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A Status Report:
The REAPS Autokon System

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IITRI

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Research and
Engineering for
Automation and
Productivity in
Shipbuilding

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A STATUS REPORT:

THE REAPS AUTOKON SYSTEM

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Ms. Taska is currently involved in the technical support and maintenance of the AUTOKON-71 System. Her major tasks include processing Analysis Requests, releasing new versions of the system, and coordinating program modifications.

Some past involvements in data processing include: support and modification of a major computer model to evaluate battle-field tactics, the design of a reduction program to handle skin burn data, enhancement of three-dimensional plotting for de-formed meshes, improvement, of crane boom analysis test data, and a post-processing program.

A STATUS REPORT: THE REAPS AUTOKON SYSTEM

I. BACKGROUND OF REAPS AUTOKON

1. Description of the System

The forerunner of the REAPS AUTOKON System was acquired over two years ago from Shipping Research Services (SRS) of Norway by the Maritime Administration for use in participating U.S. shipyards. Twelve independent computer programs communicating with a common database accomplish various aspects of ship design and construction:

(SLIDE 1)

MISC - initializes system database.

FAIR - fairs offsets.

DRAW - reads curves stored by FAIR and produces ESSI output for drawing of the curves.

TRABO - transfers the bodyplan from the FAIR temporary database to the system database.

LANSKI - fits longitudinal curves on the hull surface and stores the Tables of Details.

SHELL - produces N/C burning tapes for cutting shell plates.

TEMPLATE - produces shell plate templates and frame templates.

ALKON - parts programming module. ALKON is an interpretive language which lends itself to application in problem solving situations. Its features include capabilities for a vocabulary, stored programs, plane geometry definition, curve fairing, text generation, N/C output production, and many others.

NEST - stores nesting formats for parts.

PRODA - generates planning and production data.

PRELIKON - module for preliminary lines design.

DUP - utility program for database manipulation.

2. Supported REAPS Versions

Significant modifications have been made to the programs since their initial release to incorporate enhancements, resolve failures, and improve performance. At present, the REAPS Technical Staff maintains several versions of the system, the latest of which is Standard U.S. Version “B” released in May, 1976, to all REAPS participants. The three supported versions

are distinguished by the level numbers of the modules which compose each version.

(SLIDE 2)

Maintenance for the REAPS AUTOKON System which was previously limited only to the UNIVAC installation versions has been expanded to cover both UNIVAC and IBM installation versions. Although modifications for Version "B" were released in a form that can be applied to any installation, direct maintenance of IBM Version "B" will be available later this year. Plans for support of a Honeywell installation version are underway for the next contract year.

3. Maintenance Activities

Standard Version "B" was generated as an update to Version "A" resulting from the accumulation of modifications from the SRS Maintenance Central Activity and the REAPS Analysis Request (AR) resolution activity. Since the

(SLIDE 3)

start of the AR activity, REAPS yards have generated a total of 103 AR's, 53 of which reported system failures and 50 of which were requests for enhancements. Eighteen PRELIKON AR's which require extensive modification to resolve have been separately classified as possible projects for pursuit by request of the yard representatives. Thus, of the 85 non-PRELIKON AR's received to date, 69 have been resolved.

(SLIDE 4)

Version "B" was released on a magnetic tape accompanied by 57 pages of documentation describing the various improvements to the AUTOKON System.

(SLIDE 5)

The documentation provided a means to compare Version "B" to its predecessor "A", to describe implementation procedures, to note any updates to user manuals, and to describe each update so that non-UNIVAC users and others desiring to selectively update the System could do so.

II. FEATURES OF STANDARD U.S. VERSION "B"

Standard U.S. Version "B" added many useful enhancements to the AUTOKON System without reducing any of the performance improvements inherent in the predecessor Version "A". Nine of the modules were updated to incorporate these changes.

(SLIDE 6)

Enhancements added to the system are described for each module,

1. FAIR Modifications

A major enhancement and the correction of a failure compose the set of FAIR updates.

(SLIDE 7)

A feature has been added to the FAIR module to dump pertinent information from the E-file at the user's request. Positions of all stored frames and water lines are printed in tabular form, followed by a detailed description of each faired curve denoting the number of straight line and/or circular elements composing the curve. In addition, the number and location

(SLIDE 8 and 9)

of all inflection points found on a particular faired curve are printed. This feature can be used, therefore, to recognize curves that have not been faired smoothly. The dump may be requested as a stand-alone activity, or may be generated immediately following a fairing run to verify the contents of the E-file. No additional overhead is incurred if the feature is not used; hence, FAIR efficiency is essentially unaffected. Updates to implement this feature were originally contributed by the Bethlehem Steel (Central Technical Division) Shipyard and were subsequently modified slightly for inclusion in Version "B".

An additional modification to FAIR has restored a missing argument in a subroutine call for fairing buttocks in the third loop.

2. ALKON Modifications

A number of enhancements have been added to ALKON to create version 10.1,

(SLIDE 10)

As an aid to debugging the source of ALKON geometry errors in a user manuscript, a trace/dump feature has been incorporated that prints all known geometry information from the five element scratch areas where specifications are stored during resolution. The dump is formatted to look like ALKON code for easy interpretation by the user. As a dump, the feature is automatically invoked whenever any one of a set of ALKON geometry errors occurs. As a trace, the feature can be invoked via an option.

