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Production Engineering Measures Program
Manufacturing Methods and Technology

MANUFACTURING METHODS REPORT
FEASIBILITY OF PRE-PROGRAMMING FOR ATLS

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St. Louis, Missouri 63166

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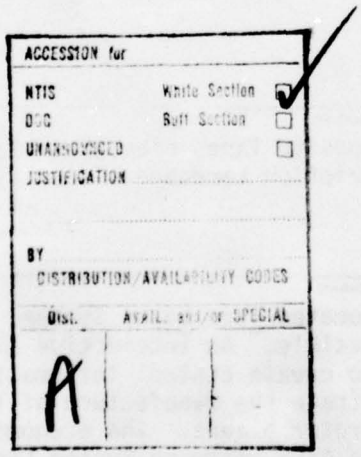

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Preprogramming NC control tapes for ATLS (Automated Tape Layup System) using computerized methods is demonstrated to be feasible. An interactive ATLS Software System is constructed and utilized to create control information on tape which is subsequently employed to demonstrate the manufacture of fiberglass components for the CH-47FRB helicopter rotor blades. The economics of digitizing compared to preprogramming with the ATLS Software System Language are estimated, and recommendations are made for extensions to control other → next page

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cont → tape layup systems and manufacture components of different geometrical configuration.

FOREWORD

This report presents the results of a study project to demonstrate the feasibility of achieving a pre-programming capability for an automated tape lay-up system (ATLS) developed separately by the Army. The findings represent the first step in achieving the long range objective to fully develop the necessary technology for the automated preparation of program manuscripts of helicopter rotor blades from engineering data, for subsequent manufacture on the ATLS.

The study was sponsored by the U.S. Army Aviation Systems Command, Product Engineering Division, under contract DAAJ01-76-C-0040. Mr. Dan Haugan and Ms. Bernestine Page served as Project Monitors.

This project was accomplished as part of the U.S. Army Aviations Systems Command Manufacturing Technology program. The primary objective of this program is to develop, on a timely basis, manufacturing processes, techniques, and equipment for use in production of Army materiel. Comments are solicited on the potential utilization of the information contained herein as applied to present and/or future production programs. Such comments should be sent to: U.S. Army Aviation Systems Command, ATTN: DRSAV-EXT, P.O. Box 209, St. Louis, Missouri 63166.

The ten month effort covered by this report began in November 1975 and was concluded in September 1976. The work was performed by G. P. Putnam, C. A. Wells, and R. N. Little from IIT Research Institute (IITRI) with the cooperation of M. J. Rohner and E. Frank of the Boeing-Vertol Company.

Respectfully submitted,

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1. INTRODUCTION

The development of the concept of building helicopter rotor blades from advanced composites resulted in the need for automating laborious hand methods for constructing blade components. Toward this end, the U.S. Army Aviation Systems Command funded a project with Goldsworthy Engineering, Inc. (Contract DAAJ01-72-C-0610 (PIG)) to build a suitable machine for laying fiberglass epoxy tape in various widths and fiber orientations. The completed machine, called an Automated Tape Layup System (ATLS), was installed at the Boeing-Vertol facility in Philadelphia, PA.

The machine is numerically controlled, and it was expected that the NC tape control information would be created through a digitizing process built into the control system furnished by Allen Bradley. However, it was soon apparent that this process would also be extremely laborious, and wasteful of machine time. Therefore, it became appropriate to inquire into alternative methods for creating the control information through preprogramming.

Boeing began to use hand methods to pre-program the control information, but this was also time consuming and susceptible to human error due to the manual handling and generating of large quantities of data.

Computer assisted pre-programming has been used successfully in many other applications of numerical control so it was natural to consider this method in this instance. Consequently the project reported herein was established to investigate the feasibility of pre-programming the ATLS using computerized methods.

The following sections describe this investigation and the results obtained, including technical and economic factors. Conclusions drawn from the investigation and recommendations for further work complete the report. Detailed technical information is relegated to appendices.

2. SYSTEM ASSESSMENT

At the outset of the project, an inspection of the ATLS was conducted at the Boeing-Vertol facility in Philadelphia. IITRI, Boeing staff and the AVSCOM project monitor were present. The design and manufacturing steps to produce a fiberglass helicopter blade were reviewed. These are, briefly:

a. Produce airfoil design.
b. Produce structure design.
c. Produce detailed component design.
d. Produce tooling design.
e. Produce NC tapes for ATLS components.
f. Build tooling and individual components.
g. Preform components.
h. Assemble components in mold.
i. Cure assembly in mold.
j. Finish assembly.

Numerous inspection and quality control procedures are used throughout to insure quality results.

The focus of this investigation was on step e, the production of NC tapes for ATLS components. To demonstrate feasibility, it was deemed adequate to produce NC tapes for a component known as a "root loop" in the CH-47C spar subassembly. Prior to preforming (step g), the root loop looks like a 30 ft. long hairpin whose thickness tapers to just a few plies of tape at the open end. The heavy thick loop end supports the full centrifugal force of the rotating blade and therefore consists of many (144 for the CH-47C) layers of fiberglass.

The original concept of the investigation was to compare digitizing to computerized pre-programming as an alternative NC tape preparation method. However, Boeing could not supply digitized data due to not being able to use the digitizer. They had, however, used manual methods to prepare test versions of "root loop" NC tapes, and this information was substituted as the baseline for study comparisons. Copies of a set of hand programmed NC tapes were given to IITRI for further detailed analysis regarding format, function codes, and process sequences for the part under consideration.

The three functional areas included in this phase of the project were: 1) Engineering design functions, 2) Special tooling, 3) The features of the "ATLS" and how they are currently being used in the manufacturing process.

2.1 Engineering Design for Fiberglass Helicopter Blades

The aerodynamic design of the helicopter blade is supplied to the engineering group at Boeing that is responsible for the final design layout. This design is in the form of a drawing representing the outside dimensions at various cross sections throughout the length of the blade. At this point, the root section of the blade is not included in the design.

The design process continues with the development of cross sectional areas and blade wall thicknesses based on considerations of the rotational forces to be encountered and the number of longitudinal fibers of glass required to give the desired strength. These considerations along with mechanical mounting considerations are used to extend the design to the root section and strap assemblies of the blades. At this point, the blade is composed of several separate longitudinal component parts which will be manufactured separately and later joined into a single component.

The output of this design process is a drawing depicting the detailed cross sections including both inside and outside dimensions as well as the boundaries of the various individual longitudinal component parts. Also included on this drawing is a detailed layout of the fiberglass tape plies for the individual components. This includes the number of plies at each cross section which therefore specifies the longitudinal taper of component parts.

2.2 Special Tooling and Blade Manufacture

Certain of the component parts of the final blade are layed up on special mandrels created for this purpose. The design of these mandrels follows directly from the design of the specific blade component. The remainder of the blade is layed up on a specially fabricated "rubber balloon" that generally conforms to the shape of the desired inside dimensions of the blade when inflated.

This and the remaining component parts are assembled in a mold that has been machined to conform to the outside dimensions specified in the original aerodynamic design. The mold is then closed, the balloon core is inflated to force the fiberglass against the mold, and the mold is electrically heated to facilitate curing of the epoxy. After curing, the balloon core is deflated and extracted through the open end of the blade. The blade is then removed from the mold and ready for the addition of final components such as the hard nickel leading edge.

2.3 The Automated Layup System (ATLS)

Detailed operation data was collected on the ATLS. During the trip to Boeing Vertol, the IITRI project staff had the opportunity to observe the ATLS during test maneuvers. The current use was also discussed with the group at Boeing. It was learned that Boeing is currently not using the digitizing function of the Allen Bradley 7300 controller. Control tapes are produced by "hand coding" the various controller command codes directly. Boeing Computer Services has provided them with the software to punch the control tape. At present, this software system performs only rudimentary end-of-card formatting and character code conversion before punching the control tape.

The automated layup proceeds as follows: first, certain of the component parts are selected as candidates to be produced on the ATLS. Initially, this was limited to the root end strap component. A mandrel is developed based on the drawing developed in the design effort. This appears to be a relatively straightforward application of the inside dimensions that were developed for the various cross sections. The mandrel is then assumed to be mounted on the ATLS with a specific orientation and the "hand coding" of machine functions proceeds. This coding is done on specially prepared manuscript forms which are reproduced with certain fixed information already filled in. It is from these forms that the machine codes are punched into cards for input to the translation software that produces the control tape. The control tape can then be tested on the ATLS and any corrections can be made by iterating the above process.

At the current early stages of use, a number of the features of the ATLS are not being used in the programming of the "root loop" strap component.

a. Blade component selection is limited to simple components that can be represented and programmed in two dimensions. This limitation is caused by the extreme complexity of the manual programming task at the machine control code level.

b. The mounting of the mandrel on the ATLS is limited to those orientations that do not introduce any extra axis of motion into the program. Again, this is the result of the complexity of handling three simultaneous axes of motion.

c. Boeing has found through trial runs that the best of the available tape applicator designs is the solid spatula-like applicator. The various roller and rubber tire applicators have not proved as useful.

d. Tape slitting and tape cutter rotation are not used due to the simple shapes of the chosen components.

The specific tangible items collected during this assessment phase are listed below.

1. Two volume final report on ATLS by Goldsworthy Engineering.

2. ATLS Operation and Maintenance Manual.

3. Technical Specifications for the purchase of the Allen Bradley 7300 control subsystem by Goldsworthy Engineering.

4. Copy of the control codes from the original Allen Bradley documentation at Boeing Vertol and annotated by the Boeing personnel involved in programming (Ed Frank).

5. A drawing of the spar layup for the CH-47C.

6. Computer listing of the existing control tape for the strap assembly for the CH-47 spar.

7. Copy of the existing control tape for the CH-47C spar strap assembly.

3. SYSTEM ANALYSIS

This phase of the project concentrated on establishing the requirements for language development, the interfacing requirements to the ATLS control system, the ATLS functions available for automatic control, and the proper representation of design data for input to the ATLS software system. This was accomplished through intensive study and analysis of the material obtained during system assessment. A key activity of the analysis was the preparation of perspective plots of the NC data from the Boeing furnished EIA coded NC control tapes. The plots give a quick visual overview or detailed views of tape applicator motion due to X, Y, and Z axis changes. The plots were augmented by the generation of postprocessor style listing derived from the same tapes. Special computer software was prepared to automate the production of plots and listings.

The following determinations were made during the course of analysis:

3.1 Language Requirements

The language should be simple, but sufficiently high level so as to substantially reduce human labor with respect to the hand coding technique developed by Boeing. Toward this end, it was desirable to describe the geometric parameters of the part being fabricated, and the madrel, rather than how the machine should move in order to fabricate the part. A language that commands machine motion would be too close to manual programming to result in an economic or process time advantage for a large number of similar parts.

3.2 ATLS Interface Requirements and the AB7300 Control

ATLS interface requirements and automatic functions controlled by the Allen Bradley 7300 system were spelled out in detail in the Goldsworthy manuals. The subset required for "root loops" was determined by inspection of the listings of the hand coded NC tapes. NC tape codes in either ASCII or EIA standards are acceptable input.

The interface and control requirement thus boiled down to providing EIA or ASCII coded data in word address format in the proper process sequences. These sequences were essentially established by the manual programming methods used by Boeing for the two types of layup necessitated by the root loop

geometry and the machine geometry restrictions of the ATLS. Our judgement was that the Boeing process sequences and tooling were appropriate for the purposes of the feasibility investigation, and that their usage would simplify comparisons.

3.3 Design Data Analysys for Input Requirements

Two types of information were available for describing the "root loop". The primary data gave cross section areas at various stations along the blade. The secondary data, which had been derived from the primary data, gave the number of plies (with prescribed tape width and thickness) at the same blade stations. It was implied that linear algebraic functions described the ply taper. It was determined that, for simplicity, the geometric profile of the ply pack should be described in terms of the number of plies at each significant station for this stage of process automation. Future automation development might well push into the area of component geometry detailing and thus gain further economic benefit.

4. SOFTWARE DESIGN

A software system was designed to automate the production of ATLS NC control tapes subject to the limitations and requirements described in the previous sections.

4.1 Implementation Language Selection

As part of the design activity, a brief investigation was conducted on the desirability of using APT (an established and standard numerical control language) or FORTRAN (a standard computer system language) as the implementation language.

After some consideration and experimentation we decided to use FORTRAN for the following reasons:

a) APT, although rich in geometry, has very limited logical capability. FORTRAN is far superior in this regard and the "root loop" problem required more logic than geometry. Therefore, programming in APT for this problem would be more complex and costly than programming in FORTRAN.

b) Using APT would have required building or modifying an APT postprocessor. This, and the use of APT, was considered undesirable from a project time and cost viewpoint. Postprocessing for this control system amounts to formatting the output data in word address EIA or ASCII code, which is easily handled with FORTRAN.

c) Tape shearing must occur a fixed distance (approximately 13.5 inches) prior to the end of a tape layer. This function could be handled in a postprocessor but would be difficult in APT Section I style computing. It is relatively easy to handle with a specially designed FORTRAN program.

d) FORTRAN implementation makes the results usable on a large variety of computers, including mini-computers, without requirements for other more expensive language systems.

e) Processing costs for use of the resulting systems are in general minimized using FORTRAN as opposed to APT.

f) The use of either language would satisfy the objectives of the investigation.

4.2 System Description

A computer software system was designed to support the primary objective of the project, i.e., to show feasibility of pre-programming the ATLS using computerized methods. The design, which has satisfied that objective and which meets the specification requirements given in Section 3, is detailed below according to three distinctly separate major functions:

- Analysis - Modules to aid in the analysis of existing and subsequently generated ATLS control tapes.

- Synthesis - A module that will generate an ATLS control tape for a specified test component. The descriptive language parameters for this component are entered as variable data.

- System Support - Utility routines that support the operation of the analysis and synthesis functions.

The bulk of the program modules that comprise this system were written in FORTRAN IV for a Digital Equipment Corporation PDP-11/45. Two subroutines, however, had to be written in assembly language to accommodate reading and punching of EIA codes on paper tape.

As shown in Figure 1, the three functions of this system are provided by five main programs:

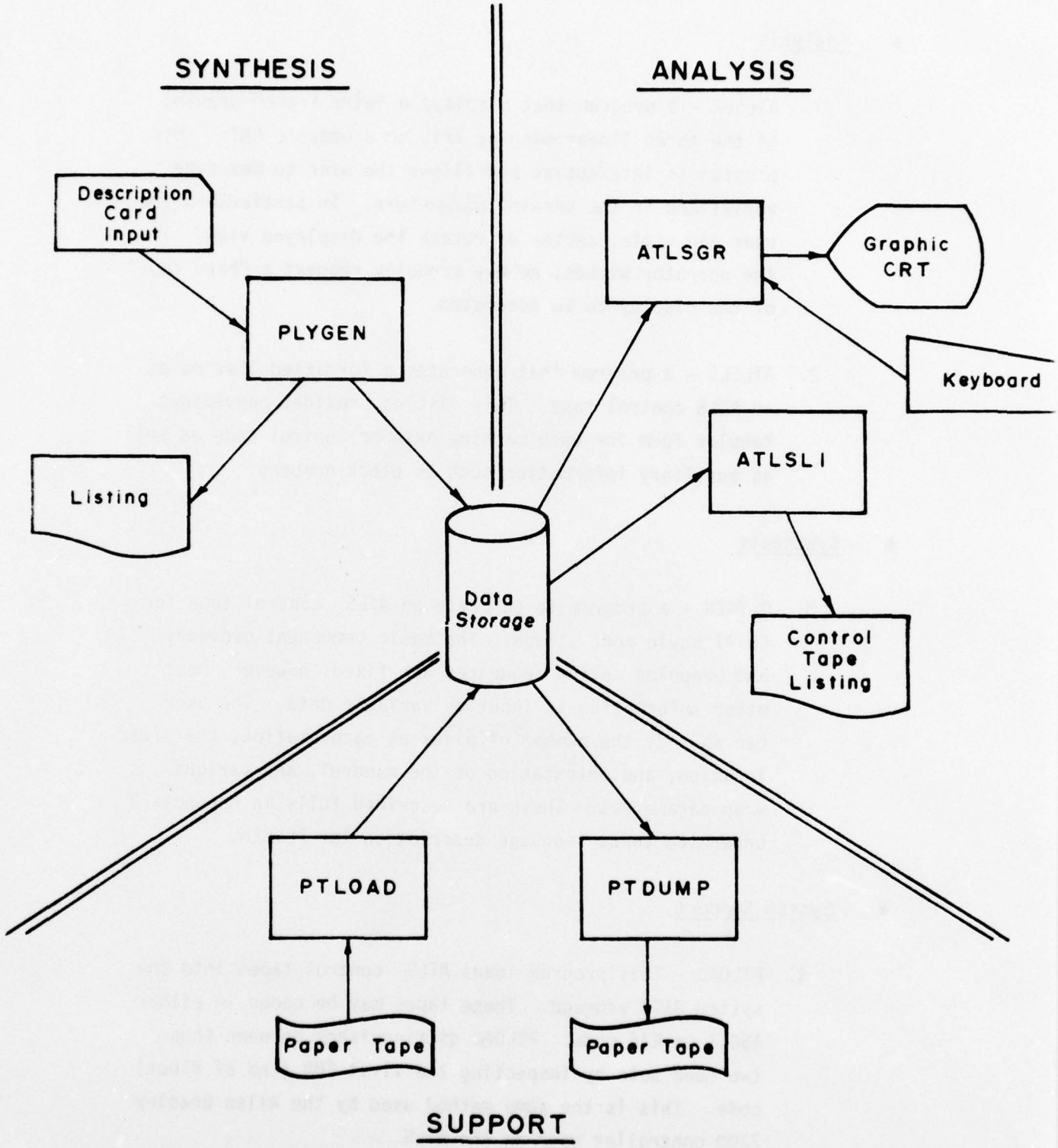

Fig. 1 ATLS PROGRAMMING SYSTEM

- Analysis

  1. ATLSGR - a program that displays a "wire frame" drawing of the three linear machine axis on a graphic CRT. This program is interactive and allows the user to describe variations in the viewing parameters. In particular, the user can scale, center or rotate the displayed view. If the operator wishes, he may manually request a "hard copy" of the display to be generated.

  2. ATLSLI - a program that generates a formatted listing of an ATLS control tape. This listing provides convenient tabular form for each machine axis or control code as well as auxiliary information such as block numbers.

- Synthesis

  3. PLYGEN - a program to generate an ATLS control tape for CH-47 style root straps. The basic component geometry and wrapping motion sequences are fixed; however, most other information is input as variable data. The user can specify the number of plies at each station, the size, location, and orientation of the mandrel, and various wrap parameters. These are described fully in Appendix B under the input language description for PLYGEN.

- System Support

  4. PTLOAD - This program loads ATLS control tapes into the system DATA storage. These tapes may be coded in either ASCII or EIA code. PTLOAD distinguishes between these two code sets by inspecting the first EOB (End of Block) code. This is the same method used by the Allen Bradley 7300 controller used on the ATLS.

5. PTDUMP - this program punches a control tape stored in the system data storage to paper tape. The current date and time along with other optional text information is punched in man-readable leader by this program.

The five main program modules all interact with a central data storage facility (file system) provided by the computer operating systems. This approach was chosen for its operational ease. Paper tapes can, however, be entered into or retrieved from the central data storage facility by using the support programs.

4.3 System Application

The system is designed for use in two basic situations which are described below:

- Analysis of an Existing Control Tape. An existing control tape can be entered into the data storage via the program PTLOAD. This program will accept control tapes punched in either ASCII or EIA codes. Once stored in the system, the control tape can be used to generate a formatted tabular listing or graphical output.

- Generation and Analysis of a New Control Tape. When the proper input parameters are entered into the program PLYGEN, it generates the control tapes for the CH-47 root strap style wrap. Two different control tapes are generated corresponding to the two wrap styles currently being used at Boeing Vertol. The program stores both of these control tapes in the system data storage for future analysis. Either of these control tapes can then be analyzed with the aid of ATLSLI or ATLSGR. If errors are detected, the operator can modify the original input parameters to PLYGEN and iterate through this entire process once again. If no errors are apparent from the analysis, the tape can be punched using PTDUMP.

5. TEST RESULTS

Original planning for this project called for testing of the ATLS software by comparison of a proven digitized NC tape with one generated by the new software. This could not be done since no digitized tapes were available. However, a comparison was made with the hand programmed tapes prepared by Boeing. Listings and CRT plots of the tapes were created using the modules ATLSLI and ATLSGR, and the results were determined to be functionally equivalent and within engineering tolerance.

Near the end of the project Boeing expressed a desire to help test the newly prepared tapes on the ATLS. These tests were conducted on August 25 and 26, 1976. In attendance were B. Page from AVSCOM, E. Frank from Boeing Vertol, and R. Little and C. Wells from IITRI. The NC tapes tested were for CH-47FRB Spar Strap ("root loop") described on Boeing Vertol Print No. 114R1710.

Two tapes were provided in accordance with Boeing procedures and tooling. The first tape was for plies 1 through 50 in the so-called "propeller wrap" configuration in which the principal linear motion for ply application is parallel to machine Y axis. The Y axis or transverse axis coincides with the shorter horizontal dimension of the ATLS bed.

The second tape, a "flip wrap" configuration for plies 51 through 155, has principal linear motions of up to twenty-eight (28) feet that are parallel to the machine X axis. The X axis or longitudinal axis is parallel to the ATLS bed and perpendicular to the Y axis.

Two problems were encountered in testing that precluded the manufacture of a complete 144 ply "root loop". However, the first 50 ply portion of the "root loop" was successfully made and the machine was run in air (no mandrel was used) for the remaining plies. It was the judgement of those in attendance that the motions of the machine were correct during the air trial.

The problems encountered were as follows. First, the mandrel rotation direction for the A axis, a rotary axis parallel to the X axis, was incorrect in some instances due to misinterpretation of sign ($\pm$) conventions for the axis commands.

Second, the plexiglass layup mandrel retaining plates were designed to be one sixteenth of an inch higher than the completed laminate. A fine scribe line was put on the plexiglass to define the completed laminate outline to serve as a visual inspection aid. This additional height did not permit the ATLS compaction foot to reach the layup surface.

For the purposes of the tests these problems were overcome in the following manner. IITRI modified the NC tape by editing on a teletype to produce a correct version. Boeing removed the plexiglass layup mandrel retaining plates during the tests.

Subsequent action was taken by IITRI to correct the ATLS software interpretation of rotational directions and to incorporate recommended changes in approach and liftoff patterns for improved tape placement. Boeing removed a tenth inch of material from compaction foot offsets to permit proper engagement between the foot and mandrel.

The tests successfully demonstrated that it is feasible to pre-program the ATLS using computerized methods. Photographs taken during testing may be found in Appendix A.

6. TECHNICAL ANALYSIS

The detailed experience gained on this project was directed at a specific component part of a fiberglass helicopter blade, manufactured in a particular style developed by Boeing Vertol and on a particular machine system called ATLS. However, we believe this experience is extendable to similar situations, and therefore offer our advice on several pertinent aspects.

6.1 Programming for a Variety of Composite Structures

The techniques used for the "root loop" are quite applicable to any composite structure formed by a numerically controlled machine using pre-impregnated tape. Basically, we identified the critical parameters of the manufacturing sequence, determined a simple but complete way to describe the part to be fabricated and its special tooling, determined the appropriate machine (ATLS) functions to control, and wrote a computer program to transform the part description (input language) into the appropriate sequence of control functions (NC tape output). We did not try to describe all parts, but only a reasonably large class of similar parts. We observe that the computer program might be written in FORTRAN or in APT, primarily depending on the nature of the geometrical versus logical problem presented and the availability of suitable computer service. Programs of this type written in APT would probably make heavy use of complex macros, and a special post-processor would be required to insert delayed result functions such as tape shearing at prior positions in the CL file sequence. The CL (cutter location) file produced by APT is a list of individual machine axis motions interspersed with feedrates and auxiliary function commands (e.g., tape shearing). A post processor modifies a CL file to suit a particular NC machine. An APT system that allows the use of current CL data in the definition of geometry would also be desirable.

Other geometrical shapes that could be treated are:

A. Flat tapered spar packs (similar to "root loop" without the "loop").

B. Single thickness flat layups consisting of flat irregular regions with side by side tape strips in a specific orientation.

C. Multiple thickness flat layups composed of superimposed single layer types described in B.

D. Cylindrical surface layups with both single and multiple thickness.

E. Multiply curved surfaces described as sculptured surfaces or with MDI data.

The currently used flat spatula foot on the ATLS could not be used in situations D and E due to machine and surface geometry.

6.2 Use of Higher Level Engineering Data

The Engineering Data used for the "root loop" consisted of a simple geometrical description of the component part in terms of tape width, tape thickness, and the number of tape plies on a specific mandrel at various stations along the length of the mandrel. We feel this is an appropriate level of data for input to the NC control tape preparation function. It is sufficiently close to the physical action that will take place at the ATLS so as to provide a basis for the checkout of programs and for quality control during production.

This is not to say, however, that prior steps in the design process (see Section 2 - System Assessment) would not benefit from additional computerized aids. We feel that each of these steps may be substantially automated, but that such automation is primarily an economic consideration that is separate from ATLS control tape preparation.

An obvious and simple extension of ATLS software is the automatic generation of ply data (inputs to PLYGEN) from the cross section cured area data given in the material quantity chart (Boeing Vertol drawing #114R1710). A further extension is the computerized breakdown of the blade spar into

individual components with specific cross sections so as to generate the cured area information.

6.3 Common Language for Multiple Machines

The design of the input language for ATLS software assured that the language itself would be quite independent of ATLS. This is true because the language basically describes a member of a class ("root loop" class) of parts to be manufactured. The language can be extended to describe additional classes and tooling, such as described in Section 6.1, but it is in no way dependent on the ATLS.

7. ECONOMIC ANALYSIS

The economic analysis called for in the statement of work was intended to establish the economics of programming the ATLS as compared to digitizing. The digitizer has not been used by Boeing due to a machine manfunction which could create a personnel safety hazard and risk of substantial damage to the machine if an emergency stop condition is created. Therefore, since actual data is unavailable from digitizing, we are providing what we consider to be realistic estimates of time required for digitizing based on our examination of the machine, tooling, controls, and the part ("root loop") selected for comparison.

The digitizing job is a two-man operation since part of the work must be accomplished with the engineer/operator near the digitizing head while the remainder is a data entry operation for miscellaneous function codes and certain motions at the machine control cabinet. One man could do the job by walking back and forth between the two locations, but with probably a greater total expenditure of man-hours.

Let T_f = time/foot of fiberglass tape = 8 seconds

T_p = time/ply = 15 minutes

L = length of tape in feet = 955

N = number of plies = 144

M = number of men = 2

T = total time required for digitizing

Then $T = (T_f \cdot L + T_p \cdot N) \cdot M$

$= (8/60 \cdot 955 + 15 \cdot 144) \cdot 2$

$= 4575$ minutes

$\cong 76$ hours

This assumes no errors are made. If there is a rework factor of 20%, then the test component would require about 91 man-hours.

As another baseline, Boeing has provided a preliminary estimate of 100 hours of programming effort for a similar CH-46 component to be fabricated on the PIN WRAP machine, a more specialized machine derived from ATLS. There is considerable uncertainty in both estimates since neither procedure has actually been accomplished.

On the other hand, the ATLS software method requires only a few language statements to describe the component and tooling. The total time to prepare the control tapes, including graphical checkout and listing examination approximates 6 hours. Assuming a labor rate of $9.50 per hour with a 65% overhead, the cost differential between digitizing and ATLS software methods is (91 hours - 6 hours) x $\frac{\$9.50}{\text{hour}}$ x 1.65 = $1332/tape.

Additional savings may be realized by avoiding setup and teardown of tooling for tape preparation through digitizing and by keeping the ATLS more available for production work. The latter is estimated at $50.00/machine hour for 45 hours/tape or $2,250/tape. Further, the cycle time for developing a control tape with ATLS software is considerably shorter than digitizing, a circumstance which could lead to substantial economic benefit in a tightly scheduled program.

These factors are summarized in Figure 2 on the basis of savings per tape. Detailed information on procurement schedules for different but similar types of blades can be translated into total savings resulting from the use of pre-programming under the given assumptions.

Quantifiable Cost Savings	
1. Reduction in Labor	$1,332
2. Recovery of lost machine production time	2,250
Additional Cost Benefits	
1. Improved cycle time	—
2. Reduction in number of setups	—
TOTAL	$3,582

Figure 2 . Summary of Cost Savings and Benefits Per Pre-programmed NC Tape.

8. CONCLUSIONS AND RECOMMENDATIONS

The primary conclusion of the study was the highly successful proof and demonstration through live machine tests of the feasibility of pre-programming the ATLS using computerized methods. Secondarily, additional very promising areas for the automation of NC control tape production were identified: 1) both simpler and more complex shapes than the "root loop", 2) interfaces with higher level engineering data, and 3) the extension of ATLS software to the control of other composite tape layup machines using the same common language for input.

We therefore urgently recommend that in the next phase of development the following areas be further automated by extension to the ATLS part description language and ATLS software system:

A. Flat tapered spar packs.
B. Single thickness flat layups in irregular regions.
C. Multiple thickness flat layups in superimposed irregular regions.
D. Control of the PIN WRAP machine for spar packs.

We believe there is sufficient variety of component requirements in these categories to justify the software development costs.

Two additional areas for further development are:

E. Layups on cylindrical surfaces.
F. Layups on multiply curved surfaces.

These are technically more ambitious but may lead to improved structural design for blades by allowing manufacture of the entire helicopter rotor blade or blade spar on a single mandrel without using the current multi-component spar approach. Software design investigation for these problems requires concurrent exploration of improved tooling and fiberglass tape applicators. It would be especially useful if some additional degrees of freedom were available in the applicator head and if some form of extrusion could be used on the tape to continuously reshape its cross section while maintaining the same sectional area.

In addition to improving blade manufacture, these advances will enable the manufacture of more severely multiply curved panels that are not amenable to flat layup approaches using either tape or broad goods.

APPENDIX A

PHOTOGRAPHS OF TEST DEMONSTRATION

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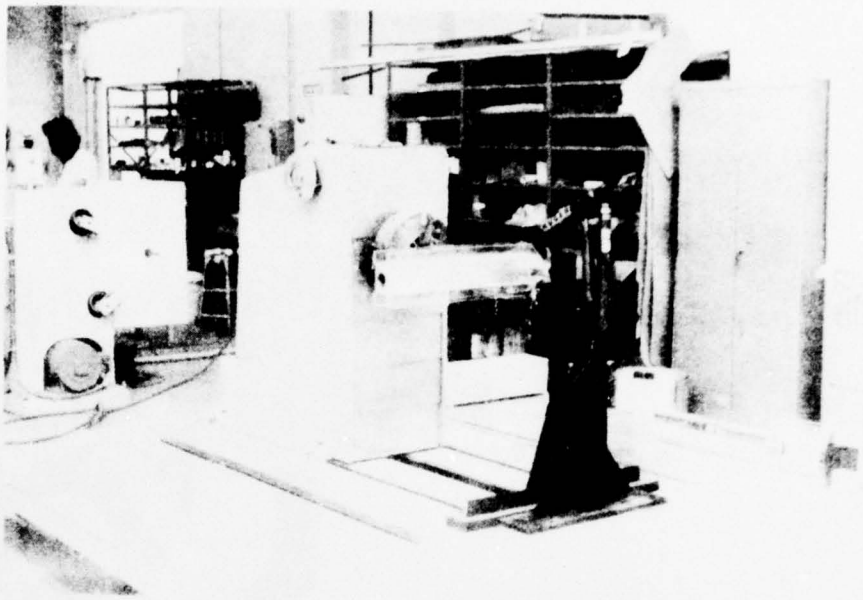
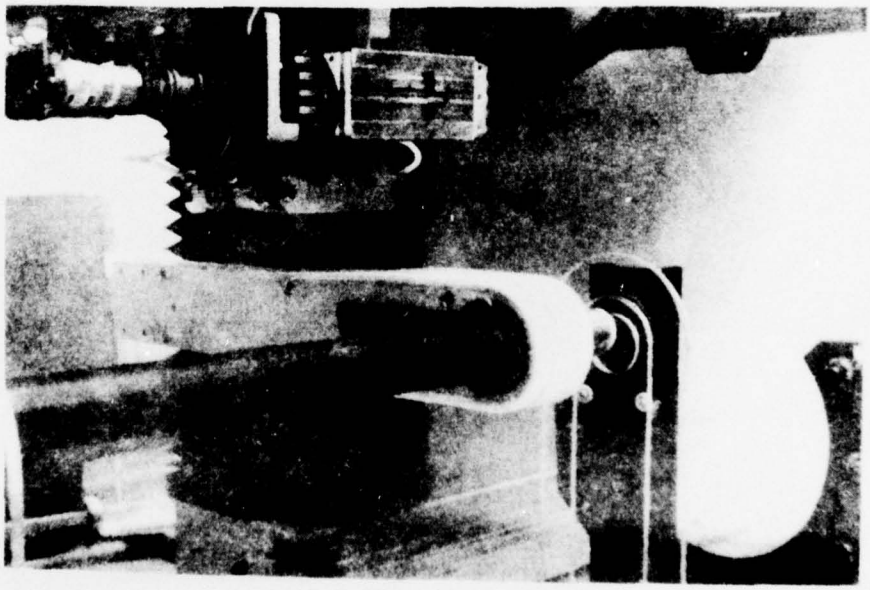
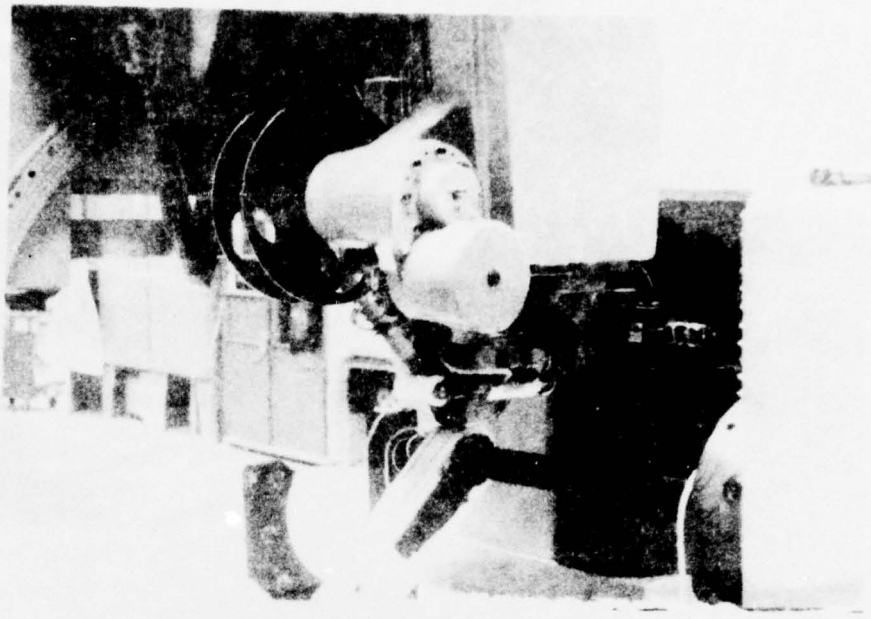


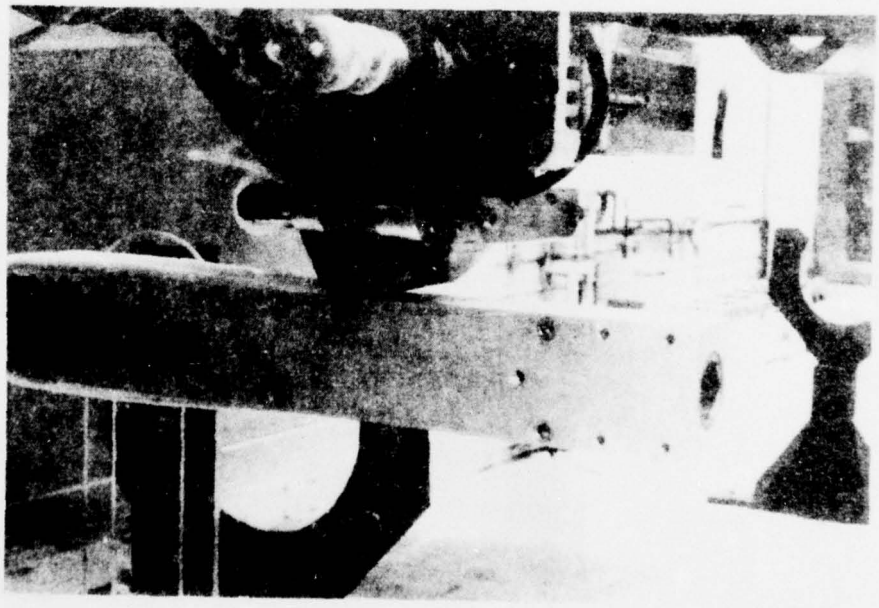
1. Initial Set Up for "Propeller Wrap" Showing Short Segments of Mandrel.



