2.2701  2.2845  2.2286  2.2333  2.3004  2.2974    ----    ----  2.1848  2.2721
    12  2.1029  1.9355    ----    ----  2.2341  2.2555  2.1989  2.2020  2.2666  2.2540    ----    ----  1.9990  2.2259
    13  1.7219  2.1272  1.9693  2.1726  2.1065  2.1834  2.1710  2.1727  2.1900  2.1195  2.1945  1.9997  2.1862  1.8112
    14  1.9035  1.7531  2.1768  2.2418  2.2078  2.1936  2.1745  2.1743  2.1955  2.2145  2.2583  2.2032  1.7922  1.9840


        FZ FACTORS FOR ASSEMBLY 16, SERIAL NUMBER OMS019
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
     1  1.3403  1.3354  1.3415  1.3439  1.3448  1.3462  1.3465  1.3468  1.3472  1.3466  1.3464  1.3450  1.3400  1.3468
     2  1.3354  1.3397  1.3382  1.3442  1.3407  1.3463  1.3476  1.3479  1.3473  1.3423  1.3466  1.3415  1.3442  1.3420
     3  1.3418  1.3385    ----    ----  1.3471  1.3479  1.3485  1.3487  1.3488  1.3486    ----    ----  1.3425  1.3482
     4  1.3445  1.3448    ----    ----  1.3489  1.3488  1.3498  1.3501  1.3496  1.3502    ----    ----  1.3485  1.3505
     5  1.3458  1.3416  1.3478  1.3493  1.3491  1.3490  1.3500  1.3502  1.3498  1.3502  1.3509  1.3501  1.3449  1.3514
     6  1.3475  1.3476  1.3489  1.3495  1.3494  1.3452  1.3508  1.3511  1.3459  1.3505  1.3510  1.3511  1.3508  1.3529
     7  1.3481  1.3492  1.3498  1.3509  1.3507  1.3512    ----    ----  1.3519  1.3518  1.3524  1.3519  1.3524  1.3535
     8  1.3487  1.3498  1.3504  1.3515  1.3512  1.3518    ----    ----  1.3525  1.3524  1.3531  1.3527  1.3531  1.3543
     9  1.3494  1.3495  1.3507  1.3512  1.3511  1.3469  1.3526  1.3529  1.3476  1.3524  1.3530  1.3531  1.3529  1.3552
    10  1.3489  1.3447  1.3508  1.3522  1.3519  1.3519  1.3529  1.3532  1.3528  1.3533  1.3541  1.3534  1.3483  1.3551
    11  1.3489  1.3491    ----    ----  1.3529  1.3528  1.3539  1.3543  1.3538  1.3545    ----    ----  1.3533  1.3556
    12  1.3476  1.3442    ----    ----  1.3524  1.3532  1.3538  1.3542  1.3543  1.3542    ----    ----  1.3488  1.3550
    13  1.3425  1.3469  1.3453  1.3512  1.3475  1.3531  1.3544  1.3549  1.3544  1.3494  1.3540  1.3491  1.3523  1.3506
    14  1.3492  1.3445  1.3508  1.3530  1.3538  1.3552  1.3554  1.3558  1.3565  1.3561  1.3563  1.3552  1.3506  1.3583

        ASSEMBLY AXIAL PEAKING FACTOR   =   1.3498 (FROM 16 PLANE DATA)
```

Figure 13
Sample User Output File
Page 27 of 37

```
1       PROGRAM ASAS VERSION 1, REV DATE 4/12/94    TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                    PAGE   27
        A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
        PIN FILE NAME : /RPG3/Sp/OPPD/s30test.p
        RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
        CASE ID       : B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 576

        XPO   = 10.500   GWD/MT,        EBAR = 16.119 GWD/MT, POWER =  20.00%, FLOW     = 100.00%
        NOTWT =   24164  STEPS INSERTED, FQ =  2.628, F-DELTA-H =  1.890,  INCORE ASI =   .2058,  PERIPHERAL ASI =   .1549
        TOTAL RELATIVE EXCORE SIGNAL      =   .4347

        FUEL TYPE : TYPE1
        2D PIN POWERS FOR ASSEMBLY 16, SERIAL NUMBER OMS019
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
    1   1.1106  1.0582  1.3438  1.4164  1.4234  1.4417  1.4571  1.4786  1.5104  1.5427  1.5910  1.5689  1.2907  1.4283
    2   1.0543  1.3295  1.2565  1.4089  1.3934  1.4624  1.4751  1.4944  1.5240  1.4961  1.5594  1.4387  1.5814  1.3197
    3   1.3351  1.2531    ----    ----  1.5043  1.5377  1.5161  1.5329  1.5931  1.5986    ----    ----  1.4558  1.6235
    4   1.4042  1.4023    ----    ----  1.5604  1.5856  1.5591  1.5736  1.6342  1.6429    ----    ----  1.5922  1.6617
    5   1.4090  1.3850  1.4997  1.5587  1.6495  1.5993  1.6335  1.6462  1.6405  1.7225  1.6581  1.6280  1.5422  1.6262
    6   1.4261  1.4528  1.5324  1.5835  1.5990  1.5543  1.6459  1.6573  1.5897  1.6587  1.6678  1.6409  1.5883  1.6074
    7   1.4418  1.4657  1.5114  1.5579  1.6343  1.6472    ----    ----  1.6813  1.6888  1.6296  1.6016  1.5773  1.5854
    8   1.4646  1.4868  1.5304  1.5749  1.6497  1.6609    ----    ----  1.6908  1.6963  1.6352  1.6056  1.5799  1.5867
    9   1.4974  1.5185  1.5938  1.6396  1.6485  1.5973  1.6852  1.6921  1.6175  1.6819  1.6862  1.6544  1.5974  1.6126
   10   1.5312  1.4923  1.6031  1.6533  1.7368  1.6728  1.6986  1.7032  1.6875  1.7627  1.6887  1.6507  1.5575  1.6358
   11   1.5812  1.5594    ----    ----  1.6779  1.6887  1.6460  1.6490  1.6992  1.6961    ----    ----  1.6142  1.6761
   12   1.5605  1.4399    ----    ----  1.6519  1.6668  1.6243  1.6261  1.6736  1.6644    ----    ----  1.4820  1.6428
   13   1.2826  1.5793  1.4623  1.6079  1.5633  1.6136  1.6029  1.6036  1.6170  1.5707  1.6207  1.4823  1.6166  1.3411
   14   1.4168  1.3039  1.6115  1.6584  1.6308  1.6187  1.6044  1.6036  1.6185  1.6330  1.6651  1.6257  1.3270  1.4606

        FUEL TYPE : TYPE1
        ADJUSTED 2D PIN POWERS FOR ASSEMBLY 16, SERIAL NUMBER OMS019 (INCLUDES GRID DIP FACTOR OF 1.0075)
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
    1   1.1111  1.0547  1.3456  1.4208  1.4287  1.4487  1.4644  1.4864  1.5189  1.5505  1.5989  1.5750  1.2909  1.4358
    2   1.0509  1.3294  1.2550  1.4135  1.3942  1.4696  1.4837  1.5035  1.5325  1.4989  1.5673  1.4405  1.5866  1.3219
    3   1.3372  1.2519    ----    ----  1.5125  1.5470  1.5259  1.5431  1.6039  1.6091    ----    ----  1.4588  1.6337
    4   1.4092  1.4076    ----    ----  1.5710  1.5964  1.5708  1.5857  1.6462  1.6557    ----    ----  1.6025  1.6749
    5   1.4153  1.3870  1.5087  1.5698  1.6611  1.6104  1.6459  1.6590  1.6527  1.7360  1.6718  1.6405  1.5480  1.6403
    6   1.4343  1.4613  1.5428  1.5951  1.6105  1.5606  1.6595  1.6713  1.5969  1.6720  1.6819  1.6547  1.6013  1.6232
    7   1.4507  1.4761  1.5227  1.5708  1.6477  1.6612    ----    ----  1.6966  1.7039  1.6451  1.6162  1.5922  1.6017
    8   1.4744  1.4980  1.5426  1.5887  1.6638  1.6758    ----    ----  1.7069  1.7123  1.6515  1.6210  1.5957  1.6039
    9   1.5082  1.5295  1.6069  1.6537  1.6625  1.6058  1.7014  1.7087  1.6270  1.6977  1.7028  1.6709  1.6130  1.6312
   10   1.5416  1.4988  1.6164  1.6685  1.7525  1.6879  1.7152  1.7202  1.7039  1.7805  1.7067  1.6675  1.5674  1.6545
   11   1.5920  1.5703    ----    ----  1.6944  1.7051  1.6634  1.6669  1.7170  1.7148    ----    ----  1.6306  1.6959
   12   1.5696  1.4447    ----    ----  1.6675  1.6835  1.6412  1.6436  1.6918  1.6823    ----    ----  1.4920  1.6614
   13   1.2852  1.5878  1.4684  1.6216  1.5723  1.6296  1.6204  1.6217  1.6346  1.5820  1.6379  1.4926  1.6317  1.3519
   14   1.4208  1.3085  1.6248  1.6748  1.6478  1.6373  1.6231  1.6229  1.6387  1.6529  1.6856  1.6444  1.3377  1.4808

        MAXIMUM 2D ONE PIN POWER          =   1.7805 AT ROW 10 COLUMN 10
        MAXIMUM 2D ONE PIN POWER W/UNC    =   2.0173        (1.7805 X 1.1000 X 1.0300)
        MAXIMUM CHANNEL POWER             =   1.7291 AT ROW 10 COLUMN  9
        MAXIMUM 3D ONE PIN POWER          =   2.4034 AT ROW 10 COLUMN 10 (INCLUDES GRID DIP FACTOR OF 1.0075)
        MAXIMUM 3D ONE PIN POWER W/UNC    =   2.7230        (2.4034 X 1.1000 X 1.0300)
        MAXIMUM LHGR                      =  14.4203 KW/FT (2.4034 X 6.0000)
        MAXIMUM LHGR W/UNCERTAINTY        =  17.1649 KW/FT (2.7230 X 6.0000 X 1.0300 X 1.0200)
        PL TO 15.00 KW/FT W/O UNC         = 106.6871        ( 15.00 X 100.00 /(14.4203 X  .9750))
        PL TO 15.00 KW/FT W/UNCERTAINTY =  86.6282        ( 15.00 X 100.00 /(17.1649 X  .9750) - 3.0000)
        ASSEMBLY AXIAL SHAPE INDEX        =   .1744
        ASSEMBLY AXIAL SHAPE INDEX W/UNC=   .1344

        NORMALIZED ASSEMBLY AXIAL POWER SHAPE:
        NODE              1       2       3       4       5       6       7       8
        AXIAL POWER     .6286   1.0180  1.2147  1.3243  1.3447  1.3498  1.2862  1.2290
        NODE              9      10      11      12      13      14      15      16
        AXIAL POWER    1.1274  1.0950   .9611   .8998   .8162   .7407   .6046   .3997
```

Figure 13
Sample User Output File
Page 28 of 37

```
1          PROGRAM ASAS VERSION 1. REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94. THE TIME IS 08:19:49                    PAGE   28
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME : /RPGJ/Sp/OPPD/s30test.p
           RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID       : B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 574

           XPO    = 10.500   GWD/MT,        EBAR = 16.119 GWD/MT, POWER =  20.00%, FLOW     = 100.00%
           NOTWI =   24164. STEPS INSERTED, FQ =  2.628, F-DELTA-H =  1.890,  INCORE ASI =   .2058,  PERIPHERAL ASI =   .1549
           TOTAL RELATIVE EXCORE SIGNAL       =  .4347

           FUEL TYPE : TYPE1
           PIN POWERS FOR LIMITING LHGR PLANE  6 FOR ASSEMBLY 11,SERIAL NUMBER OMS009
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
             1  1.7052  1.5435  1.8360  1.7169  1.8444  1.8625  1.8480  1.8507  1.8694  1.8544  1.7287  1.8524  1.5611  1.7331
             2  1.5720  1.8823  1.7465  1.8980  1.8058  1.8775  1.8720  1.8737  1.8813  1.8108  1.9058  1.7563  1.8989  1.5954
             3  1.9051  1.7793    ----    ----  1.9760  1.9693  1.9273  1.9282  1.9711  1.9784    ----    ----  1.7897  1.9291
             4  1.8142  1.9686    ----    ----  1.8685  2.0093  1.9831  1.9834  2.0093  1.8680    ----    ----  1.9755  1.8315
             5  1.9829  1.9048  2.0454  1.8998  2.0963  2.0577  2.0460  2.0458  2.0567  2.0945  1.8973  2.0441  1.9069  1.9964
             6  2.0354  2.0114  2.0697  2.0739  2.0888  2.1301  1.9195  1.9184  2.1285  2.0861  2.0701  2.0659  2.0102  2.0434
             7  2.0515  2.0340  2.0527  2.0739  2.1042  1.9447    ----    ----  1.9431  2.1017  2.0698  2.0474  2.0293  2.0530
             8  2.0788  2.0585  2.0760  2.0964  2.1272  1.9694    ----    ----  1.9677  2.1243  2.0917  2.0694  2.0515  2.0761
             9  2.1216  2.0916  2.1478  2.1496  2.1633  2.2070  1.9947  1.9943  2.2054  2.1597  2.1437  2.1398  2.0832  2.1178
            10  2.1277  2.0386  2.1608  2.0227  2.2260  2.1843  2.1756  2.1759  2.1828  2.2225  2.0167  2.1727  2.0301  2.1241
            11  2.0065  2.1664    ----    ----  2.0389  2.1881  2.1618  2.1620  2.1869  2.0358    ----    ----  2.1594  2.0040
            12  2.1709  2.0198    ----    ----  2.2161  2.2043  2.1578  2.1575  2.2035  2.2143    ----    ----  2.0151  2.1707
            13  1.8546  2.2100  2.0428  2.2089  2.0959  2.1711  2.1602  2.1591  2.1698  2.0942  2.2072  2.0401  2.2075  1.8550
            14  2.0965  1.8971  2.2463  2.0935  2.2379  2.2493  2.2159  2.2132  2.2451  2.2342  2.0900  2.2428  1.8931  2.0932


           FZ FACTORS FOR ASSEMBLY 11, SERIAL NUMBER OMS009
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
             1  1.3374  1.3318  1.3358  1.3319  1.3376  1.3396  1.3399  1.3399  1.3393  1.3370  1.3307  1.3343  1.3298  1.3358
             2  1.3321  1.3355  1.3322  1.3370  1.3332  1.3389  1.3401  1.3401  1.3386  1.3324  1.3361  1.3307  1.3342  1.3311
             3  1.3366  1.3328    ----    ----  1.3387  1.3399  1.3412  1.3412  1.3397  1.3382    ----    ----  1.3317  1.3367
             4  1.3335  1.3384    ----    ----  1.3348  1.3403  1.3414  1.3414  1.3402  1.3343    ----    ----  1.3381  1.3339
             5  1.3398  1.3353  1.3402  1.3356  1.3399  1.3412  1.3411  1.3411  1.3412  1.3399  1.3353  1.3402  1.3354  1.3412
             6  1.3424  1.3417  1.3421  1.3419  1.3420  1.3408  1.3359  1.3358  1.3410  1.3423  1.3423  1.3428  1.3427  1.3447
             7  1.3433  1.3435  1.3442  1.3437  1.3426  1.3367    ----    ----  1.3369  1.3433  1.3447  1.3455  1.3453  1.3463
             8  1.3439  1.3441  1.3448  1.3443  1.3434  1.3377    ----    ----  1.3381  1.3445  1.3458  1.3468  1.3467  1.3478
             9  1.3441  1.3434  1.3440  1.3440  1.3443  1.3433  1.3388  1.3390  1.3441  1.3457  1.3459  1.3467  1.3469  1.3491
            10  1.3427  1.3384  1.3434  1.3391  1.3436  1.3453  1.3456  1.3460  1.3464  1.3455  1.3414  1.3468  1.3425  1.3487
            11  1.3375  1.3426    ----    ----  1.3400  1.3459  1.3474  1.3480  1.3474  1.3422    ----    ----  1.3480  1.3444
            12  1.3418  1.3386    ----    ----  1.3453  1.3470  1.3490  1.3497  1.3488  1.3482    ----    ----  1.3446  1.3502
            13  1.3384  1.3425  1.3396  1.3448  1.3415  1.3477  1.3496  1.3503  1.3498  1.3448  1.3496  1.3454  1.3501  1.3478
            14  1.3452  1.3405  1.3451  1.3418  1.3481  1.3507  1.3517  1.3523  1.3528  1.3517  1.3468  1.3518  1.3487  1.3557

           ASSEMBLY AXIAL PEAKING FACTOR   =   1.3422 (FROM 16 PLANE DATA)
```

Figure 13
Sample User Output File
Page 29 of 37

```
1          PROGRAM ASAS VERSION 1. REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94. THE TIME IS 08:19:49                    PAGE   29
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME : /RPG3/Sp/OPPD/a30test.p
           RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID       : B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 574

           XPO   = 10.500   GWD/MT,        RBAR = 16.119 GWD/MT, POWER =  20.00%, FLOW     = 100.00%
           NOTWT =  24164, STEPS INSERTED, FQ =  2.628, F-DELTA-H =  1.890,  INCORE ASI =   .2058,  PERIPHERAL ASI =   .1549
           TOTAL RELATIVE EXCORE SIGNAL       =  .4347

           FUEL TYPE : TYPE1
           2D PIN POWERS FOR ASSEMBLY 11, SERIAL NUMBER OMS009
                1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1   1.2751  1.1590  1.3745  1.2890  1.3789  1.3904  1.3792  1.3812  1.3958  1.3870  1.2991  1.3883  1.1739  1.2974
        2   1.1801  1.4095  1.3110  1.4196  1.3544  1.4022  1.3969  1.3982  1.4054  1.3590  1.4264  1.3198  1.4232  1.1985
        3   1.4253  1.3350    ----    ----  1.4760  1.4697  1.4369  1.4376  1.4713  1.4784    ----    ----  1.3439  1.4433
        4   1.3605  1.4709    ----    ----  1.3998  1.4991  1.4784  1.4786  1.4993  1.4000    ----    ----  1.4764  1.3730
        5   1.4799  1.4265  1.5262  1.4224  1.5645  1.5342  1.5257  1.5254  1.5334  1.5632  1.4209  1.5252  1.4280  1.4885
        6   1.5162  1.4992  1.5420  1.5455  1.5565  1.5887  1.4369  1.4362  1.5873  1.5541  1.5422  1.5386  1.4971  1.5196
        7   1.5272  1.5139  1.5271  1.5435  1.5672  1.4549    ----    ----  1.4534  1.5646  1.5393  1.5217  1.5084  1.5250
        8   1.5468  1.5316  1.5437  1.5595  1.5834  1.4722    ----    ----  1.4704  1.5801  1.5542  1.5365  1.5233  1.5404
        9   1.5784  1.5569  1.5980  1.5995  1.6092  1.6429  1.4899  1.4894  1.6407  1.6049  1.5927  1.5889  1.5466  1.5699
       10   1.5846  1.5232  1.6233  1.5105  1.6567  1.6236  1.6168  1.6166  1.6212  1.6518  1.5034  1.6132  1.5122  1.5750
       11   1.5002  1.6136    ----    ----  1.5216  1.6257  1.6044  1.6038  1.6231  1.5168    ----    ----  1.6019  1.4907
       12   1.6179  1.5091    ----    ----  1.6473  1.6364  1.5995  1.5985  1.6336  1.6424    ----    ----  1.4986  1.6078
       13   1.3857  1.6462  1.5250  1.6426  1.5624  1.6109  1.6006  1.5990  1.6075  1.5573  1.6.55  1.5163  1.6351  1.3763
       14   1.5585  1.4152  1.6700  1.5602  1.6601  1.6653  1.6394  1.6366  1.6596  1.6528  1.5519  1.6591  1.4037  1.5439

           FUEL TYPE : TYPE1
           ADJUSTED 2D PIN POWERS FOR ASSEMBLY 11, SERIAL NUMBER OMS009 (INCLUDES GRID DIP FACTOR OF 1.0075)
                1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1   1.2800  1.1586  1.3781  1.2887  1.3844  1.3980  1.3871  1.3891  1.4032  1.3919  1.2976  1.3905  1.1718  1.3009
        2   1.1800  1.4129  1.3110  1.4247  1.3554  1.4093  1.4052  1.4064  1.4121  1.3592  1.4305  1.3183  1.4253  1.1975
        3   1.4300  1.3355    ----    ----  1.4832  1.4782  1.4466  1.4473  1.4795  1.4850    ----    ----  1.3434  1.4480
        4   1.3617  1.4777    ----    ----  1.4025  1.5082  1.4886  1.4888  1.5082  1.4022    ----    ----  1.4828  1.3747
        5   1.4884  1.4299  1.5353  1.4260  1.5735  1.5445  1.5358  1.5356  1.5438  1.5722  1.4242  1.5343  1.4313  1.4985
        6   1.5278  1.5098  1.5535  1.5567  1.5679  1.5989  1.4408  1.4400  1.5977  1.5659  1.5539  1.5507  1.5089  1.5338
        7   1.5398  1.5267  1.5408  1.5567  1.5795  1.4597    ----    ----  1.4585  1.5776  1.5536  1.5368  1.5232  1.5410
        8   1.5603  1.5452  1.5583  1.5736  1.5967  1.4783    ----    ----  1.4769  1.5945  1.5700  1.5533  1.5399  1.5583
        9   1.5925  1.5700  1.6121  1.6135  1.6238  1.6566  1.4973  1.4969  1.6554  1.6211  1.6090  1.6061  1.5637  1.5897
       10   1.5971  1.5102  1.6369  1.5183  1.6708  1.6395  1.6330  1.6332  1.6384  1.6682  1.5138  1.6308  1.5238  1.5944
       11   1.5061  1.6281    ----    ----  1.5304  1.6424  1.6227  1.6228  1.6415  1.5281    ----    ----  1.6208  1.5042
       12   1.6295  1.5161    ----    ----  1.6635  1.6546  1.6197  1.6194  1.6540  1.6621    ----    ----  1.5126  1.6294
       13   1.3921  1.6589  1.5333  1.6580  1.5712  1.6296  1.6215  1.6207  1.6287  1.5719  1.6568  1.5314  1.6570  1.3923
       14   1.5737  1.4240  1.6861  1.5714  1.6798  1.6883  1.6633  1.6612  1.6852  1.6770  1.5688  1.6835  1.4210  1.5712