(SLIDE 11)

Geometry specification errors, that formerly required a programmer-type person and much time to interpret and correct, now can be handled directly by the loftsman in much less time. Because the format of the dump looks so similar to ALKON code, it is easy to compare the user's intentions to the geometry area's actual contents and to determine where confusion has occurred. To save time, the dump is produced immediately when a geometry specification error occurs.

(SLIDE 12)

Additionally, the user may activate continuous dumping each time a geometry element is referenced to verify the stored element dimensions.

(SLIDE 13)

Three features have been incorporated to aid the parts programmer in controlling the execution of ALKON based on conditions that can only be known during the compilation phase.

Selective execution of ALKON can be controlled via an option which has been implemented in ALKON. The user can limit ALKON processing to a PASSl compilation of manuscripts and norms, a compilation followed by an execution only if no serious errors occurred in compilation, or a compilation followed by an execution regardless of any errors that may have occurred. This feature can be useful in the initial checking of manuscripts and norms for syntactical correctness.

Two new words permit the user to generate error messages from norms and manuscripts and to abort norms and manuscripts at will from PASS2. All appropriate processing to properly close the database and terminate the manuscript normally will be done if either operation is performed. These features can be used to prohibit execution or debug problem areas should inconsistent conditions be determined to exist in a manuscript.

(SLIDE 14)

An example of a manuscript where these features have been applied is given.

(SLIDE 15)

Option Y can save execution costs by allowing the user to find and correct all compiler errors before attempting to execute ALKON code. Likewise, while in execution, erroneous conditions can be found by the user and noted with a message, and, if serious enough, can cause abortion of the manuscript.

A complicated part specification that must be included in a manuscript but does not necessarily need to be plotted can be surrounded in the ESSI output by auxiliary function codes .3. and .4. (ignore on and off, respectively) if so directed by the user. A useful application of this feature might be in debugging stages of part development, where only portions of a part need to be drawn and other portions, although present, could be ignored.

(SLIDE 16)

The vector operations of dot product, cross product, vector normalization, addition, and subtraction have been incorporated into ALKON as in-line capabilities which can operate on vectors up to three components each. Lists are used to manipulate the vectors for input and output.

(SLIDE 17)

Overlength calculations have been incorporated into ALKON to determine, specifically, the web overlength factor, flange overlength factor, and the angle between the web and the flange in the frame plane. These calculations are invoked via an in-line vocabulary word call, passing input from a line of the detailed table matrix to the FORTRAN routine through an ALKON list.

The results are output to a list, as well. This capability was contributed by the Newport News Shipbuilding and Dry Dock Shipyard and has been slightly modified for inclusion in Version "B".

(SLIDE 18)

A number of system failures in ALKON were corrected as well.

- The text height specification by vocabulary word has been modified to operate correctly.
- Options K and L, which previously could not be utilized through ALKON, can now specify any desired input and output character set, respectively, at any point in a manuscript.
- The fairing processor has been modified to turn off auxiliary functions at the end of a contour.
- An inconsistent combination of startpoint-endpoint and the direction of the line passing between them will be recognized by the geometry processor and the correct specifications will be applied.
- When a buffer status is found to be out of range an error message will be generated and ALKON will terminate normally.
- Compilation of a matrix number as an expression has been corrected to operate as stated in the documentation.
- The occurrence of error message 111 will cause a manuscript to be aborted to avoid the possibility of erroneous compilation of a statement.

(SLIDE 19)

3. DRAW Modifications

Modifications to DRAW primarily have corrected existing failures of the module:

- Incorrect coding which failed to permit drawing of type 4 curves (space curves) has been corrected.
- Vertical axis tic marks which formerly could only be placed at 1 meter intervals can be placed at 2-foot intervals, as the documentation indicates.
- A GRID specification without WNDW parameters which had been ignored will now be drawn using the maximum plot dimensions for a window.

- Curves trimmed by DRAW before plotting will be properly placed within a window that has been determined after, rather than before, trimming.

(SLIDE 20)

4. Other Modifications

Updates to other AUTOKON modules corrected system failures found to exist in AUTOBASE, TRABO, DUP, LANSKI, SHELL, and NEST. A new shell plate expansion method, soon to be fully documented in Volume 5 of the Users Manual Series, was also released with Version "B".

(SLIDE 21)

5. Documentation Updates

Several volumes of the AUTOKON User Manual Series were updated to keep documentation consistent with the current AUTOKON versions. Volume 1, the ALKON Handbook, and Volume 2, the ALKON Programmers Guide were modified to be consistent with ALKON capabilities. The DUP and MISC chapters of Volume 4 were updated, and a new chapter of approximately 170 pages was added documenting the LANSKI program.

(SLIDE 22)

III. PROJECTS IN DEVELOPMENT

1. Simplified ALKON

When the AUTOKON System is implemented at a new yard, personnel must undergo a period of orientation and training to learn to use the system's features. Feedback from yards who have gone through this procedure indicates that learning the ALKON language seems to be one of the more difficult tasks to accomplish for persons unfamiliar with programming techniques. Even for programmers, the principles of parts definition can become obscured by the complexities of the language and I/0 syntax requirements. For an experienced user, the flexibility of ALKON is a desirable quality, but the beginner needs a simpler, more basic, approach to parts specification.