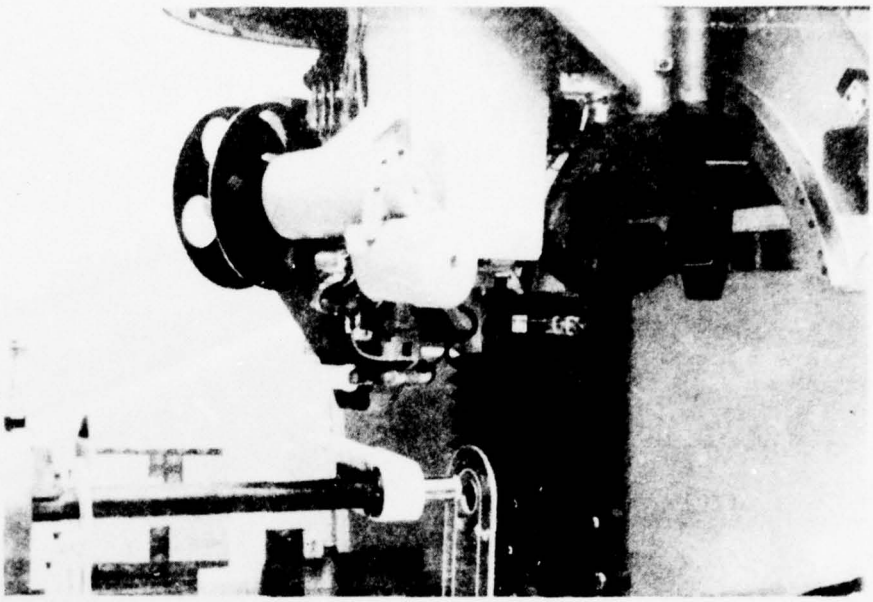
2. Starting a Ply.



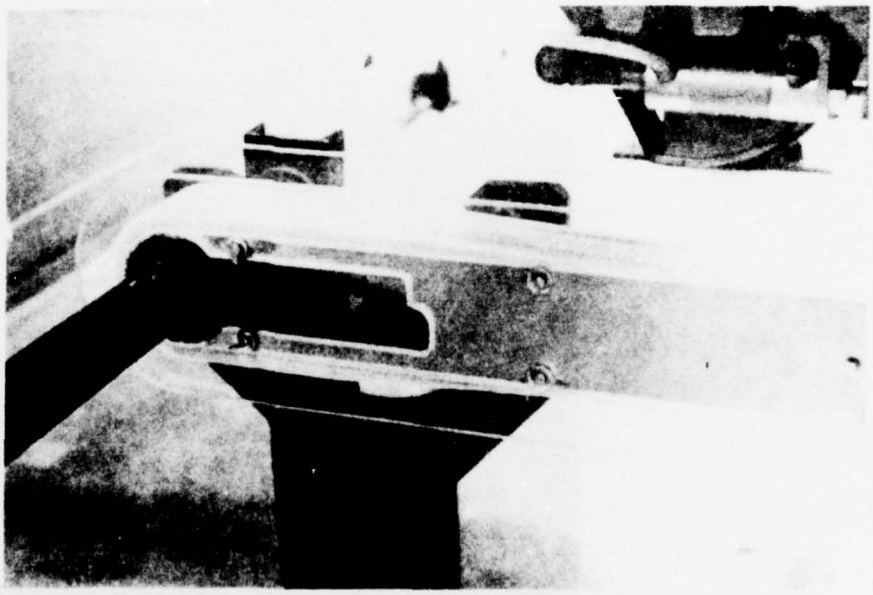
3. Mandrel D-Axis Rotation Around Pin End.



4. Completing a Ply.

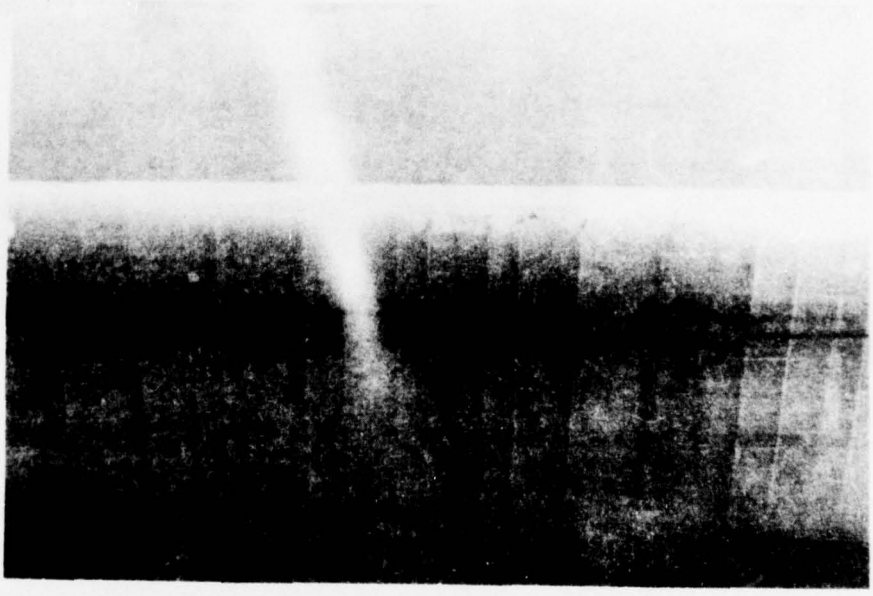


5. Applicator Head Rotating (C-Axis) for Start of Next Ply.

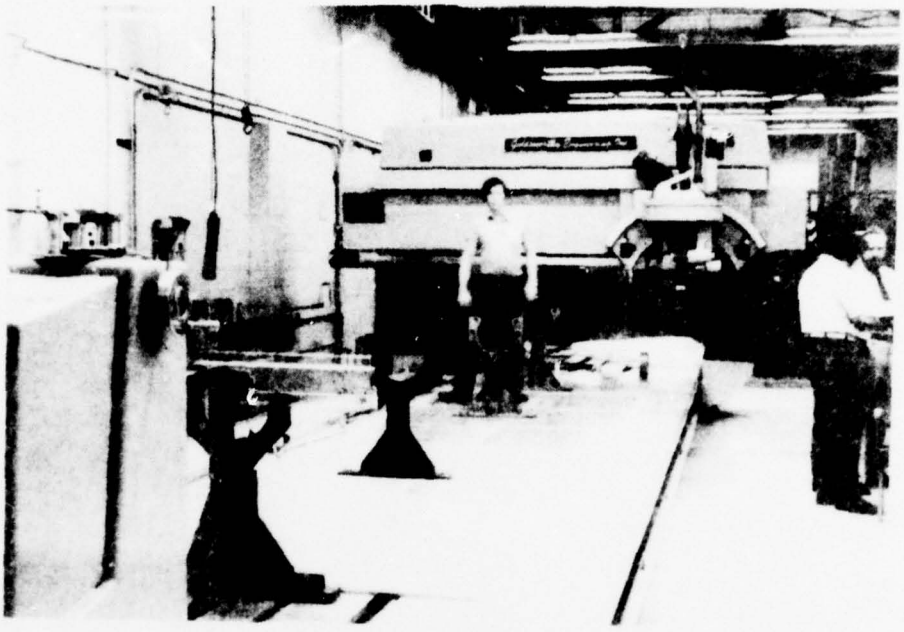


6. "Propeller Wrap" on Mandrel Showing Taper of Plies.

7. Completed "Propeller Wrap" - First 50 Plies of "Root Loop".



8. Close Up of Inside of "Root Loop" Showing Ply Ends.



9. View Down Length of Machine Showing Mandrel Steady Rests for Plies 51 Through 144.

APPENDIX B

OPERATING INSTRUCTIONS FOR THE ATLS SOFTWARE SYSTEM

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OPERATING INSTRUCTIONS FOR THE ATLS SOFTWARE SYSTEM

1. INTRODUCTION

All program modules associated with this software system run under the control of the PDP-11 Disk Operating System (DOS). Any discussion of the operational characteristics of the ATLS software system must necessarily contain some references to the host computer operation system. However, every attempt has been made to keep these references to a minimum.

Programs are initiated under the DOS system via the RUN command to the monitor. The system prompts the user by printing a dollar sign ($) and the user responds by typing in "RUN" followed by the program name. To execute program ATLSLI, the console display would contain the following:

$RUN ATLSLI

Each program then carries on a dialogue with the user in order to obtain additional input before beginning execution. Each dialogue will be described in detail along with the individual program operational descriptions.

The remainder of this text will contain detailed operational instructions for each of the five main program modules. Each of these will contain the following information:

- Program name
- Significant file information
- Operator command
- Input formats
- Output formats
- Error messages
- Program termination conditions

2. ATLSGR - ATLS Graph

2.1 Files

logical default name	filename	purpose
IN	DK:ATLS.DAT	Control tape input file.

2.2 User Commands (at CRT)

D	Draw the control tape using the current projective transformation parameters.
C	Center the picture. The graphics cursor is moved to the new center and any character is hit on the keyboard.
S	Scale the picture. The graphics cursor is used to define diagonal corners of the picture area that is to be expanded to the entire viewing area.
Xn	Rotate the figure about the X axis by n degrees. n may be negative.
Yn	Rotate the figure about the Y axis.
Zn	Rotate the figure about the Z axis.
Hn	Reset the eyepoint viewing distance. Original value is 12.0.
M	Mark or save the current transformation parameters.
R	Restore the transformation parameters to the values last marked (see M).
O	Restore the transformation parameters to their initial (original) values.
Vn	Define the virtual size of the viewing screen area. Initially this value is 6.0.
E	Exit or terminate program execution.

2.3 Input Formats

EIA or ASCII ATLS control tape.

2.4 Output Formats

See Appendix D

2.5 Error Messages

INVALID COMMAND

2.6 Program Termination

Upon encountering an "E" command.

3. ATLSLI - ATLS List

3.1 Files

logical dataset name	default filename	purpose
IN	DK:ATLS.DAT	Control tape input file.
6	DK:FOR006.DAT	Listing output file.
15	KB:FOR015.DAT	Operator command input file.
16	KB:FOR016.DAT	Operator output log file.

3.2 Operator Commands (Console Dialogue)

```
$ RUN ATLSLI
ENTER TITLE...CH47 ROOT LOOP
ENTER LISTING FILENAME....LP:
```

3.3 Input Formats

EIA or ASCII ATLS control tape.

3.4 Output Formats

Each page of the output list contains the following information:

- Page Header
  1. Title entered by operator.
  2. Current date and time.
  3. Page number.
  4. Column headings.
- Data Lines
  1. An entry for each of the permissable control code characters (N,G,M,S,X,Y,Z,A,C,D,I,J,K and F) within this block.
  2. A tape block sequence number.

3.5 Error Messages

None

3.6 Program Termination

Program terminates after listing a single control tape file.

4. PLYGEN - Ply Generator

4.1 Files

logical dataset name	default filename	purpose
2	DK:FOR002.DAT	Control tape output file for "propeller wrap."
3	DK:FOR003.DAT	Control tape output file for "flip wrap"
5	DK:FOR005.DAT	Language card input.
6	DK:FOR006.DAT	List file output.
16	KB:FOR016.DAT	Operator log output file.

4.2 Operator Commands (Console Dialogue)

$ RUN PLYGEN

4.3 Input Formats

The PLYGEN part and mandrel description language is punched on cards with one statement per card. Cards with an asterisk (*) in column 1 are printed on the output listing but otherwise ignored. This allows comments within the listing. Blank characters are totally ignored in the syntax analysis and can therefore be used freely to improve readability.

There are twelve types of language statemnets that can be input. Each will be described separately.

4.3.1 END

One card of this type appears as the last card of the deck.

4.3.2 THICKNESS n

Specifies the nominal fiberglass tape thickness in inches.

4.3.3 MANDREL(1) x,y,z,d

Specified the mandrel parameters for the first style of wrapping geometry. The center of the round end of the tooling

is specified by x,y,z. The pullout point on the x axis is specified by p. The backup point is specified by b. The windup point is specified by w.

4.3.5 INITIAL (1) x,y,z

Specifies an optional initial move for the type 1 wrap.

4.3.6 INITIAL (2) x,y,z

Specifies an optional move for the type 2 wrap.

4.3.7 FINAL (1) x,y,z

Specifies an optional final move for the type 1 wrap.

4.3.8 FINAL (2) x,y,z

Specifies an optional final move for the type 2 wrap.

4.3.9 REFSTATION n

Specifies the reference station coordinate from the print.

4.3.10 PLY n,l

Specifies the parameters for a specific reference ply. n is the ply number and l is the station at which that ply ends. A series of two or more of these cards specify the plies of a root strap component. Ply 1 and the last ply must be specified. Ply numbers that are not specified are calculated from the next higher and lower specified parameters assuming a linear increase in ply length.

4.3.11 BREAK n

Specifies the ply number at which part 2 starts.

4.3.12 CYLTRAVEL t

Specifies how much travel is allowed in the air cylinder in the head of the ATLS.

4.4 Output Formats

Program listing containing:

- Page Header
  1. PLYGEN identification and version.
  2. Date and time.
  3. Page number.
- An image of the input line containing a sequence number.

4.5 Error Messages

ERRORn

4.6 Program Termination

PLYGEN terminates normally after generating the two control tapes. If errors were detected in reading input cards, PLYGEN terminates abnormally.

5. PTDUMP - Punched Tape Dump

5.1 Files

logical dataset name	default filename	purpose
IN	DK:ATLS.DAT	Control tape input file.
OUT	PT:	Paper tape output file.
15	KB:FOR015.DAT	Operator command input.
16	KB:FOR016.DAT	Operator log output.

5.3 Operator Commands (Console Dialogue)

```
$ RUN PTDUMP
ENTER LEADER STRING
CH47 ROOT LOOP
```

5.3 Input Formats

EIA or ASCII ATLS control tape.

5.4 Output Formats

ASCII punched paper tape with man-readable leader.

5.5 Error Messages

None

5.6 Program Termination

After punching one tape.

6. PTLOAD - Punched Tape Loader

6.1 Files

logical dataset name	default filename	purpose
IN	DK:ATLS.DAT	Control tape input.
6	DK:FOR006.DAT	Control tape output.
15	KB:FOR015.DAT	Operator command input file.
16	KB:FOR016.DAT	Operator log output file.

6.2 Operator Commands (Console Dialogue)

```
$ ASSIGN, PR:, IN
$ RUN PTLOAD
ENTER OUTPUT FILENAME...TEST.DAT
127 RECORDS COPIED
```

6.3 Input Formats

EIA or ASCII ATLS control tape.

6.4 Output Formats

EIA or ASCII ATLS control tape.

6.5 Error Messages

None

6.6 Program Termination

After reading one tape.

APPENDIX C

PROGRAM DESCRIPTIONS FOR ATLS SOFTWARE SYSTEM

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PROGRAM DESCRIPTIONS FOR ATLS SOFTWARE SYSTEM

1. INTRODUCTION

The following text contains a description of each distinct module within the ATLS Software System. Each module description will contain the following information:

- Name of the subroutine or main program.
- Concise statement of purpose.
- Calling sequence and argument description (not applicable for main programs).
- Modules that call this subroutine (not applicable for main programs).
- Subroutines called.
- Diagnostics issued.
- Detailed description of methodology.
- Symbolic source listing.

Five different types of software modules were used in the ATLS programming system:

1. Main programs developed under this contract.
2. Subroutines developed under this contract.
3. Subroutines from a general utility library developed by IITRI.
4. Subroutines from a general utility library supplied with the PDP-11 by Digital Equipment Corporation.
5. Subroutines from a graphics terminal support library supplied by Tektronix Inc.

Only the program modules from categories 1 and 2 above will be described in full detail. Modules from categories 3, 4, and 5 will be described only by name and a concise statement of purpose. This minimum amount of information is required to understand the program listings for categories 1 and 2.

2. MAIN PROGRAMS

2.1 ATLSGR - ATLS Graph

Purpose: Provide a pictorial representation of the three linear head motions (x,y,z) that would be taken by the ATLS if it were presented with the control tape used as input.

Calling Sequence and Arguments: N.A.

Called By: N.A.

Subroutines Called:

INITT	SWINDO
ERASE	VWINDO
MOVABS	MOVEA
MSG	DRAWA
ANSWER	GET
SETUP	R8MULT
BELL	CHAR
	RESET

Diagnostics: None

Detailed Description: Subroutine SETUP is called to perform a prescan of the control tape file and initialize the various matrices associated with the graphic transformations used within the main program loop. Several graphics support subroutines are then called to initialize the graphics package, erase the viewing screen and draw a box that outlines the viewing area.

The control tape file is scanned and each block of data is converted to internal representation. If x, y, or z codes exist within the currently assembled block, a call is made to the graphics subroutines to draw a line to this new point. After the entire control tape is processed, subroutine RESET is called to interact with the operator and accept new projection parameters. From that subroutine, the operator may elect to terminate the main program.

```
      CCCC
```

```
0041            IF(IVALUE(3).EQ.62) FIRST=.FALSE.
0042            IF(IVALUE(3).EQ.02 .OR.
               1   IVALUE(3).EQ.03 .OR.
               2   IVALUE(3).EQ.30      ) GO TO 90
0043            MCOUNT=0
0044      20    DO 21 I=1,6
0045            II=I+4
0046            MCOUNT=MCOUNT+MARK(II)
0047      21    IF(MARK(II).GT.0) VECT(I)=RVALUE(II)
0048            IF(MCOUNT.LE.0) GO TO 10
          C
          C       SETUP VECTOR AND TRANSFORM.
          C
0049      30    DO 31 I=1,3
0050      31    CVECT(I)=VECT(I)
0051            CVECT(4)=1.0D0
0052            CALL R8MULT(CVECT,SDTM,OVECT,1,4,4)
0053            DO 32 I=1,4
0054            OVECT(I)=OVECT(I)/OVECT(4)
0055      32    IF(I.LE.2) PVECT(I)=OVECT(I)
0056            IF(FIRST.EQ..FALSE.) CALL DRAWA(PVECT(1),PVECT(2))
0057            IF(FIRST.EQ..TRUE. ) CALL MOVEA(PVECT(1),PVECT(2))
0058            IF(DEBUG.NE.0) WRITE(6,900)(CVECT(L),L=1,4),PVECT
0059            GO TO 10
          C
          C       SCAN FOR END OF FILE AND TALK TO THE OPERATOR.
          C
0060      90    IF(CHAR().GE.0) GO TO 90
0061            SCANSW=.TRUE.
0062            CALL RESET
0063            GO TO 1
          C
          C
0064      900   FORMAT(/4(D16.8)/2(E16.8))
0065            E N D

          ROUTINES CALLED:
          INITT , ERASE , MOVABS, SETUP , SWINDO, DRWABS, RESET
          BELL  , VWINDO, GET   , R8MULT, DRAWA , MOVEA , CHAR


          OPTIONS =/ON,/OP:1

          BLOCK        LENGTH
          MAIN.   722     (002644)*
          .$$$$.  4       (000010)
          GETCOM  73      (000222)
          CHRCOM  2       (000004)
          SDTMCA  260     (001010)

          **COMPILER ----- CORE**
             PHASE       USED  FREE
          DECLARATIVES 00622 14434
          EXECUTABLES  01304 13752
          ASSEMBLY     01535 18161
```

2.2 ATLSLI - ATLS List

Purpose: To provide a conveniently readable formatted listing of an ATLS control tape.

Calling Sequence and Arguments: N.A.

Called By: N.A.

Subroutines Called:

DATE	FILL
TIME	GET
ASSIGN	MOVB
DELETE	EXIT

Diagnostics: None.

Detailed Description: A dialog is carried on with the operator to accept information about the listing file name and a title string. The control tape file is then scanned and each block of data is assembled into internal format. A line is formatted for printing using the ENCODE facility of the PDP-11 FORTRAN system. Each line is then printed along with a sequential reference number. The header is printed at the top of each page of output along with a page number. When the entire control tape file is processed, this program returns control to the operating system.

```
      CCCC
```

```
0038            IF(G.EQ.02) MODE(1)=3
0039            IF(G.EQ.03) MODE(1)=4
0040            IF(G.EQ.17) MODE(2)=1
0041            IF(G.EQ.18) MODE(2)=2
0042            IF(G.EQ.19) MODE(2)=3
0043            IF(G.EQ.90) MODE(3)=1
0044            IF(G.EQ.91) MODE(3)=2
0045     92     CONTINUE
        C
0046     100    LINES=LINES+1
0047            IF(LINES.LT.(MAXLIN-1)) GO TO 101
0048            IF(LINES.LE.MAXLIN .AND. MARK(1).LE.0) GO TO 101
0049            PAGENO=PAGENO+1
0050            WRITE(6,904)FORM,TITLE,HEADER,PAGENO
0051            FORM='1'
0052            LINES=1
0053     101    CALL FILL('  ',,LPBUF,,66)
0054            IF(MARK(1).GT.0) WRITE(6,917)
0055            IF(MARK(1).GT.0) LINES=LINES+1
        C
        C       ENCODE EACH OF THE FIELDS.
        C
0056            IF(MARK(1).NE.0) ENCODE(10,906,LPBUFX)IVALUE(1)
0057            IF(MARK(1).NE.0) CALL MOVB(LPBUFX,,LPBUF,1,4)
0058            IF(MARK(2).NE.0) ENCODE(10,907,LPBUFX)IVALUE(2)
0059            IF(MARK(2).NE.0) CALL MOVB(LPBUFX,,LPBUF,6,2)
0060            IF(MARK(3).NE.0) ENCODE(10,907,LPBUFX)IVALUE(3)
0061            IF(MARK(3).NE.0) CALL MOVB(LPBUFX,,LPBUF,9,2)
0062            IF(MARK(4).NE.0) ENCODE(10,908,LPBUFX)IVALUE(4)
0063            IF(MARK(4).NE.0) CALL MOVB(LPBUFX,,LPBUF,12,3)
0064            IF(MARK(5).NE.0) ENCODE(10,909,LPBUFX)RVALUE(5)
0065            IF(MARK(5).NE.0) CALL MOVB(LPBUFX,,LPBUF,16,9)
0066            IF(MARK(6).NE.0) ENCODE(10,909,LPBUFX)RVALUE(6)
0067            IF(MARK(6).NE.0) CALL MOVB(LPBUFX,,LPBUF,26,9)
0068            IF(MARK(7).NE.0) ENCODE(10,909,LPBUFX)RVALUE(7)
0069            IF(MARK(7).NE.0) CALL MOVB(LPBUFX,,LPBUF,36,9)
0070            IF(MARK(8).NE.0) ENCODE(10,909,LPBUFX)RVALUE(8)
0071            IF(MARK(8).NE.0) CALL MOVB(LPBUFX,,LPBUF,46,9)
0072            IF(MARK(9).NE.0) ENCODE(10,910,LPBUFX)RVALUE(9)
0073            IF(MARK(9).NE.0) CALL MOVB(LPBUFX,,LPBUF,56,9)
0074            IF(MARK(10).NE.0) ENCODE(10,909,LPBUFX)RVALUE(10)
0075            IF(MARK(10).NE.0) CALL MOVB(LPBUFX,,LPBUF,66,9)
0076            IF(MARK(11).NE.0) ENCODE(10,909,LPBUFX)RVALUE(11)
0077            IF(MARK(11).NE.0) CALL MOVB(LPBUFX,,LPBUF,76,9)
0078            IF(MARK(12).NE.0) ENCODE(10,909,LPBUFX)RVALUE(12)
0079            IF(MARK(12).NE.0) CALL MOVB(LPBUFX,,LPBUF,86,9)
0080            IF(MARK(13).NE.0) ENCODE(10,909,LPBUFX)RVALUE(13)
0081            IF(MARK(13).NE.0) CALL MOVB(LPBUFX,,LPBUF,96,9)
0082            IF(MARK(14).NE.0) ENCODE(10,910,LPBUFX)RVALUE(14)
0083            IF(MARK(14).NE.0 .AND. G04SW.EQ..TRUE.)
               1 CALL MOVB(LPBUFX,,LPBUF,106,9)
0084            IF(MARK(14).NE.0) ENCODE(10,909,LPBUFX)RVALUE(14)
0085            IF(MARK(14).NE.0 .AND. G04SW.EQ..FALSE.)
               1 CALL MOVB(LPBUFX,,LPBUF,106,9)
0086            IF(MARK(15).NE.0) CALL MOVB('/',,LPBUF,,1)
0087            LINENO=LINENO+1
```

```
0088            ENCODE(10,911,LPBUFX)LINENO
0089            CALL MOVB(LPBUFX,,LPBUF,127,5)
0090            ENCODE(10,913,LPBUFX)IC
0091            IF(IC.NE.0) CALL MOVB(LPBUFX,,LPBUF,122,5)
0092            WRITE(6,905)LPBUF
0093            IF(M2.LT.2) GO TO 105
0094            DO 103 I=2,M2
0095            LINES=LINES+1
0096            IF(LINES.LE.MAXLIN) GO TO 103
0097            PAGENO=PAGENO+1
0098            WRITE(6,904)FORM,TITLE,HEADER,PAGENO
0099            LINES=1
0100      103   WRITE(6,912)GCODES(I)
0101      105   IF(MARK(3).LE.0) GO TO 106
0102            IF(IVALUE(3).EQ.02 .OR.
               1   IVALUE(3).EQ.03 .OR.
               2   IVALUE(3).EQ.30      ) GO TO 800
0103      106   CALL GET
0104            GO TO 90
          C
          C     END OF TAPE PROCESSING..
          C
0105      800   CALL EXIT
          C
          C     FORMATS
          C
0106      902   FORMAT(' TAPE CODE IS EIA'/)
0107      903   FORMAT(' TAPE CODE IS ASCII'/)
0108      904   FORMAT(A1////1X,70A1,'ATLAS CONTROL TAPE LIST  ',5A4,'   PAGE',
               1       I4///'   N   G  M  S    X-AXIS    Y-AXIS    Z-AXIS',
               2       '    A-AXIS    C-AXIS    D-AXIS   I-OFFSET  J-OFFSET',
               3       '  K-OFFSET  FEEDRATE'/'  **** ** ** ***',10(' *********'))
0109      905   FORMAT(1X,66A2)
0110      906   FORMAT(I4)
0111      907   FORMAT(I2)
0112      908   FORMAT(I3)
0113      909   FORMAT(F9.3)
0114      910   FORMAT(F9.2)
0115      911   FORMAT(I5)
0116      912   FORMAT(6X,'!',I2)
0117      913   FORMAT('!',I3,'!')
0118      915   FORMAT('$ENTER LISTING FILENAME....')
0119      916   FORMAT(66A2)
0120      917   FORMAT(2X,131('-'))
0121      918   FORMAT('$ENTER TITLE....')
0122      919   FORMAT(70A1)
0123            E N D
```

ROUTINES CALLED:
DATE , TIME , ASSIGN, DELETE, FILL , GET , MOVB
EXIT

OPTIONS =/ON,/OP:1

BLOCK	LENGTH	
MAIN.	1911	(007356)*
.$$$$.	4	(000010)
GETCOM	73	(000222)

2.3 PLYGEN - Ply Generator

Purpose: To generate ATLS control tapes for a specific configuration of a CH47-style root strap component.

Calline Sequence and Arguments: N.A.

Called By: N.A.

Subroutines Called:

CMPB	MOVE
DELETE	HEAD
ASSIGN	CLAMP
FILLB	SHEAR
DATE	SQRT
TIME	EOT
MOVB	ABS
ERR	SLIT
BOT	DELAY
BUILD	EXIT
PUNCH	

Diagnostics:

Error 1 - More than 256 ply description cards.
" 2 - Less than 2 ply description cards.
" 3 - Ply Number 1 not specified.
" 4 - Ply lengths decreasing
" 5 - Ply lengths not increasing fast enough.
" 6 - 2 ply description cards for the same ply.
" 7 - Undefined input card.

Detailed Description: PLYGEN reads input cards that describe various variable parameters for a CH47-style root strap and produces two ATLS control tapes to be used for laying-up this component. For shorter plies, a "propellor-wrap" type of wrapping geometry is generated. This type of wrap is used for the first plies (typically 50 or so) layed up. The remainder of the longer plies are layed up using a "flip-wrap" style of wrapping geometry. This style wrap is generated for the second control tape.

The program proceeds in three basic phases:

1. Input parsing and preliminary error checking phase.

2. Generate the first control tape for the first plies.

3. Generate the other control tape for the remaining plies.

The input phase reads input cards, identifies the statement type, and dispatches to a separate routine to decode each individual statement. This continues until an "END" card is encountered. The various parameters that were collected during the input phase are checked for semantic consistancy and appropriate error diagnostics are issued if problems are detected. All errors except for ERROR-7 cause PLYGEN to terminate at the end of the input phase.

Phase 2 starts by initializing the control tape file and generating some preliminary move data. The internal ply table is then scanned and each ply is generated in turn. As each ply is generated, the mandrel shape logically changes for subsequent plies. This is allowed for by the program and a piecewise linear approximation of the current mandrel shape is used to generate each ply. This process continues until all plies up to the ply specified by the "BREAK" card is generated. Trailer codes are then punched and the first control tape file is closed out.