           MAXIMUM 2D ONE PIN POWER       =   1.6883 AT ROW 14 COLUMN  6
           MAXIMUM 2D ONE PIN POWER W/UNC =   1.9129          (1.6883 X 1.1000 X 1.0300)
           MAXIMUM CHANNEL POWER          =   1.6507 AT ROW 13 COLUMN  6
           MAXIMUM 3D ONE PIN POWER       =   2.2662 AT ROW 14 COLUMN  6 (INCLUDES GRID DIP FACTOR OF 1.0075)
           MAXIMUM 3D ONE PIN POWER W/UNC =   2.5676          (2.2662 X 1.1000 X 1.0300)
           MAXIMUM LHGR                   =  13.5970 KW/FT (2.2662 X 6.0000)
           MAXIMUM LHGR W/UNCERTAINTY     =  16.1849 KW/FT (2.5676 X 6.0000 X 1.0300 X 1.0200)
           PL TO 15.00 KW/FT W/O UNC      = 113.1475          ( 15.00 X 100.00 /(13.5970 X  .9750))
           PL TO 15.00 KW/FT W/UNCERTAINTY =  92.0556         ( 15.00 X 100.00 /(16.1849 X  .9750) - 3.0000)
           ASSEMBLY AXIAL SHAPE INDEX     =   .1730
           ASSEMBLY AXIAL SHAPE INDEX W/UNC=  .1330

           NORMALIZED ASSEMBLY AXIAL POWER SHAPE:
           NODE            1       2       3       4       5       6       7       8
           AXIAL POWER    .6558   1.0203  1.2091  1.3167  1.3371  1.3422  1.2797  1.2230
           NODE            9      10      11      12      13      14      15      16
           AXIAL POWER   1.1226  1.0507   .9581   .8974   .8151   .7411   .610a   .4206
```

Figure 13
Sample User Output File
Page 30 of 37

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1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                    PAGE   30
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME : /RPG3/Sp/OPPD/s30test.p
           RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID       : B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 574

           XPO   = 10.500   GWD/MT,        EBAR = 16.119 GWD/MT, POWER =  20.00%, FLOW     = 100.00%
           NOTWT =   24164  STEPS INSERTED, FQ =  2.628, F-DELTA-H =  1.890,  INCORE ASI =   .2058,  PERIPHERAL ASI =   .1549
           TOTAL RELATIVE EXCORE SIGNAL       =  .4347

           FUEL TYPE : TYPE1
           PIN POWERS FOR LIMITING LHGR PLANE  5 FOR ASSEMBLY 18,SERIAL NUMBER OMS027
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
             1  1.9280  1.7309  7.7817  1.9387  2.0812  2.1058  2.0958  2.1031  2.1246  2.1089  1.9722  2.1242  1.7685  1.9607
             2  1.7613  2.1182  1.9175  2.0735  2.0134  2.1049  2.1018  2.1083  2.1226  2.0404  2.1106  1.9586  2.1645  1.7874
             3  2.1371  1.9345    ----    ----  2.1289  2.1749  2.1384  2.1448  2.1940  2.1596    ----    ----  1.9817  2.1721
             4  1.9997  2.1020    ----    ----  1.9881  2.1894  2.1712  2.1776  2.2100  2.0196    ----    ----  2.1590  2.0385
             5  2.1511  2.0462  2.1445  1.9933  2.2446  2.2132  2.2089  2.2154  2.2349  2.2820  2.0394  2.2047  2.1069  2.1997
             6  2.1744  2.1409  2.1940  2.1984  2.2165  2.2512  1.9989  2.0049  2.2812  2.2536  2.2500  2.2576  2.2084  2.2321
             7  2.1505  2.1355  2.1590  2.1831  2.2155  2.0019    ----    ----  2.0191  2.2494  2.2316  2.2206  2.2061  2.2213
             8  2.1502  2.1367  2.1614  2.1865  2.2197  2.0068    ----    ----  2.0246  2.2542  2.2356  2.2237  2.2082  2.2222
             9  2.1789  2.1469  2.2031  2.2097  2.2295  2.2737  2.0129  2.0197  2.2970  2.2683  2.1634  2.2693  2.2175  2.2375
            10  2.1557  2.0570  2.1601  2.0114  2.2670  2.2371  2.2338  2.2412  2.2605  2.3070  2.0609  2.2247  2.1229  2.2102
            11  2.0079  2.1179    ----    ----  2.0170  2.2231  2.2060  2.2130  2.2457  2.0518    ----    ----  2.1817  2.0538
            12  2.1508  1.9546    ----    ----  2.1683  2.2186  2.1832  2.1897  2.2398  2.2032    ----    ----  2.0091  2.1938
            13  1.7800  2.1461  1.9496  2.2147  2.0593  2.1565  2.1551  2.1612  2.1757  2.0900  2.1573  1.9972  2.1999  1.8118
            14  1.9617  1.7606  2.1217  1.9827  2.1344  2.1639  2.1538  2.1596  2.1816  2.1630  2.0188  2.1679  1.8010  1.9959


           FZ FACTORS FOR ASSEMBLY 18, SERIAL NUMBER OMS027
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
             1  1.3606  1.3562  1.3631  1.3609  1.3707  1.3752  1.3785  1.3810  1.3825  1.3826  1.3772  1.3840  1.3805  1.3899
             2  1.3568  1.3621  1.3609  1.3697  1.3677  1.3779  1.3820  1.3846  1.3855  1.3802  1.3871  1.3831  1.3891  1.3876
             3  1.3647  1.3618    ----    ----  1.3778  1.3821  1.3863  1.3890  1.3903  1.3915    ----    ----  1.3910  1.3991
             4  1.3634  1.3715    ----    ----  1.3760  1.3858  1.3905  1.3934  1.3947  1.3908    ----    ----  1.4036  1.4009
             5  1.3741  1.3706  1.3799  1.3771  1.3856  1.3902  1.3934  1.3966  1.3999  1.4019  1.3996  1.4089  1.4056  1.4154
             6  1.3797  1.3818  1.3852  1.3879  1.3912  1.3933  1.3904  1.3939  1.4040  1.4091  1.4127  1.4169  1.4203  1.4248
             7  1.3840  1.3870  1.3904  1.3937  1.3956  1.3914    ----    ----  1.4033  1.4152  1.4209  1.4251  1.4289  1.4331
             8  1.3873  1.3906  1.3942  1.3977  1.3999  1.3961    ----    ----  1.4091  1.4214  1.4276  1.4322  1.4364  1.4408
             9  1.3897  1.3926  1.3968  1.4003  1.4046  1.4076  1.4058  1.4104  1.4218  1.4281  1.4330  1.4384  1.4429  1.4483
            10  1.3908  1.3884  1.3992  1.3977  1.4079  1.4141  1.4191  1.4241  1.4295  1.4336  1.4333  1.4448  1.4434  1.4552
            11  1.3865  1.3966    ----    ----  1.4070  1.4192  1.4263  1.4318  1.4359  1.4348    ----    ----  1.4572  1.4574
            12  1.3945  1.3938    ----    ----  1.4178  1.4249  1.4321  1.4380  1.4430  1.4480    ----    ----  1.4602  1.4733
            13  1.3926  1.4014  1.4030  1.4150  1.4161  1.4300  1.4376  1.4440  1.4491  1.4485  1.4609  1.4622  1.4747  1.4789
            14  1.4043  1.4018  1.4128  1.4140  1.4279  1.4365  1.4438  1.4505  1.4571  1.4627  1.4634  1.4777  1.4824  1.5026

           ASSEMBLY AXIAL PEAKING FACTOR   =   1.4075 (FROM 16 PLANE DATA)
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Figure 13
Sample User Output File
Page 31 of 37

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1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94. THE TIME IS 08:19:49                    PAGE   31
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME : /RPG3/Sp/OPPD/s3Otest.p
           RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID       : B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 574

           XPO   = 10.500   GWD/MT,        KBAR = 16.119 GWD/MT, POWER =  20.00%, FLOW    = 100.00%
           NOTWT =   24164. STEPS INSERTED, FQ =  2.628, F-DELTA-H =  1.890,  INCORE ASI =   .2058,  PERIPHERAL ASI =   .1549
           TOTAL RELATIVE EXCORE SIGNAL        =  .4347

           FUEL TYPE : TYPE1
           2D PIN POWERS FOR ASSEMBLY 18, SERIAL NUMBER OMS027
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1  1.4173  1.2770  1.5271  1.4245  1.5184  1.5313  1.5204  1.5229  1.5367  1.5253  1.4320  1.5349  1.2810  1.4107
        2  1.2988  1.5551  1.4089  1.5139  1.4722  1.5276  1.5208  1.5226  1.5320  1.4784  1.5215  1.4161  1.5582  1.2881
        3  1.5660  1.4206    ----    ----  1.5451  1.5736  1.5425  1.5441  1.5781  1.5520    ----    ----  1.4246  1.5525
        4  1.4667  1.5326    ----    ----  1.4449  1.5800  1.5615  1.5628  1.5846  1.4521    ----    ----  1.5381  1.4551
        5  1.5654  1.4930  1.5541  1.4475  1.6199  1.5920  1.5852  1.5863  1.5964  1.6278  1.4571  1.5649  1.4990  1.5541
        6  1.5760  1.5494  1.5839  1.5840  1.5932  1.6215  1.4377  1.4383  1.6248  1.5993  1.5926  1.5933  1.5549  1.5666
        7  1.5538  1.5396  1.5527  1.5665  1.5875  1.4387    ----    ----  1.4388  1.5895  1.5706  1.5582  1.5439  1.5500
        8  1.5499  1.5366  1.5502  1.5643  1.5856  1.4374    ----    ----  1.4368  1.5859  1.5660  1.5526  1.5373  1.5423
        9  1.5657  1.5417  1.5773  1.5780  1.5873  1.6153  1.4319  1.4320  1.6156  1.5883  1.5795  1.5776  1.5369  1.5449
       10  1.5500  1.4816  1.5439  1.4391  1.6102  1.5819  1.5741  1.5737  1.5812  1.6093  1.4379  1.5398  1.4708  1.5188
       11  1.4482  1.5165    ----    ----  1.4335  1.5665  1.5467  1.5457  1.5640  1.4300    ----    ----  1.4972  1.4092
       12  1.5423  1.4023    ----    ----  1.5294  1.5569  1.5245  1.5227  1.5522  1.5215    ----    ----  1.3759  1.4890
       13  1.2781  1.5314  1.3897  1.4945  1.4541  1.5081  1.4991  1.4986  1.5012  1.4428  1.4767  1.3659  1.4917  1.2242
       14  1.3969  1.2560  1.5018  1.4021  1.4948  1.5064  1.4918  1.4888  1.4972  1.4787  1.3795  1.4670  1.2150  1.3283

           FUEL TYPE : TYPE1
           ADJUSTED 2D PIN POWERS FOR ASSEMBLY 18, SERIAL NUMBER OMS027 (INCLUDES GRID DIP FACTOR OF 1.0075)
              1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1  1.3804  1.2398  1.4901  1.3877  1.4898  1.5074  1.5002  1.5055  1.5208  1.5096  1.4118  1.5206  1.2659  1.4035
        2  1.2614  1.5163  1.3726  1.4843  1.4412  1.5067  1.5045  1.5091  1.5194  1.4606  1.5108  1.4020  1.5494  1.2795
        3  1.5298  1.3848    ----    ----  1.5239  1.5568  1.5307  1.5353  1.5705  1.5459    ----    ----  1.4185  1.5548
        4  1.4314  1.5046    ----    ----  1.4232  1.5673  1.5542  1.5588  1.5819  1.4457    ----    ----  1.5454  1.4592
        5  1.5398  1.4647  1.5351  1.4268  1.6067  1.5843  1.5812  1.5858  1.5998  1.6335  1.4598  1.5782  1.5082  1.5746
        6  1.5565  1.5325  1.5705  1.5736  1.5866  1.6172  1.4309  1.4351  1.6329  1.6132  1.6106  1.6161  1.5808  1.5978
        7  1.5394  1.5286  1.5455  1.5627  1.5859  1.4330    ----    ----  1.4453  1.6102  1.5975  1.5896  1.5792  1.5901
        8  1.5391  1.5295  1.5472  1.5652  1.5889  1.4365    ----    ----  1.4492  1.6136  1.6003  1.5918  1.5807  1.5907
        9  1.5576  1.5368  1.5770  1.5818  1.5959  1.6276  1.4409  1.4458  1.6442  1.6237  1.6202  1.6244  1.5873  1.6016
       10  1.5431  1.4725  1.5462  1.4398  1.6228  1.6013  1.5990  1.6043  1.6181  1.6514  1.4752  1.5925  1.5196  1.5821
       11  1.4373  1.5160    ----    ----  1.4438  1.5914  1.5791  1.5841  1.6075  1.4687    ----    ----  1.5617  1.4701
       12  1.5396  1.3991    ----    ----  1.5521  1.5881  1.5628  1.5674  1.6033  1.5771    ----    ----  1.4382  1.5704
       13  1.2741  1.5363  1.3956  1.5137  1.4741  1.5437  1.5427  1.5470  1.5574  1.4961  1.5443  1.4297  1.5747  1.2969
       14  1.4043  1.2603  1.5188  1.4192  1.5279  1.5490  1.5417  1.5459  1.5616  1.5483  1.4451  1.5518  1.2892  1.4287

           MAXIMUM 2D ONE PIN POWER          =   1.6514 AT ROW 10 COLUMN 10
           MAXIMUM 2D ONE PIN POWER W/UNC    =   1.8711       (1.6514 X 1.1000 X 1.0300)
           MAXIMUM CHANNEL POWER             =   1.6344 AT ROW  9 COLUMN  9
           MAXIMUM 3D ONE PIN POWER          =   2.3244 AT ROW 10 COLUMN 10 (INCLUDES GRID DIP FACTOR OF 1.0075)
           MAXIMUM 3D ONE PIN POWER W/UNC    =   2.6335       (2.3244 X 1.1000 X 1.0300)
           MAXIMUM LHGR                      =  13.9461 KW/FT (2.3244 X 6.0000)
           MAXIMUM LHGR W/UNCERTAINTY        =  16.6005 KW/FT (2.6335 X 6.0000 X 1.0300 X 1.0200)
           PL TO 15.00 KW/FT W/O UNC         = 110.3148       ( 15.00 X 100.00 /(13.9461 X  .9750))
           PL TO 15.00 KW/FT W/UNCERTAINTY   =  89.6758       ( 15.00 X 100.00 /(16.6005 X  .9750) - 3.0000)
           ASSEMBLY AXIAL SHAPE INDEX        =   .2286
           ASSEMBLY AXIAL SHAPE INDEX W/UNC  =   .1886

           NORMALIZED ASSEMBLY AXIAL POWER SHAPE:
           NODE                1       2       3       4       5       6       7       8
           AXIAL POWER       .7181   1.0988  1.2884  1.3935  1.4075  1.4007  1.3108  1.2109
           NODE                9      10      11      12      13      14      15      16
           AXIAL POWER      1.0719   .9802   .8845   .8258   .7513   .6869   .5712   .3996
```

```
1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94. THE TIME IS 08:19:49                    PAGE   32
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME : /RPG3/Rp/ORPD/s3Otest.p
           RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID       : B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 574

           XPO   = 10.500   GWD/MT.        EBAR = 16.119 GWD/MT. POWER =  20.00%. FLOW     = 100.00%
           NOTWT =  24164. STEPS INSERTED. FQ =  2.628. F-DELTA-H =  1.890.  INCORE ASI =   .2058.  PERIPHERAL ASI =   .1549
           TOTAL RELATIVE EXCORE SIGNAL          =  .4347

           FUEL TYPE : TYPE2
           PIN POWERS FOR LIMITING LHGR PLANE  6 FOR ASSEMBLY 10,SERIAL NUMBER OMR013
                1       2       3       4       5       6       7       8       9       10      11      12      13      14
        1     .9444   1.0061  1.1620  1.2274  1.2709  1.3071  1.3497  1.3982  1.4676  1.5484  1.6263  1.6752  1.5703  1.6201
        2     .9316   1.1069  1.1584  1.2360  1.3058  1.3172  1.3451  1.3904  1.4746  1.5879  1.6433  1.6784  1.7549  1.6190
        3    1.0229   1.0997    ----    ----  1.3211  1.3574  1.3745  1.4199  1.5217  1.6144    ----    ----  1.7473  1.7984
        4    1.0445   1.1312    ----    ----  1.3521  1.3953  1.4183  1.4665  1.5632  1.6504    ----    ----  1.7913  1.8291
        5    1.0585   1.1648  1.2373  1.3138  1.4073  1.4351  1.4900  1.5453  1.6030  1.7077  1.7336  1.7758  1.8198  1.8330
        6    1.0762   1.1549  1.2455  1.3262  1.4028  1.5033  1.5482  1.6130  1.6752  1.6869  1.7287  1.7634  1.7827  1.8367
        7    1.1093   1.1674  1.2429  1.3251  1.4298  1.5190    ----    ----  1.6964  1.7111  1.7081  1.7358  1.7778  1.8601
        8    1.1473   1.2043  1.2794  1.3618  1.4692  1.5628    ----    ----  1.7474  1.7547  1.7473  1.7714  1.8097  1.8949
        9    1.1932   1.2737  1.3685  1.4495  1.5232  1.6229  1.6659  1.7367  1.7898  1.8021  1.8415  1.8706  1.8818  1.9368
       10    1.2624   1.3764  1.4533  1.5297  1.6206  1.6321  1.6785  1.7364  1.7938  1.9056  1.9271  1.9611  1.9886  2.0023
       11    1.3414   1.4344    ----    ----  1.6482  1.6736  1.6767  1.7262  1.8291  1.9224    ----    ----  2.0386  2.0673
       12    1.4101   1.4887    ----    ----  1.6993  1.7146  1.7092  1.7531  1.8601  1.9576    ----    ----  2.0496  2.1006
       13    1.3660   1.5923  1.6326  1.7073  1.7654  1.7500  1.7625  1.8027  1.8824  1.9957  2.0494  2.0592  2.1346  1.9380
       14    1.4645   1.5245  1.7270  1.7842  1.8096  1.8303  1.8682  1.9140  1.9650  2.0372  2.1059  2.1376  1.9626  2.0263


           FX FACTORS FOR ASSEMBLY 10, SERIAL NUMBER OMR013
                1       2       3       4       5       6       7       8       9       10      11      12      13      14
        1    1.3102  1.3130  1.3121  1.3140  1.3166  1.3189  1.3203  1.3219  1.3229  1.3236  1.3245  1.3256  1.3301  1.3284
        2    1.3111  1.3104  1.3103  1.3121  1.3167  1.3204  1.3218  1.3228  1.3241  1.3247  1.3241  1.3264  1.3276  1.3311
        3    1.3084  1.3086    ----    ----  1.3145  1.3196  1.3227  1.3229  1.3234  1.3230    ----    ----  1.3280  1.3284
        4    1.3089  1.3090    ----    ----  1.3145  1.3198  1.3226  1.3228  1.3236  1.3230    ----    ----  1.3278  1.3292
        5    1.3106  1.3125  1.3119  1.3133  1.3170  1.3209  1.3216  1.3228  1.3243  1.3248  1.3252  1.3271  1.3305  1.3305
        6    1.3124  1.3156  1.3163  1.3179  1.3201  1.3203  1.3186  1.3211  1.3249  1.3266  1.3280  1.3298  1.3320  1.3319
        7    1.3136  1.3166  1.3190  1.3201  1.3202  1.3180    ----    ----  1.3231  1.3270  1.3292  1.3313  1.3328  1.3327
        8    1.3156  1.3181  1.3203  1.3212  1.3219  1.3206    ----    ----  1.3256  1.3288  1.3306  1.3322  1.3336  1.3340
        9    1.3164  1.3191  1.3200  1.3215  1.3236  1.3243  1.3231  1.3254  1.3289  1.3297  1.3310  1.3325  1.3347  1.3344
       10    1.3175  1.3197  1.3191  1.3204  1.3235  1.3265  1.3272  1.3284  1.3295  1.3298  1.3312  1.3324  1.3358  1.3354
       11    1.3188  1.3193    ----    ----  1.3235  1.3275  1.3297  1.3302  1.3306  1.3310    ----    ----  1.3347  1.3353
       12    1.3206  1.3213    ----    ----  1.3253  1.3290  1.3318  1.3318  1.3321  1.3322    ----    ----  1.3368  1.3365
       13    1.3252  1.3237  1.3242  1.3253  1.3288  1.3313  1.3326  1.3333  1.3343  1.3355  1.3345  1.3367  1.3369  1.3401
       14    1.3246  1.3276  1.3259  1.3273  1.3291  1.3308  1.3323  1.3339  1.3342  1.3351  1.3350  1.3364  1.3400  1.3386

           ASSEMBLY AXIAL PEAKING FACTOR   =  1.3260 (FROM 16 PLANE DATA)
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Figure 13
Sample User Output File
Page 33 of 37

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1          PROGRAM: ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                    PAGE   33
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME : /RPG3/Sp/OPPD/s30test.p
           RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - sastest
           CASE ID       : B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 574

           XPO   = 10.500  GWD/MT.        EBAR = 16.119 GWD/MT, POWER =  20.00%, FLOW     = 100.00%
           NOPWT =  24164, STEPS INSERTED, FQ =  2.628, F-DELTA-H =  1.890,  INCORE ASI =   .2058,  PERIPHERAL ASI =   .1549
           TOTAL RELATIVE EXCORE SIGNAL       =  .4347

           FUEL TYPE : TYPE2
           2D PIN POWERS FOR ASSEMBLY 10, SERIAL NUMBER OMR013
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1     .7208   .7662   .8856   .9341   .9653   .9910  1.0222  1.0577  1.1093  1.1699  1.2279  1.2637  1.1806  1.2196
        2     .7106   .8447   .8841   .9419   .9917   .9976  1.0176  1.0511  1.1137  1.1986  1.2410  1.2653  1.3218  1.2163
        3     .7818   .8404    ----    ----  1.0051  1.0286  1.0391  1.0733  1.1498  1.2202    ----    ----  1.3157  1.3539
        4     .7980   .8642    ----    ----  1.0286  1.0572  1.0724  1.1087  1.1811  1.2475    ----    ----  1.3491  1.3761
        5     .8076   .8875   .9431  1.0003  1.0685  1.0865  1.1274  1.1682  1.2104  1.2891  1.3082  1.3380  1.3677  1.3777
        6     .8201   .8779   .9462  1.0063  1.0627  1.1386  1.1741  1.2210  1.2644  1.2716  1.3017  1.3260  1.3383  1.3790
        7     .8444   .8867   .9423  1.0038  1.0830  1.1525    ----    ----  1.2821  1.2894  1.2850  1.3038  1.3339  1.3957
        8     .8720   .9137   .9691  1.0307  1.1115  1.1834    ----    ----  1.3182  1.3206  1.3131  1.3296  1.3570  1.4204
        9     .9064   .9655  1.0368  1.0969  1.1508  1.2255  1.2591  1.3103  1.3468  1.3552  1.3836  1.4038  1.4098  1.4514
       10     .9581  1.0430  1.1017  1.1585  1.2245  1.2304  1.2647  1.3072  1.3492  1.4329  1.4477  1.4718  1.4887  1.4994
       11    1.0171  1.0872    ----    ----  1.2454  1.2607  1.2610  1.2977  1.3746  1.4443    ----    ----  1.5274  1.5482
       12    1.0678  1.1267    ----    ----  1.2823  1.2901  1.2834  1.3164  1.3963  1.4695    ----    ----  1.5332  1.5717
       13    1.0307  1.2029  1.2329  1.2882  1.3286  1.3146  1.3226  1.3521  1.4107  1.4944  1.5358  1.5405  1.5967  1.4462
       14    1.1056  1.1483  1.3025  1.3442  1.3615  1.3753  1.4022  1.4348  1.4728  1.5258  1.5774  1.5996  1.4646  1.5137

           FUEL TYPE : TYPE2
           ADJUSTED 2D PIN POWERS FOR ASSEMBLY 10, SERIAL NUMBER OMR013 (INCLUDES GRID DIP FACTOR OF 1.0075)
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1     .7175   .7644   .8829   .9326   .9656   .9931  1.0255  1.0623  1.1150  1.1765  1.2356  1.2728  1.1931  1.2310
        2     .7079   .8410   .8801   .9391   .9922  1.0008  1.0220  1.0564  1.1204  1.2065  1.2486  1.2752  1.3333  1.2301
        3     .7772   .8356    ----    ----  1.0038  1.0313  1.0443  1.0789  1.1562  1.2266    ----    ----  1.3276  1.3664
        4     .7936   .8595    ----    ----  1.0273  1.0601  1.0776  1.1142  1.1877  1.2539    ----    ----  1.3610  1.3897
        5     .8042   .8850   .9400   .9982  1.0692  1.0904  1.1321  1.1741  1.2179  1.2975  1.3172  1.3492  1.3827  1.3927
        6     .8177   .8775   .9463  1.0076  1.0658  1.1422  1.1763  1.2256  1.2728  1.2817  1.3134  1.3398  1.3544  1.3955
        7     .8428   .8870   .9444  1.0068  1.0864  1.1541    ----    ----  1.2889  1.3001  1.2978  1.3188  1.3508  1.4133
        8     .8717   .9150   .9721  1.0346  1.1163  1.1874    ----    ----  1.3276  1.3332  1.3276  1.3459  1.3750  1.4397
        9     .9066   .9678  1.0398  1.1013  1.1573  1.2331  1.2657  1.3195  1.3599  1.3692  1.3991  1.4213  1.4297  1.4715
       10     .9591  1.0458  1.1042  1.1623  1.2313  1.2401  1.2753  1.3193  1.3629  1.4478  1.4642  1.4900  1.5109  1.5213
       11    1.0193  1.0898    ----    ----  1.2523  1.2716  1.2739  1.3116  1.3897  1.4606    ----    ----  1.5489  1.5707
       12    1.0714  1.1311    ----    ----  1.2911  1.3027  1.2987  1.3320  1.4133  1.4874    ----    ----  1.5572  1.5960
       13    1.0378  1.2098  1.2404  1.2972  1.3413  1.3297  1.3391  1.3696  1.4302  1.5163  1.5571  1.5645  1.6218  1.4725
       14    1.1127  1.1583  1.3121  1.3556  1.3749  1.3907  1.4195  1.4542  1.4930  1.5478  1.6001  1.6242  1.4911  1.5396

           MAXIMUM 2D ONE PIN POWER           =  1.6242 AT ROW 14 COLUMN 12
           MAXIMUM 2D ONE PIN POWER W/UNC     =  1.8402       (1.6242 X 1.1000 X 1.0300)
           MAXIMUM CHANNEL POWER              =  1.5865 AT ROW 13 COLUMN 11
           MAXIMUM 3D ONE PIN POWER           =  2.1537 AT ROW 14 COLUMN 12 (INCLUDES GRID DIP FACTOR OF 1.0075)
           MAXIMUM 3D ONE PIN POWER W/UNC     =  2.4401       (2.1537 X 1.1000 X 1.0300)
           MAXIMUM LHGR                       = 12.9221 KW/FT (2.1537 X 6.0000)
           MAXIMUM LHGR W/UNCERTAINTY         = 15.3815 KW/FT (2.4401 X 6.0000 X 1.0300 X 1.0200)
           FL TO 16.00 KW/FT W/O UNC          = 126.9941       ( 16.00 X 100.00 /(12.9221 X  .9750))
           FL TO 16.00 KW/FT W/UNCERTAINTY    = 103.6882       ( 16.00 X 100.00 /(15.3815 X  .9750) - 3.0000)
           ASSEMBLY AXIAL SHAPE INDEX         =  .1607
           ASSEMBLY AXIAL SHAPE INDEX W/UNC=  .1207

           NORMALIZED ASSEMBLY AXIAL POWER SHAPE:
           NODE            1       2       3       4       5       6       7       8
           AXIAL POWER   .6389   1.0164  1.1960  1.2977  1.3193  1.3260  1.2709  1.2205
           NODE            9      10      11      12      13      14      15      16
           AXIAL POWER  1.1288   1.0611   .9725   .9126   .8325   .7600   .6288   .4178
```