To achieve a transitional medium, effort is currently in progress to develop a Simplified ALKON language with a shorter, more basic vocabulary which will assume many defaults that must be explicitly defined under regular ALKON.

The principles of parts definition are unchanged, although the scope of ALKON capability is greatly reduced along with the simplification. For example, Simplified ALKON

- can describe only one part at a time (i.e. may build a contour into only one open matrix);

can reference only a limited number of stored contours: a lofting contour, an auxiliary contour, and a parallel contour;

- cannot modify a stored part; and
- has limited text and visual NC output capabilities,

(SLIDE 23)

On the other hand, many features are still available from ALKON to Simplified ALKON, such as:

- norms and repetitions may be written, stored, and invoked;
- full plane geometry description capabilities exist; and
- the AUTOKON database is used unchanged.

Only the PASSl compiler needs to be modified to compile Simplified ALKON to insert default coding where required and to translate Simplified ALKON statements into their ALKON counterparts. Some examples of Simplified ALKON and their equivalent interpretation in ALKON follow.

(SLIDE 24)

The effect of TFR is to place the contour in a matrix buffer and to load the Table of Details with proper information. The Simplified ALKON user need not be concerned with the frills, all he requires is the ability to reference transverse framen.

COPACON causes a contour to be copied from one buffer into another, and in Simplified ALKON application, the auxiliary contour will be copied into the lofting contour buffer.

ACON and LCON are minor simplifications of the reference to the auxiliary contour and lofting contour buffers.

LONG causes a line of the Table of Details to be referenced and various list values to assume the values for manipulation in a norm or manuscript.

In addition to the simplification of ALKON statements, Simplified ALKON will have new features that can aid the user. The $ character can be used to denote a missing coordinate or angle-value which the geometry routines must supply. It is a useful feature for relocating coordinate systems, specifying points, etc. when only one coordinate is significant and the other is determined uniquely by that one. Intersecting into a known contour is an example of its application.

(SLIDE 25)

he use of an implied do-loop in a call to a norm or repetition eliminates the formalities of ALKON'S DO statement and label while affording the capability of repeated calls to the norm or repetition.

(SLIDE 26)

As the Darts Drogrammer becomes more capable, he may gradually make the transition from Simplified ALKON to standard ALKON by switching vocabularies and cautiously combining the features of both systems. The AUTOKON database may be used so that parts may be stored and referenced by both systems. Simplified ALKON is upward compatible with ALKON to guarantee that its use as a transitional learning tool will not require any "unlearning" of techniques.

The preliminary specifications for implementing Simplified ALKON were distributed a few weeks ago to the REAPS participants for review and comment. Assuming that responses are received by mid-July, an experimental distribution will be completed by the end of October.

2. Norms Enhancement

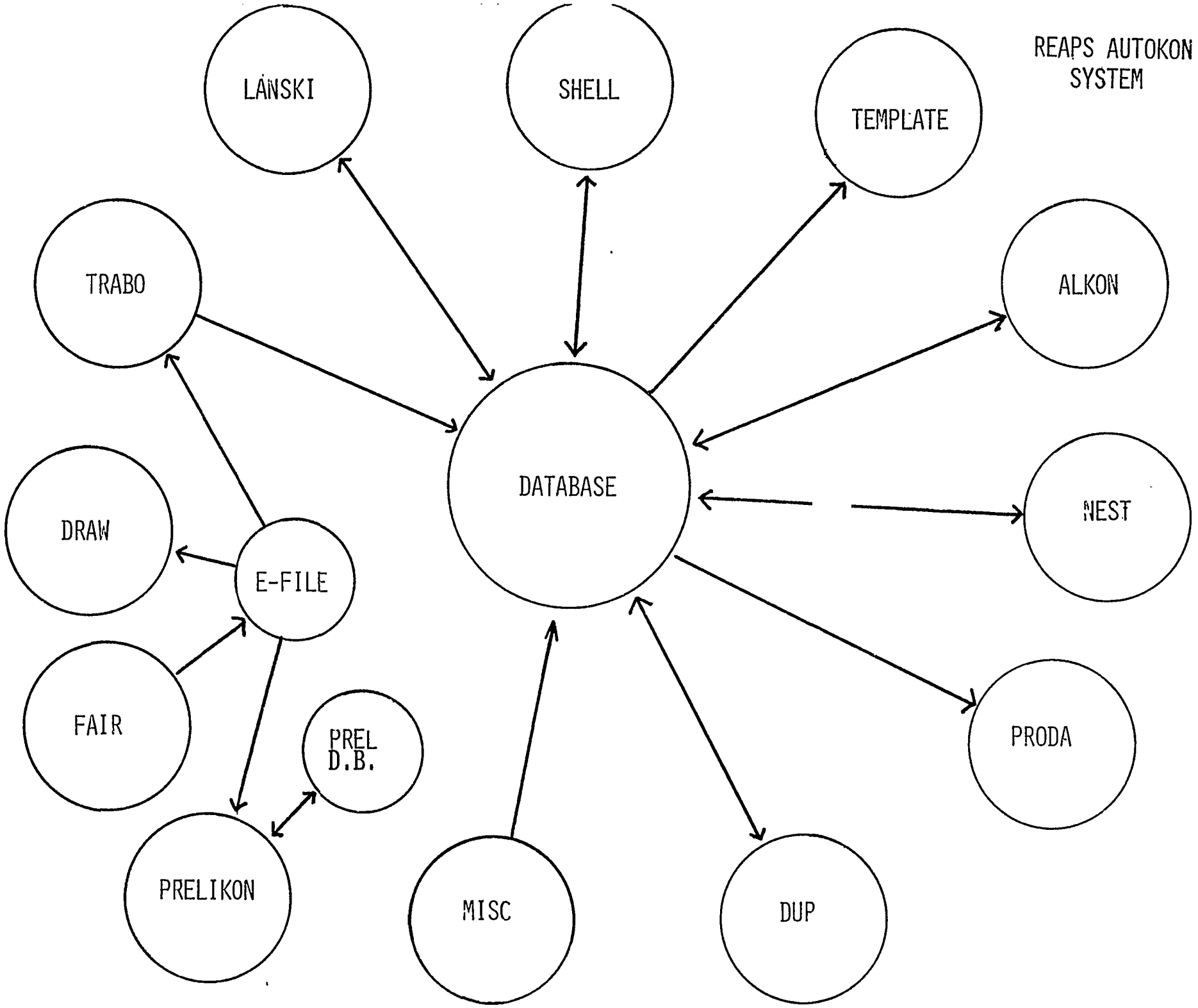
A second project was undertaken by the Technical Staff in conjunction with representatives from the REAPS yards to replace, modify and add norms to the standard AUTOKON system library, thus evolving an improved tool for use by U.S. shipyards. Loftsmen from the participating yards having norms experience and REAPS Staff members formed the Norms Library Enhancement Task Group in January and have since held several meetings to review and modify the norms library.