Phase 3 generates the second control tape file using the "flip-wrap" style geometry. This control tape file is opened and initialized in a similar fashion as the previous phase. The scanning of the ply information table then continues where previously left off with this new wrapping geometry. As in the previous phase, piecewise linear approximations and allowance for continuous ply buildup is automatically handled by the program. After the ply table is exhausted, this second control tape file is closed out and the program terminates.

```
      CCCC
```

```
0024            REAL L1,L2,L3
        C; TOTAL LENGTHS OF TAPE.
0025            REAL TOTLEN(2)
        C; INPUT CARD BUFFER.
0026            BYTE CARD(80)
        C; LISTING PAGE HEADER ETC....
0027            REAL HEADER(5)
0028            INTEGER LINENO,PAGENO,MAXLIN
        C; INTEGER FUNCTION SUBROUTINE TO COMPARE BYTE STRINGS.
0029            INTEGER CMPB
        C; LOGICAL VARIABLES FOR VARIOUS SUBROUTINE CALLS.
0030            LOGICAL OFF,ON
        C; SOME CHARACTER CONSTANTS TO BE USED AS BYTES.
0031            BYTE BLANK,COMMA,STAR,DOLLAR,EQUALS,TAB
        C; A MAGICAL NUMBER.
0032            REAL PI
        C
        C; INITIALIZE SOME OF THE ABOVE.
        C
0033            DATA OFF,ON/.FALSE.,.TRUE./
0034            DATA PI/3.14159265/
0035            DATA IFLAG,I2FLAG,FFLAG,F2FLAG,MFLAG,M2FLAG/6*.FALSE./
0036            DATA BLANK,COMMA,STAR,DOLLAR,EQUALS,TAB/' ',',','*','$','=',9/
0037            DATA MAXLIN/50/

        C
54      C       SETUP DEFAULTS.
        C
0038            THICK=0.009
0039            XM=0.0
0040            YM=0.0
0041            ZM=0.0
0042            TRAVEL=1.0
0043            SHRLEN=13.54
0044            REFSTN=0.0
        C
        C       INITIALIZE SOME OTHER STUFF.
        C
0045            CALL DELETE(6)
0046            CALL ASSIGN(16,'KB:',0)
0047            PLYMAX=0
0048            RM=0.0
0049            DM=0.0
0050            DIR=-1.0
0051            P2MIN=-1
0052            CALL FILLB(' ',,HEADER,,20)
0053            CALL DATE(HEADER(1))
0054            CALL TIME(HEADER(4))
0055            PAGENO=1
0056            LINENO=MAXLIN
0057            NCARD=0
0058            TOTLEN(1)=0.0
0059            TOTLEN(2)=0.0
        C
        C       INPUT PHASE.
        C
```

```
0060     10     IF(LINENO.LT.MAXLIN) GO TO 12
0061            WRITE(6,11)HEADER,PAGENO
0062     11     FORMAT(////1X,'PLYGEN V1.0     ',T40,5A4,'     PAGE',I4///)
0063            LINENO=0
0064            PAGENO=PAGENO+1
0065     12     READ(5,13)CARD
0066     13     FORMAT(80A1)
0067            DO 14 I=1,80
0068            J=81-I
0069            IF(CARD(J).NE.BLANK .AND. CARD(I).NE.TAB) GO TO 15
0070     14     CARD(J)=COMMA
0071            GO TO 10
0072     15     IF(CARD(1).NE.STAR) GO TO 17
0073            WRITE(6,16)TAB,(CARD(K),K=1,J)
0074     16     FORMAT(1X,81A1)
0075            LINENO=LINENO+1
0076            GO TO 10
0077     17     NCARD=NCARD+1
0078            WRITE(6,18)NCARD,TAB,(CARD(K),K=1,J)
0079     18     FORMAT(1X,I4,')',81A1)
0080            LINENO=LINENO+1
0081            DO 19 I=1,79
0082            J=80-I
0083     1999   IF(CARD(I).NE.BLANK .AND. CARD(I).NE.TAB) GO TO 1998
0084            CALL MOVB(CARD(I),1,CARD(I),0,J)
0085            GO TO 1999
0086     1998   IF(CARD(I).EQ.EQUALS) CARD(I)=COMMA
0087     19     CONTINUE
55       C
0088            IF(CMPB('THICKNESS' ,,CARD,,9 ).EQ.0) GO TO 20
0089            IF(CMPB('MANDREL(1)',,CARD,,10).EQ.0) GO TO 30
0090            IF(CMPB('MANDREL(2)',,CARD,,10).EQ.0) GO TO 35
0091            IF(CMPB('INITIAL(1)',,CARD,,10).EQ.0) GO TO 40
0092            IF(CMPB('INITIAL(2)',,CARD,,10).EQ.0) GO TO 45
0093            IF(CMPB('PLY'       ,,CARD,,3 ).EQ.0) GO TO 50
0094            IF(CMPB('FINAL(1)'  ,,CARD,,8 ).EQ.0) GO TO 60
0095            IF(CMPB('FINAL(2)'  ,,CARD,,8 ).EQ.0) GO TO 65
0096            IF(CMPB('REFSTATION',,CARD,,10).EQ.0) GO TO 70
0097            IF(CMPB('BREAK'     ,,CARD,,5 ).EQ.0) GO TO 80
0098            IF(CMPB('CYLTRAVEL' ,,CARD,,9 ).EQ.0) GO TO 90
0099            IF(CMPB('END'       ,,CARD,,3 ).EQ.0) GO TO 1090
0100            CALL ERR(7,1)
0101            GO TO 10
                C
                C       TAPE THICKNESS CARD COMES HERE.
                C
0102     20     DECODE(80,21,CARD)THICK
0103     21     FORMAT(9X,F10.0)
0104            GO TO 10
                C
                C       MANDREL PARAMETERS ARE DECODED HERE.
                C
0105     30     DECODE(80,31,CARD)XM,YM,ZM,DM
0106     31     FORMAT(10X,6F11.0)
0107            RM=DM/2.0
0108            MFLAG=.TRUE.
```

```
0109            GO TO 10
0110      35    DECODE(80,31,CARD)XM2,YM2,ZM2,WINDUP,BACKUP,PULOUT
0111            M2FLAG=.TRUE.
0112            GO TO 10
          C
          C       INITIAL HEAD CO-ORDINATES ARE DECODED HERE.
          C
0113      40    DECODE(80,41,CARD)X0,Y0,Z0
0114      41    FORMAT(10X,3F11.0)
0115            IFLAG=.TRUE.
0116            GO TO 10
0117      45    DECODE(80,41,CARD)X20,Y20,Z20
0118            I2FLAG=.TRUE.
0119            GO TO 10
          C
          C       PLY INFORMATION COMES HERE.
          C
0120      50    PLYMAX=PLYMAX+1
0121            IF(PLYMAX.GT.256) CALL ERR(1,0)
0122            DECODE(80,51,CARD)PLYNUM(PLYMAX),PLYLEN(PLYMAX)
0123      51    FORMAT(3X,I6,F10.0)
0124            GO TO 10
          C
          C       FINAL HEAD POSITION GETS DECODED HERE.
          C
0125      60    DECODE(80,61,CARD)XFINAL,YFINAL,ZFINAL
0126      61    FORMAT(8X,3F11.0)
0127            FFLAG=.TRUE.
0128            GO TO 10
0129      65    DECODE(80,61,CARD)X2FINL,Y2FINL,Z2FINL
0130            F2FLAG=.TRUE.
0131            GO TO 10
          C
          C       REFERENCE STATION CARD COMES HERE.
          C
0132      70    DECODE(80,71,CARD)REFSTN
0133      71    FORMAT(10X,F11.0)
0134            GO TO 10
          C
          C       BREAK CARD PROCESSED HERE.
          C
0135      80    DECODE(80,81,CARD)P2MIN
0136      81    FORMAT(5X,I10)
0137            GO TO 10
          C
          C       CYLINDER TRAVEL CARD COMES HERE.
          C
0138      90    DECODE(80,91,CARD)TRAVEL
0139      91    FORMAT(9X,F10.0)
0140            GO TO 10
          C
          C       END-OF-INPUT PHASE.
          C
0141      1090  IF(MFLAG.EQ..FALSE.) CALL ERR(9,0)
0142            IF(PLYMAX.LT.2) CALL ERR(2,0)
0143            DO 1092 I=2,PLYMAX
```

```
0144            J=0
0145            DO 1091 K=I,PLYMAX
0146            IF(PLYNUM(K-1).LE.PLYNUM(K)) GO TO 1091
0147            J=1
0148            ITEMP=PLYNUM(K-1)
0149            RTEMP=PLYLEN(K-1)
0150            PLYNUM(K-1)=PLYNUM(K)
0151            PLYLEN(K-1)=PLYLEN(K)
0152            PLYNUM(K)=ITEMP
0153            PLYLEN(K)=RTEMP
0154     1091   CONTINUE
0155            IF(J.EQ.0) GO TO 1093
0156     1092   CONTINUE
               C
               C       CHECK PLY LENGTHS.
               C
0157     1093   IF(PLYNUM(1).NE.1) CALL ERR(3,0)
0158            IF(PLYLEN(1).LT.REFSTN) CALL ERR(4,0)
0159            PLYLEN(1)=PLYLEN(1)-REFSTN
0160            RTEMP=2.0*PLYLEN(1)+PI*RM
0161            IF(RTEMP.LE.SHRLEN) CALL ERR(8,0)
0162            DO 1094 I=2,PLYMAX
0163            PLYLEN(I)=PLYLEN(I)-REFSTN
0164            IF(PLYNUM(I-1).EQ.PLYNUM(I)) CALL ERR(6,0)
0165            IF(PLYLEN(I-1).LE.PLYLEN(I) .AND. I.EQ.PLYMAX) GO TO 1094
0166            IF(PLYLEN(I-1).GE.PLYLEN(I)) CALL ERR(4,0)
0167            TANGNT=(PLYLEN(I)-PLYLEN(I-1))/((PLYNUM(I)-PLYNUM(I-1))*THICK)
0168            IF(TANGNT.LT.3.0) CALL ERR(5,0)
0169     1094   CONTINUE
               C
               C       CHECK OUT PART 2 PARAMETERS.
               C
0170            IF(PULOUT.EQ.0.0 .OR.
                +   BACKUP.EQ.0.0 .OR.
                +   WINDUP.EQ.0.0 .OR.
                +   PULOUT.LT.BACKUP .OR.
                +   BACKUP.LT.WINDUP .OR.
                +   WINDUP.LT.XM2         ) CALL ERR(10,0)
               C
0171            WRITE(6, 1095)
0172            WRITE(16,1095)
0173     1095   FORMAT(1X)

               C
               C       DO SOME MORE INITIALIZATION.....
               C
0174            BASE=ZM+RM
0175            TBASE=BASE-TRAVEL/2.0
0176            CALL DELETE(2)
               C
               C       DO TAPE PREAMBLE
               C
0177     100    CALL BOT(2,0)
0178            CALL BUILD('G',1)
0179            CALL BUILD('G',90)
0180            CALL PUNCH
```

```
0181            IF(IFLAG.EQ..TRUE.) CALL MOVE(X0,Y0,Z0)
0182            Y=YM-PLYLEN(1)-1.0
0183            Z=BASE+3.0
0184            CALL MOVE(XM,Y,Z)
0185            CALL MOVE(,,,0.0,270.0,-0.0001)
0186            CALL HEAD(ON)
0187            CALL CLAMP(ON)
        C
        C         LAY PLY #1
        C
0188    200     L1=PLYLEN(1)
0189            L2=PI*RM
0190            L3=L1
0191            TOTLEN(1)=TOTLEN(1)+L1+L2+L3
        C
0192            PLY=1
0193            BFLAG=.TRUE.
0194            IF(P2MIN.LE.0 .AND. SHRLEN.LT.L3+0.5) GO TO 400
        C
0195            ITYPE=1
0196            IF(SHRLEN.LT.L2+L3) ITYPE=2
0197            IF(SHRLEN.LT.   L3) ITYPE=3
        C
        C         DO PLY #1 SEGMENT 0.
        C
0198            NCODE=1
0199            Z=BASE+1.0
0200            CALL MOVE(,,Z,,,,NCODE)
0201            Y=YM-PLYLEN(1)
0202            CALL MOVE(,Y,BASE)
0203            CALL MOVE(,,TBASE)
0204            CALL CLAMP(OFF)
        C
        C         DO PLY #1 SEGMENT 1.
0205    210     IF(ITYPE.NE.1) GO TO 215
0206            Y=YM-(SHRLEN-L2-L3)
0207            CALL MOVE(,Y)
0208            CALL SHEAR
0209    215     CALL MOVE(,YM)
        C
        C         DO PLY #1 SEGMENT 2.
0210    220     IF(ITYPE.NE.2) GO TO 225
0211            D=180.0*(L2+L3-SHRLEN)/L2
0212            CALL MOVE(,,,,,D)
0213            CALL SHEAR
0214    225     CALL MOVE(,,,,,180.0)
        C
        C         DO PLY #1 SEGMENT 3.
0215    230     IF(ITYPE.NE.3) GO TO 235
0216            Y=YM+(PLYLEN(1)-SHRLEN)
0217            CALL MOVE(,Y)
0218            CALL SHEAR
0219    235     Y=YM+PLYLEN(1)
0220            CALL MOVE(,Y)
        C
        C         DO PLY #1 SEGMENT 4.
```

```
0221    240   CALL CLAMP(ON)
0222          Z=BASE+THICK
0223          CALL MOVE(,,Z)
0224          Y=Y+1
0225          Z=BASE+1
0226          CALL MOVE(,Y,Z)
0227          Z=Z+2
0228          CALL MOVE(,,Z)
      C
      C       LAY THE REST OF THE "PART 1"  PLIES BY STEPPING THROUTH THE PLY TABLES
      C
0229    300   DO 380 PLY=2,PLYMAX
0230          N1=PLYNUM(PLY-1)+1
0231          N2=PLYNUM(PLY)
0232          M2=PLY-1
0233          YINC=(PLYLEN(PLY)-PLYLEN(PLY-1))/(N2-(N1-1))
      C
      C       TEMPORARILY SAVE THE ACTUAL PARAMETERS FOR THIS PLY TABLE ENTRY
      C       AND SETUP FOR DYNAMIC MODIFICATION WITHIN THE NEXT DO LOOP.
      C
0234          SAVLEN=PLYLEN(PLY)
0235          PLYNUM(PLY)=PLYNUM(PLY-1)
0236          PLYLEN(PLY)=PLYLEN(PLY-1)
      C
      C       STEP THROUGH EACH PLY FOR THIS GROUP.
      C
0237          DO 370 NCODE=N1,N2
0238          DIR=-DIR
      C
      C       DYNAMICALLY MODIFY THE CURRENT PLY LENGTH AND NUMBER.
      C
0239          PLYNUM(PLY)=NCODE
0240          PLYLEN(PLY)=PLYLEN(PLY)+YINC
      C
      C       CALCULATE L1,L2 AND L3
      C
0241          L1=PLYLEN(1)
0242          L2=PI*(RM+(NCODE-1)*THICK)
0243          DO 310 I=2,PLY
0244          YSIDE=PLYLEN(I)-PLYLEN(I-1)
0245          ZSIDE=PLYNUM(I)*THICK
0246          RTEMP=YSIDE*YSIDE+ZSIDE*ZSIDE
0247    310   L1=L1+SQRT(RTEMP)
0248          L3=L1
0249          TOTLEN(1)=TOTLEN(1)+L1+L2+L3
      C
0250          BFLAG=.TRUE.
0251          IF(P2MIN.EQ.NCODE) GO TO 400
0252          IF(P2MIN.LE.0 .AND. SHRLEN+0.5.LT.L3) GO TO 400
      C
0253          SHRXXX=L1+L2+L3-SHRLEN
0254          CURLEN=0.0
      C
      C       DO PLY #NCODE SEGMENT 0.
      C
0255          Y=YM+DIR*(PLYLEN(PLY)+1.0)
```

```
0256            C=180.0-DIR*90.0
0257            CALL MOVE(,Y,,,C)
0258            Z=BASE+1.0
0259            CALL MOVE(,,Z,,,,NCODE)
0260            Y=YM+DIR*PLYLEN(PLY)
0261            CALL MOVE(,Y,BASE)
0262            CALL MOVE(,,TBASE)
0263            CALL CLAMP(OFF)
          C
          C       SAVE CURRENT Y AND Z CO-ORDINATES FOR THE NEXT PART.
          C
0264            YCUR=Y
0265            ZCUR=TBASE
          C
          C       LAY PLY #NCODE SEGMENT 1.
          C
0266      330   DO 339 I=1,PLY
0267            IPLY=PLY-I
0268            JPLY=PLY-I+1
          C
          C       CALCULATE NEW Y AND Z CO-ORDINATES.
          C
0269            IF(IPLY.EQ.0) YNEW=YM
0270            IF(IPLY.GT.0) YNEW=YM+DIR*PLYLEN(IPLY)
0271            IF(IPLY.EQ.0) ZNEW=TBASE+THICK*PLYNUM(PLY)
0272            IF(IPLY.GT.0) ZNEW=ZCUR+THICK*(PLYNUM(JPLY)-PLYNUM(IPLY))
          C
          C       CALCULATE RIGHT TRIANGLE AND STUFF.
          C
0273            YSIDE=YNEW-YCUR
0274            ZSIDE=ZNEW-ZCUR
0275            RTEMP=YSIDE*YSIDE+ZSIDE*ZSIDE
0276            RTEMP=SQRT(RTEMP)
          C
          C       SEE IF IT IS TIME TO CUT AND TAKE CARE OF IT IF SO.
          C
0277            IF(CURLEN.GT.SHRXXX .OR. CURLEN+RTEMP.LT.SHRXXX) GO TO 335
0278            FACTOR=(SHRXXX-CURLEN)/RTEMP
0279            Y=YCUR+YSIDE*FACTOR
0280            Z=ZCUR+ZSIDE*FACTOR
0281            CALL MOVE(,Y,Z)
0282            CALL SHEAR
0283      335   CALL MOVE(,YNEW,ZNEW)
0284            YCUR=YNEW
0285            ZCUR=ZNEW
0286            CURLEN=CURLEN+RTEMP
0287      339   CONTINUE
          C
          C       LAY PLY #NCODE SEGMENT 2.
          C
0288      340   RTEMP=PI*(RM+THICK*PLYNUM(PLY))
0289            IF(CURLEN.GT.SHRXXX .OR. CURLEN+RTEMP.LT.SHRXXX) GO TO 345
0290            D=-DIR*90.0*(1.0+DIR)+(180.0*(SHRXXX-CURLEN)/RTEMP)
0291            CALL MOVE(,,,,,D)
0292            CALL SHEAR
0293      345   IF(DIR.EQ.1) D=-.0001
```

```
0294            IF(DIR.EQ.-1) D=180.0
0295            IF(DIR.NE.1 .AND. DIR.NE.-1) STOP 12345
0296            CALL MOVE(,,,,D)
0297            CURLEN=CURLEN+RTEMP
          C
          C       LAY PLY #NCODE SEGMENT 3.
          C
0298      350   DO 359 I=1,PLY
0299            IPLY=I-1
0300            JPLY=I
          C
          C       CALCULATE NEW Y AND Z CO-ORDINATES.
          C
0301            YNEW=YM-DIR*PLYLEN(JPLY)
0302            IF(IPLY.EQ.0) ZNEW=ZCUR-THICK
0303            IF(IPLY.GT.0) ZNEW=ZCUR-THICK*(PLYNUM(JPLY)-PLYNUM(IPLY))
          C
          C       CALCULATE RIGHT TRIANGLE AND STUFF.
          C
0304            YSIDE=YNEW-YCUR
0305            ZSIDE=ZNEW-ZCUR
0306            RTEMP=YSIDE*YSIDE+ZSIDE*ZSIDE
0307            RTEMP=SQRT(RTEMP)
          C
          C       SEE IF IT IS TIME TO CUT AND TAKE CARE OF IT IF SO.
          C
0308            IF(CURLEN.GT.SHRXXX .OR. CURLEN+RTEMP.LT.SHRXXX) GO TO 355
0309            FACTOR=(SHRXXX-CURLEN)/RTEMP
0310            Y=YCUR+YSIDE*FACTOR
0311            Z=ZCUR+ZSIDE*FACTOR
0312            CALL MOVE(,Y,Z)
0313            CALL SHEAR
0314      355   CALL MOVE(,YNEW,ZNEW)
0315            YCUR=YNEW
0316            ZCUR=ZNEW
0317            CURLEN=CURLEN+RTEMP
0318      359   CONTINUE
          C
          C       LAY PLY #NCODE SEGMENT 4.
          C
0319      360   CALL CLAMP(ON)
0320            Z=BASE+THICK
0321            CALL MOVE(,,Z)
0322            Y=YM-DIR*(PLYLEN(PLY)+1.0)
0323            Z=Z+1.0
0324            CALL MOVE(,Y,Z)
0325            Z=Z+2.0
0326            CALL MOVE(,,Z)
          C
          C       TERMINATE THE LOOP THAT GOES BETWEEN TABLE ENTRIES.
          C
0327      370   CONTINUE
          C
          C       RESTORE THIS TABLE ENTRY (WHICH SHOULD BE RIGHT BUT JUST IN CASE)
          C       AND FINISH UP THE TABLE SCAN LOOP.
          C
```

```
0328            PLYNUM(PLY)=N2
0329            PLYLEN(PLY)=SAVLEN
0330      380   CONTINUE
0331            BFLAG=.FALSE.
          C
          C       FINISH UP.
          C
0332      400   CALL HEAD(OFF)
0333            IF(FFLAG.EQ..TRUE.) CALL MOVE(XFINAL,YFINAL,ZFINAL)
0334            CALL EOT
0335            IF(BFLAG.EQ..FALSE.) GO TO 900

          C
          C       DO PART 2....
          C
          C       INITIALIZE....
          C
0336      500   BASE=ZM2+RM
0337            TBASE=BASE-TRAVEL/2.0
0338            CLAMPX=3.5
0339            WINDEL=THICK*(XM2-WINDUP)/(RM+THICK*PLYNUM(PLY))
0340            WINDEL=ABS(WINDEL)
0341            DIR=-1.0
0342            CALL DELETE(3)
          C
          C       DO "PART 2" PREAMBLE.
          C
0343            CALL BOT(3,0)
0344            CALL BUILD('G',1)
0345            CALL BUILD('G',90)
0346            CALL PUNCH
0347            CALL HEAD(ON)
0348            Z=BASE+3.0
0349            CALL MOVE(0.0,0.0,Z,0.0,180.0,0.0)
0350            IF(I2FLAG.EQ..TRUE.) CALL MOVE(X20,Y20,Z20)
0351            IF(I2FLAG.EQ..FALSE. .OR. YM2.NE.Y20) CALL MOVE(,YM2)
0352            CALL CLAMP(ON)
          C
          C       NOTE THAT BFLAG=.TRUE. HERE....
          C
0353            NPLY=PLY
0354            N1=NCODE
          C
          C       LAY REST OF PART 2 PLIES BY STEPPING THROUGH THE PLY TABLE.
          C
0355            DO 580 PLY=NPLY,PLYMAX
0356            IF(BFLAG.EQ..TRUE.) GO TO 501
0357            N1=PLYNUM(PLY-1)+1
0358            N2=PLYNUM(PLY)
0359            M2=PLY-1
0360            YINC=(PLYLEN(PLY)-PLYLEN(PLY-1))/(N2-(N1-1))
          C
          C       TEMPORARILY SAVE THE ACTUAL PARAMETERS FOR THIS PLY TABLE ENTRY
          C       AND SETUP FOR DYNAMIC MODIFICATION WITHIN THE NEXT DO LOOP.
          C
0361            SAVLEN=PLYLEN(PLY)
```

```
0362            PLYNUM(PLY)=PLYNUM(PLY-1)
0363            PLYLEN(PLY)=PLYLEN(PLY-1)
0364      501   CONTINUE
          C
          C       STEP THROUGH EACH PLY FOR THIS GROUP.
          C
0365            DO 570 NCODE=N1,N2
0366            DIR=-DIR
          C
          C       DYNAMICALLY MODIFY THE CURRENT PLY LENGTH AND NUMBER.
          C
0367            IF(BFLAG.EQ..TRUE.) GO TO 502
0368            PLYNUM(PLY)=NCODE
0369            PLYLEN(PLY)=PLYLEN(PLY)+YINC
0370      502   CONTINUE
          C
          C       CALCULATE L1
          C
0371            L1=PLYLEN(1)
0372            L2=PI*(RM+(NCODE-1)*THICK)
0373            DO 510 I=2,PLY
0374            XSIDE=PLYLEN(I)-PLYLEN(I-1)
0375            ZSIDE=PLYNUM(I)*THICK
0376            RTEMP=XSIDE*XSIDE+ZSIDE*ZSIDE
0377      510   L1=L1+SQRT(RTEMP)
0378            TOTLEN(2)=TOTLEN(2)+L1+L2+L3
0379            SHRXXX=L1-SHRLEN
0380            IF(SHRXXX.LT.0.0) CALL ERR(11,0)
0381            IF(SHRXXX.EQ.0.0) CALL ERR(12,1)
0382            IF(CLAMPX.LT.0.0) CALL ERR(13,0)
0383            IF(CLAMPX.EQ.0.0) CALL ERR(14,1)
0384            CURLEN=0.0
          C
          C       LAY THIS PLY.
          C
0385            X=XM2-PLYLEN(PLY)-1.0
0386            CALL MOVE(X)
0387            Z=BASE+1.0
0388            CALL MOVE(,,Z,,,,NCODE)
0389            X=XM2-PLYLEN(PLY)
0390            CALL MOVE(X,,BASE)
0391            CALL MOVE(,,TBASE)
0392            CALL CLAMP(OFF)
0393            ZCUR=TBASE
          C
0394      530   DO 539 I=1,PLY
0395            IPLY=PLY-I
0396            JPLY=PLY-I+1
          C
          C       CALCULATE NEW X AND Z CO-ORDINATES.
          C
0397            IF(IPLY.EQ.0) XNEW=XM2
0398            IF(IPLY.GT.0) XNEW=XM2-PLYLEN(IPLY)
0399            IF(IPLY.EQ.0) ZNEW=TBASE+THICK*PLYNUM(PLY)
0400            IF(IPLY.GT.0) ZNEW=ZCUR+THICK*(PLYNUM(JPLY)-PLYNUM(IPLY))
0401            CALL MOVE(XNEW,,ZNEW)
```

```
0402            ZCUR=ZNEW
0403      539   CONTINUE
                C
0404            CALL MOVE(PULOUT)
0405            CALL MOVE(BACKUP)
0406            D=90.0*(DIR+1.0)
0407            CALL MOVE(,,,,359.99,D)
0408            CALL MOVE(WINDUP)
0409            WINDUP=WINDUP-WINDEL
0410            CALL SLIT(ON)
0411            CALL DELAY(5.0)
0412            CALL CLAMP(ON)
0413            CALL MOVE(XM2)
0414            XCUR=XM2
                C
0415      550   DO 559 I=1,PLY
0416            IPLY=I-1
0417            JPLY=I
                C
                C       CALCULATE NEW X AND Z CO-ORDINATES.
                C
0418            XNEW=XM2-PLYLEN(JPLY)
0419            IF(IPLY.EQ.0) ZNEW=ZCUR-THICK
0420            IF(IPLY.GT.0) ZNEW=ZCUR-THICK*(PLYNUM(JPLY)-PLYNUM(IPLY))
                C
                C       FIGURE RIGHT TRIANGLE AND STUFF.
                C
0421            XSIDE=XNEW-XCUR
0422            ZSIDE=ZNEW-ZCUR
0423            RTEMP=XSIDE*XSIDE+ZSIDE*ZSIDE
0424            RTEMP=SQRT(RTEMP)
                C
                C       SET CONTROL VARIABLES FOR THE NEXT PART.
                C
0425            CFLAG=.FALSE.
0426            SFLAG=.FALSE.
0427            CBSFLG=.FALSE.
0428            IF(CLAMPX.GE.CURLEN .AND. CLAMPX.LT.CURLEN+RTEMP) CFLAG=.TRUE.
0429            IF(SHRXXX.GE.CURLEN .AND. SHRXXX.LT.CURLEN+RTEMP) SFLAG=.TRUE.
0430            IF(CLAMPX.LT.SHRXXX) CBSFLG=.TRUE.
                C
                C       TAKE CARE OF CLAMP AND SHEAR HERE.
                C
0431            IF(CFLAG.EQ..FALSE. .OR. CBSFLG.EQ..FALSE.) GO TO 551
0432            FACTOR=(CLAMPX-CURLEN)/RTEMP
0433            X=XCUR+XSIDE*FACTOR
0434            Z=ZCUR+ZSIDE*FACTOR
0435            CALL MOVE(X,,Z)
0436            CALL SLIT(OFF)
0437            CALL CLAMP(OFF)
0438            XSIDE=X-XCUR
0439            ZSIDE=Z-ZCUR
0440            RTEMP=XSIDE*XSIDE+ZSIDE*ZSIDE
0441            RTEMP=SQRT(RTEMP)
0442            CURLEN=CURLEN+RTEMP
0443            XCUR=X
```

```
0444            ZCUR=Z
                C
0445      551   IF(SFLAG.EQ..FALSE.) GO TO 552
0446            FACTOR=(SHRXXX-CURLEN)/RTEMP
0447            X=XCUR+XSIDE*FACTOR
0448            Z=ZCUR+ZSIDE*FACTOR
0449            CALL MOVE(X,,Z)
0450            CALL SHEAR
0451            XSIDE=X-XCUR
0452            ZSIDE=Z-ZCUR
0453            RTEMP=XSIDE*XSIDE+ZSIDE*ZSIDE
0454            RTEMP=SQRT(RTEMP)
0455            CURLEN=CURLEN+RTEMP
0456            XCUR=X
0457            ZCUR=Z
                C
0458      552   IF(CFLAG.EQ..FALSE. .OR. CBSFLG.EQ..TRUE.) GO TO 557
0459            FACTOR=(CLAMPX-CURLEN)/RTEMP
0460            X=XCUR+XSIDE*FACTOR
0461            Z=ZCUR+ZSIDE*FACTOR
0462            CALL MOVE(X,,Z)
0463            CALL SLIT(OFF)
0464            CALL CLAMP(OFF)
0465            XSIDE=X-XCUR
0466            ZSIDE=Z-ZCUR
0467            RTEMP=XSIDE*XSIDE+ZSIDE*ZSIDE
0468            RTEMP=SQRT(RTEMP)
0469            CURLEN=CURLEN+RTEMP
0470            XCUR=X
0471            ZCUR=Z
                C
                C       FINISH UP THIS SEGMENT.
                C
0472      557   CALL MOVE(XNEW,,ZNEW)
                C
                C       CALCULATE RIGHT TRIANGLE AND STUFF.
                C
0473      558   XSIDE=XNEW-XCUR
0474            ZSIDE=ZNEW-ZCUR
0475            RTEMP=XSIDE*XSIDE+ZSIDE*ZSIDE
0476            RTEMP=SQRT(RTEMP)
0477            CURLEN=CURLEN+RTEMP
0478            XCUR=XNEW
0479            ZCUR=ZNEW
0480      559   CONTINUE
                C
                C       FINISH UP THIS PLY....
                C
0481            CALL CLAMP(ON)
0482            Z=BASE+THICK
0483            CALL MOVE(,,Z)
0484            X=XNEW-1.0
0485            Z=Z+1.0
0486            CALL MOVE(X,,Z)
0487            Z=Z+2.0
0488            CALL MOVE(,,Z)
```

```
0489          CALL MOVE(,,,,180.0)
              C
              C       TERMINATE THE LOOP THAT GOES BETWEEN TABLE ENTRIES.
              C
0490          BFLAG=.FALSE.
0491     570  CONTINUE
              C
              C       RESTORE THIS TABLE ENTRY (WHICH SHOULD BE RIGHT BUT JUST IN CASE...),
              C       AND FINISH UP THE TABLE SCAN LOOP.
              C
0492          PLYNUM(PLY)=N2
0493          PLYLEN(PLY)=SAVLEN
0494     580  CONTINUE
              C
              C       FINISH UP.
              C
0495     600  CALL HEAD(OFF)
0496          IF(F2FLAG.EQ..TRUE.) CALL MOVE(X2FINL,Y2FINL,Z2FINL)
0497          CALL EOT
              C
              C
              C
0498     900  TOTLEN(1)=TOTLEN(1)/12.0
0499          TOTLEN(2)=TOTLEN(2)/12.0
0500          WRITE(6,901)TAB,TOTLEN(1),TAB,TOTLEN(2)
0501     901  FORMAT(1X,A1,'TOTAL FIBERGLASS TAPE LENGTH: PART 1 =',F7.1' FT'/
             +       1X,A1,'                             PART 2 =',F7.1' FT')
0502          CALL EXIT
0503          E N D
```

99

```
ROUTINES CALLED:
CMPB   , DELETE, ASSIGN, FILLB , DATE   , TIME   , MOVB
ERR    , BOT   , BUILD , PUNCH , MOVE   , HEAD   , CLAMP
SHEAR , SQRT  , EOT   , ABS   , SLIT  , DELAY , EXIT


OPTIONS =/ON,/OP:1

BLOCK        LENGTH
MAIN.    6094    (027634)*

**COMPILER ----- CORE**
   PHASE       USED  FREE
DECLARATIVES 00622 14434
EXECUTABLES  02223 12833
ASSEMBLY     03167 16529
```

2.4 PTDUMP - Paper Tape Dump

Purpose: To punch ATLS control tape data stored in the system data storage into paper tape.

Calling Sequence and Arguments: N.A.

Called By: N.A.

Subroutines Called:

ASSIGN	DATE
MRL	TIME
PCHAR	CHAR
FILLB	PCLOSE
MOVB	EXIT

Diagnostics: None.

Detailed Description: Program PTDUMP first interrogates the operator and reads an optional text string to be punched as man-readable leader. This string is punched into the paper tape along with the current data and time. Following this, twenty inches of blank tape are punched followed by ASCII carriage return and line feed characters. The control tape file is then scanned character by character and punched into the output tape in ASCII.

```
      CCCC
```

```
0041            WRITE(16,91)COUNT
0042     91     FORMAT('+',I5,' LINES PROCESSED'/)
0043            CALL EXIT
0044            E N D
```

```
        ROUTINES CALLED:
        ASSIGN, MRL   , PCHAR , FILLB , MOVB  , DATE  , TIME
        CHAR  , EPARTY, PCLOSE, EXIT

        OPTIONS =/ON,/OP:1

        BLOCK        LENGTH
        MAIN.   683     (002526)*
        CHRCOM  2       (000004)

        **COMPILER ----- CORE**
           PHASE       USED  FREE
        DECLARATIVES 00622 14434
        EXECUTABLES  01043 14013
        ASSEMBLY     01340 18356
```

2.5 PTLOAD - Paper Tape Loader

Purpose: To read ATLS control tapes and enter them into the system data storage.

Calling Sequence and Arguments: N.A.

Called By: N.A.

Subroutines Called:
ASSIGN
CHAR
EXIT

Diagnostics: None.