Figure 13
Sample User Output File
Page 34 of 37

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1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94    TODAY'S DATE IS 04/12/94. THE TIME IS 08:19:49                PAGE   34
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME : /RPG3/Sp/OPPD/s3Otest.p
           RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID       : B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 574

           XPO    = 10.500   GWD/MT.        EBAR = 16.119 GWD/MT, POWER =  20.00%, FLOW     = 100.00%
           NOTWT =   24164. STEPS INSERTED, FQ =  2.628, F-DELTA-H =  1.890,  INCORE ASI =   .2058,  PERIPHERAL ASI =   .1549
           TOTAL RELATIVE EXCORE SIGNAL       =  .4347

           FUEL TYPE : TYPE2
           PIN POWERS FOR LIMITING LHGR PLANE  4 FOR ASSEMBLY 39,SERIAL NUMBER OMS026
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
             1 1.1476  .9643  1.0808  1.0040  1.1250  1.1944  1.2117  1.2117  1.1944  1.1250  1.0040  1.0808   .9643  1.1476
             2  .9653 1.0000   .7445   .7813   .9199  1.0795  1.1305  1.1305  1.0795   .9199   .7813   .7445 1.0000   .9653
             3 1.0830  .7452    ----    ----  .7638  1.0097  1.0727  1.0727  1.0097   .7638    ----    ----  .7452 1.0830
             4 1.0068  .7827    ----    ----  .6909   .9584  1.0151  1.0151   .9584  .6909    ----    ----  .7827 1.0068
             5 1.1287  .9221   .7649   .6913  .8792   .9233   .9309   .9309   .9233  .8792   .6913   .7649  .9221 1.1287
             6 1.1985 1.0824  1.0116   .9595  .9238   .8571   .6515   .6515   .8571  .9238   .9595  1.0116 1.0824 1.1985
             7 1.2158 1.1337  1.0749  1.0165  .9317   .6517    ----    ----   .6517  .9317  1.0165  1.0749 1.1337 1.2158
             8 1.2158 1.1337  1.0749  1.0165  .9317   .6517    ----    ----   .6517  .9317  1.0165  1.0749 1.1337 1.2158
             9 1.1985 1.0824  1.0116   .9595  .9238   .8571   .6515   .6515   .8571  .9238   .9595  1.0116 1.0824 1.1985
            10 1.1287  .9221   .7649   .6913  .8792   .9233   .9309   .9309   .9233  .8792   .6913   .7649  .9221 1.1287
            11 1.0068  .7827    ----    ----  .6909   .9584  1.0151  1.0151   .9584  .6909    ----    ----  .7827 1.0068
            12 1.0830  .7452    ----    ----  .7638  1.0097  1.0727  1.0727  1.0097  .7638    ----    ----  .7452 1.0830
            13  .9653 1.0000   .7445   .7813  .9199  1.0795  1.1305  1.1305  1.0795  .9199   .7813   .7445 1.0000   .9653
            14 1.1476  .9643  1.0808  1.0040 1.1250  1.1944  1.2117  1.2117  1.1944 1.1250  1.0040  1.0808  .9643 1.1476


           FZ FACTORS FOR ASSEMBLY 39, SERIAL NUMBER OMS026
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
             1 1.5226 1.5100  1.5149  1.5094  1.5205  1.5250  1.5265  1.5265  1.5250  1.5205  1.5094  1.5149  1.5100  1.5226
             2 1.5100 1.5088  1.4971  1.5039  1.5054  1.5185  1.5215  1.5215  1.5185  1.5054  1.5039  1.4971  1.5088  1.5100
             3 1.5149 1.4971    ----    ----  1.5044  1.5145  1.5180  1.5180  1.5145  1.5044    ----    ----  1.4971  1.5149
             4 1.5095 1.5040    ----    ----  1.4955  1.5115  1.5150  1.5150  1.5115  1.4955    ----    ----  1.5040  1.5095
             5 1.5206 1.5054  1.5044  1.4956  1.5065  1.5095  1.5101  1.5101  1.5095  1.5065  1.4956  1.5044  1.5054  1.5206
             6 1.5251 1.5186  1.5145  1.5116  1.5095  1.5050  1.4921  1.4921  1.5050  1.5095  1.5116  1.5145  1.5186  1.5251
             7 1.5266 1.5215  1.5181  1.5150  1.5101  1.4921    ----    ----  1.4921  1.5101  1.5150  1.5181  1.5215  1.5266
             8 1.5266 1.5215  1.5181  1.5150  1.5101  1.4921    ----    ----  1.4921  1.5101  1.5150  1.5181  1.5215  1.5266
             9 1.5251 1.5186  1.5145  1.5116  1.5095  1.5050  1.4921  1.4921  1.5050  1.5095  1.5116  1.5145  1.5186  1.5251
            10 1.5206 1.5054  1.5044  1.4956  1.5065  1.5095  1.5101  1.5101  1.5095  1.5065  1.4956  1.5044  1.5054  1.5206
            11 1.5095 1.5040    ----    ----  1.4955  1.5115  1.5150  1.5150  1.5115  1.4955    ----    ----  1.5040  1.5095
            12 1.5149 1.4971    ----    ----  1.5044  1.5145  1.5180  1.5180  1.5145  1.5044    ----    ----  1.4971  1.5149
            13 1.5100 1.5088  1.4971  1.5039  1.5054  1.5185  1.5215  1.5215  1.5185  1.5054  1.5039  1.4971  1.5088  1.5100
            14 1.5226 1.5100  1.5149  1.5094  1.5205  1.5250  1.5265  1.5265  1.5250  1.5205  1.5094  1.5149  1.5100  1.5226

           ASSEMBLY AXIAL PEAKING FACTOR   =  1.5125 (FROM 16 PLANE DATA)
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Figure 13
Sample User Output File
Page 35 of 37

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1         PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                    PAGE   35
          A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
          PIN FILE NAME : /RPG1/Sp/OPPD/s13Otest.p
          RUN TITLE     : Fort Calhoun Cycle 13 BOC 10.5 Hours - asatest
          CASE ID       : B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 574

          XPO   = 10.500   GWD/MT.        EBAR = 16.119 GWD/MT, POWER =  20.00%, FLOW     = 100.00%
          MOTWT =   24164. STEPS INSERTED, FQ =  2.628, F-DELTA-H =  1.890,  INCORE ASI =   .2058,  PERIPHERAL ASI =   .1549
          TOTAL RELATIVE EXCORE SIGNAL        =  .4147

          FUEL TYPE : TYPE2
          2D PIN POWERS FOR ASSEMBLY 39, SERIAL NUMBER OMS026
                1       2       3       4       5       6       7       8       9      10      11      12      13      14
          1   .7537   .6386   .7135   .6652   .7399   .7832   .7937   .7937   .7832   .7399   .6652   .7135   .6386   .7537
          2   .6393   .6628   .4973   .5195   .6111   .7109   .7431   .7431   .7109   .6111   .5195   .4973   .6628   .6393
          3   .7149   .4978   ----    ----    .5077   .6667   .7067   .7067   .6667   .5077   ----    ----    .4978   .7149
          4   .6670   .5204   ----    ----    .4620   .6341   .6700   .6700   .6341   .4620   ----    ----    .5204   .6670
          5   .7423   .6125   .5084   .4623   .5836   .6117   .6165   .6165   .6117   .5836   .4623   .5084   .6125   .7423
          6   .7859   .7128   .6679   .6348   .6120   .5695   .4366   .4366   .5695   .6120   .6348   .6679   .7128   .7859
          7   .7964   .7451   .7081   .6709   .6170   .4368   ----    ----    .4368   .6170   .6709   .7081   .7451   .7964
          8   .7964   .7451   .7081   .6709   .6170   .4368   ----    ----    .4368   .6170   .6709   .7081   .7451   .7964
          9   .7859   .7128   .6679   .6348   .6120   .5695   .4366   .4366   .5695   .6120   .6348   .6679   .7128   .7859
          10  .7423   .6125   .5084   .4623   .5836   .6117   .6165   .6165   .6117   .5836   .4623   .5084   .6125   .7423
          11  .6670   .5204   ----    ----    .4620   .6341   .6700   .6700   .6341   .4620   ----    ----    .5204   .6670
          12  .7149   .4978   ----    ----    .5077   .6667   .7067   .7067   .6667   .5077   ----    ----    .4978   .7149
          13  .6393   .6628   .4973   .5195   .6111   .7109   .7431   .7431   .7109   .6111   .5195   .4973   .6628   .6393
          14  .7537   .6386   .7135   .6652   .7399   .7832   .7937   .7937   .7832   .7399   .6652   .7135   .6386   .7537

          FUEL TYPE : TYPE2
          ADJUSTED 2D PIN POWERS FOR ASSEMBLY 39, SERIAL NUMBER OMS026 (INCLUDES GRID DIP FACTOR OF 1.0075)
                1       2       3       4       5       6       7       8       9      10      11      12      13      14
          1   .7644   .6423   .7199   .6688   .7494   .7956   .8071   .8071   .7956   .7494   .6688   .7199   .6423   .7644
          2   .6430   .6661   .4959   .5204   .6128   .7190   .7531   .7531   .7190   .6128   .5204   .4959   .6661   .6430
          3   .7214   .4964   ----    ----    .5087   .6726   .7145   .7145   .6726   .5087   ----    ----    .4964   .7214
          4   .6706   .5213   ----    ----    .4602   .6384   .6761   .6761   .6384   .4602   ----    ----    .5213   .6706
          5   .7518   .6142   .5095   .4605   .5856   .6150   .6201   .6201   .6150   .5856   .4605   .5095   .6142   .7518
          6   .7983   .7210   .6738   .6391   .6153   .5709   .4340   .4340   .5709   .6153   .6391   .6738   .7210   .7983
          7   .8098   .7551   .7160   .6771   .6206   .4341   ----    ----    .4341   .6206   .6771   .7160   .7551   .8098
          8   .8098   .7551   .7160   .6771   .6206   .4341   ----    ----    .4341   .6206   .6771   .7160   .7551   .8098
          9   .7983   .7210   .6738   .6391   .6153   .5709   .4340   .4340   .5709   .6153   .6391   .6738   .7210   .7983
          10  .7518   .6142   .5095   .4605   .5856   .6150   .6201   .6201   .6150   .5856   .4605   .5095   .6142   .7518
          11  .6706   .5213   ----    ----    .4602   .6384   .6761   .6761   .6384   .4602   ----    ----    .5213   .6706
          12  .7214   .4964   ----    ----    .5087   .6726   .7145   .7145   .6726   .5087   ----    ----    .4964   .7214
          13  .6430   .6661   .4959   .5204   .6128   .7190   .7531   .7531   .7190   .6128   .5204   .4959   .6661   .6430
          14  .7644   .6423   .7199   .6688   .7494   .7956   .8071   .8071   .7956   .7494   .6688   .7199   .6423   .7644

          MAXIMUM 2D ONE PIN POWER          =    .8098 AT ROW  7 COLUMN  1
          MAXIMUM 2D ONE PIN POWER W/UNC    =    .9176       ( .8098 X 1.1000 X 1.0300)
          MAXIMUM CHANNEL POWER             =    .7825 AT ROW  7 COLUMN  1
          MAXIMUM 3D ONE PIN POWER          =   1.2249 AT ROW  7 COLUMN  1 (INCLUDES GRID DIP FACTOR OF 1.0075)
          MAXIMUM 3D ONE PIN POWER W/UNC    =   1.3878       (1.2249 X 1.1000 X 1.0300)
          MAXIMUM LHGR                      =   7.3496 KW/FT (1.2249 X 6.0000)
          MAXIMUM LHGR W/UNCERTAINTY        =   8.7484 KW/FT (1.3878 X 6.0000 X 1.0300 X 1.0200)
          PL TO 16.00 KW/FT W/O UNC         = 221.2824       ( 16.00 X 100.00 /( 7.3496 X  .9750))
          PL TO 16.00 KW/FT W/UNCERTAINTY   = 184.5803       ( 16.00 X 100.00 /( 8.7484 X  .9750) - 3.0000)
          ASSEMBLY AXIAL SHAPE INDEX        =    .3308
          ASSEMBLY AXIAL SHAPE INDEX W/UNC  =    .2908

          NORMALIZED ASSEMBLY AXIAL POWER SHAPE
          NODE                1       2       3       4       5       6       7       8
          AXIAL POWER       .9392  1.2599  1.4258  1.5125  1.5105  1.4774  1.3424  1.1786
          NODE                9      10      11      12      13      14      15      16
          AXIAL POWER       .9840   .8554   .7519   .6955   .6364   .5887   .4936   .3682
```

Figure 13
Sample User Output File
Page 36 of 37

```
1       PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94, THE TIME IS 08:19:49                PAGE   36
        A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
        PIN FILE NAME : /RPG3/Sp/OPPD/s3Otest.p
        RUN TITLE     : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
        CASE ID       : B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 574

        XPO   = 10.500   GWD/MT,        EBAR = 16.119 GWD/MT, POWER =  20.00%, FLOW     = 100.00%
        NOTWT =  24164, STEPS INSERTED, PQ =  2.628, F-DELTA-H =  1.890,  INCORE ASI =   .2058,  PERIPHERAL ASI =   .1549
        TOTAL RELATIVE EXCORE SIGNAL       =  .4347

        FUEL TYPE : TYPE2
        PIN POWERS FOR LIMITING LHGR PLANE  6 FOR ASSEMBLY 35,SERIAL NUMBER OMS020
             1       2       3       4       5       6       7       8       9      10      11      12      13      14
   1   1.9810  1.8253  2.2642  2.3299  2.2894  2.2743  2.2587  2.2646  2.2919  2.3188  2.3733  2.3227  1.8896  2.0737
   2   1.8142  2.2363  2.0628  2.2750  2.2030  2.2841  2.2747  2.2802  2.3021  2.2337  2.3206  2.1203  2.3172  1.8992
   3   2.2440  2.0567    ----    ----  2.3631  2.3862  2.3288  2.3343  2.4060  2.3982    ----    ----  2.1363  2.3520
   4   2.3058  2.2644    ----    ----  2.4298  2.4445  2.3857  2.3918  2.4666  2.4687    ----    ----  2.3558  2.4212
   5   2.2637  2.1897  2.3549  2.4254  2.5437  2.4469  2.4852  2.4919  2.4706  2.5869  2.4855  2.4327  2.2825  2.3808
   6   2.2471  2.2671  2.3733  2.4349  2.4413  2.3514  2.4876  2.4954  2.3769  2.4846  2.4971  2.4537  2.3645  2.3653
   7   2.2295  2.2535  2.3105  2.3694  2.4716  2.4793    ----    ----  2.5061  2.5164  2.4309  2.3893  2.3505  2.3469
   8   2.2295  2.2535  2.3105  2.3694  2.4716  2.4793    ----    ----  2.5061  2.5164  2.4309  2.3893  2.3505  2.3469
   9   2.2471  2.2671  2.3733  2.4349  2.4413  2.3514  2.4876  2.4954  2.3769  2.4846  2.4971  2.4537  2.3645  2.3653
  10   2.2637  2.1897  2.3549  2.4254  2.5437  2.4469  2.4852  2.4919  2.4706  2.5869  2.4855  2.4327  2.2825  2.3808
  11   2.3058  2.2644    ----    ----  2.4298  2.4445  2.3857  2.3918  2.4666  2.4687    ----    ----  2.3558  2.4212
  12   2.2440  2.0567    ----    ----  2.3631  2.3862  2.3288  2.3343  2.4060  2.3982    ----    ----  2.1363  2.3520
  13   1.8142  2.2363  2.0628  2.2750  2.2030  2.2841  2.2747  2.2802  2.3021  2.2337  2.3206  2.1203  2.3172  1.8992
  14   1.9810  1.8253  2.2642  2.3299  2.2894  2.2743  2.2587  2.2646  2.2919  2.3188  2.3733  2.3227  1.8896  2.0737