As a result of the Task Group Meetings, 33 of the norms documented in User Manual Volume 3 were suggested for revision, four new norms were proposed for addition, and three were deleted from the library. Priority assignments for modifications were established. A Technical Memorandum containing preliminary specifications for the suggested revisions was published.

(SLIDE 27)

Fifty key norms which are repeatedly used in the yards in a production enviornment were identified as requiring extensive documentation in Volume 3. Norms of greater complexity requiring several explicit examples were noted for expanded documentation as well. To date, most of the Priority 1 and 2 norm revisions have been implemented. A second Technical Memorandum describing the changes for fourteen revised norms, two new norms, and documentation updates for seventeen more norms was published. It also included a cross reference list of norms and a summary of the 50 identified key norms. An interim system update incorporating the modified norms library is scheduled for mid-November, as well as a documentation update to Norm Descriptions, Volume 3 of the User Manual.

The joint activity of the yards and the REAPS Staff to identify, improve, implement and test system library norms will lead to a more efficient and relevant library for all REAPS AUTOKON users.


REAPS AUTOKON
SYSTEM
LÄNSKI
SHELL
TEMPLATE
TRABO
ALKON
DATABASE
NEST
DRAW
E-FILE
FAIR
PREL
D.B.
PRODA
PRELIKON
MISC
DUP

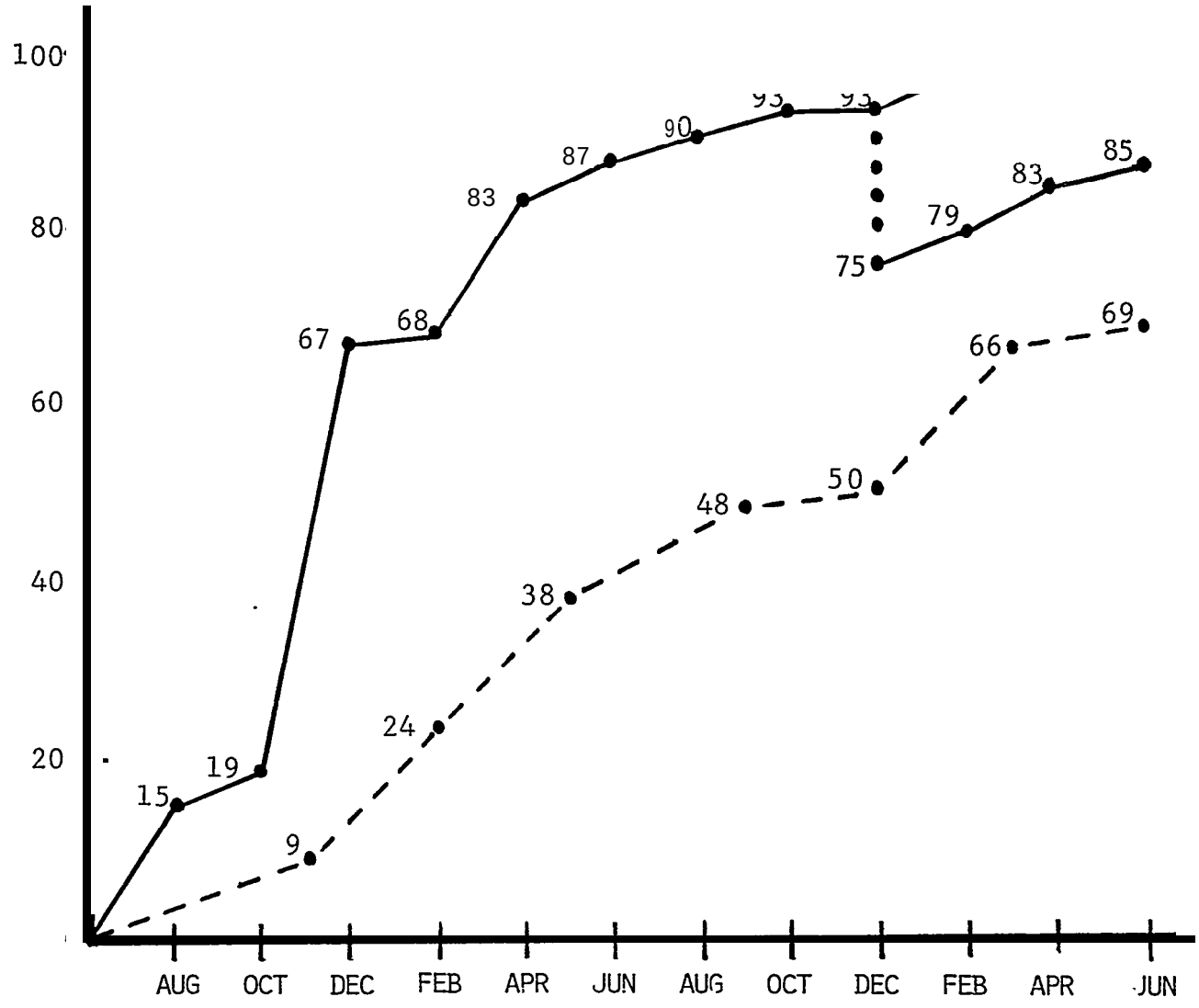
MODULE	VERSIONS		
	BASE	"A"	"B"
AUTOBASE	1	3	4
GENPUR	3	5,1	5,1
FAIR	3	4,1	4,2
DRAW	3	3	4,1
TRABO	2	5	6
MISC	1	1	1
DUP	1	2	3
SHELL	2	2	6
TEMPLATE	2	2	2
LANSKI	1	1	1,1
PRODA	1	1	1
ALKON	3	9,1	10,1
NEST	2	2	4
ALKNES	1	1,1	1,1

SUPPORTED AUTOKON VERSIONS

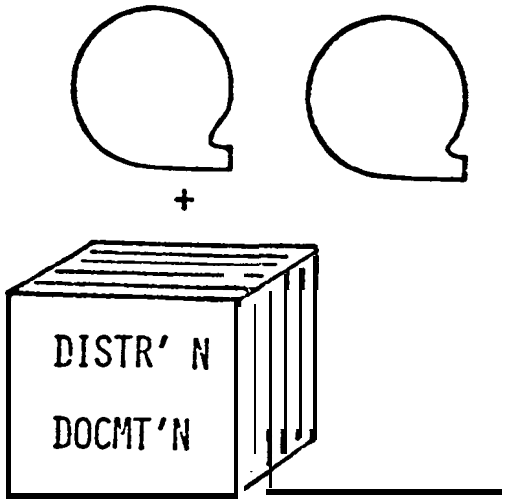
HOW MODIFICATIONS ORIGINATE

- REAPS ANALYSIS REQUEST ACTIVITY
- SRS MAINTENANCE CENTRAL ACTIVITY

A R ACTIVITY
'74-'76



RECEIVED RESOLVED DROPPED



- SYS TAPES

- BASE - vs "B" VERSION
- EXPLAIN UPDATES
- IMPL'N PROC
- ACC TESTS

MODULE	LEVEL
(*) AUTOBASE	4
GENPUR	5,1
*FAIR	4,2
*DRAW	4,1
*TRABO	6
MISC	1
*DUP	3
*SHELL	6
TEMPLATE	2
*LANSKI	1,1
PRODA	1
*ALKoN	10.1
*NEST	4
ALKNES	1,1

VERSION "B"

(*) UPDATED SERVICE MODULE

* UPDATED MODULE .