Detailed Description: Program PTLOAD first interrogates the operator and reads a file name for the control tape that is to be stored in the system data storage. Subroutine CHAR is successively called to get characters from the input tape and to assemble them into a line. When an end-of-block code is encountered, the currently accumulated line is written to the system data storage. This process continues until the physical end of the input tape is encountered and the program terminates.

```
      CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
      C                                                                             C
      C       PROGRAM "PTLOAD" PRODUCES AN ASCII FILE FROM AN ATLAS CONTROL         C
      C       TAPE.  THIS TAPE MAY BE EITHER ASCII OR EIA CODES.  THE OUTPUT        C
      C       FILE WILL CONTAIN CR/LF AS A LINE TERMINATOR INSTEAD OF JUST          C
      C       A CR                                                                  C
      C                                                                             C
      CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
      C
      C
0001          IMPLICIT INTEGER (A-Z)
0002          INTEGER OUTBUF(132),INBUF(20)
0003          LOGICAL SCANSW,EIAFLG
0004          COMMON/CHRCOM/SCANSW,EIAFLG
      C
      C       DO SOME INITIALIZATION....
      C
0005          CALL ASSIGN(15,'KB:',0)
0006          CALL ASSIGN(16,'KB:',0)
0007          WRITE(16,1)
0008    1     FORMAT('$ENTER OUTPUT FILENAME....')
0009          READ(15,2)INBUF
0010    2     FORMAT(20A2)
0011          CALL ASSIGN(6,INBUF,40)
0012          WRITE(6,3)
0013    3     FORMAT(1X)
0014          SCANSW=.TRUE.
0015          NUM=0
      C
      C       GET ONE CHARACTER AT A TIME UNTIL YOU GET THE WHOLE LINE.
      C
0016    10    I=0
0017    30    C=CHAR()
0018          IF(C)98,50,40
0019    40    I=I+1
0020          OUTBUF(I)=C
0021          IF(I.GE.132) I=131
0022          GO TO 30
0023    50    IF(I.EQ.0) GO TO 30
0024          WRITE(6,51)(OUTBUF(J),J=1,I)
0025    51    FORMAT(132A1)
0026          NUM=NUM+1
0027          GO TO 10
      C
0028    98    WRITE(16,99)NUM
0029    99    FORMAT(I7,' RECORDS COPIED')
0030          CALL EXIT
0031          E N D


      ROUTINES CALLED:
      ASSIGN, CHAR  , EXIT

      OPTIONS =/ON,/OP:1

      BLOCK       LENGTH
      MAIN.   442     (001564)*
      CHRCOM  2       (000004)
```

3. SUBROUTINES

3.1 ANSWER

Purpose: Subroutine to retrieve keyboard input from the Tektronix graphic display unit.

Calling Sequence and Arguments:

```
CALL ANSWER(ANSBUF)
```

where:

ANSBUF is a 24 byte array where the response is returned as a string of ASCII characters.

Called by: RESET

Subroutines Called:		
	ANMODE	TINPUT
	CLRB	ANCHO
	BELL	NEWLIN

Diagnostics: None

Detailed Description: Upon entry, the 24 byte argument buffer is cleared to all zeros. Subroutine TINPUT is then called iteratively and each character is stored in sequential bytes of the argument array. As each character is received, it is also echoed back to the terminal. When a carriage return character is encountered, subroutine NEWLIN is called to position the cursor to the beginning of the next line and the subroutine returns.

```
FORTRAN V06.13                  10:18:58    03-OCT-76   PAGE    1

0001          SUBROUTINE ANSWER(ANSBUF)
              C
              CCCC
```

3.2 BOT

Purpose: Subroutine to initialize a control tape file.

Calling Sequence and Arguments:

CALL BOT(NUNIT,STRING)

where:

NUNIT is an integer FORTRAN logical unit number.

STRING is byte array containing a string of up to 80 ASCII characters terminated by a character of binary zeros.

Called by: PLYGEN

Subroutines Called: None

Diagnostics: None

Detailed Description: This subroutine first moves the character string into a local buffer and calculates its length (not including the null byte). If this length is zero, the subroutine writes a single end-of-block (carriage return and line feed) and returns. If the string length is greater than zero, that string is written to the control tape file and the subroutine returns. In either of the above cases, the control tape file is on the FORTRAN logical unit number specified by the first argument.

```
FORTRAN V06.13                  10:21:11    03-OCT-76   PAGE    1

0001            SUBROUTINE BOT(NUNIT,STRING)
        C
        CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
        C                                                                             C
        C       SUBROUTINE TO PUNCH "MAN-READABLE LEADER" AND OTHERWISE               C
        C       INITIALIZE THE TAPE.                                                  C
        C                                                                             C
        CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
        C
        C
0002            INTEGER TPTR,MODE,UNIT
0003            BYTE TAPE(80)
0004            BYTE STRING(80),LCLSTR(80)
0005            COMMON/TAPCOM/TPTR,TAPE,MODE,UNIT
        C
0006            UNIT=NUNIT
0007            TPTR=1
        C
0008            DO 10 J=1,80
0009            IF(STRING(J).EQ.0) GO TO 20
0010    10      LCLSTR(J)=STRING(J)
0011            J=81
0012    20      J=J-1
0013            IF(J.GT.0) GO TO 30
0014            WRITE(UNIT,100)
0015    100     FORMAT(/)
0016            RETURN
        C
0017    30      WRITE(UNIT,101)(LCLSTR(K),K=1,J)
0018    101     FORMAT(80A1)
0019            RETURN
0020            E N D


        OPTIONS =/ON,/OP:1

        BLOCK        LENGTH
        BOT      190     (000574)*
        TAPCOM   43      (000126)

        **COMPILER ----- CORE**
           PHASE       USED  FREE
        DECLARATIVES  00622 14434
        EXECUTABLES   00795 14261
        ASSEMBLY      01056 18640
```

3.3 BUILD

Purpose: Subroutine to assemble ATLS control codes into a block to be written to the control tape file.

Calling Sequence and Arguments:

```
CALL BUILD(C,V)
```

where:

C - an ASCII character indicating the control code type
V - a real number with the value of that code.

Called By: PLYGEN et. al.

Subroutines Called: FILLB
MOVB

Diagnostics: STOP 177777 - Invalid C character
STOP 177776 - Buffer overflow.

Detailed Description: This subroutine starts by searching an internal table of valid control code type characters for a match on the first argument. When a match is found, control is transferred to the appropriate routine to service this control code. Each service routine scales the real number by the appropriate factor of ten and formats it into a string of ASCII characters using the ENCODE facility of the FORTRAN system. The characters are then moved into the next sequentially available bytes of the output buffer and the routine returns to the caller.

```
0001            SUBROUTINE BUILD(C,V)
                C
                CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
                C                                                                                     C
                C       SUBROUTINE TO BUILD CONTROL CODES INTO A TAPE BUFFER.                         C
                C       THE TAPE MUST BE SUBSEQUENTLY BE PUNCHED BY "CALL PUNCH"                      C
                C                                                                                     C
                CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
                C
                C
0002            BYTE C,CTBL(14),WORK(10),BLANK
0003            BYTE TAPE(80)
0004            REAL V,RV
0005            INTEGER TPTR,MODE,UNIT,IV
0006            EQUIVALENCE(RV,IV)
0007            COMMON/TAPCOM/TPTR,TAPE,MODE,UNIT
0008            DATA CTBL/1HN,1HG,1HM,1HS,1HX,1HY,1HZ,1HA,1HC,1HD,1HI,1HJ,1HK,1HF/
0009            DATA BLANK/' '/
                C
                C       DO SOME INITIAL CHECKS.
                C
0010            IF(TPTR.GT.72) STOP 177776
0011            IF(TPTR.GT.1) GO TO 100
0012            TPTR=1
0013            CALL FILLB(' ',,TAPE,,80)
0014            MODE=-1
                C
                C       PROCESS THIS CALL.
                C
0015    100     CALL FILLB(' ',,WORK,,10)
0016            TAPE(TPTR)=C
0017            TPTR=TPTR+1
0018            RV=V
0019            DO 110 I=1,14
0020            IF(CTBL(I).EQ.C) GO TO 120
0021    110     CONTINUE
0022            STOP 177777
0023    120     GO TO (1,2,3,3,5,5,5,5,9,5,5,5,5,14),I
                C
                C       N CODE COMES HERE.
                C
0024    1       ENCODE(4,901,WORK)IV
0025    901     FORMAT(I4)
0026            CALL MOVB(WORK,,TAPE(TPTR),,4)
0027            ISIZE=4
0028            GO TO 990
                C
                C       G CODE COMES HERE (AND FALLS THROUGH TO THE NEXT.)
                C
0029    2       MODE=IV
                C
                C       G, M, AND S CODES COME HERE.
                C
0030    3       ENCODE(2,903,WORK)IV
0031    903     FORMAT(I2)
```

```
0032            CALL MOVB(WORK,,TAPE(TPTR),,2)
0033            ISIZE=2
0034            GO TO 990
                C
                C       X, Y, Z, A, D, I, J, AND K CODES COME HERE.
                C
0035    5       RVV=RV*1000.0
0036            ENCODE(9,905,WORK)RVV
0037    905     FORMAT(F9.0)
0038            CALL MOVB(WORK,,TAPE(TPTR),,8)
0039            ISIZE=8
0040            GO TO 990
                C
                C       C CODE COMES HERE.
                C
0041    9       RVV=RV*100.0
0042            ENCODE(9,909,WORK)RVV
0043    909     FORMAT(F9.0)
0044            CALL MOVB(WORK,,TAPE(TPTR),,8)
0045            ISIZE=8
0046            GO TO 990
                C
                C       F CODE COMES HERE.  NOTE THAT F CODE FORMAT IS MODE DEPENDENT....
                C
0047    14      IF(MODE.EQ.04) GO TO 141
0048            RVV=RV*1000.0
0049            ENCODE(9,914,WORK)RVV
0050    914     FORMAT(F9.0)
0051            CALL MOVB(WORK,,TAPE(TPTR),,8)
0052            ISIZE=8
0053            GO TO 990
0054    141     RVV=RV*100.0
0055            ENCODE(6,9141,WORK)RVV
0056    9141    FORMAT(F6.0)
0057            CALL MOVB(WORK,,TAPE(TPTR),,5)
0058            ISIZE=5
                C
                C       PACK THE CURRENT VALUE OF THE WORK AREA INTO THE TAPE BUFFER.
                C
0059    990     DO 991 I=1,ISIZE
0060            IF(WORK(I).EQ.BLANK) GO TO 991
0061            TAPE(TPTR)=WORK(I)
0062            TPTR=TPTR+1
0063    991     CONTINUE
0064            E N D


        ROUTINES CALLED:
        FILLB , MOVB

        OPTIONS =/ON,/OP:1

        BLOCK       LENGTH
        BUILD   587     (002226)*
        TAPCOM  43      (000126)
```

3.4 CHAR (Assembly Language)

Purpose: Function subroutine to read a paper tape and pass the characters back to the calling routine.

Calling Sequence and Arguments:

```
I = CHAR( )
```

where the returned value indicates:

ASCII character if I.GT.0
End-of-block encountered if I.EQ.0
Physical end-of-tape encountered if I.LT.0

Called By: Many

Subroutines Called: EIA2A

Diagnostics: None

Detailed Description: All five main programs call this subroutine either directly or indirectly. This routine is set up so that it can read either paper tape or system data storage with the codes in either EIA or ASCII.

Upon entry, the subroutine checks to see if it has been entered previously within this program execution. If not, it executes a block of one-time code to perform the following initialization functions:

- Set a flag so the rest of the initialization is not executed again.
- INIT and OPEN a dataset with the logical name IN.
- Read the first block of data and initialize the local buffer pointer.

- Scan for the first end-of-block character and determine whether the tape code is EIA or ASCII.

- Set the code type flag based on the first EOB code.

The remainder of the subroutine is executed for every call. ASCII characters are taken one at a time and returned to the calling program. When the input buffer is exhausted, a new buffer is read and converted from EIA to ASCII if necessary. Before returning, the current character is matched with the entries of a table of characters to ignore. If a match is found, the routine loops back and gets a new character. End-of-block characters cause a binary zero to be returned and if an end-of-file condition is encountered on the input dataset, a binary-1 is returned.

```
                                                .NLIST  TTM
                                                .NLIST  SYM
                                                .TITLE  CHAR - GET EIA CHAR FOR AVSCOM.
                                                .DSABL  GBL
                                                .ENABL  AMA
                                        ;
                                                .MCALL  .INIT,.OPEN,.READ,.WAIT,.CLOSE,.RLSE
                                                .GLOBL  CHAR
000000  005737  000000'          CHAR:  TST     SCANSW          ; IS THE INITIAL SCAN ON?
000004  001465                         BEQ     10$             ; NO.
000006  005037  000002'                 CLR     EIAFLG          ; INITIALLY SET EIA=.FALSE.
000012                                  .INIT   #LNKBLK         ; INITIALIZE THE LINK BLOCK.
000020                                  .OPEN   #LNKBLK,#FILBLK ; OPEN THE FILE.
000032  106337  000377'           1$:   ASLB    BUFHDR+3        ; WAS THAT EOT?
000036  100460                         BMI     6$              ; YES.
000040                                  .READ   #LNKBLK,#BUFHDR ; READ A BLOCK.
000052                                  .WAIT   #LNKBLK         ; *
000060  012737  000402'  000502'        MOV     #BUFHDR+6,BUFPTR; GET A POINTER.
000066  005337  000400'           2$:   DEC     BUFHDR+4        ; DONE?
000072  100757                         BMI     1$              ; YES. GO GET ANOTHER.
000074  122777  000200  000400         CMPB    #200,@BUFPTR    ; IS THIS AN EIA E-O-B?
000102  001413                         BEQ     3$              ; YES.
000104  122777  000015  000370         CMPB    #15,@BUFPTR     ; IS THIS AN ASCII E-O-B (CARRIAGE RETURN)?
000112  001420                         BEQ     4$              ; YES.
000114  122777  000215  000360         CMPB    #215,@BUFPTR    ; IS THIS AN ASCII E-O-B?
000122  001414                         BEQ     4$              ; YES.
000124  005237  000502'                INC     BUFPTR          ; BUMP THE POINTER.
000130  000756                         BR      2$              ; KEEP GOING.
000132  012737  177777  000002' 3$:    MOV     #-1,EIAFLG      ; SET EIA FLAG=.TRUE..
                                        .GLOBL  EIA2A           ; *
000140  004537  000000G                 JSR     R5,EIA2A        ; CONVERT THE BUFFER.
000144  000403                         BR      .+10            ; *
000146  000402' 177777  000374'         .WORD   BUFHDR+6,-1,BUFHDR; *
000154  005037  000000'           4$:   CLR     SCANSW          ; SET SCANSW .FALSE.
000160  005237  000502'           10$:  INC     BUFPTR          ; BUMP THE POINTER.
000164  005337  000400'                 DEC     BUFHDR+4        ; TIME FOR ANOTHER READ?
000170  100042                         BPL     11$             ; NO.
000172  106337  000377'                 ASLB    BUFHDR+3        ; TEST THE STATUS BYTE.
000176  100013                         BPL     13$             ; OK.
000200                           6$:   .CLOSE  #LNKBLK         ; CLOSE THE FILE.
000206                                  .RLSE   #LNKBLK         ; *
000214  105037  000377'                 CLRB    BUFHDR+3        ; RESET STATUS FOR NEXT TIME.
000220  012700  177777                  MOV     #-1,R0          ; RETURN A NEGATIVE NUMBER.
000224  000205                         RTS     R5              ; RETURN TO FORTRAN.
000226                           13$:  .READ   #LNKBLK,#BUFHDR ; READ A BLOCK.
000240                                  .WAIT   #LNKBLK         ; *
000246  005737  000002'                 TST     EIAFLG          ; IS IT EIA CODE?
000252  001406                         BEQ     12$             ; NO.
000254  004537  000000G                 JSR     R5,EIA2A        ; CONVERT.
000260  000403                         BR      .+10            ; *
000262  000402' 177777  000374'         .WORD   BUFHDR+6,-1,BUFHDR; *
000270  012737  000401' 000502'  12$:   MOV     #BUFHDR+5,BUFPTR; RESET THE DATA POINTER.
000276  012700  020000           11$:   MOV     #" 8177400,R0   ; GET HIGH ORDER BLANK.
000302  157700  000174                  BISB    @BUFPTR,R0      ; GET THIS CHAR.
000306  042700  000200                  BIC     #200,R0         ; STRIP PAIRITY.
000312  122700  000015                  CMPB    #15,R0          ; IS THIS THE CARRIAGE RETURN?
000316  001002                         BNE     15$             ; NO.
```

```
     58 000320  005000                          CLR     R0              ; RETURN A ZERO.
     59 000322  000205                          RTS     R5              ; RETURN TO FORTRAN.
     60 000324  012701  000504'          15$:    MOV     #IGNORE,R1      ; GET IGNORE TABLE ADDRESS.
     61 000330  012702  000007                   MOV     #IGEND-IGNORE,R2; GET IGNORE TABLE SIZE.
     62 000334  120021                   14$:    CMPB    R0,(R1)+        ; IS THIS A CHARACTER TO BE STRIPPED?
     63 000336  001710                           BEQ     10$             ; YES.
     64 000340  077203                           SOB     R2,14$          ; CHECK ALL.
     65 000342  000205                           RTS     R5              ; RETURN TO FORTRAN.
     66                                  ;
     67                                  ;
     68         000346'                  LNKBLK  =       .+2             ; LINK BLOCK.
     69 000344  000000  000000                   .WORD   0,0
     70 000350  035160                           .RAD50  /IN/
     71 000352     001     000                   .BYTE   1,0
     72 000354  015270                           .RAD50  /DK/
     73         000362'                  FILBLK  =       .+4             ; FILE BLOCK.
     74 000356  000000  000004                   .WORD   0,4
     75 000362  004554  004470                   .RAD50  /ATLAS /
     76 000366  014474                           .RAD50  /DAT/
     77 000370  000000  000000                   .WORD   0,0
     78         000374'                  BUFHDR  =       .
     79 000374  000100  000003  000000           .WORD   64.,3,0         ; BUFFER HEADER.
     80                                          .BLKB   64.             ; DATA BUFFER.
     81 000502                           BUFPTR: .BLKW   1               ; BUFFER POINTER.
     82         000504'                  IGNORE  =       .               ; TABLE OF CHARACTERS TO BE IGNORED...
     83 000504     177                           .BYTE   177             ; DELETE.
     84 000505     000                           .BYTE   0               ; NULL.
     85 000506     040                           .BYTE   '               ; BLANK.
     86 000507     011                           .BYTE   11              ; HORIZONTAL TAB.
     87 000510     010                           .BYTE   10              ; BACK SPACE.
     88 000511     004                           .BYTE   4               ; E-O-T (REWIND STOP).
     89 000512     012                           .BYTE   12              ; LF (FOR SPECIAL ASCII TAPES ONLY).
     90         000513'                  IGEND   =       .
     91                                          .EVEN
     92                                  ;
     93         000000G                          .CSECT  CHRCOM
     94 000000  177777                   SCANSW: .WORD   -1
     95 000002  177777                   EIAFLG: .WORD   -1
     96                                  ;
     97         000001'                          .END

ERRORS DETECTED:  0
FREE CORE:  15041. WORDS
,DK1:<CHAR
```

3.5 CLAMP

Purpose: A convenient routine that generates a single block with appropriate "M-codes" to turn the tape clamp on and off.

Calling Sequence and Arguments:

CALL CLAMP(L)

where:

L is a logical variable.

.TRUE. generates a clamp on code.

.FALSE. generates a clamp off code.

Called By: PLYGEN

Subroutines Called: BUILD
PUNCH

Diagnostics: None

Detailed Description: PUNCH is called to close out the currently filled buffer. If the argument is .TRUE. then BUILD is called to generate a M-15 code. If the argument is .FALSE. then BUILD is called to generate a M-14 code.

```
0001          SUBROUTINE CLAMP(L)
              C
              CCCC
```

3.6 DELAY

Purpose: A convenient routine that generates a single block with appropriate "G" and "F" codes for a specified time delay.

Calling Sequence and Arguments:

CALL DELAY(T)

where:

T is a real variable containing the time delay in seconds.

Called By: PLYGEN

Subroutines Called: PUNCH
BUILD

Diagnostics: None

Detailed Description: PUNCH is called to flush the current block. BUILD is called to generate a G04 code and called again to generate the appropriate F-code. PUNCH is called again to write out the buffer.

```
FORTRAN V06.13                    10:20:16     03-OCT-76    PAGE     1

0001            SUBROUTINE DELAY(T)
                C
                CCCC
```

3.7 EOT

Purpose: Subroutine to close out a control tape file.

Calling Sequence and Arguments:

```
CALL EOT
```

Called By: PLYGEN

Subroutines CALLED: PUNCH
BUILD

Diagnostics: None

Detailed Description: Subroutine PUNCH is called to write any current line to the control tape file. An M30 code is written to the control tape file and PUNCH is called again to write the line. A FORTRAN ENDFILE is performed to close out the control tape file and control is returned to the calling routine.

```
FORTRAN V06.13                    10:21:26     03-OCT-76    PAGE     1

0001          SUBROUTINE EOT
              C
              CCCC
```

3.8 ERR

Purpose: Subroutine to log error messages on the line printer.

Calling Sequence and Arguments:

```
CALL ERR(NCODE,IRTRN)
```

where:

NCODE - An integer error code number.

IRTRN - Return flag.
IRTRN .NE. 0 causes return to caller.
IRTRN .EQ.0 causes program to terminate.

Called By: PLYGEN

Subroutines Called: EXIT

Diagnostics: ***ERROR n***
PLYGEN TERMINATING

Detailed Description: Subroutine ERR prints the error code number on the line printer then tests the second argument to determine whether to return to the caller or terminate execution.

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MANUFACTURING METHODS REPORT. FEASIBILITY OF PRE-PROGRAMMING FO--ETC(U)
SEP 76 R N LITTLE, C A WELLS DAAJ01-76-C-0040
UNCLASSIFIED IITRI-H6048 USAAVSCOM-76-43 NL

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AD A037681

```
0001            SUBROUTINE ERR(N,RFLAG)
                C
                CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
                C                                                                                     C
                C       ERROR PROCESSOR SUBROUTINE.  IT'S DONE THIS WAY SO LATER                      C
                C       ON MEANINGFUL MESSAGES CAN BE PRINTED.                                        C
                C                                                                                     C
                CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
                C
                C
0002                INTEGER RFLAG
0003                WRITE(16,1)N
0004            1   FORMAT(1X,'**** ERROR',I3,' ****')
0005                WRITE(6,2)N
0006            2   FORMAT(6X,'?? ERROR',I3,' ??')
0007                IF(RFLAG.NE.0) RETURN
0008                WRITE(6,3)
0009                WRITE(16,3)
0010            3   FORMAT(1X,'**** PLYGEN TERMINATING ****'/)
0011                CALL EXIT
0012                E N D


                ROUTINES CALLED:
                EXIT

                OPTIONS =/ON,/OP:1

                BLOCK        LENGTH
                ERR      140    (000430)*

                **COMPILER ----- CORE**
                   PHASE       USED  FREE
                DECLARATIVES  00702 14354
                EXECUTABLES   00702 14354
                ASSEMBLY      01079 18617
```

3.9 GET

Purpose: Subroutine to assemble a block of data from a control tape into internal form.

Calling and Arguments:

```
CALL GET
```

Called By: Many

Subroutines Called: CLR MOV
CHAR A1A2
FILL

Diagnostics: None

Detailed Description: Data is retrieved from this subroutine via data arrays stored in common. These arrays are first cleared. The subroutine then gets a single character (via CHAR) which it assumes to be a control code. It searches its table of valid control code characters and dispatches to a particular routine based on the match found. The number following the control code is assembled into a temporary work buffer and converted into internal form using a FORTRAN DECODE statement. This process continues until an end-of-block character is encountered and control is returned to the caller.

```
0001          SUBROUTINE GET
              C
              CCCC
```

```
0042            IF(I.GT.9) I=9
0043            GO TO 70
0044      80    IF(WORK(8).NE.'  ' .OR. I.EQ.0) GO TO 90
0045            CALL MOV(WORK,,WORKX,,8)
0046            CALL MOV(WORKX,,WORK,2,8)
0047            WORK(1)='  '
0048            GO TO 80
0049      90    CALL A1A2(WORK,,8)
0050            GO TO (1010,1020,1030,1040,1050,1060,1070,1080,1090,1100,
                1       1110,1120,1130,1140,1150,1160,1170),REFNUM
          C
          C
0051      1010  DECODE(8,940,WORK) IVALUE(1)
0052            IVALUE(1)=IVALUE(1)*SIGN
0053            GO TO 10
0054      1020  I=MARK(2)
0055            IF(I.GT.16) STOP 177774
0056            DECODE(8,920,WORK)GCODES(I)
0057            GCODES(I)=GCODES(I)*SIGN
0058            IF(I.EQ.1)IVALUE(2)=GCODES(1)
0059            IF(GCODES(I).EQ.04) G04SW=.TRUE.
0060            GO TO 10
0061      1030  CONTINUE
0062      1040  DECODE(8,920,WORK) IVALUE(REFNUM)
0063            IVALUE(REFNUM)=IVALUE(REFNUM)*SIGN
0064            GO TO 10
0065      1090  DECODE(8,952,WORK)RVALUE(9)
0066            RVALUE(9)=RVALUE(9)*SIGN
0067            GO TO 10
0068      1050  CONTINUE
0069      1060  CONTINUE
0070      1070  CONTINUE
0071      1080  CONTINUE
0072      1100  CONTINUE
0073      1110  CONTINUE
0074      1120  CONTINUE
0075      1130  DECODE(8,943,WORK)RVALUE(REFNUM)
0076            IF(SIGN.GT.0) GO TO 10
0077            IF(RVALUE(REFNUM).LT.0.001) RVALUE(REFNUM)=.0001
0078            RVALUE(REFNUM)=RVALUE(REFNUM)*SIGN
0079            GO TO 10
0080      1140  IF(G04SW.EQ..FALSE.) GO TO 1130
0081            DECODE(8,932,WORK)RVALUE(14)
0082            RVALUE(14)=RVALUE(14)*SIGN
0083      1150  GO TO 10
0084      1160  STOP 177776
0085      1170  STOP 177775
          C
0086      920   FORMAT(5X,I3)
0087      932   FORMAT(F8.2)
0088      940   FORMAT(3X,I5)
0089      943   FORMAT(F8.3)
0090      952   FORMAT(F8.2)
          C
0091            E N D
```

```
ROUTINES CALLED:
CLR   , CHAR  , FILL  , MOV   , A1A2

OPTIONS =/ON,/OP:1

BLOCK        LENGTH
GET     832     (003200)*
.$$$$.  4       (000010)
GETCOM  73      (000222)
CHRCOM  2       (000004)

**COMPILER ----- CORE**
   PHASE       USED  FREE
DECLARATIVES 00622 14434
EXECUTABLES  01051 14005
ASSEMBLY     01506 18190
```

3.10 HEAD

Purpose: A convenient routine that generates a single block with appropriate "M-codes" to turn the ATLS tape head on and off.

Calling Sequence and Arguments:

```
CALL HEAD(L)
```

where:

L is a logical variable.
.TRUE. generates a head on code.
.FALSE. generates a head off code.

Called By: PLYGEN

Subroutine Called: BUILD
PUNCH

Diagnostics: None

Detailed Description: PUNCH is called to close out the currently filled buffer. If the argument is .TRUE. then BUILD is called to generate a M62 code. If the argument if .FALSE. then BUILD is called to generate a M63 code. PUNCH is called again and the routine returns to the caller.

```
FORTRAN V06.13                  10:21:00     03-OCT-76    PAGE     1

0001            SUBROUTINE HEAD(L)
                C
                CCCC
```

3.11 MOVE

Purpose: Subroutine to generate block of control tape containing up to six axes of data and an N-code.

Calling Sequence and Arguments:

CALL MOVE (X,Y,Z,A,C,D,N)

where:

X,Y,Z,A,C,D are real variables containing the respective axis information.

N is an integer variable containing the N-code.

Called By: PLYGEN

Subroutines Called: NULARG
PUNCH
BUILD

Diagnostics: None

Detailed Description: PUNCH is called to flush the buffer. Each argument is tested to see if it exists using subroutine NULARG and if it does, BUILD is called with the appropriate parameters. PUNCH is called again to close out this block.

```
FORTRAN V06.13                  10:19:57    03-OCT-76   PAGE    1

0001          SUBROUTINE MOVE(X,Y,Z,A,C,D,N)
      C
      CCCC
```

3.12 MSG

Purpose: To print an alpha-numeric on the graphic terminal.

Calling Sequence and Arguments:

```
CALL MSG(STRING)
```

where:

STRING is a byte containing up to 23 characters terminated by a character of binary zeros.

Called By: ATLSGR et. al.

Subroutines Called:

ANMODE	NEWLIN
ANCHO	BELL

Diagnostics: None

Detailed Description: The graphics subroutines are called to prepare the terminal for character output and to write out the argument string. The cursor is positioned to a new line and the bell on the terminal is rung as an audible signal to the operator to respond.

```
0001          SUBROUTINE MSG(STRING)
              C
              CCCC
```

3.13 PCHAR/PCLOSE (Assembly Language)

Purpose: Subroutine to punch binary characters to paper tape.

Calling Sequence and Arguments:

```
CALL PCHAR(BYTE)
```

where:

BYTE is any 8-bit character.

Called By: PTDUMP

Subroutines Called: None

Diagnostics: None

Detailed Description: Since PDP-11 FORTRAN does not support punching the arbitrary sequences of characters required to form an ATLS control tape, this subroutine is written in assembly language. On first entry, some one-time code is executed to INIT and OPEN the logical dataset OUT. Subsequent entries put bytes one at a time into an output buffer and when the buffer is filled, it is written out.

PCLOSE is an alternate entry that must be called prior to terminating execution of the calling program. This entry writes out the partially filled local buffer and closes the dataset.

```
                                        .NLIST  TTM
                                        .NLIST  SYM
                                        .TITLE  PCHAR - PUNCH CHARACTER.
                                        .DSABL  GBL
                                        .ENABL  AMA
                                        .ENABL  LSB
                                ;
                                ;       SUBROUTINE TO PUNCH CHARACTERS TO PAPER TAPE.    FORTRAN I/O
                                ;       DOES FORMATTED ASCII TRANSFERS WHICH IS UNACCEPTABLE. SO THIS ROUTINE
                                ;       DOES UNFORMATTED TRANSFERS.
                                ;
                                        .MCALL  .INIT,.OPEN,.WRITE,.WAIT,.CLOSE,.RLSE
                                        .GLOBL  PCHAR
000000  000401                PCHAR:  BR      .+4             ; GO DO ONE TIME CODE.
000002  000412                        BR      10$             ; SKIP ONE TIME CODE.
000004  105037  000000'              CLRB    PCHAR           ; RESET ONE TIME SWITCH.
000010                               .INIT   #LB             ; INITIALIZE THE DATA SET.
000016                               .OPEN   #LB,#FB         ; OPEN THE FILE.
000030  117577  000002  000134  10$:  MOVB    @2(R5),@DATPTR  ; SAVE THIS CHAR.
000036  005237  000172'              INC     DATPTR          ; BUMP THE DATA POINTER.
000042  023727  000172' 000302'      CMP     DATPTR,#BUFEND  ; IS THE BUFFER FULL?
000050  103422                       BLO     11$             ; NO. RETURN.
000052  013737  000172' 000200' WRITE: MOV     DATPTR,BUFHDR+4 ; GET CURRENT DATA POINTER.
000060  162737  000202' 000200'      SUB     #BUFHDR+6,BUFHDR+4; SUBTRACT START ADDRESS OF BUFFER.
000066  001413                       BEQ     11$             ; NO DATA (ONLY POSSIBLE ON CLOSE.)
000070  012737  000202' 000172'      MOV     #BUFHDR+6,DATPTR; RESET THE DATA POINTER.
000076                               .WRITE  #LB,#BUFHDR     ; WRITE OUT THIS BLOCK.
000110                               .WAIT   #LB             ; *
000116  000205                11$:    RTS     R5              ; RETURN TO CALLER.
                                ;
                                        .GLOBL  PCLOSE
000120  004537  000052'         PCLOSE: JSR     R5,WRITE        ; WRITE LAST PARTIAL BUFFER.
000124                               .CLOSE  #LB             ; CLOSE THE FILE.
000132                               .RLSE   #LB             ; RELEASE IT AS WELL.
000140  000205                       RTS     R5              ; RETURN TO CALLER.
                                ;
                                ;       BUFFERS ETC.
                                ;
        000144'                 LB      =       .+2             ; LINK BLOCK.
000142  000000  000000                  .WORD   0,0
000146  060434                          .RAD50  /OUT/
000150     001     000                  .BYTE   1,0
000152  063200                          .RAD50  /PP/
                                ;
        000160'                 FB      =       .+4
000154  000000  000002  000000          .WORD   0,2,0,0,0,0,0   ; FILE BLOCK.
000162  000000  000000  000000
000170  000000
                                ;
        000100                  BUFSIZ  =       100             ; BUFFER SIZE.
000172  000202'                 DATPTR: .WORD   BUFHDR+6        ; LOCAL DATA POINTER.
000174  000100  000003  000000  BUFHDR: .WORD   BUFSIZ,3,0      ; BUFFER HEADER.
                                        .BLKB   BUFSIZ          ; BUFFER.
        000302'                 BUFEND  =       .               ; BUFFER END.
                                ;
        000001'                         .END
```

ERRORS DETECTED: 0

3.14 PUNCH

Purpose: Subroutine to write out an accumulated block of control tape data.

Calling Sequence and Arguments:

```
CALL PUNCH
```

Called By: PLYGEN et. al.

Subroutine Called: None

Detailed Description: Arguments are passed between PUNCH and BUILD via common. Upon entry, the buffer pointer is used to calculate the length of the output string. If this length is greater than zero, the buffer is written. The buffer pointer is then reset to the beginning of the buffer and a return is made to the main program.

```
FORTRAN V06.13                  10:22:09     03-OCT-76    PAGE     1

0001          SUBROUTINE PUNCH
              C
              CCCC
```

3.15 RESET

Purpose: Subroutine that accepts operator input to modify the graphic transformation matrices used in the graphics program.