        FZ FACTORS FOR ASSEMBLY 35, SERIAL NUMBER OMS020
             1       2       3       4       5       6       7       8       9      10      11      12      13      14
   1   1.3454  1.3409  1.3480  1.3514  1.3535  1.3564  1.3585  1.3610  1.3638  1.3655  1.3681  1.3696  1.3672  1.3772
   2   1.3396  1.3443  1.3433  1.3506  1.3481  1.3556  1.3589  1.3612  1.3628  1.3599  1.3673  1.3648  1.3710  1.3715
   3   1.3456  1.3422    ----    ----  1.3545  1.3570  1.3595  1.3619  1.3642  1.3666    ----    ----  1.3693  1.3787
   4   1.3478  1.3483    ----    ----  1.3561  1.3578  1.3608  1.3632  1.3650  1.3683    ----    ----  1.3760  1.3820
   5   1.3485  1.3444  1.3518  1.3546  1.3561  1.3578  1.3608  1.3632  1.3652  1.3685  1.3721  1.3745  1.3722  1.3832
   6   1.3497  1.3501  1.3525  1.3545  1.3560  1.3534  1.3614  1.3638  1.3608  1.3685  1.3722  1.3755  1.3787  1.3850
   7   1.3497  1.3512  1.3529  1.3554  1.3568  1.3592    ----    ----  1.3668  1.3695  1.3732  1.3759  1.3801  1.3854
   8   1.3497  1.3512  1.3529  1.3554  1.3568  1.3592    ----    ----  1.3668  1.3695  1.3732  1.3759  1.3801  1.3854
   9   1.3497  1.3501  1.3525  1.3545  1.3560  1.3534  1.3614  1.3638  1.3608  1.3685  1.3722  1.3755  1.3787  1.3850
  10   1.3485  1.3444  1.3518  1.3546  1.3561  1.3578  1.3608  1.3632  1.3652  1.3685  1.3721  1.3745  1.3722  1.3832
  11   1.3478  1.3483    ----    ----  1.3561  1.3578  1.3608  1.3632  1.3650  1.3683    ----    ----  1.3760  1.3820
  12   1.3456  1.3422    ----    ----  1.3545  1.3570  1.3595  1.3619  1.3642  1.3666    ----    ----  1.3693  1.3787
  13   1.3396  1.3443  1.3433  1.3506  1.3481  1.3556  1.3589  1.3612  1.3628  1.3599  1.3673  1.3648  1.3710  1.3715
  14   1.3454  1.3409  1.3480  1.3514  1.3535  1.3564  1.3585  1.3610  1.3638  1.3655  1.3681  1.3696  1.3672  1.3772

        ASSEMBLY AXIAL PEAKING FACTOR   =   1.3613 (FROM 16 PLANE DATA)
```

```
1          PROGRAM ASAS VERSION 1, REV DATE 4/12/94.   TODAY'S DATE IS 04/12/94. THE TIME IS 08:19:49                    PAGE   37
           A CODE TO CREATE HOT CHANNEL DATA FILES FROM A SIMULATE-3 PIN FILE
           PIN FILE NAME  : /RPG3/Sp/OPPD/s30test.p
           RUN TITLE      : Fort Calhoun Cycle 15 BOC 10.5 Hours - asatest
           CASE ID        : B-10.5-J  PDIL CASE J -  20% POWER, BANK 3 AT 574

           XPO   = 10.500   GWD/MT,        EBAR = 16.119 GWD/MT, POWER =  20.00%, FLOW     = 100.00%
           NOTWT =   24164. STEPS INSERTED. FQ =  2.628, F-DELTA-H =  1.890,  INCORE ASI =   .2058,  PERIPHERAL ASI =   .1549
           TOTAL RELATIVE EXCORE SIGNAL       =  .4347

           FUEL TYPE : TYPE2
           2D PIN POWERS FOR ASSEMBLY 35, SERIAL NUMBER OMS020
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1   1.4724  1.3613  1.6796  1.7241  1.6915  1.6767  1.6626  1.6639  1.6806  1.6982  1.7347  1.6960  1.3822  1.5058
        2   1.3542  1.6636  1.5356  1.6845  1.6341  1.6849  1.6739  1.6751  1.6893  1.6425  1.6972  1.5535  1.6901  1.3847
        3   1.6676  1.5323    ----    ----  1.7447  1.7585  1.7129  1.7140  1.7637  1.7549    ----    ----  1.5602  1.7063
        4   1.7108  1.6795    ----    ----  1.7917  1.8004  1.7532  1.7546  1.8070  1.8042    ----    ----  1.7121  1.7530
        5   1.6788  1.6288  1.7420  1.7905  1.8758  1.8021  1.8263  1.8281  1.8098  1.8904  1.8115  1.7699  1.6633  1.7224
        6   1.6649  1.6792  1.7547  1.7976  1.8003  1.7375  1.8272  1.8297  1.7467  1.8155  1.8198  1.7840  1.7154  1.7093
        7   1.6519  1.6677  1.7077  1.7481  1.8216  1.8241    ----    ----  1.8336  1.8375  1.7702  1.7365  1.7037  1.6959
        8   1.6519  1.6677  1.7077  1.7481  1.8216  1.8241    ----    ----  1.8336  1.8375  1.7702  1.7365  1.7037  1.6959
        9   1.6649  1.6792  1.7547  1.7976  1.8003  1.7375  1.8272  1.8297  1.7467  1.8155  1.8198  1.7840  1.7154  1.7093
       10   1.6788  1.6288  1.7420  1.7905  1.8758  1.8021  1.8263  1.8281  1.8098  1.8904  1.8115  1.7699  1.6633  1.7224
       11   1.7108  1.6795    ----    ----  1.7917  1.8004  1.7532  1.7546  1.8070  1.8042    ----    ----  1.7121  1.7530
       12   1.6676  1.5323    ----    ----  1.7447  1.7585  1.7129  1.7140  1.7637  1.7549    ----    ----  1.5602  1.7063
       13   1.3542  1.6636  1.5356  1.6845  1.6341  1.6849  1.6739  1.6751  1.6893  1.6425  1.6972  1.5535  1.6901  1.3847
       14   1.4724  1.3613  1.6796  1.7241  1.6915  1.6767  1.6626  1.6639  1.6806  1.6982  1.7347  1.6960  1.3822  1.5058

           FUEL TYPE : TYPE2
           ADJUSTED 2D PIN POWERS FOR ASSEMBLY 35, SERIAL NUMBER OMS020 (INCLUDES GRID DIP FACTOR OF 1.0075)
                 1       2       3       4       5       6       7       8       9      10      11      12      13      14
        1   1.4662  1.3509  1.6757  1.7244  1.6944  1.6833  1.6717  1.6760  1.6963  1.7162  1.7565  1.7191  1.3986  1.5348
        2   1.3427  1.6552  1.5267  1.6838  1.6305  1.6905  1.6835  1.6876  1.7039  1.6532  1.7175  1.5693  1.7150  1.4056
        3   1.6608  1.5222    ----    ----  1.7490  1.7660  1.7236  1.7277  1.7807  1.7749    ----    ----  1.5811  1.7412
        4   1.7066  1.6759    ----    ----  1.7983  1.8092  1.7657  1.7702  1.8256  1.8271    ----    ----  1.7437  1.7931
        5   1.6754  1.6206  1.7429  1.7951  1.8827  1.8110  1.8394  1.8443  1.8286  1.9146  1.8396  1.8005  1.6893  1.7633
        6   1.6631  1.6779  1.7565  1.8021  1.8068  1.7403  1.8411  1.8469  1.7592  1.8389  1.8482  1.8161  1.7504  1.7521
        7   1.6501  1.6679  1.7100  1.7536  1.8203  1.8350    ----    ----  1.8548  1.8624  1.7991  1.7684  1.7403  1.7389
        8   1.6501  1.6679  1.7100  1.7536  1.8293  1.8350    ----    ----  1.8548  1.8624  1.7991  1.7684  1.7403  1.7389
        9   1.6631  1.6779  1.7565  1.8021  1.8068  1.7403  1.8411  1.8469  1.7592  1.8389  1.8482  1.8161  1.7504  1.7521
       10   1.6754  1.6206  1.7429  1.7951  1.8827  1.8110  1.8394  1.8443  1.8286  1.9146  1.8396  1.8005  1.6893  1.7633
       11   1.7066  1.6759    ----    ----  1.7983  1.8092  1.7657  1.7702  1.8256  1.8271    ----    ----  1.7437  1.7931
       12   1.6608  1.5222    ----    ----  1.7490  1.7660  1.7236  1.7277  1.7807  1.7749    ----    ----  1.5811  1.7412
       13   1.3427  1.6552  1.5267  1.6838  1.6305  1.6905  1.6835  1.6876  1.7039  1.6532  1.7175  1.5693  1.7150  1.4056
       14   1.4662  1.3509  1.6757  1.7244  1.6944  1.6833  1.6717  1.6760  1.6963  1.7162  1.7565  1.7191  1.3986  1.5348

           MAXIMUM 2D ONE PIN POWER           =   1.9146 AT ROW  5 COLUMN 10
           MAXIMUM 2D ONE PIN POWER W/UNC     =   2.1692        (1.9146 X 1.1000 X 1.0300)
           MAXIMUM CHANNEL POWER              =   1.8603 AT ROW  5 COLUMN 10
           MAXIMUM 3D ONE PIN POWER           =   2.6063 AT ROW  5 COLUMN 10 (INCLUDES GRID DIP FACTOR OF 1.0075)
           MAXIMUM 3D ONE PIN POWER W/UNC     =   2.9529        (2.6063 X 1.1000 X 1.0300)
           MAXIMUM LHGR                       =  15.6376 KW/FT (2.6063 X 6.0000)
           MAXIMUM LHGR W/UNCERTAINTY         =  18.6140 KW/FT (2.9529 X 6.0000 X 1.0300 X 1.0200)
           PL TO 16.00 KW/FT W/O UNC          = 104.9407        ( 16.00 X 100.00 /(15.6376 X  .9750))
           PL TO 16.00 KW/FT W/UNCERTAINTY    =  85.1610        ( 16.00 X 100.00 /(18.6140 X  .9750) - 3.0000)
           ASSEMBLY AXIAL SHAPE INDEX         =   .1871
           ASSEMBLY AXIAL SHAPE INDEX W/UNC=      .1471

           NORMALIZED ASSEMBLY AXIAL POWER SHAPE:
           NODE                1       2       3       4       5       6       7       8
           AXIAL POWER       .6498   1.0409  1.2320  1.3392  1.3586  1.3613  1.2912  1.2233
           NODE                9      10      11      12      13      14      15      16
           AXIAL POWER      1.1122  1.0349   .9410   .8808   .8002   .7295   .6019   .4033
```

Figure 14
Sample CTS Output File

"CASE"	"CASEID"	"AS1-ASS"	"AS1-PER"	"AS1-CORE"	"PFDL"	"LNGR W/UNC"	"PZLOC-FISS"	"ASSEMBLY #"	"EXCORE RES"
1	"B-10.5-A11"	-1.551158E-02	2.263026E-03	7.764136E-03	4.200959E+02	3.636200E+00	8	1	4.425462E-01
1	"B-10.5-A12"	1.512922E-02	2.263026E-03	7.764136E-03	1.093469E+02	1.369385E+01	8	18	4.425462E-01
1	"B-10.5-A13"	2.726061E-02	2.263026E-03	7.764136E-03	1.044323E+02	1.432029E+01	8	16	4.425462E-01
1	"B-10.5-A14"	5.521520E-03	2.263026E-03	7.764136E-03	1.134165E+02	1.321514E+01	8	25	4.425462E-01
1	"B-10.5-A21"	2.057734E-02	2.263026E-03	7.764136E-03	1.211895E+02	1.321388E+01	8	10	4.425462E-01
1	"B-10.5-A22"	-4.618372E-03	2.263026E-03	7.764136E-03	1.314050E+02	1.220956E+01	8	39	4.425462E-01
1	"B-10.5-A23"	2.385532E-02	2.263026E-03	7.764136E-03	1.117915E+02	1.429569E+01	8	35	4.425462E-01
1	"B-10.5-A24"	7.412684E-03	2.263026E-03	7.764136E-03	1.257704E+02	1.274381E+01	8	19	4.425462E-01
2	"B-10.5-J11"	1.508123E-01	1.548550E-01	2.058113E-01	3.522741E+02	4.330351E+00	5	1	4.347418E-01
2	"B-10.5-J12"	1.956038E-01	1.548550E-01	2.058113E-01	8.893226E+01	1.673473E+01	5	13	4.347418E-01
2	"B-10.5-J13"	1.744356E-01	1.548550E-01	2.058113E-01	8.662815E+01	1.716494E+01	5	16	4.347418E-01
2	"B-10.5-J14"	1.730036E-01	1.548550E-01	2.058113E-01	9.205556E+01	1.618487E+01	5	11	4.347418E-01
2	"B-10.5-J15"	2.285856E-01	1.548550E-01	2.058113E-01	8.567583E+01	1.660046E+01	5	18	4.347418E-01
2	"B-10.5-J21"	1.607262E-01	1.548550E-01	2.058113E-01	1.038882E+02	1.538151E+01	5	10	4.347418E-01
2	"B-10.5-J22"	3.309019E-01	1.548550E-01	2.058113E-01	1.845803E+02	8.748392E+00	5	39	4.347418E-01
2	"B-10.5-J23"	1.870529E-01	1.548550E-01	2.058113E-01	8.516104E+01	1.861395E+01	5	35	4.347418E-01

Figure 15
Sample ATS Output File
Page 1 of 16

```
  40                'Axial Nodes'
   2                'Fields on File'
   1                'Case Number'
'B-10.5-All'        'Case ID'
  100.000           'Percent Full Power'
   .77641E-02       'Core Average ASI'
  1.77000           'Radial Peaking Factor (FR)'
  1.18769           'Axial Peaking Factor'
  1.14813           'Assembly Peaking Factor'
   1                'Assembly Number'
'  USER SELECT '    'Reason For Selection'
'K'  'RPOW-HPTH '   'ASS-AXIAL '
  1       .45136      .62061
  2       .58215      .68913
  3       .71219      .75737
  4       .82428      .81884
  5       .90120      .86707
  6       .94830      .90412
  7       .98984      .93942
  8      1.03160      .97511
  9      1.06685     1.00650
 10      1.08886     1.02890
 11      1.10080     1.04439
 12      1.11660     1.06220
 13      1.13928     1.08430
 14      1.15891     1.10388
 15      1.16554     1.11409
 16      1.16260     1.11730
 17      1.16554     1.12410
 18      1.17771     1.13681
 19      1.18769     1.14747
 20      1.18407     1.14813
 21      1.17046     1.14133
 22      1.16334     1.13865
 23      1.16635     1.14262
 24      1.16773     1.14489
 25      1.15578     1.13719
 26      1.13399     1.12201
 27      1.11837     1.11086
 28      1.11244     1.10628
 29      1.10484     1.10002
 30      1.08411     1.08378
 31      1.05313     1.05966
 32      1.02495     1.03745
 33      1.00248     1.01923
 34       .97530      .99722
 35       .93300      .96356
 36       .87466      .91861
 37       .79864      .86542
 38       .70472      .80485
 39       .60189      .74055
 40       .49861      .67607
'ASSEMBLY 2D PIN POWERS'
  .0500   .0521   .0556   .0589   .0620   .0655   .0708   .0726   .0717   .0728   .0745   .0760   .0775   .0809
  .0568   .0624   .0686   .0729   .0747   .0760   .0781   .0800   .0825   .0863   .0903   .0919   .0914   .0928
  .0667   .0752   .0000   .0000   .0898   .0891   .0897   .0918   .0962   .1029   .0000   .0000   .1083   .1072
  .0786   .0879   .0000   .0000   .1043   .1034   .1038   .1062   .1112   .1188   .0000   .0000   .1243   .1224
  .0926   .0999   .1089   .1149   .1172   .1190   .1207   .1235   .1279   .1330   .1385   .1402   .1381   .1381
  .1107   .1136   .1198   .1258   .1312   .1374   .1435   .1469   .1481   .1492   .1512   .1527   .1530   .1550
  .1373   .1314   .1342   .1396   .1466   .1576   .0000   .0000   .1720   .1687   .1691   .1701   .1709   .1734
  .1584   .1515   .1542   .1597   .1671   .1798   .0000   .0000   .1950   .1900   .1902   .1914   .1928   .1970
  .1728   .1747   .1822   .1894   .1956   .2026   .2083   .2123   .2146   .2157   .2184   .2201   .2203   .2236
  .1981   .2064   .2206   .2285   .2286   .2281   .2268   .2300   .2392   .2488   .2594   .2617   .2563   .2558
  .2317   .2457   .0000   .0000   .2672   .2586   .2548   .2583   .2707   .2897   .0000   .0000   .2998   .2935
  .2712   .2840   .0000   .0000   .3020   .2922   .2895   .2942   .3067   .3279   .0000   .0000   .3410   .3351
  .3157   .3189   .3110   .3356   .3311   .3286   .3326   .3397   .3477   .3619   .3781   .3833   .3782   .3818
  .3716   .3628   .3641   .3662   .3687   .3761   .3950   .4072   .4046   .4102   .4185   .4250   .4302   .4441
```

Figure 15
Sample ATS Output File
Page 2 of 16

```
  40              'Axial Nodes'
   2              'Fields on File'
   1              'Case Number'
'B-16.5-A12'      'Case ID'
  100.000         'Percent Full Power'
   .77641E-02     'Core Average ASI'
  1.77000         'Radial Peaking Factor (FR)'
  1.18769         'Axial Peaking Factor'
  1.19574         'Assembly Peaking Factor'
  18              'Assembly Number'
'  FQ-PLANE 1  '  'Reason For Selection'
'K'  'RPOW-HPTH '  'ASS-AXIAL '
   1      .45136      .45359
   2      .58215      .58283
   3      .71219      .71137
   4      .82428      .82325
   5      .90120      .90250
   6      .94830      .95386
   7      .98984      .99903
   8     1.03160     1.04315
   9     1.06685     1.07946
  10     1.08886     1.10120
  11     1.10080     1.11197
  12     1.11660     1.12728
  13     1.13928     1.15052
  14     1.15891     1.17051
  15     1.16554     1.17604
  16     1.16260     1.17100
  17     1.16554     1.17285
  18     1.17771     1.18541
  19     1.18769     1.19574
  20     1.18407     1.19083
  21     1.17046     1.17507
  22     1.16334     1.16667
  23     1.16635     1.16987
  24     1.16773     1.17144
  25     1.15578     1.15825
  26     1.13399     1.13414
  27     1.11837     1.11680
  28     1.11244     1.11009
  29     1.10484     1.10165
  30     1.08411     1.07896
  31     1.05313     1.04516
  32     1.02495     1.01468
  33     1.00248      .99071
  34      .97530      .96134
  35      .93300      .91476
  36      .87466      .85117
  37      .79864      .77396
  38      .70492      .68403
  39      .60189      .58771
  40      .49861      .49111
'ASSEMBLY 2D PIN POWERS'
  1.3413  1.2075  1.4451  1.3481  1.4385  1.4537  1.4455  1.4491  1.4630  1.4517  1.3634  1.4630  1.2211  1.3466
  1.2716  1.4738  1.3290  1.4298  1.3965  1.4548  1.4511  1.4542  1.4634  1.4095  1.4467  1.3467  1.4905  1.2340
  1.4906  1.3441   .0000   .0000  1.4664  1.5035  1.4774  1.4804  1.5129  1.4814   .0000   .0000  1.3629  1.4961
  1.4001  1.4562   .0000   .0000  1.3744  1.5139  1.5616  1.5047  1.5243  1.3904   .0000   .0000  1.4809  1.4101
  1.4999  1.4290  1.4840  1.3811  1.5564  1.5338  1.5280  1.5310  1.5451  1.5761  1.4051  1.5143  1.4576  1.5162
  1.5169  1.4927  1.5269  1.5271  1.5397  1.5675  1.3851  1.3879  1.5790  1.5595  1.5546  1.5603  1.5263  1.5405
  1.5017  1.4901  1.5047  1.5202  1.5397  1.3905   .0000   .0000  1.3993  1.5577  1.5463  1.5378  1.5269  1.5354
  1.5028  1.4923  1.5077  1.5239  1.5441  1.3954   .0000   .0000  1.4089  1.5630  1.5512  1.5421  1.5307  1.5385
  1.5233  1.5021  1.5388  1.5407  1.5550  1.5844  1.4013  1.4050  1.5978  1.5777  1.5721  1.5570  1.5413  1.5534
  1.5123  1.4457  1.5044  1.4033  1.5834  1.5622  1.5576  1.5617  1.5763  1.6078  1.4331  1.5427  1.4836  1.5396
  1.4184  1.4806   .0000   .0000  1.4089  1.5541  1.5434  1.5474  1.5682  1.4308   .0000   .0000  1.5184  1.4427
  1.5175  1.3745   .0000   .0000  1.5141  1.5557  1.5309  1.5348  1.5695  1.5367   .0000   .0000  1.4086  1.5420
  1.2624  1.5156  1.3725  1.4820  1.4528  1.5168  1.5151  1.5189  1.5298  1.4739  1.5109  1.4048  1.5516  1.2829
  1.3872  1.2500  1.5004  1.4056  1.5051  1.5250  1.5174  1.5212  1.5375  1.5256  1.4320  1.5341  1.2798  1.4129
```

Figure 15
Sample ATS Output File
Page 3 of 16