• FAIR

E-FILE PRINT SUMMARY

- RESTORE MISSING SUBROUTINE ARGUMENT

E-FILE SUMMARY

E-TAPE SUMMARY PROGRAM FOR FRAME OFFSET OF .00 AND INTERNAL UNITS CONVERSION FACTOR 304.80

POSITION TABLES RECORD, FRAMES

USER NO.	-800.00	POSITION=	-16.01
USER NO.	-700,00)	POSITION=	-14.01
USER NO.	-600.00	POSITION=	-12.01
USER NO.	-500.00	POSITION=	-10.00
USER NO.	-400.00	POSITION=	-8.00
USER NO.	-300.00	POSITION=	-6.00
USER NO.	-200.00	POSITION=	-4.00
USER NO.	-100.00	POSITION=	-2.00
USER NO.	.00	POSITION=	.00
USER NO.	100.00	POSITION=	2.00
USER NO.	200.00	POSITION=	4.00
USER NO.	300.00	POSITION=	6.00
USER NO.	400.00	POSITION=	8.00
USER NO.	500,00	POSITION=	10.00
USER NO.	600.00	POSITION=	12.01
USER NO.	700.00	POSITION=	14.01
USER NO.	800.00	POSITION=	16.01
USER NO.	900.00	POSITION=	18.01
USER NO.	1000.00	POSITION=	20.01
USER NO.	1100.00	POSITION=	22.01
USER NO.	1200.00	POSITION=	24.01
USER NO.	1300.00	POSITION=	26.01
USER NO.	1400.00	POSITION=	28.01
USER NO.	1500,00	POSITION=	30.01
USER NO.	1600.00	POSITION=	32.80
USER NO.	1700.00	POSITION=	35.59
USER NO.	1800.00	POSITION=	38.38
USER NO.	1900.00	POSITION=	41.17
USER NO.	2000.00	POSITION=	43.96
USER NO.	2100.00	POSITION=	46.75
USER NO.	2200.00	POSITION=	49.54
USER NO.	2300.00	POSITION=	52.33
USER NO.	2400,00	POSITION=	55.12
USER NO.	2500,00	POSITION=	57.90
USER NO.	2600.00	POSITION=	60.69
USER NO.	2700.00	POSITION=	63.48
USER NO.	2800.00	POSITION=	66.27
USER NO.	2900.00	POSITION=	69.06
USER NO.	3000.00	POSITION=	71.85
USER NO.	3100.00	POSITION=	74.64
USER NO.	3200,00	POSITION=	77.43
USER NO.	3300,00	POSITION=	80.22
USER NO.	3400.00	POSITION=	83.01
USER NO.	3500.00	POSITION=	85.79
USER NO.	3600.00	POSITION=	88.58
USER NO.	3700.00	POSITION=	91.37
USER NO.	3800.00	POSITION=	94.16
USER NO.	3900.00	POSITION=	96.95
USER NO.	400.00	POSITION=	99.74
USER NO.	4100.00	POSITION=	102.53
USER NO.	4200.00	POSITION=	105.32

E-FILE SUMMARY

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FRAME NO. 8.00, POSITION= 16.01, 1 STRAIGHT LINE ELEMENTS, 10 CIRCULAR ELEMENTS, 1 INFLECTION POINTS
INFLECTION POINTS... (3, 6.63, 34.45) (

FRAME NO. 9.00, POSITION= 18.01, 6 STRAIGHT LINE ELEMENTS, 11 CIRCULAR ELEMENTS, 1 INFLECTION POINTS
INFLECTION POINTS... (8, 7.42, 34.45) (

FRAME NO. 10.00, POSITION= 20.01, 5 STRAIGHT LINE ELEMENTS, 18 CIRCULAR ELEMENTS, 1 INFLECTION POINTS
INFLECTION POINTS... (13, 5.53, 32.01) (

FRAME NO. 11.00, POSITION= 22.01, 5 STRAIGHT LINE ELEMENTS, 21 CIRCULAR ELEMENTS, 3 INFLECTION POINTS
INFLECTION POINTS... (3, .36, 7.58) (8, .95, 15.58) (17, 6.35, 32.01) (

FRAME NO. 12.00, POSITION= 24.01, 1 STRAIGHT LINE ELEMENTS, 26 CIRCULAR ELEMENTS, 2 INFLECTION POINTS
INFLECTION POINTS... (9, 1.33, 17.23) (18, 7.16, 32.00) (

FRAME NO. 13.00, POSITION= 26.01, 0 STRAIGHT LINE ELEMENTS, 25 CIRCULAR ELEMENTS, 4 INFLECTION POINTS
INFLECTION POINTS... (2, .13, .00) (3, .71, 2.46) (9, 2.07, 17.24) (16, 7.97, 32.00)

FRAME NO. 14.00, POSITION= 28.01, 0 STRAIGHT LINE ELEMENTS, 25 CIRCULAR ELEMENTS, 2 INFLECTION POINTS
INFLECTION POINTS... (9, 2.82, 17.24) (17, 11.36, 34.45) (

FRAME NO. 15.00, POSITION= 30.01, 0 STRAIGHT LINE ELEMENTS, 27 CIRCULAR ELEMENTS, 2 INFLECTION POINTS
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INFLECTION POINTS... (9, 7.77, 14.77) (17, 19.58, 37.74) (

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INFLECTION POINTS... (11, 8.66, 11.47) (21, 23.26, 40.44) (

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INFLECTION POINTS... (11, 9.64, 11.47) (20, 24.26, 40.44) (

FRAME NO. 22.00, POSITION= 49.54, 2 STRAIGHT LINE ELEMENTS, 24 CIRCULAR ELEMENTS, 2 INFLECTION POINTS
INFLECTION POINTS... (11, 10.63, 11.47) (19, 25.26, 40.44) (

FRAME NO. 23.00, POSITION= 52.33, 2 STRAIGHT LINE ELEMENTS, 24 CIRCULAR ELEMENTS, 2 INFLECTION POINTS
INFLECTION POINTS... (11, 11.62, 11.47) (19, 26.25, 40.44) (

FRAME NO. 24.00, POSITION= 55.12, 2 STRAIGHT LINE ELEMENTS, 23 CIRCULAR ELEMENTS, 2 INFLECTION POINTS
INFLECTION POINTS... (10, 12.59, 11.48) (18, 27.24, 40.45) (