Calling Sequence and Arguments:

```
CALL RESET
```

Called By: ATLSGR

Subroutines Called:

ABS	R8MOVE
MOVABS	R8ID
MSG	COS
ANSWER	SIN
MOVB	VWINDO
R8MULT	FINITT
VCURSR	

Diagnostics: **INVALID COMMAND**

Detailed Description: The transformation matrices are passed between SETUP, RESET, and ATLSGR in common. Subroutine RESET asks the operator to enter a command and waits for a response. The single letter starting the response is decoded as a unique command code and an internal table of valid characters is searched for a match. A match causes control to be transferred to a routine that decodes the remaining input as needed and makes the requested matrix modifications.

All commands except two go back for more input from the operator. These special commands are:

1. "D" (draw) - returns control to caller.

2. "E" (exit) - terminates execution.

```
0001            SUBROUTINE RESET
                C
                CCCC
```

```
0039            T(4,2)=T(4,2)-Y*SFACT
0040            GO TO 1
                C
                C     S - - SCALE COMMAND.
                C
0041    30      CALL MSG('SET JOYSTICK TO CORNER')
0042            CALL VCURSR(ICHAR,X,Y)
0043            CALL MSG('NOW DO OTHER CORNER')
0044            CALL VCURSR(ICHAR,XX,YY)
0045            XDEL=ABS(X-XX)
0046            YDEL=ABS(Y-YY)
0047            SIZE=XDEL
0048            IF(XDEL.LT.YDEL) SIZE=YDEL
0049            IF(SIZE.EQ.0.0) GO TO 3
0050            SIZE=SIZE*SFACT
0051            SIZEX=ABS(HLAST)+ABS(SLAST)-SIZE*ABS(HLAST)/VLAST
0052            S(4,3)=S(4,3)+SIZEX
0053            X=(X+XX)/2
0054            Y=(Y+YY)/2
0055            GO TO 21
                C
                C     X - - X ROTATION.
0056    40      IFLAG=2
0057            JFLAG=3
0058            GO TO 61
                C
                C     Y - - Y ROTATION.
                C
0059    50      IFLAG=1
0060            JFLAG=3
0061            GO TO 61
                C
                C     Z - - Z ROTATION.
                C
0062    60      IFLAG=1
0063            JFLAG=2
0064    61      DECODE(7,71,ANS)ROT
0065            CALL R8MOVE(T,TEMP1,4,4)
0066            CALL R8ID(TEMP2,4)
0067            ROT=ROT*3.14159265/180.0
0068            TEMP2(IFLAG,IFLAG)=COS(ROT)
0069            TEMP2(JFLAG,JFLAG)=COS(ROT)
0070            TEMP2(IFLAG,JFLAG)=-SIN(ROT)
0071            TEMP2(JFLAG,IFLAG)=SIN(ROT)
0072            CALL R8MULT(TEMP1,TEMP2,T,4,4,4)
0073            GO TO 1
                C
                C     H - - RESET EYEPOINT DISTANCE.
                C
0074    70      DECODE(7,71,ANS)HNEW
0075    71      FORMAT(F12.0)
0076            P(3,4)=-1.0/HNEW
0077            GO TO 1
                C
                C     M - - MARK (SAVE) CURRENT STATUS.
                C
```

```
0078     80    CALL R8MOVE(T,TSAVE,4,4)
0079           CALL R8MOVE(S,SSAVE,4,4)
0080           HSAVE=P(3,4)
0081           VSAVE=V
0082           GO TO 1
       C
       C     R - - RESTORE LAST SAVED STATUS.
       C
0083     90    CALL R8MOVE(TSAVE,T,4,4)
0084           CALL R8MOVE(SSAVE,S,4,4)
0085           P(3,4)=HSAVE
0086           V=VSAVE
0087           GO TO 1
       C
       C     O - - ORIGINAL STATUS RESTORED HERE.
       C
0088     100   CALL R8MOVE(T0,T,4,4)
0089           CALL R8MOVE(S0,S,4,4)
0090           P(3,4)=-1.0D0/12.0D0
0091           V=6.0
0092           GO TO 1
       C
       C       V - - SET VWINDO HERE.
       C
0093     110   DECODE(7,71,ANS)VV
0094           IF(VV.LE.0.0) GO TO 3
0095           V=VV
0096           GO TO 1
       C
       C       E - - EXIT HERE.
       C
0097     999   CALL FINITT(0,780)
0098           E N D
```



```
ROUTINES CALLED:
ABS    , MOVABS, MSG    , ANSWER, MOVB   , R8MULT, VCURSR
R8MOVE, R8ID  , COS    , SIN    , FINITT

OPTIONS =/ON,/OP:1

BLOCK        LENGTH
RESET   1116   (004270)*
TEMP    128    (000400)
SAVE    264    (001020)
SDTMCA  260    (001010)

**COMPILER ----- CORE**
   PHASE       USED  FREE
DECLARATIVES 00622 14434
EXECUTABLES  01460 13596
ASSEMBLY     01666 18030
```

3.16 SETUP

Purpose: Subroutine to initialize graphic transformation matrices.

Calling Sequence and Arguments:

```
CALL SETUP(IFLAG)
```

where:

IFLAG.NE.0 causes a special diagnostic dump to the line printer.

Called By: ATLSGR

Subroutines Called:

GET	R8MOVE
CHAR	R8MULT
R8ID	DELETE

Diagnostics: None

Detailed Description: All transformation matrices are initialized except for the initial linear transform matrix (T). T is initialized by scanning through the input control tape file and calculating average X, Y and Z deviations. These averages are used to roughly center the picture for its first drawing.

```
0001            SUBROUTINE SETUP( IFLAG)
                C
                CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
                C                                                                                     C
                C       THE FOLLOWING ROUTINE SETS UP THE MASTER TRANSFORM MATRIX                     C
                C       "SDTM" IN COMMON AREA "SDTMCA".                                               C
                C       IF THE ARGUMENT "IFLAG" IS NOT EQUAL TO ZERO, SETUP WILL                      C
                C       DUMP THE INTERMEDIATE ARRAYS ONTO DEVICE 6                                    C
                C                                                                                     C
                CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
                C
                C
0002            IMPLICIT INTEGER (A-Z)
0003            REAL*8 T(4,4),S(4,4),P(4,4),SDTM(4,4),V
0004            REAL*8 T0(4,4),S0(4,4),TSAVE(4,4),SSAVE(4,4),HSAVE,VSAVE
0005            REAL*8 TEMP1(4,4),TEMP2(4,4),H
                C
0006            INTEGER MARK(17),IVALUE(4),GCODES(16)
0007            REAL*4 RVALUE(17)
0008            LOGICAL SCANSW,EIAFLG,G04SW
                C
0009            REAL*4 XMIN,XMAX,XAVE,YMIN,YMAX,YAVE,ZMIN,ZMAX,ZAVE,XDEL,YDEL,ZDEL
0010            INTEGER XCOUNT,YCOUNT,ZCOUNT,TCOUNT
                C
0011            COMMON/SDTMCA/T,S,P,SDTM,V
0012            COMMON/SAVE  /T0,S0,TSAVE,SSAVE,HSAVE,VSAVE
0013            COMMON/TEMP  /TEMP1,TEMP2
0014            COMMON/GETCOM/N,MARK,IVALUE,RVALUE,GCODES,IC
0015            COMMON/CHRCOM/SCANSW,EIAFLG
0016            COMMON        MODE(3),G04SW
                C
0017            DATA XMIN,YMIN,ZMIN,XMAX,YMAX,ZMAX/3*1.0E9,3*-1.0E9/
0018            DATA XCOUNT,YCOUNT,ZCOUNT,TCOUNT/4*0/
                C
0019            V=6.0
                C
                C-----CALCULATE DATA FOR THE INITIAL TRANSFORMATION.
                C
0020    100     SCANSW=.TRUE.
0021    105     CALL GET
0022            IF(MARK(3).LE.0 .OR. IVALUE(3).NE.62) GO TO 105
0023    110     CALL GET
0024            IF(MARK(3).LE.0) GO TO 120
0025            IF(IVALUE(3).EQ.02 .OR.
                1   IVALUE(3).EQ.03 .OR.
                2   IVALUE(3).EQ.30      ) GO TO 130
                C
0026    120     IF(MARK(5).EQ.0 .AND. MARK(6).EQ.0 .AND. MARK(7).EQ.0)
                1   GO TO 110
                C
0027            IF(MARK(5).LE.0) GO TO 121
0028            XCOUNT=XCOUNT+1
0029            XAVE=XAVE+RVALUE(5)
0030            IF(RVALUE(5).LT.XMIN) XMIN=RVALUE(5)
0031            IF(RVALUE(5).GT.XMAX) XMAX=RVALUE(5)
```

```
      C
0032  121   IF(MARK(6).LE.0) GO TO 122
0033        YCOUNT=YCOUNT+1
0034        YAVE=YAVE+RVALUE(6)
0035        IF(RVALUE(6).LT.YMIN) YMIN=RVALUE(6)
0036        IF(RVALUE(6).GT.YMAX) YMAX=RVALUE(6)
      C
0037  122   IF(MARK(7).LE.0) GO TO 123
0038        ZCOUNT=ZCOUNT+1
0039        ZAVE=ZAVE+RVALUE(7)
0040        IF(RVALUE(7).LT.ZMIN) ZMIN=RVALUE(7)
0041        IF(RVALUE(7).GT.ZMAX) ZMAX=RVALUE(7)
      C
0042  123   TCOUNT=TCOUNT+1
0043        GO TO 110
      C
      C-----SCAN FOR END-OF-FILE ON INPUT AND RESET SCAN SWITCH.
      C
0044  130   IF(CHAR().GE.0) GO TO 130
0045        SCANSW=.TRUE.
      C
      C-----CALCULATE AVERAGES.
      C
0046        XAVE=XAVE/TCOUNT
0047        YAVE=YAVE/TCOUNT
0048        ZAVE=ZAVE/TCOUNT
      C
      C-----SETUP THE FIRST TRANSLATION MATRIX HERE.
      C
110
0049        CALL R8ID(T,4)
0050        T(4,1)=-XAVE
0051        T(4,2)=-YAVE
0052        T(4,3)=-ZAVE
      C
      C-----SETUP INITIAL X ROTATION HERE.
      C
0053        CALL R8MOVE(T,TEMP1,4,4)
0054        CALL R8ID(TEMP2,4)
0055        TEMP2(2,2)=0
0056        TEMP2(3,3)=0
0057        TEMP2(3,2)=1
0058        TEMP2(2,3)=-1
0059        CALL R8MULT(TEMP1,TEMP2,T,4,4,4)
      C
      C-----SETYP INITIAL Y ROTATION HERE.
      C
0060        CALL R8MOVE(T,TEMP1,4,4)
0061        CALL R8ID(TEMP2,4)
0062        TEMP2(1,1)=0
0063        TEMP2(3,3)=0
0064        TEMP2(3,1)=1
0065        TEMP2(1,3)=-1
0066        CALL R8MULT(TEMP1,TEMP2,T,4,4,4)
      C
      C-----SETUP INITIAL Z ROTATION HERE.
      C
```

```
0067          CONTINUE
              C
              C-----SETUP SCALING MATRIX (S) HERE.
              C
0068          CALL R8ID(S,4)
0069          XDEL=(2.0*(XMAX-XMIN)-H)
0070          YDEL=(2.0*(YMAX-YMIN)-H)
0071          ZDEL=(2.0*(ZMAX-ZMIN)-H)
0072          IF(XDEL.GE.0.0) XDEL=XDEL*1.10
0073          IF(XDEL.LT.0.0) XDEL=XDEL*0.90
0074          IF(YDEL.GE.0.0) YDEL=YDEL*1.10
0075          IF(YDEL.LT.0.0) YDEL=YDEL*0.90
0076          IF(ZDEL.GE.0.0) ZDEL=ZDEL*1.10
0077          IF(ZDEL.LT.0.0) ZDEL=ZDEL*0.90
0078          S(4,3)=-XDEL
0079          IF(YDEL.GT.XDEL) S(4,3)=-YDEL
              C
              C-----SETUP PROJECTIVE TRANSFORMATION MATRIX (P) HERE.
              C
0080          CALL R8ID(P,4)
0081          H=12.0D0
0082          P(3,3)=0.0
0083          P(3,4)=-1.0D0/H
              C
              C-----DO MAIN TRANSFORM CALCULATION HERE.
              C
0084          CALL R8MULT(T,S,TEMP1,4,4,4)
0085          CALL R8MULT(TEMP1,P,SDTM,4,4,4)
              C
              C----SETUP SAVE MATRICIES.
              C
0086          CALL R8MOVE(T,T0,4,4)
0087          CALL R8MOVE(S,S0,4,4)
0088          CALL R8MOVE(T,TSAVE,4,4)
0089          CALL R8MOVE(S,SSAVE,4,4)
0090          HSAVE=P(3,4)
0091          VSAVE=V
              C
              C
0092          IF(IFLAG.EQ.0) RETURN
              C
              C-----DO THE DIAGNOSTIC DUMP STUFF.
              C
0093          CALL DELETE(6)
0094          NAME='T'
0095          WRITE(6,901)NAME,((T(I,J),J=1,4),I=1,4)
0096          NAME='S'
0097          WRITE(6,901)NAME,((S(I,J),J=1,4),I=1,4)
0098          NAME='P'
0099          WRITE(6,901)NAME,((P(I,J),J=1,4),I=1,4)
0100          NAME='SD'
0101          WRITE(6,901)NAME,((SDTM(I,J),J=1,4),I=1,4)
0102          WRITE(6,902)XMAX,XMIN,XAVE,XCOUNT,
             1            YMAX,YMIN,YAVE,YCOUNT,
             2            ZMAX,ZMIN,ZAVE,ZCOUNT
0103          RETURN
```

```
0104     901   FORMAT(///' MATRIX NAME = ',A2,4(//16X,4D14.6))
0105     902   FORMAT(/////10X,'    MAX            MIN            AVE            COUNT'
               1           /10X,'******** ******** ******** ********'
               2           /5X,'X ->',3F10.3,3X,I5
               3           /5X,'Y ->',3F10.3,3X,I5
               4           /5X,'Z ->',3F10.3,3X,I5)
0106          E N D


        ROUTINES CALLED:
        GET    , CHAR   , R8ID   , R8MOVE, R8MULT, DELETE

        OPTIONS =/ON,/OP:1

        BLOCK        LENGTH
        SETUP    1340    (005170)*
        .$$$$.   4       (000010)
        SDTMCA   260     (001010)
        SAVE     264     (001020)
        TEMP     128     (000400)
        GETCOM   73      (000222)
        CHRCOM   2       (000004)

        **COMPILER ----- CORE**
           PHASE        USED  FREE
        DECLARATIVES  00622 14434
        EXECUTABLES   01408 13648
        ASSEMBLY      01849 17847
```

3.17 SHEAR

Purpose: Subroutine to output a shear code to the control tape.

Calling Sequence and Arguments:

```
CALL SHEAR
```

Called By: PLYGEN

Subroutines Called: PUNCH
BUILD

Diagnostics: None

Detailed Description: PUNCH is called to flush the buffer. BUILD is called to generate an M80 code and PUNCH is again called before returning.

```
0001          SUBROUTINE SHEAR
              C
              CCCC
```

3.18 SLIT

Purpose: A convenient routine that generates a single block with the appropriate "M-code" to turn the tape slitters on or off. (Boeing has modified ATLS so that the slitter functions operate a rewind function on the fiberglass tape supply reel.)

Calling Sequence and Arguments:

```
CALL SLIT(L)
```

where:

L is a logical variable.
.TRUE. generates a slitter on code.
.FALSE. generates a slitter off code.

Called By: PLYGEN

Subroutines Called: BUILD
PUNCH

Diagnostics: None

Detailed Description: PUNCH is called to close out the currently filled buffer. If the argument is .TRUE. then BUILD is called to generate a M64 code. If it is .FALSE. then a M65 code is generated. PUNCH is called again before returning.

```
FORTRAN V06.13                    10:20:49     03-OCT-76    PAGE     1

0001          SUBROUTINE SLIT(L)
              C
              CCCC
```

4. SUBROUTINES FROM IITRI'S GENERAL UTILITY LIBRARY

A1A2 - Pack one ASCII character per word into two per word.

CLR - Clear word arrays to binary zeros.

CLRB - Clear byte arrays to binary zeros.

CMPB - Compare byte arrays.

DELETE - Delete the file associated with a FORTRAN logical unit number from the system data storage.

EIA2A - Convert EIA codes to ASCII codes.

FILL - Fill word arrays with a constant.

FILLB - Fill byte arrays with a constant.

MOV - Move word arrays in memory.

MOVB - Move byte arrays in memory.

MRL - Convert ASCII strings to binary man-readable leader strings.

NULARG - Determine if the caller was called with a non-existent argument.

R8ID - Initialize a REAL*8 array with the identity matrix.

R8MOVE - Move a REAL*8 matrix in memory.

R8MULT - Multiply two REAL*8 matrices.

5. SUBROUTINES FROM PDP-11 UTILITY LIBRARY

ABS - Get real absolute value.

ASSIGN - Associate a FORTRAN logical unit number with a filename of a file stored in the system data storage.

COS - Cosine function.

DATE - Retrieve current date in ASCII.

EXIT - Terminate Execution.

SIN - Sine function.

SQRT - Square root function.

TIME - Retrieve current time in ASCII.

6. SUBROUTINES FROM GRAPHIC SUPPORT LIBRARY

ANCHO - Output an alpha-numeric character.

ANMODE - Condition graphics terminal for alpha-numeric output.

BELL - Ring bell on terminal.

DRWABS - Draw a line using real screen coordinates.

DRAWA - Draw a line using virtual screen coordinates.

ERASE - Erase the screen.

FINITT - Final cleanup processing.

INITT - Initialization processing.

MOVABS - Move the graphics cursor using real screen coordinates.

MOVEA - Move the graphics cursor using virtual screen coordinates.

NEWLINE - Position cursor on beginning of next input line.

SWINDO - Define the available real viewing area on the display screen.

VCURSR - Obtain virtual screen coordinates for the graphics input cross-hair cursor.

VWINDO - Specify virtual coordinate range for the real screen window.

TINPUT - Get a keyboard input character.

APPENDIX D

ATLS SOFTWARE SYSTEM
SAMPLE INPUT AND OUTPUT

TABLE OF CONTENTS

for Appendix D

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2.	Sample Graphical Output from ATLSGR	123
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1. PLYGEN List Output Showing Input Language For "Root Loop" and Mandrel Descriptions.

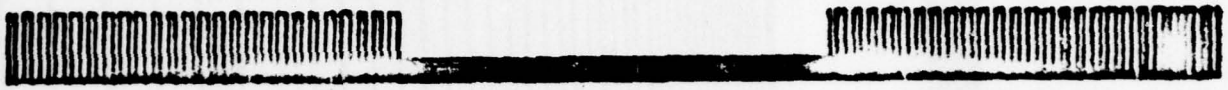
```
PLYGEN V1.0                              27-AUG-76    13:49:38     PAGE    1

        ********************************************************************************
        *                                                                              *
        *       CH47FRB Root Loop Program.                                             *
        *                                                                              *
        *       Data taken from Boeing Vertol drawing #114R1710                        *
        *                                                                              *
        ********************************************************************************
        *
        *
  1)    CYLTRAVEL 0
  2)    THICKNESS .0095
  3)    MANDREL(1) 0, 0, -1.75, 3.5
  4)    MANDREL(2) -29.5, 0, -1.75, -24.830, -19.330, -12.330
        *
  5)    REFSTATION 29.5
        *
  6)    PLY 1   = 34.5
  7)    PLY 58  = 45.0
  8)    PLY 71  = 50.5
  9)    PLY 72  = 55.0
 10)    PLY 80  = 60.0
 11)    PLY 88  = 65.0
 12)    PLY 99  = 70.0
 13)    PLY 110 = 77.0
 14)    PLY 122 = 117.0
 15)    PLY 126 = 124.0
 16)    PLY 127 = 134.0
 17)    PLY 133 = 306.0
 18)    PLY 134 = 363.0
 19)    PLY 144 = 363.0
        *
 20)    BREAK 51
        *
 21)          E N D

        TOTAL FIBERGLASS TAPE LENGTH: PART 1 =   108.2 FT
                                      PART 2 =   846.5 FT
```

2. Sample Graphical Output from ATLSGR:

- Four Similar Views of IITRI Test Tape.
- Four Views of Original Boeing Tape.

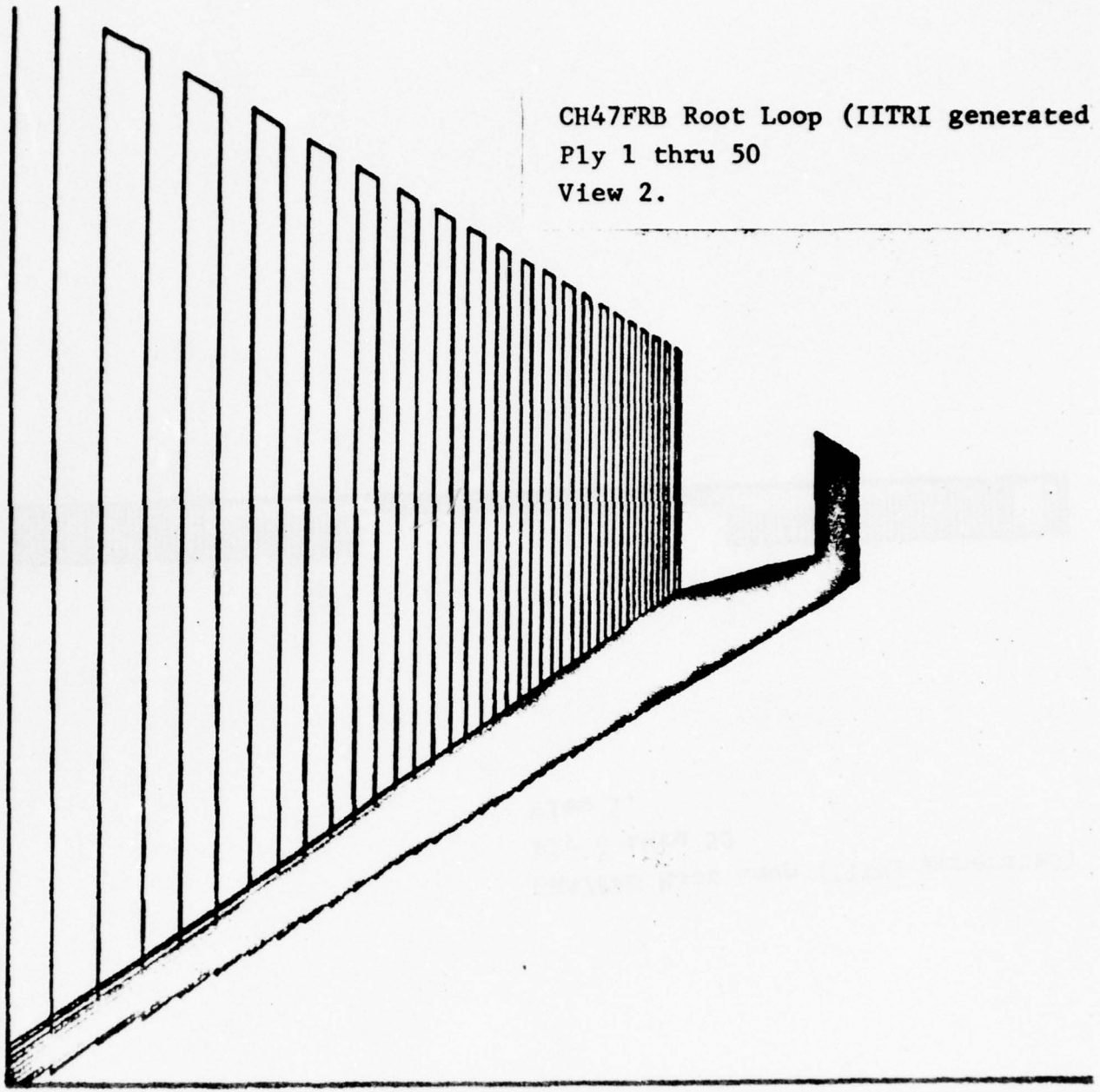
ENTER COMMAND

CH47FRB Root Loop (IITRI generated)
Ply 1 thru 50
View 1.

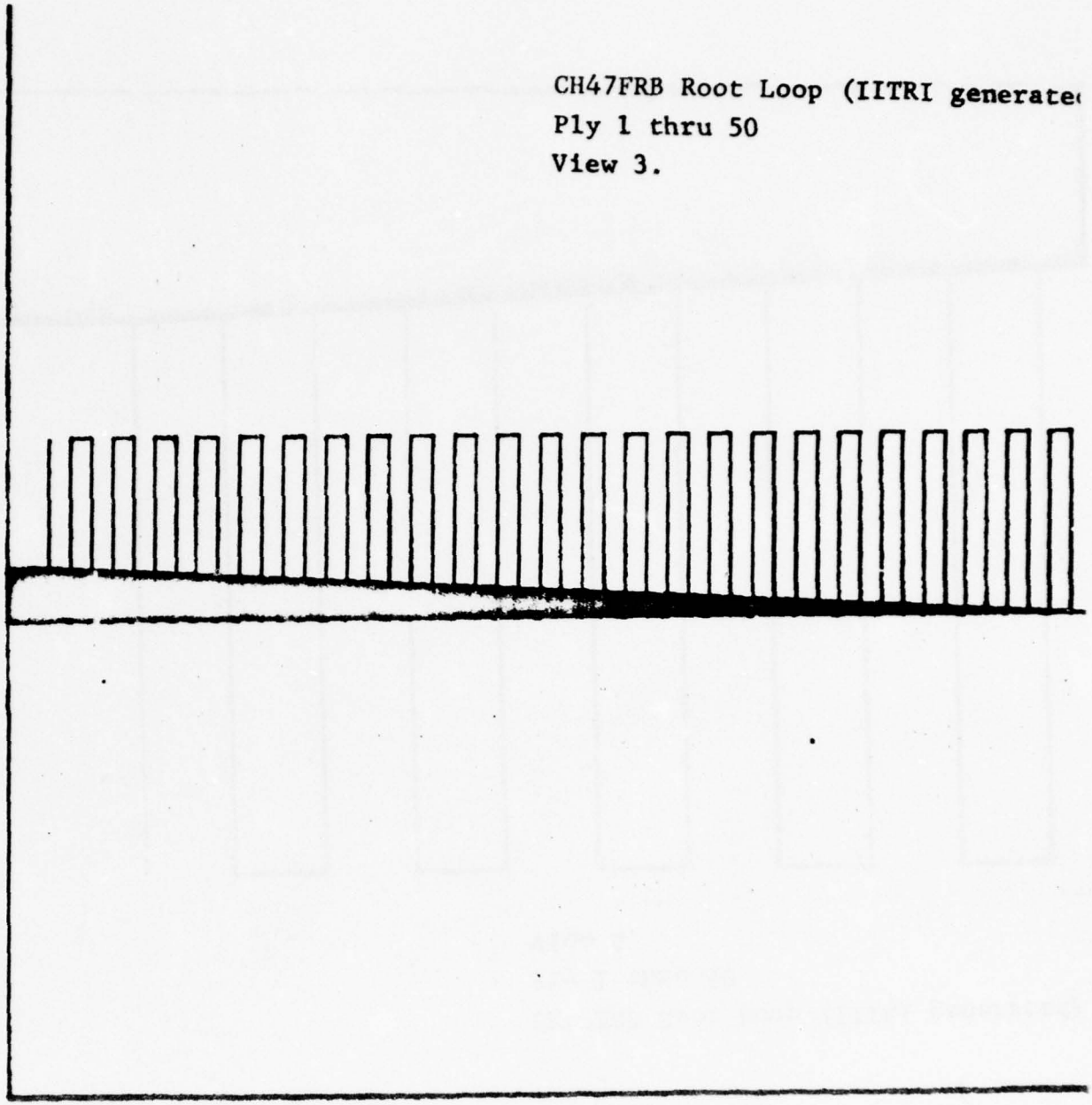


ENTER COMMAND

CH47FRB Root Loop (IITRI generated
Ply 1 thru 50
View 2.

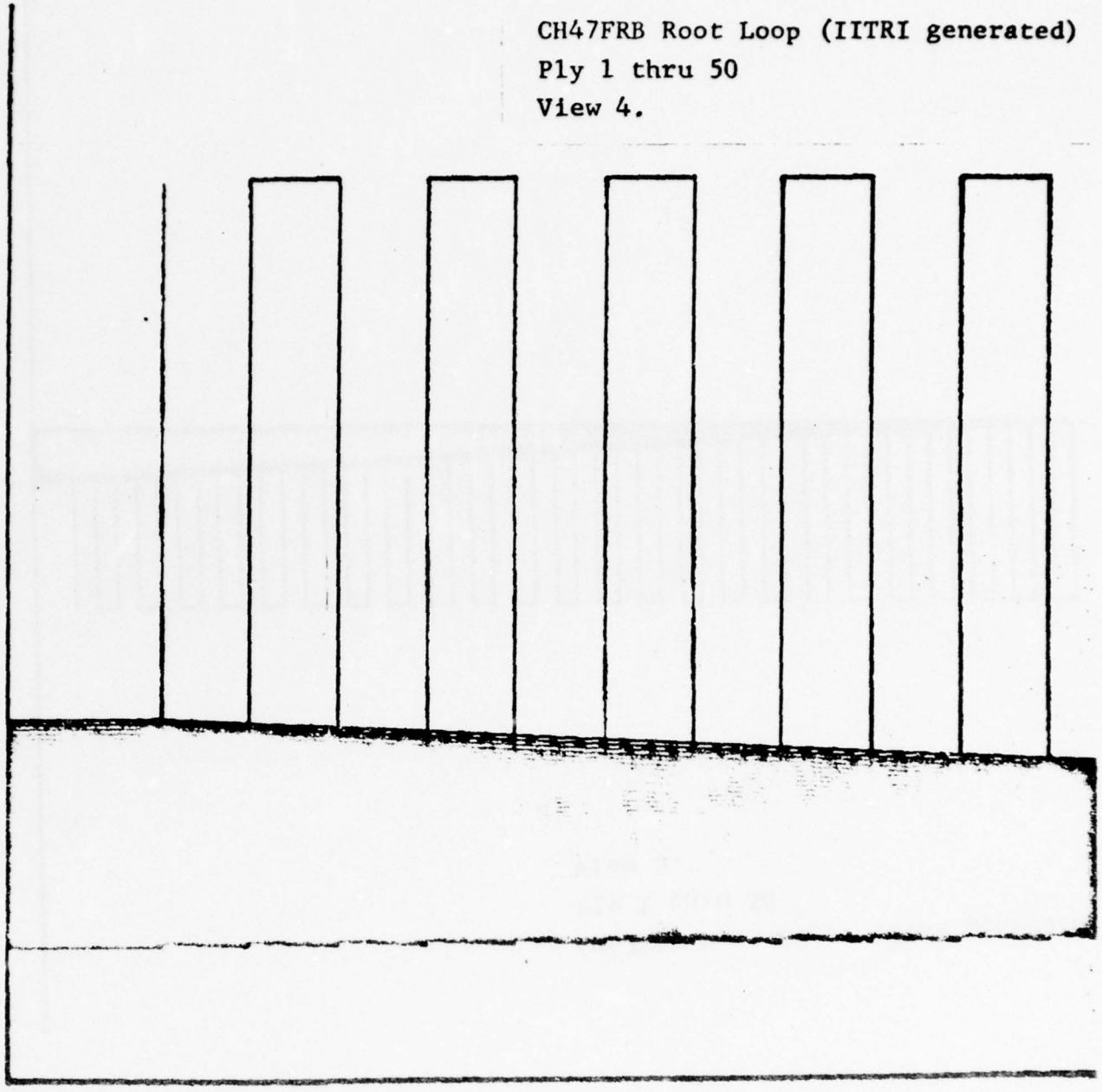


ENTER COMMAND



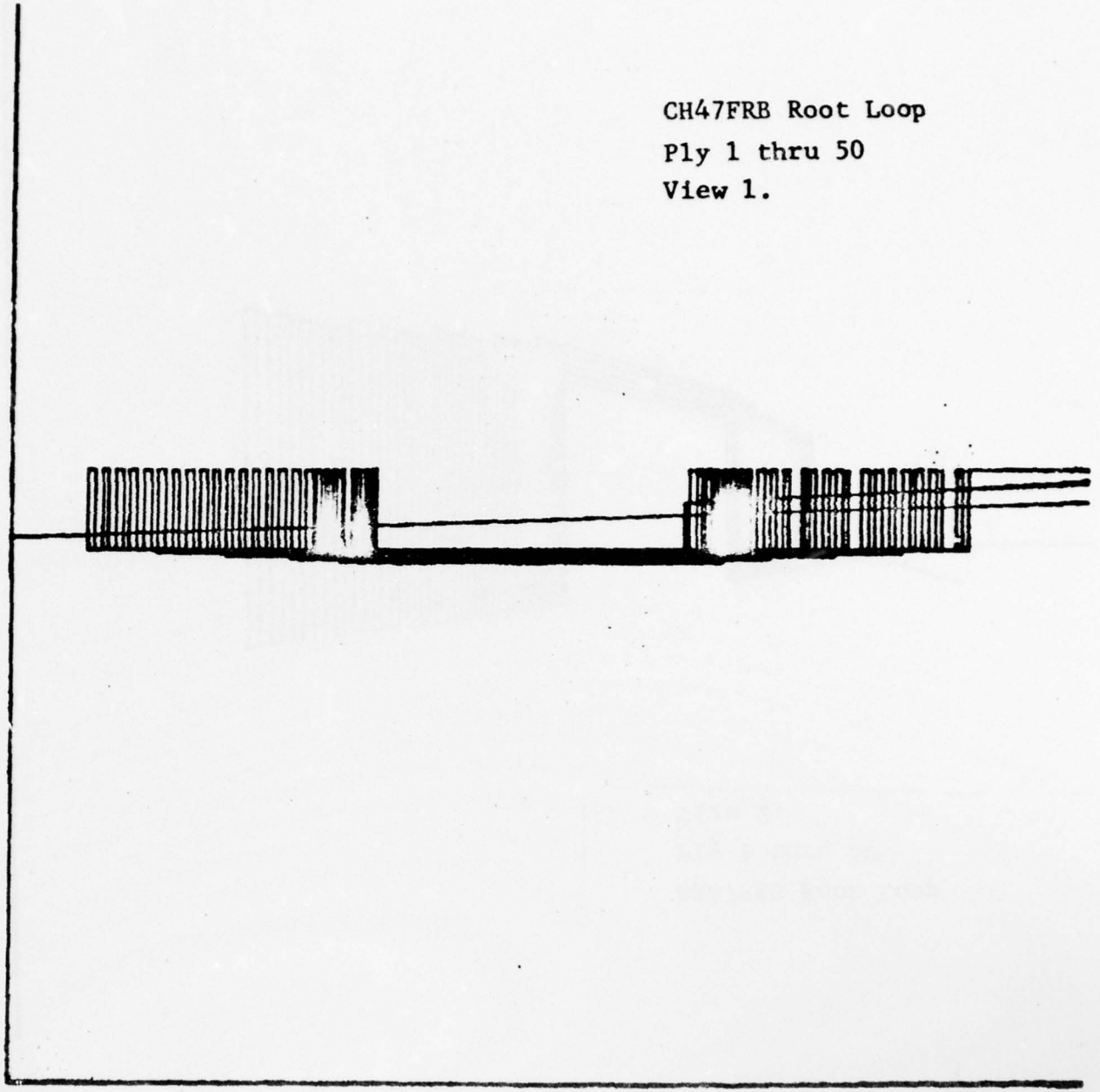
ENTER COMMAND

CH47FRB Root Loop (IITRI generated)
Ply 1 thru 50
View 4.