```
  40              'Axial Nodes'
   2              'Fields on File'
   1              'Case Number'
'B-10.5-A13'      'Case ID'
  100.000         'Percent Full Power'
   .77641E-02     'Core Average ASI'
  1.77000         'Radial Peaking Factor (FR)'
  1.18769         'Axial Peaking Factor'
  1.21041         'Assembly Peaking Factor'
  16              'Assembly Number'
'  FQ-PLANE 2  '  'Reason For Selection'
'K'   'RPOW-HPTH '  'ASS-AXIAL '
   1       .45136       .41221
   2       .58215       .55581
   3       .71219       .69865
   4       .82428       .82315
   5       .90120       .91176
   6       .94830       .96947
   7       .98984      1.01934
   8      1.03160      1.06684
   9      1.06685      1.10519
  10      1.08886      1.12763
  11      1.10080      1.13797
  12      1.11660      1.15263
  13      1.13928      1.17523
  14      1.15891      1.19422
  15      1.16554      1.19805
  16      1.16260      1.19079
  17      1.16554      1.19066
  18      1.17771      1.20167
  19      1.18769      1.21041
  20      1.18407      1.20354
  21      1.17046      1.18529
  22      1.15334      1.17485
  23      1.16635      1.17648
  24      1.16773      1.17647
  25      1.15578      1.16122
  26      1.13399      1.13470
  27      1.11837      1.11529
  28      1.11244      1.10696
  29      1.10484      1.09693
  30      1.08411      1.07225
  31      1.05313      1.03613
  32      1.02495      1.00325
  33      1.00248       .97678
  34       .97530       .94476
  35       .93300       .89520
  36       .87466       .82795
  37       .79864       .74513
  38       .70472       .64727
  39       .60189       .54182
  40       .49861       .43606
'ASSEMBLY 20 PIN POWERS'
  1.1806  1.1043  1.3816  1.4370  1.4302  1.4360  1.4368  1.4462  1.4702  1.4917  1.5289  1.5027  1.2329  1.3621
  1.1962  1.3692  1.2711  1.4107  1.3869  1.4480  1.4508  1.4588  1.4779  1.4392  1.4888  1.3697  1.5102  1.2572
  1.3721  1.2673   .0000   .0000  1.4818  1.5113  1.4842  1.4907  1.5170  1.5279   .0000   .0000  1.3802  1.5453
  1.4234  1.4031   .0000   .0000  1.5257  1.5502  1.5177  1.5227  1.5718  1.5644   .0000   .0000  1.5081  1.5795
  1.4137  1.3768  1.4759  1.5212  1.6094  1.5548  1.5796  1.5835  1.5724  1.6427  1.5708  1.5412  1.4639  1.5469
  1.4174  1.4358  1.5025  1.5462  1.5535  1.5008  1.5744  1.5780  1.5167  1.5809  1.5868  1.5588  1.5107  1.5294
  1.4176  1.4377  1.4761  1.5136  1.5782  1.5744   .0000   .0000  1.5908  1.6050  1.5498  1.5235  1.4999  1.5054
  1.4275  1.4465  1.4837  1.5199  1.5836  1.5790   .0000   .0000  1.5948  1.6081  1.5520  1.5249  1.5007  1.5056
  1.4512  1.4664  1.5315  1.5713  1.5752  1.5201  1.5915  1.5944  1.5299  1.5916  1.5952  1.5648  1.5148  1.5316
  1.4729  1.4291  1.5246  1.5669  1.6494  1.5884  1.6095  1.6109  1.5948  1.6617  1.5851  1.5518  1.4713  1.5515
  1.5099  1.4794   .0000   .0000  1.5808  1.5985  1.5586  1.5593  1.6031  1.5897   .0000   .0000  1.5188  1.5870
  1.4835  1.3594   .0000   .0000  1.5528  1.5730  1.5359  1.5362  1.5761  1.5596   .0000   .0000  1.3935  1.5563
  1.2142  1.4943  1.3735  1.5090  1.4709  1.5219  1.5125  1.5123  1.5237  1.4760  1.5190  1.3908  1.5294  1.2707
  1.3318  1.2288  1.5171  1.5591  1.5347  1.5244  1.5086  1.5077  1.5245  1.5377  1.5673  1.5335  1.2546  1.3852
```

Figure 15
Sample ATS Output File
Page 4 of 16

```
  40                'Axial Nodes'
   2                'Fields on File'
   1                'Case Number'
'B-10.5-A14'        'Case ID'
  100.000           'Percent Full Power'
   .77641E-02       'Core Average ASI'
  1.77000           'Radial Peaking Factor (FR)'
  1.18769           'Axial Peaking Factor'
  1.18670           'Assembly Peaking Factor'
  25                'Assembly Number'
'  FQ-PLANE 16 '    'Reason For Selection'
'K'  'RPOW-HPTH '   'ASS-AXIAL '
  1       .45136       .47040
  2       .58215       .59118
  3       .71219       .71133
  4       .82428       .81635
  5       .90120       .89172
  6       .94830       .94168
  7       .98984       .98573
  8      1.03160      1.02846
  9      1.06685      1.06360
 10      1.08886      1.08489
 11      1.10080      1.09581
 12      1.11660      1.11142
 13      1.13928      1.13502
 14      1.15891      1.15559
 15      1.16554      1.16212
 16      1.16260      1.15841
 17      1.16554      1.16153
 18      1.17771      1.17520
 19      1.18769      1.18670
 20      1.18407      1.18331
 21      1.17046      1.16908
 22      1.16334      1.16219
 23      1.16635      1.16671
 24      1.16773      1.16962
 25      1.15578      1.15797
 26      1.13399      1.13557
 27      1.11837      1.12002
 28      1.11244      1.11522
 29      1.10484      1.10857
 30      1.08411      1.08757
 31      1.05313      1.05536
 32      1.02495      1.02659
 33      1.00248      1.00436
 34       .97530       .97646
 35       .93300       .93050
 36       .87466       .86717
 37       .79864       .79190
 38       .70472       .70612
 39       .60189       .61500
 40       .49861       .52363
'ASSEMBLY 2D PIN POWERS'
 1.4188  1.2899  1.5461  1.4389  1.5296  1.5115  1.3608  1.3608  1.5115  1.5296  1.4389  1.5461  1.2899  1.4188
 1.2847  1.5506  1.4007  1.4999  1.4411  1.4991  1.4762  1.4762  1.4991  1.4411  1.4999  1.4007  1.5506  1.2847
 1.5314  1.3930   .0000   .0000  1.3746  1.5205  1.5066  1.5066  1.5205  1.3746   .0000   .0000  1.3930  1.5314
 1.4159  1.4821   .0000   .0000  1.3835  1.5306  1.5176  1.5176  1.5306  1.3835   .0000   .0000  1.4821  1.4159
 1.4943  1.4141  1.3565  1.3741  1.5629  1.5410  1.5309  1.5309  1.5410  1.5629  1.3741  1.3565  1.4141  1.4943
 1.4649  1.4602  1.4898  1.5094  1.5302  1.5581  1.3753  1.3753  1.5581  1.5302  1.5094  1.4898  1.4602  1.4649
 1.3072  1.4267  1.4656  1.4862  1.5097  1.3659   .0000   .0000  1.3659  1.5097  1.4862  1.4656  1.4267  1.3072
 1.2974  1.4181  1.4573  1.4782  1.5016  1.3571   .0000   .0000  1.3571  1.5016  1.4782  1.4573  1.4181  1.2974
 1.4321  1.4287  1.4587  1.4787  1.4994  1.5266  1.3462  1.3462  1.5266  1.4994  1.4787  1.4587  1.4287  1.4321
 1.4367  1.3604  1.3059  1.3239  1.5079  1.4873  1.4775  1.4775  1.4873  1.5079  1.3239  1.3059  1.3604  1.4367
 1.3383  1.4039   .0000   .0000  1.3134  1.4551  1.4430  1.4430  1.4551  1.3134   .0000   .0000  1.4039  1.3383
 1.4266  1.2987   .0000   .0000  1.2857  1.4247  1.4121  1.4121  1.4247  1.2857   .0000   .0000  1.2987  1.4266
 1.1816  1.4273  1.2901  1.3841  1.3306  1.3864  1.3658  1.3658  1.3864  1.3306  1.3841  1.2901  1.4273  1.1816
 1.3000  1.1764  1.4109  1.3137  1.3993  1.3843  1.2455  1.2455  1.3843  1.3993  1.3137  1.4109  1.1764  1.3000
```

Figure 15
Sample ATS Output File
Page 5 of 16

```
  40              'Axial Nodes'
   2              'Fields on File'
   1              'Case Number'
'B-10.5-A21'      'Case ID'
  100.000         'Percent Full Power'
   .77641E-02     'Core Average ASI'
  1.77000         'Radial Peaking Factor (FR)'
  1.18769         'Axial Peaking Factor'
  1.20018         'Assembly Peaking Factor'
  10              'Assembly Number'
'  USER SELECT '  'Reason For Selection'
'K'  'RPOW-HPTH '  'ASS-AXIAL '
  1       .45136       .41996
  2       .58215       .56307
  3       .71219       .70538
  4       .82428       .82828
  5       .90120       .91315
  6       .94810       .96557
  7       .98984      1.01101
  8      1.03160      1.05555
  9      1.06685      1.09234
 10      1.08886      1.11453
 11      1.10080      1.12557
 12      1.11660      1.14039
 13      1.13928      1.16230
 14      1.15891      1.18086
 15      1.16554      1.18566
 16      1.16260      1.18032
 17      1.16554      1.18117
 18      1.17771      1.19177
 19      1.18769      1.20018
 20      1.18607      1.19448
 21      1.17046      1.17845
 22      1.16334      1.16924
 23      1.16635      1.17066
 24      1.16773      1.17051
 25      1.15578      1.15665
 26      1.13399      1.13268
 27      1.11837      1.11513
 28      1.11264      1.10759
 29      1.10484      1.09840
 30      1.08411      1.07593
 31      1.05313      1.04292
 32      1.02495      1.01259
 33      1.00248       .98778
 34       .97530       .95789
 35       .93300       .91233
 36       .87466       .85008
 37       .79864       .76923
 38       .70472       .66956
 39       .60189       .56027
 40       .49861       .45060
'ASSEMBLY 2D PIN POWERS'
   .8489    .8681    .9735  1.0048  1.0222  1.0351  1.0538  1.0737  1.1133  1.1621  1.2084  1.2355  1.1495  1.1798
   .8483    .9603    .9703  1.0106  1.0474  1.0409  1.0480  1.0658  1.1172  1.1872  1.2155  1.2302  1.2820  1.1760
   .9370    .9553    .0000    .0000  1.0589  1.0723  1.0705  1.0888  1.1506  1.2028    .0000    .0000  1.2702  1.3055
   .9576    .9846    .0000    .0000  1.0848  1.1019  1.1039  1.1219  1.1805  1.2286    .0000    .0000  1.3022  1.3258
   .9683   1.0137   1.0403   1.0770  1.1307  1.1333  1.1586  1.1795  1.2088  1.2737  1.2773  1.2974  1.3235  1.3284
   .9772   1.0037   1.0491   1.0892  1.1283  1.1655  1.1995  1.2254  1.2590  1.2570  1.2766  1.2921  1.2983  1.3301
   .9929   1.0092   1.0459   1.0894  1.1513  1.1971    .0000    .0000  1.2710  1.2727  1.2600  1.2719  1.2920  1.3446
  1.0198   1.0327   1.0686   1.1106  1.1735  1.2220    .0000    .0000  1.2998  1.2978  1.2814  1.2910  1.3103  1.3632
  1.0642   1.0870   1.1318   1.1702  1.2055  1.2607  1.2734  1.3028  1.3313  1.3297  1.3465  1.3591  1.3606  1.3920
  1.1198   1.1630   1.1875   1.2211  1.2725  1.2624  1.2812  1.3041  1.3329  1.4012  1.4009  1.4158  1.4318  1.4376
  1.1766   1.1990    .0000    .0000  1.2826  1.2876  1.2752  1.2927  1.3548  1.4058    .0000    .0000  1.4627  1.4830
  1.2198   1.2295    .0000    .0000  1.3137  1.3127  1.2955  1.3101  1.3752  1.4286    .0000    .0000  1.4689  1.5072
  1.1596   1.3025   1.2979   1.3321  1.3595  1.3341  1.3286  1.3424  1.3898  1.4582  1.4840  1.4822  1.5365  1.3904
  1.2148   1.2288   1.3647   1.3871  1.3897  1.3701  1.4034  1.4186  1.4455  1.4885  1.5295  1.5458  1.4131  1.4554
```

Figure 15
Sample ATS Output File
Page 6 of 16

```
  40                "Axial Nodes"
   2                "Fields on File"
   1                "Case Number"
"B-10.5-A22"        "Case ID"
  100.000           "Percent Full Power"
   .77641E-02       "Core Average ASI"
 1.73000            "Radial Peaking Factor (FR)"
 1.18769            "Axial Peaking Factor"
 1.18005            "Assembly Peaking Factor"
  39                "Assembly Number"
"  USER SELECT "    "Reason For Selection"
"K"  "RPOW-HPTH "   "ASS-AXIAL "
  1       .45136       .44891
  2       .58215       .57648
  3       .71219       .70333
  4       .82428       .81305
  5       .90120       .88922
  6       .94830       .93674
  7       .98984       .97802
  8      1.03160      1.01839
  9      1.06685      1.05173
 10      1.08886      1.07188
 11      1.10080      1.08230
 12      1.11660      1.09780
 13      1.13928      1.12162
 14      1.15891      1.14276
 15      1.16554      1.15021
 16      1.16260      1.14771
 17      1.16554      1.15214
 18      1.17771      1.16715
 19      1.18769      1.18005
 20      1.18407      1.17813
 21      1.17046      1.16542
 22      1.16334      1.16011
 23      1.16635      1.16625
 24      1.16773      1.17058
 25      1.15578      1.16001
 26      1.13399      1.13855
 27      1.11837      1.12458
 28      1.11244      1.12210
 29      1.10484      1.11812
 30      1.08411      1.09946
 31      1.05313      1.06944
 32      1.02495      1.04323
 33      1.00248      1.02409
 34       .97530       .99928
 35       .93300       .95593
 36       .87466       .89408
 37       .79864       .81613
 38       .70472       .72283
 39       .60189       .62176
 40       .49861       .52040
"ASSEMBLY 2D PIN POWERS"
 1.2621  1.1389  1.3710  1.2833  1.3754  1.3919  1.3822  1.3822  1.3919  1.3754  1.2833  1.3710  1.1389  1.2621
 1.1395  1.3793  1.2509  1.3528  1.3232  1.3806  1.3750  1.3750  1.3806  1.3232  1.3528  1.2509  1.3793  1.1395
 1.3724  1.2515   .0000   .0000  1.3819  1.4165  1.3892  1.3892  1.4165  1.3819   .0000   .0000  1.2515  1.3724
 1.2851  1.3540   .0000   .0000  1.2867  1.4175  1.4027  1.4027  1.4175  1.2867   .0000   .0000  1.3540  1.2851
 1.3776  1.3247  1.3829  1.2872  1.4513  1.4283  1.4195  1.4195  1.4283  1.4513  1.2872  1.3829  1.3247  1.3776
 1.3942  1.3825  1.4179  1.4184  1.4287  1.4517  1.2788  1.2788  1.4517  1.4287  1.4184  1.4179  1.3825  1.3942
 1.3843  1.3768  1.3906  1.4037  1.4201  1.2790   .0000   .0000  1.2790  1.4201  1.4037  1.3906  1.3768  1.3843
 1.3843  1.3768  1.3906  1.4037  1.4201  1.2790   .0000   .0000  1.2790  1.4201  1.4037  1.3906  1.3768  1.3843
 1.3942  1.3825  1.4179  1.4184  1.4287  1.4517  1.2788  1.2788  1.4517  1.4287  1.4184  1.4179  1.3825  1.3942
 1.3776  1.3247  1.3829  1.2872  1.4513  1.4283  1.4195  1.4195  1.4283  1.4513  1.2872  1.3829  1.3247  1.3776
 1.2851  1.3540   .0000   .0000  1.2867  1.4175  1.4027  1.4027  1.4175  1.2867   .0000   .0000  1.3540  1.2851
 1.3724  1.2515   .0000   .0000  1.3819  1.4165  1.3892  1.3892  1.4165  1.3819   .0000   .0000  1.2515  1.3724
 1.1395  1.3793  1.2509  1.3528  1.3232  1.3806  1.3750  1.3750  1.3806  1.3232  1.3528  1.2509  1.3793  1.1395
 1.2621  1.1389  1.3710  1.2833  1.3754  1.3919  1.3822  1.3822  1.3919  1.3754  1.2833  1.3710  1.1389  1.2621
```

Figure 15
Sample ATS Output File
Page 7 of 16

```
  40                'Axial Nodes'
   2                'Fields on File'
   1                'Case Number'
'B-10.5-A23'        'Case ID'
   100.000          'Percent Full Power'
    .77641E-02      'Core Average ASI'
  1.77500           'Radial Peaking Factor (FR)'
  1.18769           'Axial Peaking Factor'
  1.20500           'Assembly Peaking Factor'
  35                'Assembly Number'
'  FQ-PLANE 1  '    'Reason For Selection'
'K'  'RPOW-HPTH '   'ASS-AXIAL '
  1       .45136       .42543
  2       .58215       .56669
  3       .71219       .70716
  4       .82428       .82879
  5       .90120       .91352
  6       .94830       .96675
  7       .98984      1.01319
  8      1.03160      1.05873
  9      1.06685      1.09614
 10      1.08886      1.11823
 11      1.10080      1.12870
 12      1.11660      1.14359
 13      1.13428      1.16643
 14      1.15691      1.18580
 15      1.16514      1.19125
 16      1.16260      1.18478
 17      1.16558      1.18434
 18      1.17771      1.19581
 19      1.18769      1.20500
 20      1.18407      1.19874
 21      1.17046      1.18119
 22      1.16334      1.17131
 23      1.16635      1.17331
 24      1.16773      1.17367
 25      1.15578      1.15895
 26      1.13399      1.13307
 27      1.11837      1.11417
 28      1.11244      1.10619
 29      1.10484      1.09651
 30      1.08411      1.07243
 31      1.05313      1.03709
 32      1.02495      1.00514
 33      1.00248       .97976
 34       .97530       .94937
 35       .93300       .90240
 36       .87466       .83843
 37       .79864       .75812
 38       .70472       .66187
 39       .60189       .55739
 40       .49861       .45260
'ASSEMBLY 2D PIN POWERS'
 1.2642  1.1704  1.4484  1.4909  1.4702  1.4648  1.4569  1.4634  1.4873  1.5091  1.5479  1.5232  1.2491  1.3710
 1.1603  1.4295  1.3153  1.4481  1.4143  1.4688  1.4665  1.4728  1.4912  1.4529  1.5048  1.3851  1.5261  1.2576
 1.4275  1.3075   .0000   .0000  1.5031  1.5281  1.4987  1.5049  1.5517  1.5446   .0000   .0000  1.3982  1.5480
 1.4628  1.4328   .0000   .0000  1.5409  1.5634  1.5308  1.5371  1.5885  1.5847   .0000   .0000  1.5337  1.5881
 1.4367  1.3932  1.4890  1.5336  1.6186  1.5636  1.5905  1.5972  1.5894  1.6660  1.5991  1.5737  1.4939  1.5618
 1.4258  1.4405  1.5065  1.5483  1.5557  1.5043  1.5810  1.5881  1.5309  1.6023  1.6157  1.5933  1.5450  1.5510
 1.4124  1.4316  1.4699  1.5077  1.5734  1.5717   .0000   .0000  1.5990  1.6209  1.5736  1.5547  1.5352  1.5361
 1.4124  1.4316  1.4699  1.5077  1.5734  1.5717   .0000   .0000  1.5990  1.6209  1.5736  1.5547  1.5352  1.5361
 1.4258  1.4405  1.5065  1.5483  1.5557  1.5043  1.5810  1.5881  1.5309  1.6023  1.6157  1.5933  1.5450  1.5510
 1.4367  1.3932  1.4890  1.5336  1.6186  1.5636  1.5905  1.5972  1.5894  1.6660  1.5991  1.5737  1.4939  1.5618
 1.4628  1.4328   .0000   .0000  1.5409  1.5634  1.5308  1.5371  1.5885  1.5847   .0000   .0000  1.5337  1.5881
 1.4275  1.3075   .0000   .0000  1.5031  1.5281  1.4987  1.5049  1.5517  1.5446   .0000   .0000  1.3982  1.5480
 1.1603  1.4295  1.3153  1.4481  1.4143  1.4688  1.4665  1.4728  1.4912  1.4529  1.5048  1.3851  1.5261  1.2576
 1.2642  1.1704  1.4484  1.4909  1.4702  1.4648  1.4569  1.4634  1.4873  1.5091  1.5479  1.5232  1.2491  1.3710
```

Figure 15
Sample ATS Output File
Page 8 of 16