FRAME NO. 25.00, POSITION= 57.90, 2 STRAIGHT LINE ELEMENTS, 23 CIRCULAR ELEMENTS, 2 INFLECTION POINTS

- ALKON ENHANCE
    - USER GEO TRACE
    - CONTROL PASS2 EXEC
    - NEW VOC WORDS
    - OVERLENGTH CALCULATIONS
    - VECTOR OPERATIONS
    - FIX BUGS

ALKON GEO DUMP/TRACE

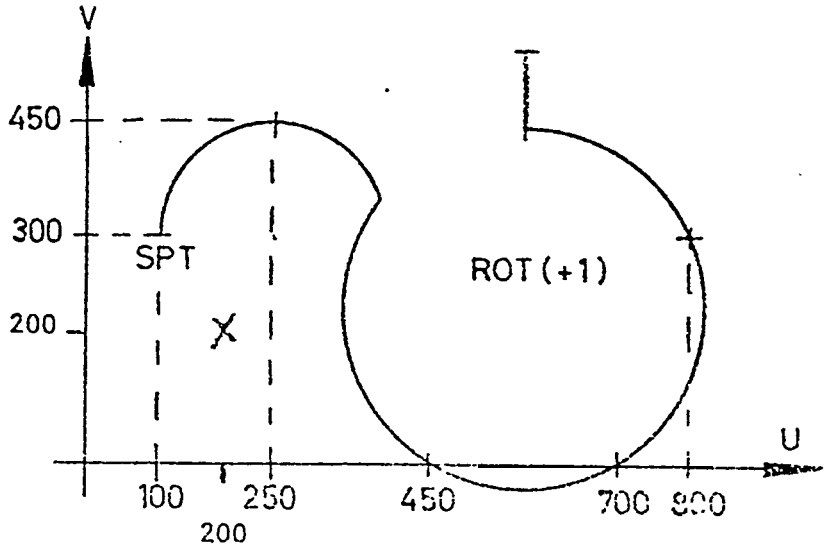
Ž DUMPS GEOMETRY AREA

- WHEN ERROR OCCURS
- AT USER REQUEST

• EASY TO READ

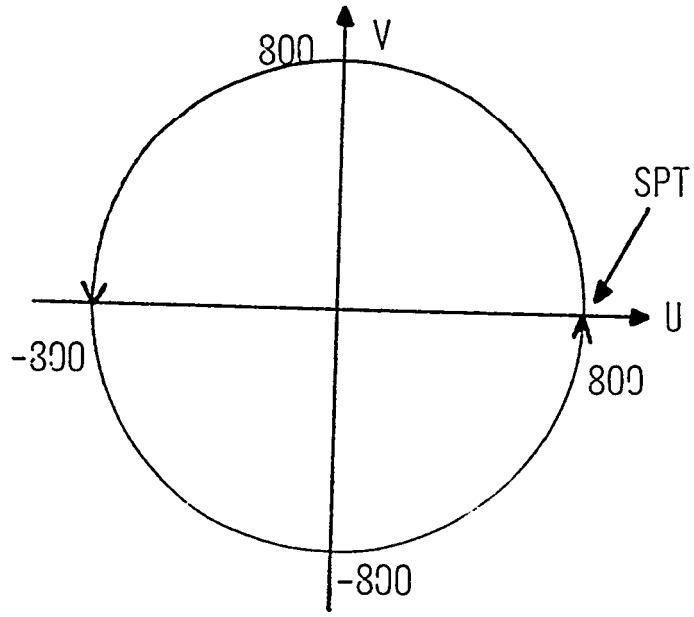
USER TRACE

```
1,  ?
2,  TEMP' STRT RGEO' ON(CT)
3,  SPT (+100+300)
4,  CIR: SDIR(+90) PT(+250+450) INT(+400+700)
5,  CIR: PT(+700+0) PT(+300+300) PT(+450+0) EDIR(+130) ROT(+I)
6,  SL:DIR(+90) LGTH (+50)
7,  SL:PT(+200+200)
8,  END RGEO' PRINTCON'
```




```
***DUMP OF ESA***
STRT: EPT( 100, 0+ 300,0)
CIR:   EQU ( 250, 0+ 300 ,0+   -150,0) SPT( 100,0+ 300,0)
       EPT( 386,7+ 361,8)
CIR:   EQU ( 575, 0+ 208,3+    243 ,0) SPT( 386,7+ 361,8)
       EPT( 575,0+ 451,3)
SL:    EQU (     1,0+      ,0+   -575, 0) SPT( 575, 0+ 451,3)
       EPT( 575,0+ 501,3)
SL:    EQU (     -,6+      -,8+   -30,6) SPT( 575,0+ 501,3)
ERROR 364( 0        0         0) OCCURRED ON LINE 8 IN MANUS 3
```

```
1, ?
2, STRT LGEO'
3, SPT (+800,+0,) ON(CT)
4, CIR: CNT(+O, +0, ) RAD(+8000) EDIR(-90)
5, CIR: CNT(+O,+O, ) RAD(+800) EDIR(+99) OFF(CT)
6, END LGEO'
```




```
***DUMP OF ESA***
STRT:
STRT:
STRT:
STRT:
STRT: EPT(800,+0,)

***DUMP OF ESA***
STRT:
STRT:
STRT: EPT(800, +0,)
CIR:    SPT(800, +0,) EDR(-90,) CNT(O, O,)
        RAD(800,)       ROT(800# )

***DUMP OF ESA***
STRT:
STRT:
STRT:
STRT:  EPT(800,+0,)
CIR:    EQU(O,+0,+800,) SPT(800,+0,) EPT(-800, +0,)
•


***DUMP OF ESA***
STRT:
STRT:
STRT:    EPT(800, +0)
CIR:    EQU(O, +0,+800,) SPT(800,+0,) EPT(-800,+0,)
CIR:    EQU(0, +0,+800,) SPT(-800,+0,) EPT(800,+0,)
```