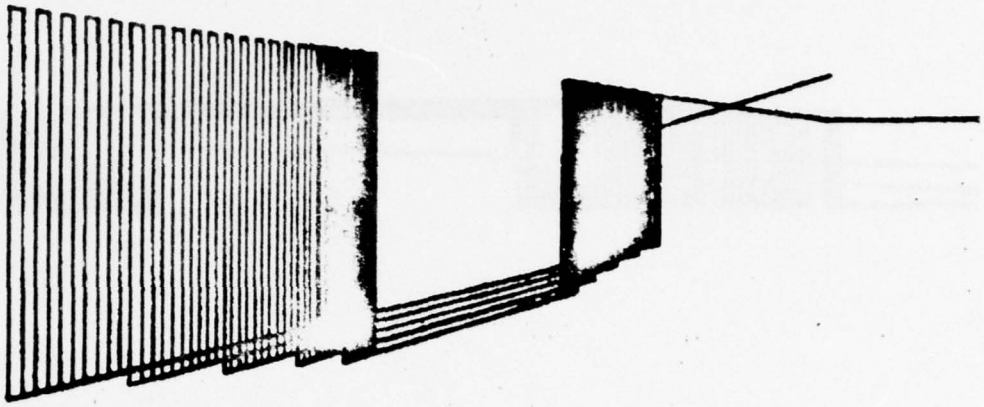
ENTER COMMAND

CH47FRB Root Loop
Ply 1 thru 50
View 1.

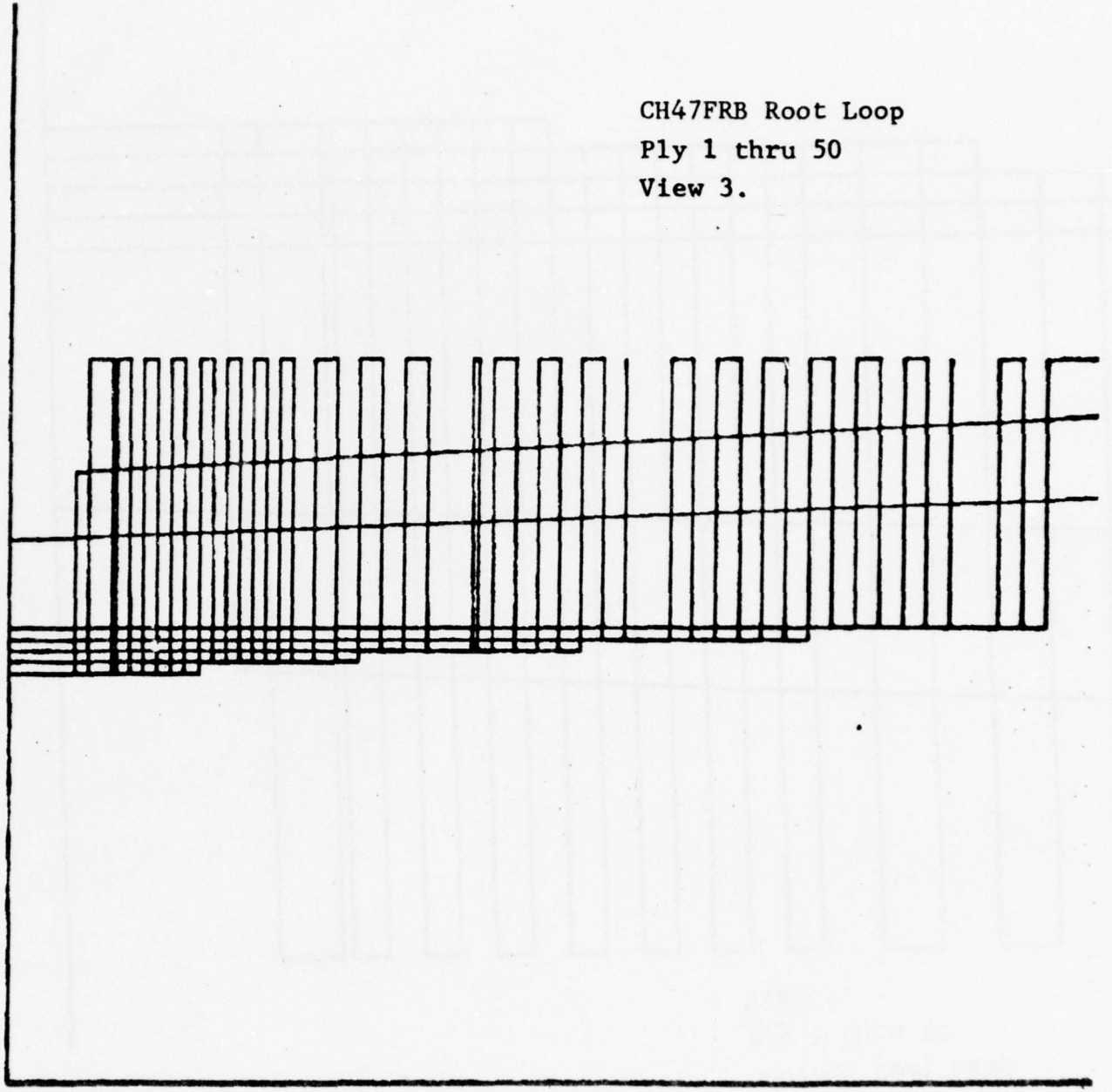


ENTER COMMAND

CH47FRB Root Loop
Ply 1 thru 50
View 2.

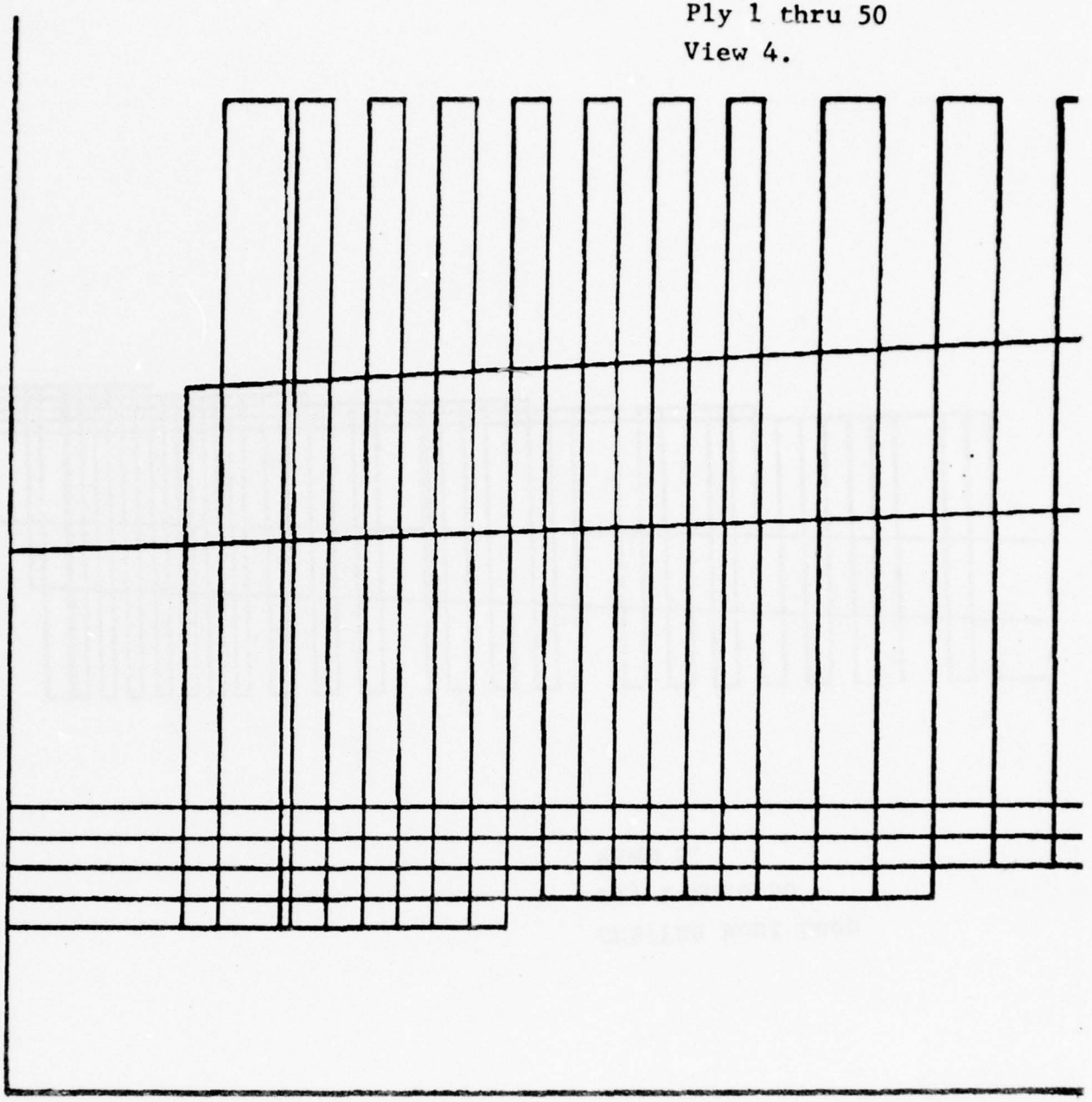


ENTER COMMAND



ENTER COMMAND

CH47FRB Root Loop
Ply 1 thru 50
View 4.



3. Control Tape Listings Produced by ATLSLI

- IITRI Test Tape - First 50 Plies.
- IITRI Test Tape - Ply 51 through Ply 144.
- Original Boeing Tape - First 50 Plies.
- Original Boeing Tape - Ply 51 through Ply 144.

3.1 IITRI Test Tape - First 50 Plies.

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
														1
	1													2
	!90													
				0.000	-5.000	3.000								3
							0.000	270.00	-0.000					4
		62												5
		75												6
1						0.000								7
		74												8
					-3.042									9
		80												10
					0.000									11
									180.000					12
					5.000									13
		75												14
					6.000	1.000								15
						3.000								16
					5.184			90.00						17
2						0.000								18
		74												19
134					5.000	0.009								20
					2.826	0.014								21
		80												22
					0.000	0.019								23
									-0.000					24
					-5.000	0.009								25
					-5.184	0.000								26
		75												27
					3.826	1.014								28
						3.014								29
					-5.368			270.00						30
3						0.000								31
		74												32
					-5.000	0.019								33
					-2.612	0.024								34
		80												35
					0.000	0.028								36
									180.000					37
					5.000	0.019								38
					5.368	0.000								39
		75												40
					-3.612	1.024								41
						3.024								42
					5.553			90.00						43
4						0.000								44
		74												45

N	C	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE
					5.000	0.028							
					2.398	0.033							
		80											
					0.000	0.038							
									-0.000				
					-5.000	0.028							
					-5.553	-0.000							
		75											
					3.398	1.033							
						3.033							
					-5.737			270.00					
5						0.000							
		74											
					-5.000	0.038							
					-2.184	0.043							
		80											
					0.000	0.047							
									180.000				
					5.000	0.038							
					5.737	0.000							
		75											
					-3.184	1.043							
						3.043							
					5.921			90.00					
6						0.000							
		74											
					5.000	0.047							
					1.970	0.053							
		80											
					0.000	0.057							
									-0.000				
					-5.000	0.047							
					-5.921	0.000							
		75											
					2.970	1.053							
						3.053							
					-6.105			270.00					
7						0.000							
		74											
					-5.000	0.057							
					-1.755	0.063							
		80											
					0.000	0.066							
									180.000				
					5.000	0.057							
					6.105	0.000							
		75											

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
					-2.755	1.063								93
						3.063								94
					6.289			90.00						95
8						0.000								96
		74												97
					5.000	0.066								98
					1.541	0.073								99
		80												100
					0.000	0.076								101
									-0.000					102
					-5.000	0.066								103
					-6.289	0.000								104
		75												105
					2.541	1.073								106
						3.073								107
					-6.474			270.00						108
9						0.000								109
		74												110
					-5.000	0.076								111
					-1.327	0.083								112
		80												113
					0.000	0.085								114
									180.000					115
					5.000	0.076								116
					6.474	0.000								117
		75												118
					-2.327	1.083								119
						3.083								120
					6.658			90.00						121
10						0.000								122
		74												123
					5.000	0.085								124
					1.112	0.093								125
		80												126
					0.000	0.095								127
									-0.000					128
					-5.000	0.085								129
					-6.658	0.000								130
		75												131
					2.112	1.093								132
						3.093								133
					-6.842			270.00						134
11						0.000								135
		74												136
					-5.000	0.095								137
					-0.898	0.103								138

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE
****	**	**	***	********	********	********	********	********	********	********	********	********	********
		80											
					0.000	0.104							
									180.000				
					5.000	0.095							
					6.842	0.000							
		75											
					-1.898	1.103							
						3.103							
					7.026			90.00					
12						0.000							
		74											
					5.000	0.104							
					0.684	0.113							
		80											
					0.000	0.114							
									-0.000				
					-5.000	0.104							
					-7.026	0.000							
		75											
					1.684	1.113							
						3.113							
					-7.211			270.00					
13						0.000							
		74											
					-5.000	0.114							
					-0.470	0.123							
		80											
					0.000	0.123							
									180.000				
					5.000	0.114							
					7.211	0.000							
		75											
					-1.470	1.123							
						3.123							
					7.395			90.00					
14						0.000							
		74											
					5.000	0.123							
					0.255	0.133							
		80											
					0.000	0.133							
									-0.000				
					-5.000	0.123							
					-7.395	0.000							
		75											
					1.255	1.133							
						3.133							

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
					-7.579			270.00						186
15						0.000								187
		74												188
					-5.000	0.133								189
					-0.041	0.142								190
		80												191
					0.000	0.142								192
									180.000					193
					5.000	0.133								194
					7.579	0.000								195
		75												196
					-1.041	1.142								197
						3.142								198
					7.763			90.00						199
16						0.000								200
		74												201
					5.000	0.142								202
					0.000	0.152								203
									-174.780					204
		80												205
									-0.000					206
					-5.000	0.142								207
					-7.763	0.000								208
		75												209
					8.763	4.142								210
						6.142								211
					-7.947			270.00						212
17						0.000								213
		74												214
					-5.000	0.152								215
					0.000	0.161								216
									11.618					217
		80												218
									180.000					219
					5.000	0.152								220
					7.947	0.000								221
		75												222
					-8.947	7.142								223
						9.142								224
					8.132			90.00						225
18						0.000								226
		74												227
					5.000	0.161								228
					3.000	0.171								229
									-162.048					230
		80												231

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
									-0.000					232
					-5.000	0.161								233
					-8.132	0.000								234
		75												235
					9.132	10.142								236
						12.142								237
					-8.316			270.00						238
19						0.000								239
		74												240
					-5.000	0.171								241
					0.000	0.180								242
									24.224					243
		80												244
									180.000					245
					5.000	0.171								246
					8.316	0.000								247
		75												248
					-9.316	13.142								249
						15.142								250
					8.500			90.00						251
20						0.000								252
		74												253
					5.000	0.180								254
					0.000	0.190								255
									-149.566					256
		80												257
									-0.000					258
					-5.000	0.180								259
					-8.500	0.000								260
		75												261
					9.500	16.142								262
						18.142								263
					-8.684			270.00						264
21						0.000								265
		74												266
					-5.000	0.190								267
					0.000	0.199								268
									36.584					269
		80												270
									180.000					271
					5.000	0.190								272
					8.684	0.000								273
		75												274
					-9.684	19.142								275
						21.142								276
					8.868			90.00						277

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
22						0.000								278
	74													279
					5.000	0.199								280
					0.000	0.209								281
									-137.325					282
	80													283
									-0.000					284
					-5.000	0.199								285
					-8.868	0.000								286
	75													287
					9.868	22.142								288
						24.142								289
					-9.053			270.00						290
23						0.000								291
	74													292
					-5.000	0.209								293
					0.000	0.218								294
									48.706					295
	80													296
									180.000					297
					5.000	0.209								298
					9.053	0.000								299
	75													300
					-10.053	25.142								301
						27.142								302
					9.237			90.00						303
24						0.000								304
	74													305
					5.000	0.218								306
					0.000	0.228								307
									-125.320					308
	80													309
									-0.000					310
					-5.000	0.218								311
					-9.237	0.000								312
	75													313
					10.237	28.142								314
						30.142								315
					-9.421			270.00						316
25						0.000								317
	74													318
					-5.000	0.228								319
					0.000	0.237								320
									60.596					321
	80													322
									180.000					323

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
					5.000	0.228								324
					9.421	0.000								325
		75												326
					-10.421	31.142								327
						33.142								328
					9.605			90.00						329
26						0.000								330
		74												331
					5.000	0.237								332
					0.000	0.247								333
									-113.544					334
		80												335
									-0.000					336
					-5.000	0.237								337
					-9.605	0.000								338
		75												339
					10.605	34.142								340
						36.142								341
					-9.789			270.00						342
27						0.000								343
		74												344
					-5.000	0.247								345
					0.000	0.256								346
									72.261					347
		80												348
									180.000					349
					5.000	0.247								350
					9.789	0.000								351
		75												352
					-10.789	37.142								353
						39.142								354
					9.974			90.00						355
28						0.000								356
		74												357
					5.000	0.256								358
					0.000	0.266								359
									-101.989					360
		80												361
									-0.000					362
					-5.000	0.256								363
					-9.974	0.000								364
		75												365
					10.974	40.142								366
						42.142								367
					-10.158			270.00						368

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
29						0.000								369
		74												370
					-5.000	0.266								371
					0.000	0.275								372
									83.707					373
		80												374
									180.000					375
					5.000	0.266								376
					10.158	0.000								377
		75												378
					-11.158	43.142								379
						45.142								380
					10.342			90.00						381
30						0.000								382
		74												383
					5.000	0.275								384
					0.000	0.285								385
									-90.650					386
		80												387
									-0.000					388
					-5.000	0.275								389
					-10.342	0.000								390
		75												391
					11.342	46.142								392
						48.142								393
					-10.526			270.00						394
31						0.000								395
		74												396
					-5.000	0.285								397
					0.000	0.294								398
									94.941					399
		80												400
									180.000					401
					5.000	0.285								402
					10.526	0.000								403
		75												404
					-11.526	49.142								405
						51.142								406
					10.711			90.00						407
32						0.000								408
		74												409
					5.000	0.294								410
					0.000	0.304								411
									-79.521					412
		80												413
									-0.000					414

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
					-5.000	0.294								415
					-10.711	0.000								416
		75												417
					11.711	52.142								418
						54.142								419
					-10.895			270.00						420
33						0.000								421
		74												422
					-5.000	0.304								423
					0.000	0.313								424
									105.967					425
		80												426
									180.000					427
					5.000	0.304								428
					10.895	0.000								429
		75												430
					-11.895	55.142								431
						57.142								432
					11.079			90.00						433
34						0.000								434
		74												435
					5.000	0.313								436
					0.000	0.323								437
									-68.596					438
		80												439
									-0.000					440
					-5.000	0.313								441
					-11.079	0.000								442
		75												443
					12.079	58.142								444
						60.142								445
					-11.263			270.00						446
35						0.000								447
		74												448
					-5.000	0.323								449
					0.000	0.332								450
									116.792					451
		80												452
									180.000					453
					5.000	0.323								454
					11.263	0.000								455
		75												456
					-12.263	61.142								457
						63.142								458
					11.447			90.00						459

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
36						0.000								460
	74													461
					5.000	0.332								462
					0.000	0.342								463
									-57.869					464
	80													465
									-0.000					466
					-5.000	0.332								467
					-11.447	0.000								468
	75													469
					12.447	64.142								470
						66.142								471
					-11.632			270.00						472
37						0.000								473
	74													474
					-5.000	0.342								475
					0.000	0.351								476
									127.422					477
	80													478
									180.000					479
					5.000	0.342								480
					11.632	0.000								481
	75													482
					-12.632	67.142								483
						69.142								484
					11.816			90.00						485
38						0.000								486
	74													487
					5.000	0.351								488
					0.000	0.361								489
									-47.335					490
	80													491
									-0.000					492
					-5.000	0.351								493
					-11.816	0.000								494
	75													495
					12.816	70.142								496
						72.142								497
					-12.000			270.00						498
39						0.000								499
	74													500
					-5.000	0.361								501
					0.000	0.370								502
									137.861					503
	80													504
									180.000					505

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
					5.000	0.361								506
					12.000	0.000								507
		75												508
					-13.000	73.142								509
						75.142								510
					12.184			90.00						511
40						0.000								512
		74												513
					5.000	0.370								514
					0.000	0.380								515
									-36.989					516
		80												517
									-0.000					518
					-5.000	0.370								519
					-12.184	0.000								520
		75												521
					13.184	76.142								522
						78.142								523
					-12.368			270.00						524
41						0.000								525
		74												526
					-5.000	0.380								527
					0.000	0.389								528
									148.114					529
		80												530
									180.000					531
					5.000	0.380								532
					12.368	0.000								533
		75												534
					-13.368	79.142								535
						81.142								536
					12.553			90.00						537
42						0.000								538
		74												539
					5.000	0.389								540
					0.000	0.399								541
									-26.827					542
		80												543
									-0.000					544
					-5.000	0.389								545
					-12.553	0.000								546
		75												547
					13.553	82.142								548
						84.142								549
					-12.737			270.00						550

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
43						0.000								551
		74												552
					-5.000	0.399								553
					0.000	0.408								554
									158.188					555
		80												556
									180.000					557
					5.000	0.399								558
					12.737	0.000								559
		75												560
					-13.737	85.142								561
						87.142								562
					12.921			90.00						563
44						0.000								564
		74												565
					5.000	0.408								566
					0.000	0.418								567
									-16.842					568
		80												569
									-0.000					570
					-5.000	0.408								571
					-12.921	0.000								572
		75												573
					13.921	88.142								574
						90.142								575
					-13.105			270.00						576
45						0.000								577
		74												578
					-5.000	0.418								579
					0.000	0.427								580
									168.085					581
		80												582
									180.000					583
					5.000	0.418								584
					13.105	0.000								585
		75												586
					-14.105	91.142								587
						93.142								588
					13.289			90.00						589
46						0.000								590
		74												591
					5.000	0.427								592
					0.000	0.437								593
									-7.031					594
		80												595
									-0.000					596

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
					-5.000	0.427								597
					-13.289	0.000								598
		75												599
					14.289	94.142								600
						96.142								601
					-13.474			270.00						602
47						0.000								603
		74												604
					-5.000	0.437								605
					0.000	0.446								606
									177.811					607
		80												608
									180.000					609
					5.000	0.437								610
					13.474	0.000								611
		75												612
					-14.474	97.142								613
						99.142								614
					13.658			90.00						615
48						0.000								616
		74												617
					5.000	0.446								618
					0.000	0.456								619
									-0.000					620
					-0.101	0.456								621
		80												622
					-5.000	0.446								623
					-13.658	0.000								624
		75												625
					0.899	1.456								626
						3.456								627
					-13.842			270.00						628
49						0.000								629
		74												630
					-5.000	0.456								631
					0.000	0.465								632
									180.000					633
					0.285	0.465								634
		80												635
					5.000	0.456								636
					13.842	0.000								637
		75												638
					-0.715	1.465								639
						3.465								640
					14.026			90.00						641

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
50						0.000								642
	74													643
					5.000	0.465								644
					0.000	0.475								645
									-0.000					646
					-0.469	0.474								647
	80													648
					-5.000	0.465								649
					-14.026	0.000								650
	75													651
					0.531	1.474								652
						3.474								653
	63													654
	30													655

3.2 IITRI Test Tape - Ply 51 through Ply 144.

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
	1													1
	!90													2
		62												3
				0.000	0.000	3.000	0.000	180.00	0.000					4
					0.000									5
		75												6
				-43.711										7
51						0.000								8
		74												9
				-34.500		0.475								10
				-29.500		0.484								11
				-12.330										12
				-19.330										13
								359.99	180.000					14
				-24.830										15
		64												16
	4												5.00	17
		75												18
				-29.500										19
				-30.183		0.483								20
		80												21
				-33.000		0.478								22
		65												23
		74												24
				-34.500		0.475								25
				-43.711		0.000								26
		75												27
				-44.711		1.000								28
						3.000								29
								180.00						30
				-43.895										31
52						0.000								32
		74												33
				-34.500		0.484								34
				-29.500		0.494								35
				-12.330										36
				-19.330										37
								359.99	0.000					38
				-24.850										39
		64												40
	4												5.00	41
		75												42
				-29.500										43
				-30.368		0.492								44
		80												45
				-33.000		0.487								46
		65												47

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
		74												48
				-34.500		0.484								49
				-43.895		0.000								50
		75												51
				-44.895		1.000								52
						3.000								53
								180.00						54
				-44.079										55
53						0.000								56
		74												57
				-34.500		0.494								58
				-29.500		0.503								59
				-12.330										60
				-19.330										61
								359.99	180.006					62
				-24.870										63
		64												64
	4												5.00	65
		75												66
				-29.500										67
				-30.552		0.502								68
		80												69
				-33.000		0.497								70
		65												71
		74												72
				-34.500		0.494								73
				-44.079		-0.000								74
		75												75
				-45.079		1.000								76
						3.000								77
								180.00						78
				-44.263										79
54						0.000								80
		74												81
				-34.500		0.503								82
				-29.500		0.513								83
				-12.330										84
				-19.330										85
								359.99	0.000					86
				-24.890										87
		64												88
	4												5.00	89
		75												90
				-29.500										91
				-30.737		0.511								92
		80												93
				-33.000		0.506								94
		65												95

N	C	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		74												96
				-34.500		0.503								97
				-44.263		0.000								98
		75												99
				-45.263		1.000								100
						3.000								101
								180.00						102
				-44.447										103
55						0.000								104
		74												105
				-34.500		0.513								106
				-29.500		0.522								107
				-12.330										108
				-19.330										109
								359.99	180.000					110
				-24.909										111
		64												112
	4												5.00	113
		75												114
				-29.500										115
				-30.921		0.520								116
		80												117
				-33.000		0.516								118
		65												119
		74												120
				-34.500		0.513								121
				-44.447		-0.000								122
		75												123
				-45.447		1.000								124
						3.000								125
								180.00						126
				-44.632										127
56						0.000								128
		74												129
				-34.500		0.522								130
				-29.500		0.532								131
				-12.330										132
				-19.330										133
								359.99	0.000					134
				-24.929										135
		64												136
	4												5.00	137
		75												138
				-29.500										139
				-31.106		0.529								140
		80												141
				-33.000		0.525								142
		65												143

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		74												144
				-34.500		0.522								145
				-44.632		0.000								146
		75												147
				-45.632		1.000								148
						3.000								149
								180.00						150
				-44.816										151
57						0.000								152
		74												153
				-34.500		0.532								154
				-29.500		0.541								155
				-12.330										156
				-19.330										157
								359.99	180.000					158
				-24.949										159
		64												160
	4												5.00	161
		75												162
				-29.500										163
				-31.290		0.538								164
		80												165
				-33.000		0.535								166
		65												167
		74												168
				-34.500		0.532								169
				-44.816		-0.000								170
		75												171
				-45.816		1.000								172
						3.000								173
								180.00						174
				-45.000										175
58						0.000								176
		74												177
				-34.500		0.541								178
				-29.500		0.551								179
				-12.330										180
				-19.330										181
								359.99	0.000					182
				-24.969										183
		64												184
	4												5.00	185
		75												186
				-29.500										187
				-31.474		0.547								188
		80												189
				-33.000		0.544								190
		65												191

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		74												192
				-34.500		0.541								193
				-45.000		0.000								194
		75												195
				-46.000		1.000								196
						3.000								197
								180.00						198
				-45.423										199
59						0.000								200
		74												201
				-45.000		0.009								202
				-34.500		0.551								203
				-29.500		0.560								204
				-12.330										205
				-19.330										206
								359.99	180.000					207
				-24.989										208
		64												209
	4												5.00	210
		75												211
				-29.500										212
				-32.177		0.555								213
		80												214
				-33.000		0.554								215
		65												216
		74												217
				-34.500		0.551								218
				-45.000		0.009								219
				-45.423		-0.000								220
		75												221
				-46.423		1.000								222
						3.000								223
								180.00						224
				-45.846										225
60						0.000								226
		74												227
				-45.000		0.019								228
				-34.500		0.560								229
				-29.500		0.570								230
				-12.330										231
				-19.330										232
								359.99	0.000					233
				-25.009										234
		64												235
	4												5.00	236
		75												237
				-29.500										238
				-32.495		0.564								239

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		80												240
				-33.000		0.563								241
		65												242
		74												243
				-34.500		0.560								244
				-45.000		0.019								245
				-45.846		-0.000								246
		75												247
				-46.846		1.000								248
						3.000								249
								180.00						250
				-46.269										251
61						0.000								252
		74												253
				-45.000		0.028								254
				-34.500		0.570								255
				-29.500		0.579								256
				-12.330										257
				-19.330										258
								359.99	180.000					259
				-25.029										260
		64												261
	4												5.00	262
		75												263
				-29.500										264
				-32.870		0.573								265
		80												266
				-33.000		0.573								267
		65												268
		74												269
				-34.500		0.570								270
				-45.000		0.028								271
				-46.269		-0.000								272
		75												273
				-47.269		1.000								274
						3.000								275
								180.00						276
				-46.692										277
62						0.000								278
		74												279
				-45.000		0.038								280
				-34.500		0.579								281
				-29.500		0.589								282
				-12.330										283
				-19.330										284
								359.99	0.000					285
				-25.048										286
		64												287

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
	4												5.00	288
		75												289
				-29.500										290
				-33.000		0.582								291
		65												292
		74												293
				-33.266		0.582								294
		80												295
				-34.500		0.579								296
				-45.000		0.038								297
				-46.692		-0.000								298
		75												299
				-47.692		1.000								300
						3.000								301
								180.00						302
				-47.115										303
63						0.000								304
		74												305
				-45.000		0.047								306
				-34.500		0.589								307
				-29.500		0.598								308
				-12.330										309
				-19.330										310
								359.99	180.000					311
				-25.068										312
		64												313
	4												5.00	314
		75												315
				-29.500										316
				-33.000		0.592								317
		65												318
		74												319
				-33.673		0.591								320
		80												321
				-34.500		0.589								322
				-45.000		0.047								323
				-47.115		-0.000								324
		75												325
				-48.115		1.000								326
						3.000								327
								180.00						328
				-47.538										329
64						0.000								330
		74												331
				-45.000		0.057								332
				-34.500		0.598								333
				-29.500		0.608								334
				-12.330										335

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-19.330										336
								359.99	0.000					337
				-25.088										338
		64												339
	4												5.00	340
		75												341
				-29.500										342
				-33.000		0.601								343
		65												344
		74												345
				-34.085		0.599								346
		80												347
				-34.500		0.598								348
				-45.000		0.057								349
				-47.538		-0.000								350
		75												351
				-48.538		1.000								352
						3.000								353
								180.00						354
				-47.962										355
65						0.000								356
		74												357
				-45.000		0.066								358
				-34.500		0.608								359
				-29.500		0.617								360
				-12.330										361
				-19.330										362
								359.99	180.000					363
				-25.108										364
		64												365
	4												5.00	366
		75												367
				-29.500										368
				-33.000		0.611								369
		65												370
		74												371
				-34.500		0.608								372
		80												373
				-34.500		0.608								374
				-45.000		0.067								375
				-47.962		0.000								376
		75												377
				-48.962		1.000								378
						3.000								379
								180.00						380
				-48.385										381
66						0.000								

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-45.000		0.076								384
				-34.500		0.617								385
				-29.500		0.627								386
				-12.330										387
				-19.330										388
								359.99	0.000					389
				-25.128										390
		64												391
	4												5.00	392
		75												393
				-29.500										394
				-33.000		0.620								395
		65												396
		74												397
				-34.500		0.617								398
				-34.916		0.596								399
		80												400
				-45.000		0.076								401
				-48.385		-0.000								402
		75												403
				-49.385		1.000								404
						3.000								405
								180.00						406
158				-48.808										407
67						0.000								408
		74												409
				-45.000		0.085								410
				-34.500		0.627								411
				-29.500		0.636								412
				-12.330										413
				-19.330										414
								359.99	180.000					415
				-25.148										416
		64												417
	4												5.00	418
		75												419
				-29.500										420
				-33.000		0.630								421
		65												422
		74												423
				-34.500		0.627								424
				-35.334		0.584								425
		80												426
				-45.000		0.085								427
				-48.808		0.000								428