```
   40                'Axial Nodes'
    2                'Fields on File'
    1                'Case Number'
'B-10.5-A24'         'Case ID'
   100.000           'Percent Full Power'
    .77641E-02       'Core Average ASI'
   1.77000           'Radial Peaking Factor (FR)'
   1.18769           'Axial Peaking Factor'
   1.18044           'Assembly Peaking Factor'
   19                'Assembly Number'
'  FQ-PLANE 16 '     'Reason For Selection'
'K'   'RPOW-HPTH '   'ASS-AXIAL '
   1       .45136       .47071
   2       .58215       .59980
   3       .71219       .72809
   4       .82428       .83753
   5       .90120       .91003
   6       .94830       .95150
   7       .98984       .98866
   8      1.03160      1.02789
   9      1.06685      1.06183
  10      1.08886      1.08308
  11      1.10080      1.09470
  12      1.11660      1.11005
  13      1.13928      1.13208
  14      1.15891      1.15125
  15      1.16554      1.15805
  16      1.16260      1.15572
  17      1.16554      1.15888
  18      1.17771      1.17072
  19      1.18769      1.18044
  20      1.18407      1.17734
  21      1.17046      1.16453
  22      1.16334      1.15784
  23      1.16635      1.16060
  24      1.16773      1.16176
  25      1.15578      1.15032
  26      1.13399      1.12957
  27      1.11837      1.11446
  28      1.11244      1.10829
  29      1.10484      1.10046
  30      1.08411      1.08029
  31      1.05313      1.05043
  32      1.02495      1.02312
  33      1.00248      1.00113
  34       .97530       .97500
  35       .93300       .93540
  36       .87466       .88095
  37       .79864       .80846
  38       .70472       .71725
  39       .60189       .61650
  40       .49861       .51540
'ASSEMBLY 2D PIN POWERS'
  1.3175  1.2952  1.3918  1.3798  1.3674  1.3484  1.3487  1.3487  1.3484  1.3674  1.3798  1.3918  1.2952  1.3175
  1.3245  1.4285  1.3885  1.3934  1.4002  1.3555  1.3311  1.3311  1.3555  1.4002  1.3934  1.3885  1.4285  1.3245
  1.4433  1.4082   .0000   .0000  1.3996  1.3784  1.3411  1.3411  1.3784  1.3996   .0000   .0000  1.4082  1.4433
  1.4451  1.4273   .0000   .0000  1.4035  1.3954  1.3592  1.3592  1.3954  1.4035   .0000   .0000  1.4273  1.4451
  1.4431  1.4452  1.4246  1.4142  1.4466  1.4073  1.3998  1.3998  1.4073  1.4466  1.4142  1.4246  1.4452  1.4431
  1.4311  1.4071  1.4109  1.4141  1.4153  1.4495  1.4108  1.4108  1.4495  1.4153  1.4141  1.4109  1.4071  1.4311
  1.4364  1.3865  1.3773  1.3818  1.4122  1.4152   .0000   .0000  1.4152  1.4122  1.3818  1.3773  1.3865  1.4364
  1.4404  1.3863  1.3754  1.3794  1.4128  1.4192   .0000   .0000  1.4192  1.4128  1.3794  1.3754  1.3863  1.4404
  1.4461  1.4187  1.4213  1.4247  1.4265  1.4646  1.4321  1.4321  1.4646  1.4265  1.4247  1.4213  1.4187  1.4461
  1.4734  1.4730  1.4507  1.4389  1.4724  1.4335  1.4319  1.4319  1.4335  1.4724  1.4389  1.4507  1.4730  1.4734
  1.4925  1.4724   .0000   .0000  1.4431  1.4341  1.3990  1.3990  1.4341  1.4431   .0000   .0000  1.4724  1.4925
  1.5108  1.4716   .0000   .0000  1.4535  1.4288  1.3901  1.3901  1.4288  1.4535   .0000   .0000  1.4716  1.5108
  1.4039  1.5148  1.4690  1.4695  1.4711  1.4186  1.3874  1.3874  1.4186  1.4711  1.4695  1.4690  1.5148  1.4039
  1.4240  1.3983  1.5015  1.4815  1.4605  1.4288  1.4117  1.4117  1.4288  1.4605  1.4815  1.5015  1.3983  1.4240
```

Figure 15
Sample ATS Output File
Page 9 of 16

```
  40              'Axial Nodes'
   2              'Fields on File'
   2              'Case Number'
'B-10.5-J11'      'Case ID'
   20.000         'Percent Full Power'
   .20581E+00     'Core Average ASI'
  2.33200         'Radial Peaking Factor (FR)'
  1.37822         'Axial Peaking Factor'
  1.27083         'Assembly Peaking Factor'
   1              'Assembly Number'
'  USER SELECT '  'Reason For Selection'
'K'  'RPOW-MPTH '  'ASS-AXIAL '
  1       .58414       .78065
  2       .75266       .86673
  3       .92019       .95242
  4      1.06408      1.02881
  5      1.16168      1.08696
  6      1.21965      1.12944
  7      1.26866      1.16796
  8      1.31597      1.20521
  9      1.35251      1.23500
 10      1.36919      1.25115
 11      1.36988      1.25618
 12      1.37165      1.26125
 13      1.37822      1.26879
 14      1.37750      1.27083
 15      1.35736      1.25933
 16      1.32139      1.23717
 17      1.28598      1.21711
 18      1.25487      1.20200
 19      1.21943      1.18400
 20      1.17105      1.15526
 21      1.11419      1.11864
 22      1.06808      1.08696
 23      1.03704      1.06313
 24      1.00947      1.03963
 25       .97368      1.00897
 26       .93262       .97355
 27       .90009       .94403
 28       .87901       .92286
 29       .85977       .90284
 30       .83256       .87681
 31       .79954       .84646
 32       .77087       .81979
 33       .74879       .79853
 34       .72497       .77622
 35       .69127       .74628
 36       .64654       .70874
 37       .58814       .66482
 38       .51554       .61486
 39       .43578       .56188
 40       .35570       .50875
'ASSEMBLY 2D PIN POWERS'
   .0502   .0530   .0568   .0604   .0617   .0675   .0730   .0750   .0742   .0754   .0771   .0789   .0806   .0842
   .0576   .0619   .0705   .0751   .0772   .0788   .0810   .0832   .0859   .0899   .0941   .0959   .0957   .0972
   .0679   .0771   .0000   .0000   .0930   .0926   .0934   .0958   .1005   .1075   .0000   .0000   .1138   .1127
   .0801   .0904   .0000   .0000   .1081   .1076   .1083   .1110   .1165   .1243   .0000   .0000   .1308   .1291
   .0945   .1028   .1125   .1190   .1218   .1240   .1261   .1293   .1341   .1397   .1454   .1474   .1456   .1459
   .1132   .1171   .1240   .1306   .1366   .1433   .1499   .1540   .1556   .1569   .1593   .1611   .1617   .1640
   .1402   .1354   .1390   .1451   .1528   .1646   .0000   .0000   .1809   .1779   .1786   .1799   .1810   .1838
   .1620   .1565   .1602   .1666   .1749   .1867   .0000   .0000   .2061   .2012   .2017   .2033   .2051   .2098
   .1769   .1807   .1898   .1980   .2051   .2131   .2196   .2244   .2273   .2290   .2321   .2343   .2348   .2386
   .2033   .2140   .2300   .2392   .2401   .2402   .2395   .2436   .2539   .2646   .2763   .2792   .2738   .2736
   .2385   .2552   .0000   .0000   .2809   .2727   .2695   .2740   .2877   .3085   .0000   .0000   .3210   .3147
   .2797   .2955   .0000   .0000   .3181   .3087   .3066   .3125   .3265   .3498   .0000   .0000   .3657   .3599
   .3264   .3322   .3469   .3530   .3493   .3476   .3527   .3613   .3706   .3866   .4049   .4111   .4063   .4107
   .3854   .3789   .3823   .3861   .3899   .3988   .4197   .4339   .4319   .4389   .4488   .4566   .4629   .4788
```

Figure 15
Sample ATS Output File
Page 10 of 16

```
  40                'Axial Nodes'
   2                'Fields on File'
   2                'Case Number'
'B-10.5-J12'        'Case ID'
   20.000           'Percent Full Power'
   .20581E+00       'Core Average ASI'
  2.33200           'Radial Peaking Factor (FR)'
  1.37822           'Axial Peaking Factor'
  1.36853           'Assembly Peaking Factor'
  13                'Assembly Number'
'  FQ-PLANE 1  '    'Reason For Selection'
'K'   'RPOW-HPTH '  'ASS-AXIAL '
  1       .58414      .57013
  2       .75266      .73565
  3       .92019      .90025
  4      1.06408     1.04267
  5      1.16168     1.14166
  6      1.21965     1.20332
  7      1.26866     1.25576
  8      1.31597     1.30559
  9      1.35251     1.34343
 10      1.36919     1.35991
 11      1.36988     1.35978
 12      1.37165     1.36082
 13      1.37822     1.36840
 14      1.37750     1.36853
 15      1.35736     1.34763
 16      1.32139     1.31029
 17      1.28598     1.27722
 18      1.25487     1.25311
 19      1.21943     1.22565
 20      1.17105     1.18266
 21      1.11419     1.12877
 22      1.06808     1.08484
 23      1.03704     1.05496
 24      1.00947     1.02765
 25       .97366      .99067
 26       .93262      .94738
 27       .90009      .91337
 28       .87901      .89213
 29       .85977      .87270
 30       .83256      .84418
 31       .79954      .80900
 32       .77087      .77875
 33       .74879      .75592
 34       .72497      .73127
 35       .69127      .69578
 36       .64654      .64795
 37       .58814      .58884
 38       .51564      .51812
 39       .43578      .44155
 40       .35570      .36473
'ASSEMBLY 2D PIN POWERS'
 1.3048  1.1758  1.3985  1.3084  1.4075  1.4224  1.4119  1.4119  1.4224  1.4075  1.3084  1.3985  1.1758  1.3048
 1.1993  1.4264  1.3214  1.4375  1.3689  1.4251  1.4210  1.4210  1.4251  1.3689  1.4375  1.3214  1.4264  1.1993
 1.4475  1.3410   .0000   .0000  1.4919  1.4888  1.4572  1.4572  1.4888  1.4919   .0000   .0000  1.3410  1.4475
 1.3718  1.4780   .0000   .0000  1.4063  1.5152  1.4961  1.4961  1.5152  1.4063   .0000   .0000  1.4780  1.3718
 1.4942  1.4256  1.5311  1.4245  1.5763  1.5499  1.5419  1.5419  1.5499  1.5763  1.4245  1.5311  1.4256  1.4942
 1.5292  1.5034  1.5482  1.5552  1.5706  1.6045  1.4460  1.4460  1.6045  1.5706  1.5552  1.5482  1.5034  1.5292
 1.5377  1.5199  1.5369  1.5577  1.5850  1.4666   .0000   .0000  1.4666  1.5850  1.5577  1.5369  1.5199  1.5377
 1.5579  1.5395  1.5567  1.5777  1.6059  1.4879   .0000   .0000  1.4879  1.6059  1.5777  1.5567  1.5395  1.5579
 1.5936  1.5673  1.6140  1.6216  1.6376  1.6736  1.5101  1.5101  1.6736  1.6376  1.6216  1.6140  1.5673  1.5936
 1.6027  1.5312  1.6442  1.5304  1.6921  1.6638  1.6558  1.6558  1.6638  1.6921  1.5304  1.6442  1.5312  1.6027
 1.5161  1.6350   .0000   .0000  1.5557  1.6747  1.6536  1.6536  1.6747  1.5557   .0000   .0000  1.6350  1.5161
 1.6475  1.5294   .0000   .0000  1.6994  1.6948  1.6588  1.6588  1.6948  1.6994   .0000   .0000  1.5294  1.6475
 1.4076  1.6762  1.5537  1.6887  1.6077  1.6718  1.6665  1.6665  1.6718  1.6077  1.6887  1.5537  1.6762  1.4076
 1.5796  1.4257  1.6950  1.5857  1.7040  1.7213  1.7080  1.7080  1.7213  1.7040  1.5857  1.6950  1.4257  1.5796
```

Figure 15
Sample ATS Output File
Page 11 of 16

```
  40                'Axial Nodes'
   2                'Fields on File'
   2                'Case Number'
'B-10.5-J13'        'Case ID'
   20.000           'Percent Full Power'
   .20581E+00       'Core Average ASI'
  2.33200           'Radial Peaking Factor (FR)'
  1.3782            'Axial Peaking Factor'
  1.35690           'Assembly Peaking Factor'
  16                'Assembly Number'
'  FQ-PLANE 3   '   'Reason For Selection'
'K'  'RPOW-HPTH '   'ASS-AXIAL '
   1      .58414       .49767
   2      .75266       .67229
   3      .92019       .84597
   4     1.06408       .99702
   5     1.16168      1.10375
   6     1.21965      1.17209
   7     1.26866      1.22954
   8     1.31597      1.28260
   9     1.35251      1.32257
  10     1.36919      1.34071
  11     1.36988      1.34155
  12     1.37165      1.34462
  13     1.37822      1.35423
  14     1.37750      1.35690
  15     1.35736      1.33911
  16     1.32139      1.30563
  17     1.28598      1.27787
  18     1.25487      1.26060
  19     1.21943      1.24034
  20     1.17105      1.20364
  21     1.11419      1.15514
  22     1.06808      1.11572
  23     1.03704      1.09009
  24     1.00947      1.06556
  25      .97368      1.02943
  26      .93262       .98548
  27      .90009       .95077
  28      .87901       .92906
  29      .85977       .90878
  30      .83256       .87826
  31      .79954       .84016
  32      .77087       .80686
  33      .74879       .78107
  34      .72497       .75261
  35      .69127       .71141
  36      .64654       .65701
  37      .58814       .58937
  38      .51554       .50880
  39      .43578       .42161
  40      .35570       .33412
'ASSEMBLY 2D FIN POWERS'
  1.1111  1.0547  1.3456  1.4208  1.4287  1.4487  1.4644  1.4864  1.5189  1.5505  1.5989  1.5750  1.2909  1.4358
  1.0509  1.3294  1.2950  1.4135  1.3943  1.4696  1.4837  1.5035  1.5325  1.4989  1.5673  1.4405  1.5866  1.3219
  1.3372  1.2619   .0000   .0000  1.5125  1.5470  1.5259  1.5431  1.6039  1.6091   .0000   .0000  1.4588  1.6337
  1.4092  1.4076   .0000   .0000  1.5710  1.5964  1.5708  1.5857  1.6462  1.6557   .0000   .0000  1.6025  1.6749
  1.4153  1.3870  1.5087  1.5698  1.6611  1.6104  1.6459  1.6590  1.6527  1.7360  1.6718  1.6405  1.5480  1.6403
  1.4343  1.4613  1.5428  1.5951  1.6105  1.5606  1.6595  1.6713  1.5969  1.6720  1.6819  1.6547  1.6013  1.6232
  1.4507  1.4761  1.5227  1.5708  1.6477  1.6612   .0000   .0000  1.6966  1.7039  1.6451  1.6162  1.5922  1.6017
  1.4744  1.4980  1.5426  1.5887  1.6638  1.6758   .0000   .0000  1.7069  1.7123  1.6515  1.6210  1.5957  1.6039
  1.5082  1.5295  1.6069  1.6537  1.6625  1.6058  1.7014  1.7087  1.6270  1.6977  1.7028  1.6709  1.6130  1.6312
  1.5416  1.4988  1.6164  1.6685  1.7526  1.6879  1.7152  1.7202  1.7039  1.7805  1.7067  1.6675  1.5674  1.6545
  1.5920  1.5703   .0000   .0000  1.6944  1.7051  1.6634  1.6669  1.7170  1.7148   .0000   .0000  1.6306  1.6959
  1.5696  1.4447   .0000   .0000  1.6675  1.6835  1.6412  1.6436  1.6918  1.6823   .0000   .0000  1.4920  1.6614
  1.2852  1.5878  1.4684  1.6216  1.5723  1.6296  1.6204  1.6217  1.6346  1.5820  1.6379  1.4926  1.6317  1.3519
  1.4208  1.3085  1.6248  1.6748  1.6479  1.6373  1.6231  1.6229  1.6387  1.6529  1.6856  1.6444  1.3377  1.4808
```

Figure 15
Sample ATS Output File
Page 12 of 16

```
  40              'Axial Nodes'
   2              'Fields on File'
   2              'Case Number'
'B-10.5-J14'      'Case ID'
   20.000         'Percent Full Power'
   .20581E+00     'Core Average ASI'
  2.33200         'Radial Peaking Factor (FR)'
  1.37822         'Axial Peaking Factor'
  1.34918         'Assembly Peaking Factor'
  14              'Assembly Number'
'  FQ-PLANE 16 '  'Reason For Selection'
'K'  'RPOW-HPTH '  'ASS-AXIAL '
   1      .58414      .53356
   2      .75266      .69656
   3      .92019      .85871
   4     1.06408     1.00022
   5     1.16168     1.10132
   6     1.21965     1.16742
   7     1.26866     1.22356
   8     1.31597     1.27564
   9     1.35251     1.31489
  10     1.36919     1.33293
  11     1.36988     1.33388
  12     1.37165     1.33701
  13     1.37822     1.34651
  14     1.37750     1.34918
  15     1.35736     1.33176
  16     1.32139     1.29893
  17     1.28598     1.27157
  18     1.25487     1.25434
  19     1.21943     1.23413
  20     1.17105     1.19786
  21     1.11419     1.15004
  22     1.06808     1.11108
  23     1.03704     1.08556
  24     1.00947     1.06114
  25      .97368     1.02546
  26      .93262      .98217
  27      .90009      .94793
  28      .87901      .92635
  29      .85977      .90618
  30      .83256      .87608
  31      .79954      .83861
  32      .77087      .80593
  33      .74879      .78062
  34      .72497      .75278
  35      .69127      .71261
  36      .64654      .65979
  37      .58814      .59578
  38      .51554      .52094
  39      .43578      .44068
  40      .35570      .36017
'ASSEMBLY 2D PIN POWERS'
 1.2800  1.1586  1.3781  1.2887  1.3844  1.3980  1.3871  1.3891  1.4032  1.3919  1.2976  1.3905  1.1718  1.3009
 1.1800  1.4129  1.3110  1.4247  1.3554  1.4093  1.4052  1.4064  1.4121  1.3592  1.4305  1.3183  1.4253  1.1975
 1.4300  1.3355   .0000   .0000  1.4832  1.4782  1.4466  1.4473  1.4795  1.4850   .0000   .0000  1.3434  1.4480
 1.3617  1.4777   .0000   .0000  1.4025  1.5082  1.4886  1.4888  1.5082  1.4022   .0000   .0000  1.4828  1.3747
 1.4884  1.4298  1.5353  1.4260  1.5736  1.5445  1.5358  1.5356  1.5438  1.5722  1.4242  1.5343  1.4313  1.4985
 1.5278  1.5098  1.5535  1.5567  1.5679  1.5989  1.4408  1.4400  1.5977  1.5659  1.5539  1.5507  1.5089  1.5338
 1.5398  1.5267  1.5408  1.5567  1.5795  1.4597   .0000   .0000  1.4585  1.5776  1.5536  1.5368  1.5232  1.5410
 1.5603  1.5452  1.5583  1.5736  1.5967  1.4783   .0000   .0000  1.4769  1.5945  1.5700  1.5533  1.5199  1.5583
 1.5925  1.5700  1.6121  1.6135  1.6238  1.6566  1.4973  1.4969  1.6554  1.6211  1.6090  1.6061  1.5637  1.5897
 1.5971  1.5302  1.6369  1.5183  1.6708  1.6395  1.6330  1.6332  1.6384  1.6682  1.5138  1.6308  1.5238  1.5944
 1.5961  1.6261   .0000   .0000  1.5304  1.6424  1.6227  1.6228  1.6415  1.5281   .0000   .0000  1.6208  1.5042
 1.6295  1.5161   .0000   .0000  1.6635  1.6546  1.6197  1.6194  1.6540  1.6621   .0000   .0000  1.5126  1.6294
 1.3921  1.6589  1.5333  1.6580  1.5732  1.6296  1.6215  1.6207  1.6287  1.5719  1.6568  1.5314  1.6570  1.3923
 1.5737  1.4240  1.6861  1.5714  1.6798  1.6883  1.6633  1.6612  1.6852  1.6770  1.5688  1.6835  1.4210  1.5712
```

Figure 15
Sample ATS Output File
Page 13 of 16

```
  40              'Axial Nodes'
   2              'Fields on File'
   2              'Case Number'
'B-10.5-J15'      'Case ID'
   20.000         'Percent Full Power'
   .20581E+00     'Core Average ASI'
  2.33200         'Radial Peaking Factor (FR)'
  1.37822         'Axial Peaking Factor'
  1.41253         'Assembly Peaking Factor'
  18              'Assembly Number'
'  CH-PLANE 2  '  'Reason For Selection'
'K'  'RPOW-HPTH '  'ASS-AXIAL '
   1      .58414      .58975
   2      .75266      .76083
   3      .92019      .93096
   4     1.06408     1.07857
   5     1.16168     1.18208
   6     1.21965     1.24749
   7     1.26866     1.30259
   8     1.31597     1.35194
   9     1.35251     1.39229
  10     1.36919     1.40838
  11     1.36988     1.40668
  12     1.37165     1.40665
  13     1.37822     1.41253
  14     1.37750     1.40998
  15     1.35736     1.38463
  16     1.32139     1.34101
  17     1.28598     1.29957
  18     1.25487     1.26499
  19     1.21943     1.22627
  20     1.17105     1.17251
  21     1.11419     1.10870
  22     1.06808     1.05677
  23     1.03704     1.02172
  24     1.00947      .99101
  25      .97368      .95220
  26      .93262      .90841
  27      .90009      .87427
  28      .87901      .85296
  29      .85977      .83381
  30      .83256      .80611
  31      .79954      .77217
  32      .77087      .74302
  33      .74879      .72108
  34      .72497      .69711
  35      .69127      .66199
  36      .64654      .61542
  37      .58814      .55821
  38      .51554      .49067
  39      .43578      .41787
  40      .35570      .34485
'ASSEMBLY 2D PIN POWERS'
  1.3804  1.2398  1.4901  1.3877  1.4898  1.5074  1.5002  1.5055  1.5208  1.5096  1.4118  1.5206  1.2659  1.4035
  1.2614  1.5163  1.3726  1.4843  1.4412  1.5067  1.5045  1.5091  1.5194  1.4606  1.5108  1.4020  1.5494  1.2795
  1.5298  1.3848   .0000   .0000  1.5239  1.5568  1.5307  1.5353  1.5705  1.5459   .0000   .0000  1.4185  1.5548
  1.4314  1.5046   .0000   .0000  1.4232  1.5673  1.5542  1.5588  1.5819  1.4457   .0000   .0000  1.5454  1.4592
  1.5398  1.4647  1.5351  1.4268  1.6067  1.5843  1.5812  1.5858  1.5998  1.6335  1.4598  1.5782  1.5082  1.5746
  1.5565  1.5325  1.5705  1.5736  1.5866  1.6172  1.4309  1.4351  1.6329  1.6132  1.6106  1.6161  1.5808  1.5978
  1.5394  1.5286  1.5455  1.5627  1.5859  1.4330   .0000   .0000  1.4451  1.6102  1.5975  1.5896  1.5792  1.5901
  1.5391  1.5295  1.5472  1.5652  1.5889  1.4365   .0000   .0000  1.4492  1.6136  1.6003  1.5918  1.5807  1.5907
  1.5576  1.5368  1.5790  1.5818  1.5959  1.6276  1.4409  1.4458  1.6442  1.6237  1.6202  1.6244  1.5873  1.6016
  1.5431  1.4725  1.5462  1.4778  1.6228  1.6013  1.5990  1.6043  1.6181  1.6514  1.4752  1.5925  1.5196  1.5821
  1.4373  1.5160   .0000   .0000  1.4438  1.5914  1.5791  1.5841  1.6075  1.4687   .0000   .0000  1.5617  1.4701
  1.5296  1.3981   .0000   .0000  1.5521  1.5881  1.5628  1.5674  1.6033  1.5771   .0000   .0000  1.4382  1.5704
  1.2741  1.5363  1.3956  1.5137  1.4741  1.5437  1.5427  1.5470  1.5574  1.4961  1.5443  1.4297  1.5747  1.2969
  1.4043  1.2603  1.5188  1.4192  1.5279  1.5490  1.5417  1.5459  1.5616  1.5483  1.4451  1.5518  1.2892  1.4287
```