ERROR CONTROL

- OPTION Y
  - COMPILE ONLY
  - COMPILE AND EXECUTE ALKON
  - COMPILE AND EXECUTE IF NO ERRORS

- ERROR
  - USER GENERATES ERROR MESSAGE

- ABORT
  - USER ABORTS MANUSCRIPT

ERROR CONTROL

EX:

```
?
%Y1'
___
___

STRT RGEO'
SPT (Al + A2)
SL: DIR (90, )

TEST O, 1 (A3)

ERROR 999'  ABORT'

LAB1: LGTH (A3)
```

NC OUTPUT CONTROL

Ž ON (IGNORE)

• OFF (IGNORE)

VECTOR OPS

• DOT ALIST (BLIST)

• CROSS ALIST, BLIST (CLIST)

• NORML ALIST (BLIST)

Ž VADD ALIST, BLIST (CLIST)

• VSUB ALIST, BLIST (CLIST)

OVERLENGTH ALIST (BLIST)

CALC:

- WEB OVERLENGTH
- FLANGE OVERLENGTH
- ANGLE BTWN WEB/FLANGE

ALKON BUGS

Ž TXTHEIGHT

- %K %L

Ž BUFFER STAT

Ž MATRIX NAME

ALKON

DRAW BUGS

Ž DRAW SPACE CURVES

- TIC MARKS
- GRID & WNDW
- TRIMMING

BUGS CORRECTED:

AUTOBASE	LANSKI
TRABO	SHELL
DUP	NEST

DOCUMENTATION

- NEW LANSKI

Ž UPD ALKON HANDBOOK

Ž UPD ALKON PROG GUIDE

- UPD DUP

Ž UPD MISC

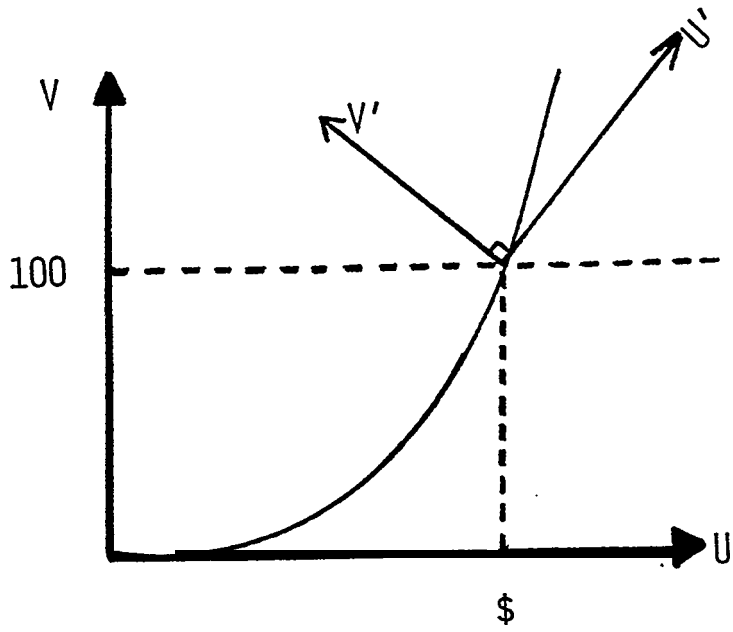
SIMPLIFIED ALKON

- DESCRIBE SINGLE PART
- REF LCON, ACON, PCON
- STORE PART
- LIMITED TEXT, DRAW OUTPUT
- NORMS, REPS OK
- FULL GEOMETRY SPECS
- SAME DATABASE

SIMPLIFIED ALKON	ALKON
TFR N '	TFRAME N' AT SHELL' FETCH LCON'' FETCH LTAB'
COPACON'	STRT TAB RBUF(+5+2) (CONMO) GENTAB 11 (1+LINES(ABUF)+ ABUF +2+0) END TAB RBUF (CONMO)
ACON	CON ABUF
LCON	CON LBUF
LONG N '	INLONG (N+ RBUF+ELIST)

Ž MISSING COORDINATE

```
LCON
AXIS (+$+100, +$)
```



SIMPLIFIED
ALKON

Ž IMPLIED DO-LOOP

AXIS 1, 1,B5,2 **(+ARG+ARG...)**

DO 10 (+1+B5+2)

AXIS 1 (+ARG+ARG+ ,,,)

LAB 10:

NORMS ENHANCEMENTS

- 33 NORMS CHANGED
- 4 ADDED

Ž 3 DELETED

Ž TECH NOTE PUBLISHED