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-49.231										433
68						0.000								434
		74												435
				-45.000		0.095								436
				-34.500		0.636								437
				-29.500		0.646								438
				-12.330										439
				-19.330										440
								359.99	0.000					441
				-25.168										442
		64												443
	4												5.00	444
		75												445
				-29.500										446
				-33.000		0.639								447
		65												448
		74												449
				-34.500		0.636								450
				-35.753		0.572								451
		80												452
				-45.000		0.095								453
				-49.231		-0.000								454
		75												455
				-50.231		1.000								456
						3.000								457
								180.00						458
				-49.654										459
69						0.000								460
		74												461
				-45.000		0.104								462
				-34.500		0.646								463
				-29.500		0.655								464
				-12.330										465
				-19.330										466
								359.99	180.000					467
				-25.187										468
		64												469
	4												5.00	470
		75												471
				-29.500										472
				-33.000		0.649								473
		65												474
		74												475
				-34.500		0.646								476
				-36.172		0.560								477
		80												478
				-45.000		0.104								479
				-49.654		0.000								480

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		75												481
				-50.654		1.000								482
						3.000								483
								180.00						484
				-50.077										485
70						0.000								486
		74												487
				-45.000		0.114								488
				-34.500		0.655								489
				-29.500		0.665								490
				-12.330										491
				-19.330										492
								359.99	0.000					493
				-25.207										494
		64												495
	4												5.00	496
		75												497
				-29.500										498
				-33.000		0.658								499
		65												500
		74												501
				-34.500		0.655								502
				-36.592		0.548								503
		80												504
				-45.000		0.114								505
				-50.077		-0.000								506
		75												507
				-51.077		1.000								508
						3.000								509
								180.00						510
				-50.500										511
71						0.000								512
		74												513
				-45.000		0.123								514
				-34.500		0.665								515
				-29.500		0.674								516
				-12.330										517
				-19.330										518
								359.99	180.000					519
				-25.227										520
		64												521
	4												5.00	522
		75												523
				-29.500										524
				-33.000		0.668								525
		65												526
		74												527
				-34.500		0.665								528

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
				-37.012		0.535								529
		80												530
				-45.000		0.123								531
				-50.500		-0.000								532
		75												533
				-51.500		1.000								534
						3.000								535
								180.00						536
				-55.000										537
72						0.000								538
		74												539
				-50.500		0.009								540
				-45.000		0.133								541
				-34.500		0.674								542
				-29.500		0.684								543
				-12.330										544
				-19.330										545
								359.99	0.000					546
				-25.247										547
		64												548
	4												5.00	549
		75												550
				-29.500										551
				-33.000		0.577								552
		65												553
		74												554
				-34.500		0.674								555
				-41.558		0.311								556
		80												557
				-45.000		0.133								558
				-50.500		0.009								559
				-55.000		-0.000								560
		75												561
				-56.000		1.000								562
						3.000								563
								180.00						564
				-55.625										565
73						0.000								566
		74												567
				-55.000		0.009								568
				-50.500		0.019								569
				-45.000		0.142								570
				-34.500		0.684								571
				-29.500		0.693								572
				-12.330										573
				-19.330										574
								359.99	180.000					575
				-25.267										576

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		64												577
	4												5.00	578
		75												579
				-29.500										580
				-33.000		0.687								581
		65												582
		74												583
				-34.500		0.684								584
				-42.490		0.272								585
		80												586
				-45.000		0.142								587
				-50.500		0.019								588
				-55.000		0.009								589
				-55.625		-0.000								590
		75												591
				-56.625		1.000								592
						3.000								593
								180.00						594
				-56.250										595
74						0.000								596
		74												597
				-55.000		0.019								598
				-50.500		0.028								599
				-45.000		0.152								600
				-34.500		0.693								601
				-29.500		0.703								602
				-12.330										603
				-19.330										604
								359.99	0.000					605
				-25.287										606
		64												607
	4												5.00	608
		75												609
				-29.500										610
				-33.000		0.696								611
		65												612
		74												613
				-34.500		0.693								614
				-42.990		0.256								615
		80												616
				-45.000		0.152								617
				-50.500		0.028								618
				-55.000		0.019								619
				-56.250		-0.000								620
		75												621
				-57.250		1.000								622
						3.000								623
								180.00						624
				-56.875										625

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
75						0.000								626
		74												627
				-55.000		0.028								628
				-50.500		0.038								629
				-45.000		0.161								630
				-34.500		0.703								631
				-29.500		0.712								632
				-12.330										633
				-19.330										634
								359.99	180.000					635
				-25.307										636
		64												637
	4												5.00	638
		75												639
				-29.500										640
				-33.000		0.706								641
		65												642
		74												643
				-34.500		0.703								644
				-43.561		0.236								645
		80												646
				-45.000		0.161								647
				-50.500		0.038								648
				-55.000		0.028								649
				-56.875		-0.000								650
		75												651
				-57.875		1.000								652
						3.000								653
								180.00						654
				-57.500										655
76						0.000								656
		74												657
				-55.000		0.038								658
				-50.500		0.047								659
				-45.000		0.171								660
				-34.500		0.712								661
				-29.500		0.722								662
				-12.330										663
				-19.330										664
								359.99	0.000					665
				-25.326										666
		64												667
	4												5.00	668
		75												669
				-29.500										670
				-33.000		0.715								671
		65												672
		74												673

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-34.500		0.712								674
				-44.157		0.214								675
		80												676
				-45.000		0.171								677
				-50.500		0.048								678
				-55.000		0.038								679
				-57.500		0.000								680
		75												681
				-58.500		1.000								682
						3.000								683
								180.00						684
				-58.125										685
77						0.000								686
		74												687
				-55.000		0.047								688
				-50.500		0.057								689
				-45.000		0.180								690
				-34.500		0.722								691
				-29.500		0.731								692
				-12.330										693
				-19.330										694
								359.99	180.000					695
				-25.346										696
		64												697
	4												5.00	698
		75												699
				-29.500										700
				-33.000		0.725								701
		65												702
		74												703
				-34.500		0.722								704
				-44.763		0.193								705
		80												706
				-45.000		0.180								707
				-50.500		0.057								708
				-55.000		0.047								709
				-58.125		-0.000								710
		75												711
				-59.125		1.000								712
						3.000								713
								180.00						714
				-58.750										715
78						0.000								716
		74												717
				-55.000		0.057								718
				-50.500		0.066								719
				-45.000		0.190								720
				-34.500		0.731								721

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-29.500		0.741								722
				-12.330										723
				-19.330										724
								359.99	0.000					725
				-25.366										726
		64												727
	4												5.00	728
		75												729
				-29.500										730
				-33.000		0.734								731
		65												732
		74												733
				-34.500		0.731								734
				-45.000		0.190								735
				-45.376		0.182								736
		80												737
				-50.500		0.066								738
				-55.000		0.057								739
				-58.750		0.000								740
		75												741
				-59.750		1.000								742
						3.000								743
165								180.00						744
				-59.375										745
79						0.000								746
		74												747
				-55.000		0.066								748
				-50.500		0.076								749
				-45.000		0.199								750
				-34.500		0.741								751
				-29.500		0.750								752
				-12.330										753
				-19.330										754
								359.99	180.000					755
				-25.386										756
		64												757
	4												5.00	758
		75												759
				-29.500										760
				-33.000		0.744								761
		65												762
		74												763
				-34.500		0.741								764
				-45.000		0.199								765
				-45.992		0.177								766
		80												767
				-50.500		0.076								768
				-55.000		0.066								769
				-59.375		-0.000								770

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-29.500		0.741								722
				-12.330										723
				-19.330										724
								359.99	0.000					725
				-25.366										726
		64												727
	4												5.00	728
		75												729
				-29.500										730
				-33.000		0.734								731
		65												732
		74												733
				-34.500		0.731								734
				-45.000		0.190								735
				-45.376		0.182								736
		80												737
				-50.500		0.066								738
				-55.000		0.057								739
				-58.750		0.000								740
		75												741
				-59.750		1.000								742
						3.000								743
165								180.00						744
				-59.375										745
79						0.000								746
		74												747
				-55.000		0.066								748
				-50.500		0.076								749
				-45.000		0.199								750
				-34.500		0.741								751
				-29.500		0.750								752
				-12.330										753
				-19.330										754
								359.99	180.000					755
				-25.386										756
		64												757
	4												5.00	758
		75												759
				-29.500										760
				-33.000		0.744								761
		65												762
		74												763
				-34.500		0.741								764
				-45.000		0.199								765
				-45.992		0.177								766
		80												767
				-50.500		0.076								768
				-55.000		0.066								769
				-59.375		-0.000								770

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
		75												771
				-60.375		1.000								772
						3.000								773
								180.00						774
				-60.000										775
80						0.000								776
		74												777
				-55.000		0.076								778
				-50.500		0.085								779
				-45.000		0.209								780
				-34.500		0.750								781
				-29.500		0.760								782
				-12.330										783
				-19.330										784
								359.99	0.000					785
				-25.406										786
		64												787
	4												5.00	788
		75												789
				-29.500										790
				-33.000		0.753								791
		65												792
		74												793
				-34.500		0.750								794
				-45.000		0.209								795
				-46.610		0.173								796
		80												797
				-50.500		0.085								798
				-55.000		0.076								799
				-60.000		0.000								800
		75												801
				-61.000		1.000								802
						3.000								803
								180.00						804
				-60.625										805
81						0.000								806
		74												807
				-60.000		0.009								808
				-55.000		0.085								809
				-50.500		0.095								810
				-45.000		0.218								811
				-34.500		0.760								812
				-29.500		0.769								813
				-12.330										814
				-19.330										815
								359.99	180.000					816
				-25.426										817
		64												818

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
	4												5.00	819
		75												820
				-29.500										821
				-33.000		0.763								822
		65												823
		74												824
				-34.500		0.760								825
				-45.000		0.218								826
				-47.601		0.160								827
		80												828
				-50.500		0.095								829
				-55.000		0.085								830
				-60.000		0.009								831
				-60.625		-0.000								832
		75												833
				-61.625		1.000								834
						3.000								835
								180.00						836
				-61.250										837
82						0.000								838
		74												839
				-60.000		0.019								840
				-55.000		0.095								841
				-50.500		0.104								842
				-45.000		0.228								843
				-34.500		0.769								844
				-29.500		0.779								845
				-12.330										846
				-19.330										847
								359.99	0.000					848
				-25.446										849
		64												850
	4												5.00	851
		75												852
				-29.500										853
				-33.000		0.772								854
		65												855
		74												856
				-34.500		0.769								857
				-45.000		0.228								858
				-48.083		0.159								859
		80												860
				-50.500		0.104								861
				-55.000		0.095								862
				-60.000		0.019								863
				-61.250		-0.000								864
		75												865
				-62.250		1.000								866
						3.000								867

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
								180.00						868
				-61.875										869
83						0.000								870
		74												871
				-60.000		0.028								872
				-55.000		0.104								873
				-50.500		0.114								874
				-45.000		0.237								875
				-34.500		0.779								876
				-29.500		0.788								877
				-12.330										878
				-19.330										879
								359.99	180.000					880
				-25.465										881
		64												882
	4												5.00	883
		75												884
				-29.500										885
				-33.000		0.782								886
		65												887
		74												888
				-34.500		0.779								889
				-45.000		0.237								890
				-48.644		0.156								891
		80												892
				-50.500		0.114								893
				-55.000		0.104								894
				-60.000		0.028								895
				-61.875		-0.000								896
		75												897
				-62.875		1.000								898
						3.000								899
								180.00						900
				-62.500										901
84						0.000								902
		74												903
				-60.000		0.038								904
				-55.000		0.114								905
				-50.500		0.123								906
				-45.000		0.247								907
				-34.500		0.788								908
				-29.500		0.798								909
				-12.330										910
				-19.330										911
								359.99	0.000					912
				-25.485										913
		64												914
	4												5.00	915

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		75												916
				-29.500										917
				-33.000		0.791								918
		65												919
		74												920
				-34.500		0.788								921
				-45.000		0.247								922
				-49.234		0.152								923
		80												924
				-50.500		0.123								925
				-55.000		0.114								926
				-60.000		0.038								927
				-62.500		-0.000								928
		75												929
				-63.500		1.000								930
						3.000								931
								180.00						932
				-63.125										933
85						0.000								934
		74												935
				-60.000		0.047								936
				-55.000		0.123								937
				-50.500		0.133								938
				-45.000		0.256								939
				-34.500		0.798								940
				-29.500		0.807								941
				-12.330										942
				-19.330										943
								359.99	180.000					944
				-25.505										945
		64												946
	4												5.00	947
		75												948
				-29.500										949
				-33.000		0.801								950
		65												951
		74												952
				-34.500		0.798								953
				-45.000		0.256								954
				-49.837		0.148								955
		80												956
				-50.500		0.133								957
				-55.000		0.123								958
				-60.000		0.047								959
				-63.125		-0.000								960
		75												961
				-64.125		1.000								962
						3.000								963
								180.00						964

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-63.750										965
86						0.000								966
	74													967
				-60.000		0.057								968
				-55.000		0.133								969
				-50.500		0.142								970
				-45.000		0.266								971
				-34.500		0.807								972
				-29.500		0.817								973
				-12.330										974
				-19.330										975
								359.99	0.000					976
				-25.525										977
	64													978
4													5.00	979
	75													980
				-29.500										981
				-33.000		0.810								982
	65													983
	74													984
				-34.500		0.807								985
				-45.000		0.266								986
				-50.447		0.144								987
	80													988
				-50.500		0.142								989
				-55.000		0.133								990
				-60.000		0.057								991
				-63.750		-0.000								992
	75													993
				-64.750		1.000								994
						3.000								995
								180.00						996
				-64.375										997
87						0.000								998
	74													999
				-60.000		0.066								1000
				-55.000		0.142								1001
				-50.500		0.152								1002
				-45.000		0.275								1003
				-34.500		0.817								1004
				-29.500		0.826								1005
				-12.330										1006
				-19.330										1007
								359.99	180.000					1008

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-29.500										1013
				-33.000		0.820								1014
		65												1015
		74												1016
				-34.500		0.817								1017
				-45.000		0.275								1018
				-50.500		0.152								1019
				-51.062		0.151								1020
		80												1021
				-55.000		0.142								1022
				-60.000		0.066								1023
				-64.375		0.000								1024
		75												1025
				-65.375		1.000								1026
						3.000								1027
								180.00						1028
				-65.000										1029
88						0.000								1030
		74												1031
				-60.000		0.076								1032
				-55.000		0.152								1033
				-50.500		0.161								1034
				-45.000		0.285								1035
				-34.500		0.826								1036
				-29.500		0.836								1037
				-12.330										1038
				-19.330										1039
								359.99	0.000					1040
				-25.565										1041
		64												1042
	4												5.00	1043
		75												1044
				-29.500										1045
				-33.000		0.829								1046
		65												1047
		74												1048
				-34.500		0.826								1049
				-45.000		0.285								1050
				-50.500		0.161								1051
				-51.679		0.159								1052
		80												1053
				-55.000		0.152								1054
				-60.000		0.076								1055
				-65.000		-0.000								1056
		75												1057

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
89						0.000								1062
		74												1063
				-65.000		0.009								1064
				-60.000		0.085								1065
				-55.000		0.161								1066
				-50.500		0.171								1067
				-45.000		0.294								1068
				-34.500		0.836								1069
				-29.500		0.845								1070
				-12.330										1071
				-19.330										1072
								359.99	180.000					1073
				-25.585										1074
		64												1075
	4												5.00	1076
		73												1077
				-29.500										1078
				-33.000		0.839								1079
		65												1080
		74												1081
				-34.500		0.836								1082
				-45.000		0.294								1083
				-50.500		0.171								1084
				-52.639		0.166								1085
		80												1086
				-53.000		0.161								1087
				-60.000		0.085								1088
				-65.000		0.009								1089
				-65.455		-0.000								1090
		75												1091
				-66.455		1.000								1092
						3.000								1093
								180.00						1094
				-65.909										1095
90						0.000								1096
		74												1097
				-65.000		0.019								1098
				-60.000		0.095								1099
				-55.000		0.171								1100
				-50.500		0.180								1101
				-45.000		0.304								1102
				-34.500		0.845								1103
				-29.500		0.855								1104
				-12.330										1105
				-19.330										1106
								359.99	0.000					1107
				-25.604										1108
		64												1109

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
	4												5.00	1110
		75												1111
				-29.500										1112
				-33.000		0.848								1113
		65												1114
		74												1115
				-34.500		0.845								1116
				-45.000		0.304								1117
				-50.500		0.180								1118
				-52.927		0.175								1119
		80												1120
				-55.000		0.171								1121
				-60.000		0.095								1122
				-65.000		0.019								1123
				-65.909		-0.000								1124
		75												1125
				-66.909		1.000								1126
						3.000								1127
								180.00						1128
				-66.364										1129
91						0.000								1130
		74												1131
				-65.000		0.028								1132
				-60.000		0.104								1133
				-55.000		0.180								1134
				-50.500		0.190								1135
				-45.000		0.313								1136
				-34.500		0.855								1137
				-29.500		0.864								1138
				-12.330										1139
				-19.330										1140
								359.99	180.000					1141
				-25.624										1142
		64												1143
	4												5.00	1144
		75												1145
				-29.500										1146
				-33.000		0.858								1147
		65												1148
		74												1149
				-34.500		0.855								1150
				-45.000		0.313								1151
				-50.500		0.190								1152
				-53.293		0.184								1153
		80												1154
				-55.000		0.180								1155
				-60.000		0.104								1156
				-65.000		0.028								1157
				-66.364		-0.000								1158

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		75												1159
				-67.364		1.000								1160
						3.000								1161
								180.00						1162
				-66.818										1163
92						0.000								1164
		74												1165
				-63.000		0.038								1166
				-60.000		0.114								1167
				-55.000		0.190								1168
				-50.500		0.199								1169
				-45.000		0.323								1170
				-34.500		0.864								1171
				-29.500		0.874								1172
				-12.330										1173
				-19.330										1174
								359.99	0.000					1175
				-25.644										1176
		64												1177
	4												5.00	1178
		75												1179
				-29.500										1180
				-33.000		0.867								1181
		65												1182
		74												1183
				-34.500		0.864								1184
				-45.000		0.323								1185
				-50.500		0.199								1186
				-53.696		0.193								1187
		80												1188
				-55.000		0.190								1189
				-60.000		0.114								1190
				-65.000		0.038								1191
				-66.818		-0.000								1192
		75												1193
				-67.818		1.000								1194
						3.000								1195
								180.00						1196
				-67.273										1197
93						0.000								1198
		74												1199
				-65.000		0.047								1200
				-60.000		0.123								1201
				-55.000		0.199								1202
				-50.500		0.209								1203
				-45.000		0.332								1204
				-34.500		0.874								1205
				-29.500		0.883								1206

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
				-12.330										1207
				-19.330										1208
								359.99	180.000					1209
				-25.664										1210
		64												1211
	4												5.00	1212
		75												1213
				-29.500										1214
				-33.000		0.877								1215
		65												1216
		74												1217
				-34.500		0.874								1218
				-45.000		0.332								1219
				-50.500		0.209								1220
				-54.117		0.201								1221
		80												1222
				-55.000		0.199								1223
				-60.000		0.123								1224
				-65.000		0.047								1225
				-67.273		-0.000								1226
		75												1227
				-68.273		1.000								1228
						3.000								1229
175								180.00						1230
				-67.727										1231
94						0.000								1232
		74												1233
				-65.000		0.057								1234
				-60.000		0.133								1235
				-55.000		0.209								1236
				-50.500		0.218								1237
				-45.000		0.342								1238
				-34.500		0.883								1239
				-29.500		0.893								1240
				-12.330										1241
				-19.330										1242
								359.99	0.000					1243
				-25.684										1244
		64												1245
	4												5.00	1246
		75												1247
				-29.500										1248
				-33.000		0.886								1249
		65												1250
		74												1251
				-34.500		0.883								1252
				-45.000		0.342								1253
				-50.500		0.218								1254
				-54.549		0.210								1255

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		80												1256
				-55.000		0.209								1257
				-60.000		0.133								1258
				-65.000		0.057								1259
				-67.727		-0.000								1260
		75												1261
				-68.727		1.000								1262
						3.000								1263
								180.00						1264
				-68.182										1265
95						0.000								1266
		74												1267
				-65.000		0.066								1268
				-60.000		0.142								1269
				-55.000		0.218								1270
				-50.500		0.228								1271
				-45.000		0.351								1272
				-34.500		0.893								1273
				-29.500		0.902								1274
				-12.330										1275
				-19.330										1276
								359.99	180.000					1277
				-25.704										1278
		64												1279
	4												5.00	1280
		75												1281
				-29.500										1282
				-33.000		0.896								1283
		65												1284
		74												1285
				-34.500		0.893								1286
				-45.000		0.351								1287
				-50.500		0.228								1288
				-54.986		0.219								1289
		80												1290
				-55.000		0.218								1291
				-60.000		0.142								1292
				-65.000		0.066								1293
				-68.182		-0.000								1294
		75												1295
				-69.182		1.000								1296
						3.000								1297
								180.00						1298
				-68.636										1299
96						0.000								1300
		74												1301
				-65.000		0.076								1302
				-60.000		0.152								1303

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
				-55.000		0.228								1304
				-50.500		0.237								1305
				-45.000		0.361								1306
				-34.500		0.902								1307
				-29.500		0.912								1308
				-12.330										1309
				-19.330										1310
								359.99	0.000					1311
				-25.723										1312
		64												1313
	4												5.00	1314
		75												1315
				-29.500										1316
				-33.000		0.905								1317
		65												1318
		74												1319
				-34.500		0.902								1320
				-45.000		0.361								1321
				-50.500		0.237								1322
				-55.000		0.228								1323
				-55.428		0.221								1324
		80												1325
				-60.000		0.152								1326
				-65.000		0.076								1327
				-68.636		0.000								1328
		75												1329
				-69.636		1.000								1330
						3.000								1331
								180.00						1332
				-69.091										1333
97						0.000								1334
		74												1335
				-65.000		0.085								1336
				-60.000		0.161								1337
				-55.000		0.237								1338
				-50.500		0.247								1339
				-45.000		0.370								1340
				-34.500		0.912								1341
				-29.500		0.921								1342
				-12.330										1343
				-19.330										1344
								359.99	180.000					1345
				-25.743										1346
		64												1347
	4												5.00	1348
		75												1349
				-29.500										1350
				-33.000		0.915								1351
		65												1352

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		74												1353
				-34.500		0.912								1354
				-45.000		0.370								1355
				-50.500		0.247								1356
				-55.000		0.237								1357
				-55.872		0.224								1358
		80												1359
				-60.000		0.161								1360
				-65.000		0.085								1361
				-69.091		-0.000								1362
		75												1363
				-70.091		1.000								1364
						3.000								1365
								180.00						1366
				-69.545										1367
98						0.000								1368
		74												1369
				-65.000		0.095								1370
				-60.000		0.171								1371
				-55.000		0.247								1372
				-50.500		0.256								1373
				-45.000		0.380								1374
				-34.500		0.921								1375
				-29.500		0.931								1376
				-12.330										1377
				-19.330										1378
								359.99	0.000					1379
				-25.763										1380
		64												1331
	4												5.00	1382
		75												1383
				-29.500										1384
				-33.000		0.924								1385
		65												1386
		74												1387
				-34.500		0.921								1388
				-45.000		0.380								1389
				-50.500		0.256								1390
				-55.000		0.247								1391
				-56.318		0.227								1392
		80												1393
				-60.000		0.171								1394
				-65.000		0.095								1395
				-69.545		0.000								1396
		75												1397
				-70.545		1.000								1398
						3.000								1399
								180.00						1400
				-70.000										1401

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
99						0.000								1402
		74												1403
				-65.000		0.104								1404
				-60.000		0.180								1405
				-55.000		0.256								1406
				-50.500		0.266								1407
				-45.000		0.389								1408
				-34.500		0.931								1409
				-29.500		0.940								1410
				-12.330										1411
				-19.330										1412
								359.99	180.000					1413
				-25.783										1414
		64												1415
	4												5.00	1416
		75												1417
				-29.500										1418
				-33.000		0.934								1419
		65												1420
		74												1421
				-34.500		0.931								1422
				-45.000		0.389								1423
				-50.500		0.266								1424
				-55.000		0.256								1425
				-56.766		0.230								1426
		80												1427
				-60.000		0.180								1428
				-65.000		0.104								1429
				-70.000		-0.000								1430
		75												1431
				-71.000		1.000								1432
						3.000								1433
								180.00						1434
				-70.636										1435
100						0.000								1436
		74												1437
				-70.000		0.009								1438
				-65.000		0.114								1439
				-60.000		0.190								1440
				-55.000		0.266								1441
				-50.500		0.275								1442
				-45.000		0.399								1443
				-34.500		0.940								1444
				-29.500		0.950								1445
				-12.330										1446
				-19.330										1447
								359.99	0.000					1448
				-25.803										1449

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		64												1450
	4												5.00	1451
		75												1452
				-29.500										1453
				-33.000		0.943								1454
		65												1455
		74												1456
				-34.500		0.940								1457
				-45.000		0.399								1458
				-50.500		0.275								1459
				-55.000		0.266								1460
				-57.910		0.222								1461
		80												1462
				-60.000		0.190								1463
				-65.000		0.114								1464
				-70.000		0.010								1465
				-70.636		0.000								1466
		75												1467
				-71.636		1.000								1468
						3.000								1469
								180.00						1470
				-71.273										1471
180	101					0.000								1472
		74												1473
				-70.000		0.019								1474
				-65.000		0.123								1475
				-60.000		0.199								1476
				-55.000		0.275								1477
				-50.500		0.285								1478
				-45.000		0.408								1479
				-34.500		0.950								1480
				-29.500		0.959								1481
				-12.330										1482
				-19.330										1483
								359.99	180.000					1484
				-25.823										1485
		64												1486
	4												5.00	1487
		75												1488
				-29.500										1489
				-33.000		0.953								1490
		65												1491
		74												1492
				-34.500		0.950								1493
				-45.000		0.408								1494
				-50.500		0.285								1495
				-55.000		0.275								1496
				-58.360		0.224								1497
		80												1498

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
				-60.000		0.199								1499
				-65.000		0.123								1500
				-73.000		0.019								1501
				-71.273		-0.000								1502
		75												1503
				-72.273		1.000								1504
						3.000								1505
								180.00						1506
				-71.909										1507
102						0.000								1508
		74												1509
				-70.000		0.028								1510
				-65.000		0.133								1511
				-60.000		0.209								1512
				-55.000		0.285								1513
				-50.500		0.294								1514
				-45.000		0.418								1515
				-34.500		0.959								1516
				-29.500		0.969								1517
				-12.330										1518
				-19.330										1519
								359.99	0.000					1520
181				-25.843										1521
		64												1522
	4												5.00	1523
		75												1524
				-29.500										1525
				-33.000		0.962								1526
		65												1527
		74												1528
				-34.500		0.959								1529
				-45.000		0.418								1530
				-50.500		0.294								1531
				-55.000		0.285								1532
				-58.907		0.226								1533
		80												1534
				-60.000		0.209								1535
				-65.000		0.133								1536
				-70.000		0.029								1537
				-71.909		0.000								1538
		75												1539
				-72.909		1.000								1540
						3.000								1541
								180.00						1542
				-72.545										1543
103						0.000								1544
		74												1545
				-70.000		0.038								1546

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-65.000		0.142								1547
				-60.000		0.218								1548
				-55.000		0.294								1549
				-50.500		0.304								1550
				-45.000		0.427								1551
				-34.500		0.969								1552
				-29.500		0.978								1553
				-12.330										1554
				-19.330										1555
								359.99	180.000					1556
				-25.862										1557
		64												1558
	4												5.00	1559
		75												1560
				-29.500										1561
				-33.000		0.972								1562
		65												1563
		74												1564
				-34.500		0.969								1565
				-45.000		0.427								1566
				-50.500		0.304								1567
				-55.000		0.294								1568
				-59.493		0.226								1569
		80												1570
				-60.000		0.218								1571
				-65.000		0.142								1572
				-70.000		0.038								1573
				-72.545		-0.000								1574
		75												1575
				-73.545		1.000								1576
						3.000								1577
								180.00						1578
				-73.182										1579
104						0.000								1580
		74												1581
				-70.000		0.047								1582
				-65.000		0.152								1583
				-60.000		0.228								1584
				-55.000		0.304								1585
				-50.500		0.313								1586
				-45.000		0.437								1587
				-34.500		0.978								1588
				-29.500		0.988								1589
				-12.330										1590
				-19.330										1591
								359.99	0.000					1592
				-25.882										1593
		64												1594
	4												5.00	1595

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		75												1596
				-29.500										1597
				-33.000		0.981								1598
		65												1599
		74												1600
				-34.500		0.978								1601
				-45.000		0.437								1602
				-50.500		0.313								1603
				-55.000		0.304								1604
				-60.000		0.228								1605
				-60.098		0.227								1606
		80												1607
				-65.000		0.152								1608
				-70.000		0.047								1609
				-73.182		0.000								1610
		75												1611
				-74.182		1.000								1612
						3.000								1613
								180.00						1614
				-73.818										1615
105						0.000								1616
		74												1617
				-70.000		0.057								1618
				-65.000		0.161								1619
				-60.000		0.237								1620
				-55.000		0.313								1621
				-50.500		0.323								1622
				-45.000		0.446								1623
				-34.500		0.988								1624
				-29.500		0.997								1625
				-12.330										1626
				-19.330										1627
								359.99	180.000					1628
				-25.902										1629
		64												1630
	4												5.00	1631
		75												1632
				-29.500										1633
				-33.000		0.991								1634
		65												1635
		74												1636
				-34.500		0.988								1637
				-45.000		0.446								1638
				-50.500		0.323								1639
				-55.000		0.313								1640
				-60.000		0.237								1641
				-60.712		0.227								1642
		80												1643
				-65.000		0.161								1644

AD-A037 681 IIT RESEARCH INST CHICAGO ILL MANAGEMENT AND COMPUTE--ETC F/G 13/8
MANUFACTURING METHODS REPORT. FEASIBILITY OF PRF-PROGRAMMING FO--ETC(U)
SEP 76 R N LITTLE, C A WELLS DAAJ01-76-C-0040
UNCLASSIFIED IITRI-H6048 USAAVSCOM-76-43 NL

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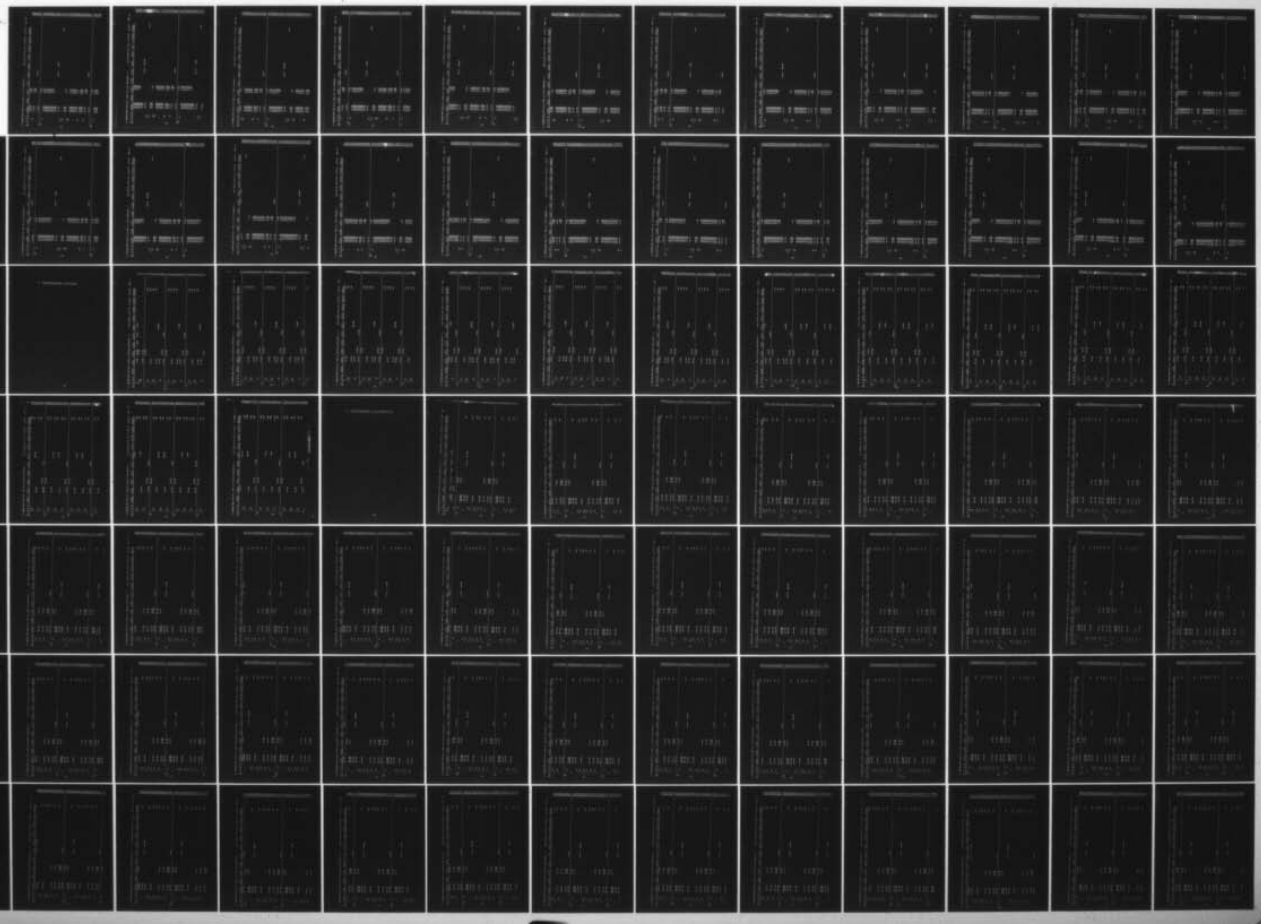