```
  40                'Axial Nodes'
   2                'Fields on File'
   2                'Case Number'
'B-10.5-J21'        'Case ID'
   20.000           'Percent Full Power'
   .20581E+00       'Core Average ASI'
  2.33200           'Radial Peaking Factor (FR)'
  1.37822           'Axial Peaking Factor'
  1.33216           'Assembly Peaking Factor'
  10                'Assembly Number'
'  USER SELECT '    'Reason For Selection'
'K'  'RPOW-MPOW '   'ASS-AXIAL '
  1       .58414       .51095
  2       .75266       .68154
  3       .92019       .85116
  4      1.06408       .99726
  5      1.16168      1.09732
  6      1.21965      1.15789
  7      1.26866      1.20905
  8      1.31597      1.25794
  9      1.35251      1.29575
 10      1.36919      1.31365
 11      1.36988      1.31568
 12      1.37165      1.31949
 13      1.37822      1.32897
 14      1.37750      1.33216
 15      1.35736      1.31705
 16      1.32139      1.28790
 17      1.28598      1.26368
 18      1.25487      1.24861
 19      1.21943      1.23065
 20      1.17105      1.19780
 21      1.11419      1.15415
 22      1.06808      1.11828
 23      1.03704      1.09435
 24      1.00947      1.07104
 25       .97368      1.03704
 26       .93262       .99574
 27       .90009       .96272
 28       .87901       .94172
 29       .85977       .92120
 30       .83256       .89180
 31       .79954       .85556
 32       .77087       .82365
 33       .74879       .79856
 34       .72457       .77117
 35       .69127       .73234
 36       .64654       .68096
 37       .58814       .61417
 38       .51554       .53145
 39       .43578       .44062
 40       .35570       .34945
'ASSEMBLY 2D PIN POWERS'
  .7175   .7644   .8829   .9326   .9656   .9911  1.0255  1.0623  1.1150  1.1765  1.2356  1.2728  1.1931  1.2310
  .7079   .8410   .8801   .9391   .9922  1.0008  1.0220  1.0564  1.1204  1.2065  1.2486  1.2752  1.3333  1.2301
  .7772   .8356   .0000   .0000  1.0038  1.0313  1.0443  1.0789  1.1562  1.2266   .0000   .0000  1.3276  1.3664
  .7936   .8595   .0000   .0000  1.0273  1.0601  1.0776  1.1142  1.1877  1.2539   .0000   .0000  1.3610  1.3897
  .8042   .8850   .9400   .9982  1.0692  1.0904  1.1321  1.1741  1.2179  1.2975  1.3172  1.3492  1.3827  1.3927
  .8177   .8775   .9463  1.0076  1.0658  1.1422  1.1763  1.2256  1.2728  1.2817  1.3134  1.3398  1.3544  1.3955
  .8428   .8870   .9444  1.0066  1.0864  1.1541   .0000   .0000  1.2889  1.3001  1.2978  1.3188  1.3508  1.4133
  .8717   .9150   .9721  1.0346  1.1163  1.1874   .0000   .0000  1.3276  1.3332  1.3276  1.3459  1.3750  1.4397
  .9066   .9678  1.0398  1.1013  1.1573  1.2331  1.2659  1.3195  1.3599  1.3692  1.3991  1.4213  1.4297  1.4715
  .9591  1.0458  1.1042  1.1623  1.2313  1.2401  1.2753  1.3193  1.3629  1.4478  1.4642  1.4900  1.5109  1.5213
 1.0192  1.0898   .0000   .0000  1.2523  1.2716  1.2739  1.3116  1.3897  1.4606   .0000   .0000  1.5489  1.5707
 1.0714  1.1311   .0000   .0000  1.2911  1.3027  1.2987  1.3320  1.4133  1.4874   .0000   .0000  1.5572  1.5960
 1.0378  1.2098  1.2404  1.2972  1.3413  1.3297  1.3391  1.3696  1.4302  1.5163  1.5571  1.5645  1.6218  1.4725
 1.1127  1.1583  1.3121  1.3596  1.3749  1.3907  1.4195  1.4542  1.4930  1.5478  1.6001  1.6242  1.4911  1.5396
```

Figure 15
Sample ATS Output File
Page 15 of 16

```
  40              "Axial Nodes"
   2              "Fields on File"
   2              "Case Number"
"B-10.5-J22"      "Case ID"
   20.000         "Percent Full Power"
   .205818+00     "Core Average ASI"
  2.33200         "Radial Peaking Factor (FR)"
  1.37822         "Axial Peaking Factor"
  1.52250         "Assembly Peaking Factor"
  39              "Assembly Number"
"  USER SELECT "  "Reason For Selection"
"K"  "RPOW-HPTH "  "ASS-AXIAL "
   1      .58414      .83171
   2      .75266      .97502
   3      .92019     1.11758
   4     1.06408     1.24213
   5     1.16168     1.33141
   6     1.21965     1.38989
   7     1.26866     1.43850
   8     1.31597     1.48210
   9     1.35251     1.51275
  10     1.36919     1.52250
  11     1.36988     1.51527
  12     1.37165     1.50819
  13     1.37822     1.50489
  14     1.37750     1.49066
  15     1.35736     1.45098
  16     1.32139     1.38949
  17     1.28598     1.32625
  18     1.25487     1.26561
  19     1.21943     1.19988
  20     1.17105     1.12143
  21     1.11419     1.03539
  22     1.06808      .96357
  23     1.03704      .91097
  24     1.00947      .86711
  25      .97368      .82147
  26      .93262      .77617
  27      .90009      .74157
  28      .87901      .71984
  29      .85977      .70197
  30      .83256      .67879
  31      .79954      .65202
  32      .77087      .63001
  33      .74879      .61448
  34      .72497      .59701
  35      .69127      .56xxx
  36      .64654      .53074
  37      .58814      .48279
  38      .51554      .42558
  39      .43578      .36368
  40      .35570      .30159
"ASSEMBLY 2D PIN POWERS"
   .7644   .6423   .7199   .6688   .7494   .7956   .8071   .8071   .7956   .7494   .6688   .7199   .6423   .7644
   .6430   .6661   .4959   .5204   .6128   .7190   .7531   .7531   .7190   .6128   .5204   .4959   .6661   .6430
   .7214   .4964   .0000   .0000   .5087   .6726   .7145   .7145   .6726   .5087   .0000   .0000   .4964   .7214
   .6706   .5213   .0000   .0000   .4602   .6384   .6761   .6761   .6384   .4602   .0000   .0000   .5213   .6706
   .7518   .6142   .5095   .4605   .5856   .6150   .6201   .6201   .6150   .5856   .4605   .5095   .6142   .7518
   .7983   .7210   .6738   .6391   .6153   .5709   .4340   .4340   .5709   .6153   .6391   .6738   .7210   .7983
   .8098   .7551   .7160   .6771   .6206   .4341   .0000   .0000   .4341   .6206   .6771   .7160   .7551   .8098
   .8098   .7551   .7160   .6771   .6206   .4341   .0000   .0000   .4341   .6206   .6771   .7160   .7551   .8098
   .7983   .7210   .6738   .6391   .6153   .5709   .4340   .4340   .5709   .6153   .6391   .6738   .7210   .7983
   .7518   .6142   .5095   .4605   .5856   .6150   .6201   .6201   .6150   .5856   .4605   .5095   .6142   .7518
   .6706   .5213   .0000   .0000   .4602   .6384   .6761   .6761   .6384   .4602   .0000   .0000   .5213   .6706
   .7214   .4964   .0000   .0000   .5087   .6726   .7145   .7145   .6726   .5087   .0000   .000'   .4964   .7214
   .6430   .6661   .4959   .5204   .6128   .7190   .7531   .7531   .7190   .6128   .5204   .49' /  .6661   .6430
   .7644   .6423   .7199   .6688   .7494   .7956   .8071   .8071   .7956   .7494   .6688   .71 ?   .6423   .7644
```

Figure 15
Sample ATS Output File
Page 16 of 16

```
  40              "Axial Nodes"
   2              "Fields on File"
   2              "Case Number"
"B-10.5-J23"      "Case ID"
  20.000          "Percent Full Power"
 .20581E+00       "Core Average ASI"
 2.33200          "Radial Peaking Factor (FR)"
 1.37822          "Axial Peaking Factor"
 1.36887          "Assembly Peaking Factor"
  35              "Assembly Number"
"  FQ-PLANE 1  "  "Reason For Selection"
"K"  "RPOW-DPTH "  "ASSY-AXIAL "
  1      .58414       .55172
  2      .75266       .69187
  3      .92019       .86903
  4     1.06408      1.02054
  5     1.16168      1.12574
  6     1.21965      1.19106
  7     1.26866      1.24617
  8     1.31597      1.29809
  9     1.35251      1.33756
 10     1.36919      1.35531
 11     1.36988      1.35581
 12     1.37165      1.35839
 13     1.37822      1.36732
 14     1.37750      1.36887
 15     1.35736      1.34932
 16     1.32139      1.31335
 17     1.28598      1.28219
 18     1.25487      1.26053
 19     1.21943      1.23560
 20     1.17105      1.19459
 21     1.11419      1.14234
 22     1.06808      1.09964
 23     1.03704      1.07155
 24     1.00947      1.04541
 25      .97368      1.00873
 26      .93262       .96504
 27      .90009       .93069
 28      .87901       .90926
 29      .85977       .88964
 30      .83256       .85986
 31      .79954       .82311
 32      .77087       .79126
 33      .74879       .76692
 34      .72497       .74051
 35      .69127       .70241
 36      .64654       .65179
 37      .58814       .58760
 38      .51554       .50957
 39      .43578       .42461
 40      .35570       .33934
"ASSEMBLY 2D PIN POWERS"
 1.4662  1.3509  1.6757  1.7244  1.6944  1.6833  1.6717  1.6760  1.6963  1.7162  1.7565  1.7191  1.3986  1.5348
 1.3427  1.6552  1.5267  1.6838  1.6305  1.6905  1.6835  1.6876  1.7039  1.6532  1.7175  1.5693  1.7150  1.4056
 1.6608  1.5222   .0000   .0000  1.7490  1.7660  1.7236  1.7277  1.7807  1.7749   .0000   .0000  1.5811  1.7412
 1.7066  1.6759   .0000   .0000  1.7983  1.8092  1.7657  1.7702  1.8256  1.8271   .0000   .0000  1.7437  1.7931
 1.6754  1.6206  1.7429  1.7951  1.8827  1.8110  1.8394  1.8443  1.8286  1.9146  1.8396  1.8005  1.6893  1.7633
 1.6611  1.6779  1.7565  1.8021  1.8068  1.7403  1.8411  1.8469  1.7592  1.8389  1.8482  1.8161  1.7504  1.7521
 1.6501  1.6679  1.7100  1.7536  1.8293  1.8350   .0000   .0000  1.8548  1.8624  1.7991  1.7684  1.7403  1.7389
 1.6501  1.6679  1.7100  1.7536  1.8293  1.8350   .0000   .0000  1.8548  1.8624  1.7991  1.7684  1.7403  1.7389
 1.6611  1.6779  1.7565  1.8021  1.8068  1.7403  1.8411  1.8469  1.7592  1.8389  1.8482  1.8161  1.7504  1.7521
 1.6754  1.6206  1.7429  1.7951  1.8827  1.8110  1.8394  1.8443  1.8286  1.9146  1.8396  1.8005  1.6893  1.7633
 1.7066  1.6759   .0000   .0000  1.7983  1.8092  1.7657  1.7702  1.8256  1.8271   .0000   .0000  1.7437  1.7931
 1.6608  1.5222   .0000   .0000  1.7490  1.7660  1.7236  1.7277  1.7807  1.7749   .0000   .0000  1.5811  1.7412
 1.3427  1.6552  1.5267  1.6838  1.6305  1.6905  1.6835  1.6876  1.7039  1.6532  1.7175  1.5693  1.7150  1.4056
 1.4662  1.3509  1.6757  1.7244  1.6944  1.6833  1.6717  1.6760  1.6963  1.7162  1.7565  1.7191  1.3986  1.5348
```

FIGURE
AXIAL POWER SHAPES FOR CORE AVERAGE
CASEID = B-10.5-A PDIL CASE A - 100% POWER, ARO

40 PLANE AVERAGE = 1.00000

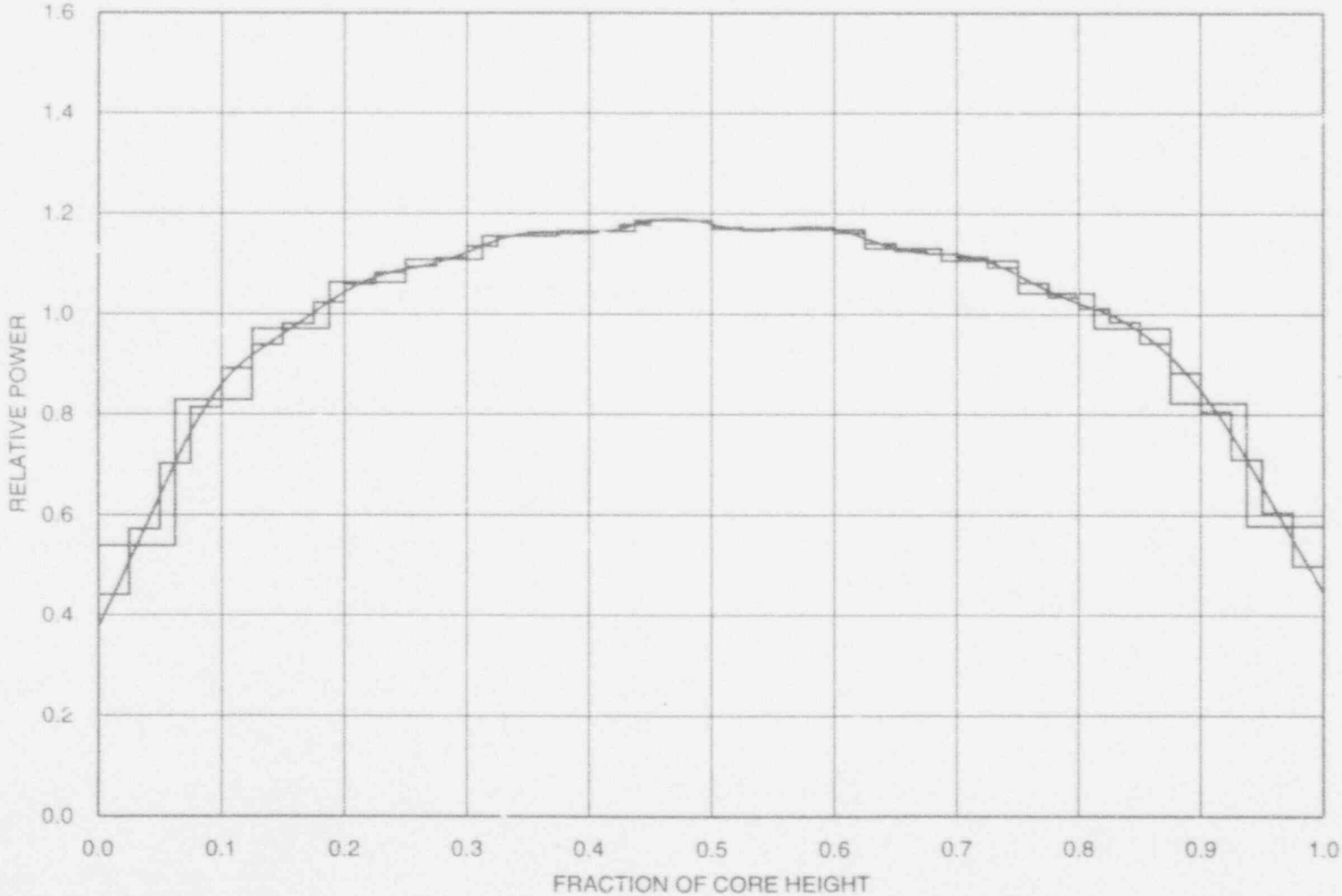

Figure 16
Sample POSTSCRIPT Plots
Page 1 of 2
Case #1, Core Average

Figure 16
Sample POSTSCRIPT Plots
Page 2 of 2
Case #2, Assembly #30

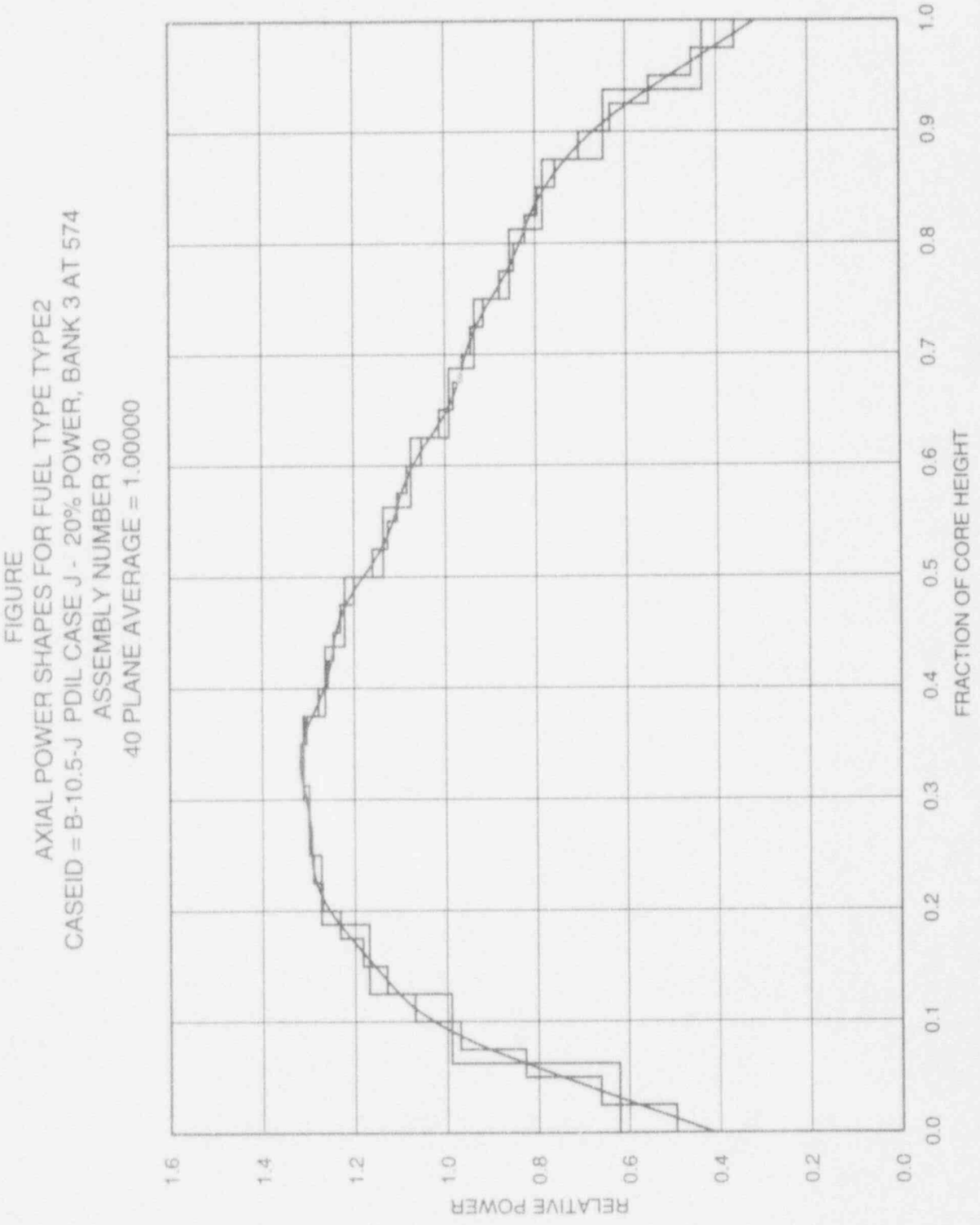

Figure 17
POSTER.TOP
File Added to Top of ASAS Plot File
Prior to Plotting
Page 1 of 5

```
%!PS-Adobe-2.0 EPSF
%%Creator: JPG SVV MEC JWK (YAEC)
%%CreationDate: 11/17/91
%%Title: POSTER7.EPS
%%BoundingBox:  0 0 792 612
%%Pages: 0
%%DocumentFonts: Helvetica Symbol
%%EndComments
 /START
  (statusdict /lettertray known {statusdict begin lettertray end} if
   /shwpge (showpage) def
%  Added for OPPD
   /printerswitch 1 def
   /colorswitch 0 def
   /slideswitch 0 def
%  Added for OPPD
   /printerswitcharray [   1     0     0     1     1     1     1     0     1    ] def
   /colorswitcharray   [   0     1     1     1     0     0     0     1     0    ] def
   /slideswitcharray   [   0     0     0     0     0     0     0     0     0    ] def
   /versionarray       [(47.0) (2.3)(54.0)(2011.108)(50.5)(52.2)(2011.110)(1007.1)(2010.118) ] def
%                      (NECR90)(QSD)(GSWI)(TEKTRONX)          (LASERJT4)(XVIEW) (LASERJT3)
   0 1 versionarray length 1 sub  {/whichswitch exch def versionarray whichswitch get
   version eq {colorswitcharray whichswitch get /colorswitch exch def
               printerswitcharray whichswitch get /printerswitch exch def
               slideswitcharray whichswitch get /slideswitch exch def
               }if } for
   save Posterdict7 begin
   1 setlinewidth 0 setlinecap 0 setlinejoin
   [] 0 setdash 0 setgray 10 setmiterlimit /wp 0 def /LGL 0 def} def
 /FINISH
  (end restore shwpge) def
 /Posterdict7 500 dict def
 Posterdict7 begin
 stack
 %--- arrays and strings
 /istrg 12 string def
 /sbtyp 16 def /sbary sbtyp array def
 /lgary sbtyp array def /listrg 80 string def /legx 0 def
 /txtseg 100 array def /subseg 100 array def
 /sizes   [(MD) (MD) (SB) (SP) (RZ) (LW)] def     %v3.0
 /szenum  [ 00   42   95   94  126   64 ] def     %v3.0
 /azechar [(*)  (*)  (_)  (^)  (~)  (@) ] def     %v3.0
 /fontt   [(HFNOH) (HFNOH) (SFNOH)] def
 /fntnum  [   00      58      63 ] def
 %--- common macros
 /s /show load def
 /inch {72 mul} def
 /init {exch inch exch inch} def
 /actn [{strgwp} {pop} {s}] def
 /fntsc {fhgt mul} def
 /cvstrg {/istrg 12 string def istrg cvs} bind def
 /strgwp {stringwidth pop} bind def
 /F {findfont exch dup /fhgt exch def scalefont setfont} def
 /FNOH {findfont exch scalefont setfont} def
 /HF {/Helvetica F} def
 /SF {/Symbol F} def
 /HFNOH {/Helvetica FNOH} def
 /SFNOH {/Symbol FNOH} def
 /FNTMULT  {/fontmult exch def} def
 /FNTMULT2 {/fontmult2 exch def} def
 /FNTMULT3 {/fontmult3 exch def} def
 /DELXST {/delxstrt exch def} def
 /DELYST {/delystrt exch def} def
 /XBOXM {/xbox exch def} def
 /YBOXM {/ybox exch def} def
 /TRIM {/trim exch def} def
 /YBOXMAR {/ymar exch def} def
 /XAXENDS{/xnoends exch def} def
 /YAXENDS{/ynoends exch def} def
 /MD {gsave 1.0 fntsc fontt ifnt get cvx exec
      actn ipss get exec grestore} def
 /grymax 1 def /grymin 0 def
 %--- page formats
 /PLOTSETUP      % set inital plot values
  {/iline 0 def /yaf 0.0 def /irot 1 def /yf 1 def /ymar .05 def
   /delxstrt 0 def /delystrt 0 def /fontmult 1 def /sigcall 0 def
   /fontmult2 1 def /fontmult3 1 def /xlogdat 0 def /ylogdat 0 def
   /xaxdis 0 def /xnoends 0 def /ynoends 0 def
   /data1 [] def  /data2 [] def  /data3 [] def /datastar [] def
   /data4 [] def  /data5 [] def  /data6 [] def /graydat [] def /colordat [] def
   /boxin [] def  /fueltype [] def /enrichment [] def /triin [] def
   /i1max -1 def /i2max -1 def /i3max -1 def /dateaxis 0 def
   /i4max -1 def /i5max -1 def /i6max -1 def
   /mycycle 0 def /xbox 0.5 def /ybox 0.1 def /bindwid 0 def
   LGL 0 eq {/xlf   7.50 inch def /xl 10.25 inch def /xo  0.25 inch def
             /ylf   5.00 inch def /yl  7.50 inch def /yo  0.50 inch def}
            {/xlf  10.50 inch def /xl 13.25 inch def /xo  0.25 inch def
             /ylf   6.00 inch def /yl  8.00 inch def /yo  0.50 inch def}
            ifelse
    wp 1 lt {yo xl xo add translate 270 rotate}
            {/printerswitch 0 eq {xo .25 sub yo translate .9 .9 scale }
```

Figure 17
POSTER.TOP
File Added to Top of ASAS Plot File
Prior to Plotting
Page 2 of 5

```
          {xo yo translate} ifelse } ifelse
  /xof 0 def  /yof 0 def 14 MF
 } bind def
%--- frame formats
/PLOTFRAME
 {gsave 4 2 roll irot 1 eq
    {1 add exch 1.5 add exch} {.75 add exch .5 add exch} ifelse
  init translate 10 MF
  /yf exch def /xf exch def /yaf 0 def
  /ylf ylf yf mul def /xlf xlf xf mul def
  /iline 0 def  /iplot 1 def} def
/RESETPLOT
 {grestore /ylf ylf yf div def /xlf xlf xf div def} def
  /sigdig 3 def
  /sigmult {10 sigdig exp} def
  /SIGDIGIT {/sigdig exch def
             /sigcali 1 def} def
/CLIPON                                                    %v3.0
 {gsave newpath 0 0 moveto
                0 ylf lineto
                xlf ylf lineto
                xlf 0 lineto
                closepath clip} def
/CLIPOFF                                                   %v3.0
 {grestore} def

/FRAMETITLE
 {12 fontmult mul MF xlf .5 mul delxstrt inch add /xframetit exch def
       inch ylf add delystrt inch add /yframetit exch def
       xframetit yframetit CPRNT 12 MF} def

/CPRNT
 {/ipos -0.5 def moveto PRINT2} def

/FORMAT
 { /ifnt 2 def /isze 7 def
  d_p 0 get                                                %check 1st char
   {dup fntnum ifnt get eq {exit} if
    /ifnt ifnt 1 sub def ifnt 0 eq {exit} if
   } loop pop
  ifnt 0 gt
   {/   1 get                                              %check 2nd char
     {dup szenum isze get eq {exit} if
      /isze isze 1 sub def isze 0 eq {exit} if
     } loop pop
    isze 0 gt
      {isze 3 gt {subseg di 1 put} {subseg di 0 put} ifelse
       szechar isze get search {pop pop} if} if
    sizes isze get cvx exec
   } {subseg di 0 put MD} ifelse
   ipss 0 eq {txtseg di 3 -1 roll put} if
 } def
/DLIMTR
 { {///} search {dup length 0 gt {3 di add 1 roll pop /di di 1 add def}
                                 {pop pop} ifelse}
                {di 0 gt { di 1 add 1 roll } if /di di 1 add def} exit}
   ifelse } loop } def
/CSHOW
 {/ipos -0.5 def PRINT2} bind def
/CYSHOW
 {gsave dup strgwp /temp exch def temp
  yaf gt {/yaf temp def} if ty 0 gt {temp 0 exch rmoveto} if
                            ty -1 eq {temp yaxlmaxlen sub 0 exch rmoveto} if
  %RIGHT JUSTIFY YAXIS2 LABELS    10/91
  270 rotate 0 fhgt 0.5 mul neg 2 3 div mul
  rmoveto s grestore} bind def
/PRINT2
 {/oldfhgt2 fhgt def fontmult} fntsc MF
  dup length 0 gt {
   dup dup /ipss 0 def /tot 0 def
   {/di 0 def DLIMTR /daeg di def
    {ipss 1 eq { di 0 gt
     {subseg di get 1 eq
         {subseg di 1 sub get 1 eq
             {txtseg di get txtseg di 1 sub get gt
               {txtseg di 1 sub txtseg di get put txtseg di 0 put}
               {txtseg di 0 put} ifelse
             } if  } if } if /tot tot txtseg di get add def } if
      ipss 2 eq {
      di daeg ne {txtseg di 1 add get 0 rmoveto}
                 {tot ipos mul 0 rmoveto} ifelse
                }if
     FORMAT /di di 1 sub def di 1 lt {exit} if }loop
    ipss 2 lt {/ipss ipss 1 add def} {exit} ifelse } loop
    } {pop} ifelse oldfhgt2 MF
 } def
%--- axis processing
/XAXIS          % label,minxxx,stp,maxxxx,grd,tck on stack
 {/a1 xof def /a2 yof def /b1 xlf def /b2 ylf def /ty 0 def
  /noends xnoends def /xlogdat 0 def
```

Figure 17
POSTER.TOP
File Added to Top of ASAS Plot File
Prior to Plotting
Page 3 of 5

```
   axis /xtck tck def /xstp stp def
   /xscale bl maxzzz minzzz sub div def /xmin minzzz def
   /xunits  (xmin sub xscale mul) def
   /rxunits (xscale mul) def
  }def
 /YAXIS            % label,minzzz,stp,maxzzz,grd,tck on stack
  {/a1 yof def /a2 xlf def /b1 ylf def /b2 xof def /ty 1 def /ylogdat 0 def
   /noends ynoends def gsave a2 yof translate 90 rotate
   axis
   grestore
   /yscale bl maxzzz minzzz sub div def /ymin minzzz def
   /yunits  (ymin sub yscale mul) def
   /ryunits (yscale mul) def          }def

 /axis   %label,minzzz,stp,maxzzz,grd,tck on stack
  {/tck exch def /grd exch def /maxzzz exch def
   /stp exch def /minzzz exch def /maxis 0 def /yax2maxlen 0 def
   /scl bl maxzzz minzzz sub div def /axunt (minzzz sub scl mul) def
   /minzzzm 0 def /stpm stp sigmult mul maxzzz sigmult mul minzzz sigmult mul sub div bl mul def
   /maxzzzm bl def
   /sclm bl maxzzzm minzzzm sub div def /axuntm (minzzzm sub sclm mul) def
   /mintemp minzzz def    /maxtemp maxzzz def
   noends 0 ne {noends 1 eq {/mintemp minzzz stp add def} if
                noends 2 eq {/maxtemp maxzzz stp sub def} if
                noends 3 eq {/mintemp minzzz stp add def
                             /maxtemp maxzzz stp sub def} if
               } if
   newpath
   a1 a2 moveto b1 a2 lineto   a1 b2 moveto b1 b2 lineto
   stroke 10 HF /oldfhgt fhgt def fontmult2 fntsc HF
   dup strgwp .01 gt
    {ty -1 eq {
     mintemp stp maxtemp .5 stp mul add  %FIND MAXIMUM AXIS LABEL LENGTH FOR YAXIS2
        {dateaxis 1 eq {dateform DATECONV /sigcall -1 def}
        {sigcall 1 eq {NUM2CHAR}
        {10000 mul round 10000 div stp .9 gt {cvi} if cvstrg} ifelse
                    } ifelse
        strgwp dup yax2maxlen gt {/yax2maxlen exch def} {pop} ifelse
        } for
              } if
     mintemp stp maxtemp .5 stp mul add  %PRINT AXIS LABELS
     {dateaxis 1 eq {cvi} if
      dup axunt b1 1 add le
      {dup axunt a2 ty 0 eq {11 2 3 div fntsc add}
                            {11} ifelse
       ty 0 le {sub} {add} ifelse ty 0 eq {dup -12 gt {pop -12} if} if moveto
%----- NUM2CHAR for significant digits on axes added to the following line.
%-----          use SIGDIGIT to activate (JWK 3/91)
       dateaxis 1 eq {dateform DATECONV /sigcall -1 def} {sigcall 1 eq {NUM2CHAR}
        {10000 mul round 10000 div stp .9 gt {cvi} if cvstrg} ifelse } ifelse
%find maximum axis label length
       dup strgwp dup maxis gt {/maxis exch def} {pop} ifelse
       ty abs 1 lt {CSHOW} {CYSHOW} ifelse} {pop} ifelse
     } for   oldfhgt HF

       b1 .5 mul                    %PRINT AXIS TITLE
       a2 ty 0 eq {11 2 3 div fontmult2 mul fntsc add
                   9 add dup /xaxdis exch def 2 3 div fontmult mul fntsc add}
                  {11 maxis add 7 add dup xaxdis lt {pop xaxdis} if
                   ty -1 eq {fontmult fntsc add} if} ifelse
       ty 0 le {sub} {add} ifelse /oldfhgt fhgt def fontmult fntsc HF
       ty 0 lt
        {gsave translate 180 rotate a1 fhgt neg CPRNT grestore}
        {CPRNT} ifelse
     oldfhgt HF} {pop} ifelse
  tck 0 ne
%major ticks, main axis
    {newpath
     minzzzm stpm maxzzzm .5 stpm mul add
      {dup axuntm b1 1 add le
       {dup axuntm a2 moveto
        axuntm a2 6 ty 0 le {sub} {add} ifelse lineto}
       {pop} ifelse} for
     stroke
%minor ticks, main axis
    tck abs 1 gt
     {gsave currentlinewidth 2 div setlinewidth
      newpath
      minzzzm stpm tck abs div maxzzzm
       {dup axuntm b1 1 add le
        {dup axuntm a2 moveto
         axuntm a2 3 ty 0 le {sub} {add} ifelse lineto}
        {pop} ifelse} for
      stroke grestore} if
%major ticks, aux axis
    tck 0 lt {
      newpath
      minzzzm stpm maxzzzm .5 stpm mul add
       {dup axuntm b1 1 add le
        {dup axuntm b2 moveto
```

Figure 17
POSTER.TOP
File Added to Top of ASAS Plot File
Prior to Plotting
Page 4 of 5

```
        axuntm b2 6 ty 0 le {add} {sub} ifelse lineto}
       {pop} ifelse} for
      stroke
%minor ticks, aux axis
    tck abs 1 gt
     {gsave currentlinewidth 2 div setlinewidth
      newpath
      minzzzm stpm tck abs div maxzzzm
       {dup axuntm b1 1 add le
       {dup axuntm b2 moveto
         axuntm b2 3 ty 0 le {add} {sub} ifelse lineto}
        {pop} ifelse} for
      stroke grestore} if} if} if
%major grids
   grd 0 ne
    {currentlinewidth 2 div setlinewidth
     grd 0 lt {[3] 0 setdash} if newpath
     minzzzm stpm add stpm maxzzzm .5 stpm mul sub
      {dup axuntm b1 1 add le
       {dup axuntm a2 moveto axuntm b2 lineto}
       {pop} ifelse} for
     stroke currentlinewidth 2 mul setlinewidth} if
     [] 0 setdash
%minor grids
   grd abs 1 gt
    {gsave currentlinewidth 16 div setlinewidth
     grd 0 lt {[3] 0 setdash} if
     newpath stpm grd abs div /ginc exch def
     minzzzm ginc add ginc maxzzzm ginc sub ginc .5 mul add
      {dup axuntm b1 1 add le
       {dup axuntm a2 moveto axuntm b2 lineto}
      {pop} ifelse} for
     stroke grestore} if
     [] 0 setdash
   } bind def

  /NUM2CHAR
    {/num2ord2 sigdig 1 add string def /num2sin 1 string def
     num2ord2 0 (.) putinterval
     1 1 sigdig {num2ord2 exch (0) putinterval} for
     sigmult mul round dup 0 lt {/num2sin (-) def} {/num2sin () def} ifelse
     abs /num2mulnum exch def
     num2mulnum sigmult div truncate cvstrg /num2absc exch def
     num2mulnum sigmult div dup truncate sub sigmult mul round sigmult div sigmult mul cvi cvstrg /num2ord exch def
     sigdig 0 ne {
              num2ord2 num2ord2 length num2ord length sub num2ord 0 num2ord length getinterval putinterval
             printerswitch 0 eq {num2sin num2absc num2ord2 3 CONCATENATE}
                        {num2sin num2absc 0 num2absc length 2 sub getinterval num2ord2 3 CONCATENATE} ifelse
                    }
                    {
             printerswitch 0 eq {num2sin num2absc 2 CONCATENATE}
                        {num2sin num2absc 0 num2absc length 2 sub getinterval 2 CONCATENATE} ifelse
                    } ifelse
    } def
  /CONCATENATE {
           /concatnum exch def
           /concatstrg 0 string def
           /concattotlen 0 def
           /concatinclen 0 def
           dup length /concattotlen exch def
           concatnum -1 2 { 1 roll dup length
             /concattotlen exch concattotlen add def} for
           /concatstrg concattotlen string def
           1 1 concatnum {pop dup concatstrg concatinclen 3 -1 roll
                          putinterval length /concatinclen exch
                          concatinclen add def} for concatstrg
           } def

%--- curve processing
  /XPUT
   {/numelm exch def /data1 numelm array def data1 astore
    xlogdat 1 eq
   {0 1 numelm 1 sub {/cv exch def data1 cv data1 cv get log put} for} if
    pop} def
  /YPUT
   {/numelm exch def /data2 numelm array def data2 astore
    ylogdat 1 eq
   {0 1 numelm 1 sub {/cv exch def data2 cv data2 cv get log put} for} if
    pop} def
  /unt {symscale 0 gt {symscale .075 inch mul} {.075 inch} ifelse mul} bind def
  /CURVENGPOINT
   {pop 11 savesym /symscale exch def /ltyp 2 def curvedraw} def

  /savesym {dup 0 eq {lline 0 gt
             {lline sbtyp 2 sub lt {pop sbary lline 1 sub get 1 add
                                    dup sbtyp 2 sub ge {pop 0} if} if} if } if
            dup 0 lt {pop 0} if                                    %v3.0
            dup sbary lline 3 -1 roll put
            12 eq {dashart dashct dashpat put} if
           } def
```

Figure 17
POSTER.TOP
File Added to Top of ASAS Plot File
Prior to Plotting
Page 5 of 5

```
/curvedraw
 {lgary iline } -1 roll put
  ltyp 3 lt    %line
    {gsave ltyp -2 le {[dashpat 3] 0 setdash} if
     newpath
      data1 0 get xunits  data2 0 get yunits moveto
      1 1 data1 length 1 sub
       {dup data1 exch get xunits exch
        data2 exch get yunits lineto} for
% curvefill 8/90
      ltyp -1 eq {gsave .8 setgray closepath fill grestore /ltyp 2 def }
                 {stroke} ifelse  % fill a closed path
% curvefill 8/90
     stroke grestore} if
   ltyp abs 2 ne    %symbols
     {gsave [] 0 setdash currentlinewidth 8 div setlinewidth
      0 1 data1 length 1 sub
       {newpath
        dup data1 exch get xunits exch data2 exch get yunits moveto
        symbols sbary iline get get cvx exec
       } for grestore} if
   /iline iline 1 add def  iline sbtyp gt {/iline 0 def} if
 } bind def

/symbols [                                                      %v3.0
          {circ}      {box}      {triangle} {diam}      {invtri} {star}
          {circfill} {boxfill} {trifill}  {diamfill} {invtrifill}
          {line}      {dline}    {starfill} ] def
/circ
 {currentpoint newpath .5 unt 0 360 arc stroke} bind def
/circfill
 {currentpoint .5 unt 0 360 arc fill} bind def
/box
 { 0.5 unt  0.5 unt rmoveto -1.0 unt  0.0     rlineto
   0.0     -1.0 unt rlineto  1.0 unt  0.0     rlineto
   closepath stroke} bind def
/boxfill
 { 0.5 unt  0.5 unt rmoveto -1.0 unt  0.0     rlineto
   0.0     -1.0 unt rlineto  1.0 unt  0.0     rlineto
   closepath fill} bind def
/triangle
 { 0.0      0.5 unt rmoveto     .5 unt  -1 unt rlineto
  -1.0 unt  0.0     rlineto
   closepath stroke} bind def
/trifill
 { 0.0      0.5 unt rmoveto     .5 unt  -1 unt rlineto
  -1.0 unt  0.0     rlineto
   closepath fill} bind def
/diam
 { 0.4 unt  0.0     rmoveto  -0.4 unt  0.5 unt rlineto
  -0.4 unt -0.5 unt rlineto   0.4 unt -0.5 unt rlineto
  closepath stroke} bind def
/diamfill
 { 0.4 unt  0.0     rmoveto  -0.4 unt  0.5 unt rlineto
  -0.4 unt -0.5 unt rlineto   0.4 unt -0.5 unt rlineto
  closepath fill} bind def
/invtri
 { 0.0     -0.5 unt rmoveto     .5 unt  1.0 unt rlineto
  -1.0 unt  0.0     rlineto
   closepath stroke} bind def
/invtrifill
 { 0.0     -0.5 unt rmoveto     .5 unt  1.0 unt rlineto
  -1.0 unt  0.0     rlineto
   closepath fill} bind def
/starmidlen {72 sin .5 mul 1. unt mul} def                      %v3.0
/starside                                                       %v3.0
 {1 unt 0 rlineto currentpoint translate -144 rotate} def
/star                                                           %v3.0
 {gsave 18 cos starmidlen mul neg 18 sin starmidlen mul rmoveto
  currentpoint translate 4 {starside} repeat closepath
  stroke grestore} bind def
/starfill                                                       %v3.0
 {gsave 18 cos starmidlen mul neg 18 sin starmidlen mul rmoveto
  currentpoint translate 4 {starside} repeat closepath
  gsave 0 setgray fill grestore stroke grestore} bind def
/line
 {-1.2 unt  0.0     rmoveto   2.4 unt  0.0     rlineto stroke} bind def
/dline
 {gsave [dashart dashct get 3] 0 setdash
  -1.2 unt  0.0     rmoveto   2.4 unt  0.0     rlineto stroke
  grestore /dashct dashct 1 add def} bind def

end
%%EndProlog
%%Page: one 1
```

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