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-70.000		0.057								1645
				-73.818		-0.000								1646
		75												1647
2325				-74.818		1.000								1648
2326						3.000								1649
2327								180.00						1650
				-74.455										1651
2328														
2329														
106						0.000								1652
		74												1653
2331				-70.000		0.066								1654
2332				-65.000		0.171								1655
2333				-60.000		0.247								1656
2334				-55.000		0.323								1657
2335				-50.500		0.332								1658
2336				-45.000		0.456								1659
2337				-34.500		0.997								1660
2338				-29.500		1.007								1661
2339				-12.330										1662
2340				-19.330										1663
2341								359.99	0.000					1664
2342				-25.922										1665
2343		64												1666
2344	4												5.00	1667
184		75												1668
2346				-29.500										1669
2347				-33.000		1.000								1670
2348		65												1671
2349		74												1672
2350				-34.500		0.997								1673
2351				-45.000		0.456								1674
2352				-50.500		0.332								1675
2353				-55.000		0.323								1676
2354				-60.000		0.247								1677
2355				-61.333		0.227								1678
2356		80												1679
2357				-65.000		0.171								1680
2358				-70.000		0.066								1681
2359				-74.455		-0.000								1682
2360		75												1683
2361				-75.455		1.000								1684
2362						3.000								1685
2363								180.00						1686
2364				-75.091										1687
2365														
2366														
107						0.000								1688
2367		74												1689
2368				-70.000		0.076								1690
2369				-65.000		0.180								1691
2370				-60.000		0.256								1692
2371														
2372														

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
				-55.000		0.332								1693
				-50.500		0.342								1694
				-45.000		0.465								1695
				-34.500		1.007								1696
				-29.500		1.016								1697
				-12.330										1698
				-19.330										1699
								359.99	180.000					1700
				-25.942										[illegible]
		64												[illegible]
	4												5.00	[illegible]
		75												[illegible]
				-29.500										1705
				-33.000		1.010								1706
		65												1707
		74												1708
				-34.500		1.007								1709
				-45.000		0.465								1710
				-50.500		0.342								1711
				-55.000		0.332								1712
				-60.000		0.256								1713
				-61.957		0.227								1714
		80												1715
				-65.000		0.180								1716
				-70.000		0.076								1717
				-75.091		0.000								1718
		75												1719
				-76.091		1.000								1720
						3.000								1721
								180.00						1722
				-75.727										1723
108						0.000								1724
		74												1725
				-70.000		0.085								1726
				-65.600		0.190								1727
				-60.000		0.266								1728
				-55.000		0.342								1729
				-50.500		0.351								1730
				-45.000		0.475								1731
				-34.500		1.016								1732
				-29.500		1.026								1733
				-12.330										1734
				-19.330										1735
								359.99	0.000					1736
				-25.962										1737
		64												1738
	4												5.00	1739
		75												1740
				-29.500										1741

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-33.000		1.019								1742
		65												1743
		74												1744
				-34.500		1.016								1745
				-45.000		0.475								1746
				-50.500		0.352								1747
				-55.000		0.342								1748
				-60.000		0.266								1749
				-62.584		0.227								1750
		80												1751
				-63.000		0.190								1752
				-70.000		0.086								1753
				-75.727		0.000								1754
		75												1755
				-76.727		1.000								1756
						3.000								1757
								180.00						1758
				-76.364										1759
109						0.000								1760
		74												1761
				-70.000		0.095								1762
				-65.000		0.199								1763
				-60.000		0.275								1764
				-55.000		0.351								1765
				-50.500		0.361								1766
				-45.000		0.484								1767
				-34.500		1.026								1768
				-29.500		1.035								1769
				-12.330										1770
				-19.330										1771
								359.99	180.000					1772
				-25.982										1773
		64												1774
	4												5.00	1775
		75												1776
				-29.500										1777
				-33.000		1.029								1778
		65												1779
		74												1780
				-34.500		1.026								1781
				-45.000		0.484								1782
				-50.500		0.361								1783
				-55.000		0.351								1784
				-60.000		0.275								1785
				-63.213		0.227								1786
		80												1787
				-65.000		0.199								1788
				-70.000		0.095								1789
				-76.364		-0.000								1790

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		75												1791
				-77.364		1.000								1792
						3.000								1793
								180.00						1794
				-77.000										1795
110						0.000								1796
		74												1797
				-70.000		0.104								1798
				-65.000		0.209								1799
				-60.000		0.285								1800
				-55.000		0.361								1801
				-50.500		0.370								1802
				-45.000		0.494								1803
				-34.500		1.035								1804
				-29.500		1.045								1805
				-12.330										1806
				-19.330										1807
								359.99	0.000					1808
				-26.001										1809
		64												1810
	4												5.00	1811
		75												1812
				-29.500										1813
				-33.000		1.038								1814
		65												1815
		74												1816
				-34.500		1.035								1817
				-45.000		0.494								1818
				-50.500		0.370								1819
				-55.000		0.361								1820
				-60.000		0.285								1821
				-63.843		0.227								1822
		80												1823
				-65.000		0.209								1824
				-70.000		0.104								1825
				-77.000		-0.000								1826
		75												1827
				-78.000		1.000								1828
						3.000								1829
								180.00						1830
				-80.333										1831
111						0.000								1832
		74												1833
				-77.000		0.009								1834
				-70.000		0.114								1835
				-65.000		0.218								1836
				-60.000		0.294								1837
				-55.000		0.370								1838

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
				-50.500		0.380								1839
				-45.000		0.503								1840
				-34.500		1.045								1841
				-29.500		1.054								1842
				-12.330										1843
				-19.330										1844
								359.99	180.000					1845
				-26.021										1846
		64												1847
	4												5.00	1848
		75												1849
				-29.500										1850
				-33.000		1.048								1851
		65												1852
		74												1853
				-34.500		1.045								1854
				-45.000		0.503								1855
				-50.500		0.380								1856
				-55.000		0.370								1857
				-60.000		0.294								1858
				-65.000		0.218								1859
				-67.339		0.170								1860
		80												1861
				-70.000		0.114								1862
				-77.000		0.009								1863
				-80.333		-0.000								1864
		75												1865
				-81.333		1.000								1866
						3.000								1867
								180.00						1868
				-83.667										1869
112						0.000								1870
		74												1871
				-77.000		0.019								1872
				-70.000		0.123								1873
				-65.000		0.228								1874
				-60.000		0.304								1875
				-55.000		0.380								1876
				-50.500		0.389								1877
				-45.000		0.513								1878
				-34.500		1.054								1879
				-29.560		1.064								1880
				-12.330										1881
				-19.330										1882
								359.99	0.000					1883
				-26.041										1884
		64												1885
	4												5.00	1886
		75												1887

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
				-29.500										1888
				-33.000		1.057								1889
		65												1890
		74												1891
				-34.500		1.054								1892
				-45.000		0.513								1893
				-50.500		0.389								1894
				-55.000		0.380								1895
				-60.000		0.304								1896
				-65.000		0.228								1897
				-70.000		0.123								[illegible]
				-70.593		0.115								[illegible]
		80												1900
				-77.000		0.019								1901
				-83.667		-0.000								1902
		75												1903
				-84.667		1.000								1904
						3.000								1905
								180.00						1906
				-87.000										1907
113						0.000								1908
		74												1909
				-77.000		0.028								1910
				-70.000		0.133								1911
				-63.000		0.237								1912
				-60.000		0.313								1913
				-55.000		0.389								1914
				-50.500		0.399								1915
				-45.000		0.522								1916
				-34.500		1.064								1917
				-29.500		1.073								1918
				-12.330										1919
				-19.330										1920
								359.99	180.000					1921
				-26.061										1922
		64												1923
	4												5.00	1924
		75												1925
				-29.500										1926
				-33.000		1.067								1927
		65												1928
		74												1929
				-34.500		1.064								1930
				-45.000		0.522								1931
				-50.500		0.399								1932
				-55.000		0.389								1933
				-60.000		0.313								1934
				-65.000		0.237								1935
				-70.000		0.133								1936

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
				-73.899		0.075								1937
		80												1938
				-77.000		0.028								1939
				-87.000		-0.000								1940
		75												1941
				-88.000		1.000								1942
						3.000								1943
								180.00						1944
				-90.333										1945
114						0.000								1946
		74												1947
				-77.000		0.038								1948
				-70.000		0.142								1949
				-65.000		0.247								1950
				-60.000		0.323								1951
				-55.000		0.399								1952
				-50.500		0.408								1953
				-45.000		0.532								1954
				-34.500		1.073								1955
				-29.500		1.083								1956
				-12.330										1957
				-19.330										1958
190								359.99	0.000					1959
				-26.081										1960
		64												1961
	4												5.00	1962
		75												1963
				-29.500										1964
				-33.000		1.076								1965
		65												1966
		74												1967
				-34.500		1.073								1968
				-45.000		0.532								1969
				-50.500		0.408								1970
				-55.000		0.399								1971
				-60.000		0.323								1972
				-65.000		0.247								1973
				-70.000		0.142								1974
				-77.000		0.038								1975
				-77.218		0.037								1976
		80												1977
				-90.333		-0.000								1978
		75												1979
				-91.333		1.000								1980
						3.000								1981
								180.00						1982
				-93.667										1983

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
115						0.000								1984
		74												1985
				-77.000		0.047								1986
				-70.000		0.152								1987
				-65.000		0.256								1988
				-60.000		0.332								1989
				-55.000		0.409								1990
				-50.500		0.418								1991
				-45.000		0.542								1992
				-34.500		1.083								1993
				-29.500		1.092								1994
				-12.330										1995
				-19.330										1996
								359.99	180.000					1997
				-26.101										1998
		64												1999
	4												5.00	2000
		75												2001
				-29.500										2002
				-33.000		1.086								2003
		65												2004
		74												2005
				-34.500		1.083								2006
				-45.000		0.541								2007
				-50.500		0.418								2008
				-55.000		0.408								2009
				-60.000		0.332								2010
				-65.000		0.256								2011
				-70.000		0.152								2012
				-77.000		0.047								2013
				-80.543		0.037								2014
		80												2015
				-93.667		-0.000								2016
		75												2017
				-94.667		1.000								2018
						3.000								2019
								180.00						2020
				-97.000										2021
116						0.000								2022
		74												2023
				-77.000		0.057								2024
				-70.000		0.161								2025
				-65.000		0.266								2026
				-60.000		0.342								2027
				-55.000		0.418								2028
				-50.500		0.427								2029
				-45.000		0.551								2030
				-34.500		1.092								2031

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-29.500		1.102								2032
				-12.330										2033
				-19.330										2034
								359.99	0.000					2035
				-26.121										2036
		64												2037
	4												5.00	2038
		75												2039
				-29.500										2040
				-33.000		1.095								2041
		65												2042
		74												2043
				-34.500		1.092								2044
				-45.000		0.551								2045
				-50.500		0.427								2046
				-55.000		0.418								2047
				-60.000		0.342								2048
				-65.000		0.266								2049
				-70.000		0.161								2050
				-77.000		0.057								2051
				-83.871		0.037								2052
		80												2053
				-97.000		-0.000								2054
		75												2055
192				-98.000		1.000								2056
						3.000								2057
								180.00						2058
				-100.333										2059
117						0.000								2060
		74												2061
				-77.000		0.066								2062
				-70.000		0.171								2063
				-65.000		0.275								2064
				-60.000		0.351								2065
				-55.000		0.427								2066
				-50.500		0.437								2067
				-45.000		0.560								2068
				-34.500		1.102								2069
				-29.500		1.111								2070
				-12.330										2071
				-19.330										2072
								359.99	180.000					2073
				-26.140										2074
		64												2075
	4												5.00	2076
		75												2077
				-29.500										2078
				-33.000		1.105								2079
		65												2080

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
		74												2081
				-34.500		1.102								2082
				-45.000		0.560								2083
				-50.500		0.437								2084
				-55.000		0.427								2085
				-60.000		0.351								2086
				-65.000		0.275								2087
				-70.000		0.171								2088
				-77.000		0.066								2089
				-87.201		0.037								2090
		80												2091
				-100.333		-0.000								2092
		75												2093
				-101.333		1.000								2094
						3.000								2095
								180.00						2096
				-103.667										2097
118						0.000								2098
		74												2099
				-77.000		0.076								2100
				-70.000		0.180								2101
				-65.000		0.285								2102
				-60.000		0.361								2103
				-55.000		0.437								2104
				-50.500		0.446								2105
				-45.000		0.570								2106
				-34.500		1.111								2107
				-29.500		1.121								2108
				-12.330										2109
				-19.330										2110
								359.99	0.000					2111
				-26.160										2112
		64												2113
	4												5.00	2114
		75												2115
				-29.500										2116
				-33.000		1.114								2117
		65												2118
		74												2119
				-34.500		1.111								2120
				-45.000		0.570								2121
				-50.500		0.446								2122
				-55.000		0.437								2123
				-60.000		0.361								2124
				-65.000		0.285								2125
				-70.000		0.180								2126
				-77.000		0.076								2127
				-90.531		0.037								2128
		80												2129

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-103.667		-0.000								2130
		75												2131
				-104.667		1.000								2132
						3.000								2133
								180.00						2134
				-107.000										2135
119						0.000								2136
		74												2137
				-77.000		0.085								2138
				-70.000		0.190								2139
				-65.000		0.294								2140
				-60.000		0.370								2141
				-55.000		0.446								2142
				-50.500		0.456								2143
				-45.000		0.579								2144
				-34.500		1.121								2145
				-29.500		1.130								2146
				-12.330										2147
				-19.330										2148
								359.99	180.000					2149
				-26.180										2150
		64												2151
	4												5.00	2152
		75												2153
				-29.500										2154
				-33.000		1.124								2155
		65												2156
		74												2157
				-34.500		1.121								2158
				-45.000		0.579								2159
				-50.500		0.456								2160
				-55.000		0.446								2161
				-60.000		0.370								2162
				-65.000		0.294								2163
				-70.000		0.190								2164
				-77.000		0.085								2165
				-93.862		0.037								2166
		80												2167
				-107.000		-0.000								2168
		75												2169
				-108.000		1.000								2170
						3.000								2171
								180.00						2172
				-110.333										2173
120						0.000								2174
		74												2175
				-77.000		0.095								2176
				-70.000		0.199								2177

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-65.000		0.304								2178
				-60.000		0.380								2179
				-55.000		0.456								2180
				-50.500		0.465								2181
				-45.000		0.589								2182
				-34.500		1.130								2183
				-29.500		1.140								2184
				-12.330										2185
				-19.330										2186
								359.99	0.000					2187
				-26.200										2188
		64												2189
	4													2190
		75											5.00	2191
				-29.500										2192
				-33.000		1.133								2193
		65												2194
		74												2195
				-34.500		1.130								2196
				-45.000		0.589								2197
				-50.500		0.465								2198
				-55.000		0.456								2199
				-60.000		0.380								2200
				-65.000		0.304								2201
				-70.000		0.199								2202
				-77.000		0.095								2203
				-97.194		0.037								2204
		80												2205
				-110.333		-0.000								2206
		75												2207
				-111.333		1.000								2208
						3.000								2209
								180.00						2210
				-113.667										2211
121						0.000								2212
		74												2213
				-77.000		0.104								2214
				-70.000		0.209								2215
				-65.000		0.313								2216
				-60.000		0.389								2217
				-55.000		0.465								2218
				-50.500		0.475								2219
				-45.000		0.598								2220
				-34.500		1.140								2221
				-29.500		1.149								2222
				-12.330										2223
				-19.330										2224
								359.99	180.000					2225
				-26.220										2226

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		64												2227
	4												5.00	2228
		75												2229
				-29.500										2230
				-33.000		1.143								2231
		65												2232
		74												2233
				-34.500		1.140								2234
				-45.000		0.598								2235
				-50.500		0.475								2236
				-55.000		0.465								2237
				-60.000		0.389								2238
				-65.000		0.313								2239
				-70.000		0.209								2240
				-77.000		0.104								2241
				-100.526		0.037								2242
		80												2243
				-113.667		0.000								2244
		75												2245
				-114.667		1.000								2246
						3.000								2247
								180.00						2248
				-117.000										2249
961	122					0.000								2250
		74												2251
				-77.000		0.114								2252
				-70.000		0.218								2253
				-65.000		0.323								2254
				-60.000		0.399								2255
				-55.000		0.475								2256
				-50.500		0.485								2257
				-45.000		0.608								2258
				-34.500		1.149								2259
				-29.500		1.159								2260
				-12.330										2261
				-19.330										2262
								359.99	0.000					2263
				-26.240										2264
		64												2265
	4												5.00	2266
		75												2267
				-29.500										2268
				-33.000		1.152								2269
		65												2270
		74												2271
				-34.500		1.149								2272
				-45.000		0.608								2273
				-50.500		0.484								2274
				-55.000		0.475								2275

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-60.000		0.399								2276
				-65.000		0.323								2277
				-70.000		0.218								2278
				-77.000		0.114								2279
				-103.858		0.037								2280
		80												2281
				-117.000		-0.000								2282
		75												2283
				-118.000		1.000								2284
						3.000								2285
								180.00						2286
				-118.750										2287
123						0.000								2288
		74												2289
				-117.000		0.009								2290
				-77.000		0.123								2291
				-70.000		0.228								2292
				-65.000		0.332								2293
				-60.000		0.409								2294
				-55.000		0.485								2295
				-50.500		0.494								2296
				-45.000		0.617								2297
				-34.500		1.159								2298
				-29.500		1.168								2299
				-12.330										2300
				-19.330										2301
								359.99	180.000					2302
				-26.260										2303
		64												2304
	4												5.00	2305
		75												2306
				-29.500										2307
				-33.000		1.162								2308
		65												2309
		74												2310
				-34.500		1.159								2311
				-45.000		0.617								2312
				-50.500		0.494								2313
				-55.000		0.484								2314
				-60.000		0.408								2315
				-65.000		0.332								2316
				-70.000		0.228								2317
				-77.000		0.123								2318
				-105.962		0.041								2319
		80												2320
				-117.000		0.009								2321
				-118.750		-0.000								2322
		75												2323
				-119.750		1.000								2324

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
						3.000								2325
								180.00						2326
				-120.500										2327
124						0.000								2328
		74												2329
				-117.000		0.019								2330
				-77.000		0.133								2331
				-70.000		0.237								2332
				-65.000		0.342								2333
				-60.000		0.418								2334
				-55.000		0.494								2335
				-50.500		0.504								2336
				-45.000		0.627								2337
				-34.500		1.169								2338
				-29.500		1.178								2339
				-12.330										2340
				-19.330										2341
								359.99	0.000					2342
				-26.279										2343
		64												2344
	4												5.00	2345
		75												2346
				-29.500										2347
198				-33.000		1.171								2348
		65												2349
		74												2350
				-34.500		1.168								2351
				-45.000		0.627								2352
				-50.500		0.503								2353
				-55.000		0.494								2354
				-60.000		0.418								2355
				-65.000		0.342								2356
				-70.000		0.237								2357
				-77.000		0.133								2358
				-107.551		0.046								2359
		80												2360
				-117.000		0.019								2361
				-120.500		-0.000								2362
		75												2363
				-121.500		1.000								2364
						3.000								2365
								180.00						2366
				-122.250										2367
125						0.000								2368
		74												2369
				-117.000		0.028								2370
				-77.000		0.142								2371
				-70.000		0.247								2372

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-65.000		0.351								2373
				-60.000		0.427								2374
				-55.000		0.503								2375
				-50.500		0.513								2376
				-45.000		0.636								2377
				-34.500		1.178								2378
				-29.500		1.187								2379
				-12.330										2380
				-19.330										2381
								359.99	180.000					2382
				-26.299										2383
		64												2384
	4												5.00	2385
		75												2386
				-29.500										2387
				-33.000		1.181								2388
		65												2389
		74												2390
				-34.500		1.178								2391
				-45.000		0.636								2392
				-50.500		0.513								2393
				-55.000		0.503								2394
				-60.000		0.427								2395
				-65.000		0.351								2396
				-70.000		0.247								2397
				-77.000		0.142								2398
				-109.240		0.051								2399
		80												2400
				-117.000		0.028								2401
				-122.250		-0.000								2402
		75												2403
				-123.250		1.000								2404
						3.000								2405
								180.00						2406
				-124.000										2407
126						0.000								2408
		74												2409
				-117.000		0.038								2410
				-77.000		0.152								2411
				-70.000		0.256								2412
				-65.000		0.361								2413
				-60.000		0.437								2414
				-55.000		0.513								2415
				-50.500		0.523								2416
				-45.000		0.646								2417
				-34.500		1.187								2418
				-29.500		1.197								2419
				-12.330										2420
				-19.330										2421

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
								359.99	0.000					2422
				-26.319										2423
		64												2424
	4												5.00	2425
		75												2426
				-29.500										2427
				-33.000		1.190								2428
		65												2429
		74												2430
				-34.500		1.187								2431
				-45.000		0.646								2432
				-50.500		0.522								2433
				-55.000		0.513								2434
				-60.000		0.437								2435
				-65.000		0.361								2436
				-70.000		0.256								2437
				-77.000		0.152								2438
				-110.959		0.055								2439
		80												2440
				-117.000		0.038								2441
				-124.000		-0.000								2442
		75												2443
				-125.000		1.000								2444
200						3.000								2445
								180.00						2446
				-134.000										2447
127						0.000								2448
		74												2449
				-124.000		0.009								2450
				-117.000		0.047								2451
				-77.000		0.161								2452
				-70.000		0.266								2453
				-65.000		0.370								2454
				-60.000		0.446								2455
				-55.000		0.522								2456
				-50.500		0.532								2457
				-45.000		0.655								2458
				-34.500		1.197								2459
				-29.500		1.206								2460
				-12.330										2461
				-19.330										2462
								359.99	180.000					2463
				-26.339										2464
		64												2465
	4												5.00	2466
		75												2467
				-29.500										2468
				-33.000		1.200								2469
		65												2470

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		74												2471
				-34.500		1.197								2472
				-45.000		0.655								2473
				-50.500		0.532								2474
				-55.000		0.522								2475
				-60.000		0.446								2476
				-65.000		0.370								2477
				-70.000		0.266								2478
				-77.000		0.161								2479
				-117.000		0.047								2480
				-121.032		0.026								2481
		80												2482
				-124.000		0.009								2483
				-134.000		-0.000								2484
		75												2485
				-135.000		1.000								2486
						3.000								2487
								180.00						2488
				-162.667										2489
128						0.000								2490
		74												2491
				-134.000		0.009								2492
				-124.000		0.019								2493
				-117.000		0.057								2494
				-77.000		0.171								2495
				-70.000		0.275								2496
				-65.000		0.380								2497
				-60.000		0.456								2498
				-55.000		0.532								2[illegible]
				-50.500		0.542								[illegible]
				-45.000		0.665								2501
				-34.500		1.206								2502
				-29.500		1.216								2503
				-12.330										2504
				-19.330										2505
								359.99	0.000					2506
				-26.359										2507
		64												2508
	4												5.00	2509
		75												2510
				-29.500										2511
				-33.000		1.209								2512
		65												2513
		74												2514
				-34.500		1.206								2515
				-45.000		0.665								2516
				-50.500		0.541								2517
				-55.000		0.532								2518
				-60.000		0.456								2519

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-65.000		0.380								2520
				-70.000		0.275								2521
				-77.000		0.171								2522
				-117.000		0.057								2523
				-124.000		0.019								2524
				-134.000		0.009								2525
				-149.724		0.004								2526
		80												2527
				-162.667		-0.000								2528
		75												2529
				-163.667		1.000								2530
						3.000								2531
								180.00						2532
				-191.333										2533
129						0.000								2534
		74												2535
				-134.000		0.019								2536
				-124.000		0.028								2537
				-117.000		0.066								2538
				-77.000		0.180								2539
				-70.000		0.285								2540
				-63.000		0.389								2541
				-60.000		0.465								2542
				-55.000		0.541								2543
				-50.500		0.551								2544
				-45.000		0.674								2545
				-34.500		1.216								2546
				-29.500		1.225								2547
				-12.330										2548
				-19.330										2549
								359.99	180.000					2550
				-26.379										2551
		64												2552
	4												5.00	2553
		75												2554
				-29.500										2555
				-33.000		1.219								2556
		65												2557
		74												2558
				-34.500		1.216								2559
				-43.000		0.674								2560
				-50.500		0.551								2561
				-55.000		0.541								2562
				-60.000		0.465								2563
				-65.000		0.389								2564
				-70.000		0.285								2565
				-77.000		0.180								2566
				-117.000		0.066								2567
				-124.000		0.028								2568

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
				-134.000		0.019								2569
				-178.378		0.004								2570
		80												2571
				-191.333		-0.000								2572
		75												2573
				-192.333		1.000								2574
						3.000								2575
								180.00						2576
				-220.000										2577
130						0.000								2578
		74												2579
				-134.000		0.028								2580
				-124.000		0.038								2581
				-117.000		0.076								2582
				-77.000		0.190								2583
				-70.000		0.294								2584
				-65.000		0.399								2585
				-60.000		0.475								2586
				-55.000		0.551								2587
				-50.500		0.560								2588
				-45.000		0.684								2589
				-34.500		1.225								2590
203				-29.500		1.235								2591
				-12.330										2592
				-19.330										2593
								359.99	0.000					2594
				-26.399										2595
		64												2596
	4												5.00	2597
		75												2598
				-29.500										2599
				-33.000		1.228								2600
		65												2601
		74												2602
				-34.500		1.225								2603
				-45.000		0.684								2604
				-50.500		0.560								2605
				-55.000		0.551								2606
				-60.000		0.475								2607
				-65.000		0.399								2608
				-70.000		0.294								2609
				-77.000		0.190								2610
				-117.000		0.076								2611
				-124.000		0.038								2612
				-134.000		0.028								2613
				-207.041		0.004								2614
		80												2615
				-220.000		-0.000								2616
		75												2617

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-221.000		1.000								2618
						3.000								2619
								180.00						2620
				-248.667										2621
131						0.000								2622
		74												2623
				-134.000		0.038								2624
				-124.000		0.047								2625
				-117.000		0.085								2626
				-77.000		0.200								2627
				-70.000		0.304								2628
				-65.000		0.409								2629
				-60.000		0.485								2630
				-55.000		0.560								2631
				-50.500		0.570								2632
				-45.000		0.694								2633
				-34.500		1.235								2634
				-29.500		1.244								2635
				-12.330										2636
				-19.330										2637
								359.99	180.000					2638
204				-26.418										2639
		64												2640
	4												5.00	2641
		75												2642
				-29.500										2643
				-33.000		1.238								2644
		65												2645
		74												2646
				-34.500		1.235								2647
				-45.000		0.693								2648
				-50.500		0.570								2649
				-55.000		0.560								2650
				-60.000		0.484								2651
				-65.000		0.408								2652
				-70.000		0.304								2653
				-77.000		0.199								2654
				-117.000		0.085								2655
				-124.000		0.047								2656
				-134.000		0.038								2657
				-235.705		0.004								2658
		80												2659
				-248.667		-0.000								2660
		75												2661
				-249.667		1.000								2662
						3.000								2663
								180.00						2664
				-277.333										2665

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
132						0.000								2666
		74												2667
				-134.000		0.047								2668
				-124.000		0.057								2669
				-117.000		0.095								2670
				-77.000		0.209								2671
				-70.000		0.314								2672
				-65.000		0.418								2673
				-60.000		0.494								2674
				-55.000		0.570								2675
				-50.500		0.579								2676
				-45.000		0.703								2677
				-34.500		1.244								2678
				-29.500		1.254								2679
				-12.330										2680
				-19.330										2681
								359.99	0.000					2682
				-26.438										2683
		64												2684
	4												5.00	2685
		75												2686
				-29.500										2687
				-33.000		1.247								2688
		65												2689
		74												2690
				-34.500		1.244								2691
				-45.000		0.703								2692
				-50.500		0.579								2693
				-55.000		0.570								2694
				-60.000		0.494								2695
				-65.000		0.418								2696
				-70.000		0.313								2697
				-77.000		0.209								2698
				-117.000		0.095								2699
				-124.000		0.057								2700
				-134.000		0.047								2701
				-264.371		0.004								2702
		80												2703
				-277.333		-0.000								2704
		75												2705
				-278.333		1.000								2706
						3.000								2707
								180.00						2708
				-306.000										2709
133						0.000								2710
		74												2711
				-134.000		0.057								2712
				-124.000		0.066								2713

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-117.000		0.104								2714
				-77.000		0.218								2715
				-70.000		0.323								2716
				-65.000		0.427								2717
				-60.000		0.503								2718
				-55.000		0.579								2719
				-50.500		0.589								2720
				-45.000		0.712								2721
				-34.500		1.254								2722
				-29.500		1.263								2723
				-12.330										2724
				-19.330										2725
								359.99	180.000					2726
				-26.458										2727
		64												2728
	4												5.00	2729
		75												2730
				-29.500										2731
				-33.000		1.257								2732
		65												2733
		74												2734
				-34.500		1.254								2735
				-45.000		0.712								2736
				-50.500		0.589								2737
				-55.000		0.579								2738
				-60.000		0.503								2739
				-65.000		0.427								2740
				-70.000		0.323								2741
				-77.000		0.218								2742
				-117.000		0.104								2743
				-124.000		0.066								2744
				-134.000		0.057								2745
				-293.036		0.004								2746
		80												2747
				-306.000		-0.000								2748
		75												2749
				-307.000		1.000								2750
						3.000								2751
								180.00						2752
				-363.000										2753
134						0.000								2754
		74												2755
				-306.000		0.009								2756
				-134.000		0.066								2757
				-124.000		0.076								2758
				-117.000		0.114								2759
				-77.000		0.228								2760
				-70.000		0.332								2761
				-65.000		0.437								2762

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-60.000		0.513								2763
				-55.000		0.589								2764
				-50.500		0.598								2765
				-45.000		0.722								2766
				-34.500		1.263								2767
				-29.500		1.273								2768
				-12.330										2769
				-19.330										2770
								359.99	0.000					2771
				-26.478										2772
		64												2773
	4												5.00	2774
		75												2775
				-29.500										2776
				-33.000		1.266								2777
		65												2778
		74												2779
				-34.500		1.263								2780
				-45.000		0.722								2781
				-50.500		0.598								2782
				-55.000		0.589								2783
				-60.000		0.513								2784
				-65.000		0.437								2785
				-70.000		0.332								2786
				-77.000		0.228								2787
				-117.000		0.114								2788
				-124.000		0.076								2789
				-134.000		0.067								2790
				-306.000		0.010								2791
				-350.051		0.002								2792
		80												2793
				-363.000		0.000								2794
		75												2795
				-364.000		1.000								2796
						3.000								2797
								180.00						2798
				-363.000										2799
135						0.000								2800
		74												2801
				-363.000		0.009								2802
				-306.000		0.019								2803
				-134.000		0.076								2804
				-124.000		0.085								2805
				-117.000		0.123								2806
				-77.000		0.237								2807
				-70.000		0.342								2808
				-65.000		0.446								2809
				-60.000		0.522								2810
				-55.000		0.598								2811

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-50.500		0.608								2812
				-45.000		0.731								2813
				-34.500		1.273								2814
				-29.500		1.282								2815
				-12.330										2816
				-19.330										2817
								359.99	180.000					2818
				-26.498										2819
		64												2820
	4												5.00	2821
		75												2822
				-29.500										2823
				-33.000		1.276								2824
		65												2825
		74												2826
				-34.500		1.273								2827
				-45.000		0.731								2828
				-50.500		0.608								2829
				-55.000		0.598								2830
				-60.000		0.522								2831
				-65.000		0.446								2832
				-70.000		0.342								2833
				-77.000		0.237								2834
				-117.000		0.123								2835
				-124.000		0.085								2836
				-134.000		0.076								2837
				-306.000		0.019								2838
				-351.333		0.011								2839
		80												2840
				-363.000		0.009								2841
				-363.000		-0.000								2842
		75												2843
						3.000								2844
								180.00						2845
				-363.000										2846
														2847
136						0.000								2848
		74												2849
				-363.000		0.019								2850
				-306.000		0.028								2851
				-134.000		0.085								2852
				-124.000		0.095								2853
				-117.000		0.133								2854
				-77.000		0.247								2855
				-70.000		0.351								2856
				-65.000		0.456								2857
				-60.000		0.532								2858
				-55.000		0.608								2859
				-50.500		0.617								2860

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-45.000		0.741								2861
				-34.500		1.282								2862
				-29.500		1.292								2863
				-12.330										2864
				-19.330										2865
								359.99	0.000					2866
				-26.518										2867
		64												2868
	4												5.00	2869
		75												2870
				-29.500										2871
				-33.000		1.285								2872
		65												2873
		74												2874
				-34.500		1.282								2875
				-45.000		0.741								2876
				-50.500		0.617								2877
				-55.000		0.608								2878
				-60.000		0.532								2879
				-65.000		0.456								2880
				-70.000		0.351								2881
				-77.000		0.247								2882
				-117.000		0.133								2883
				-124.000		0.095								2884
				-134.000		0.085								2885
				-306.000		0.028								2886
				-351.343		0.021								2887
		80												2888
				-363.000		0.019								2889
				-363.000		-0.000								2890
		75												2891
				-364.000		1.000								2892
						3.000								2893
								180.00						2894
				-363.000										2895
137						0.000								2896
		74												2897
				-363.000		0.028								2898
				-306.000		0.038								2899
				-134.000		0.095								2900
				-124.000		0.104								2901
				-117.000		0.142								2902
				-77.000		0.256								2903
				-70.000		0.361								2904
				-65.000		0.465								2905
				-60.000		0.541								2906
				-55.000		0.617								2907
				-50.500		0.627								2908
				-45.000		0.750								2909

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-34.500		1.292								2910
				-29.500		1.301								2911
				-12.330										2912
				-19.330										2913
								359.99	180.000					2914
				-26.538										2915
		64												2916
	4												5.00	2917
		75												2918
				-29.500										2919
				-33.000		1.295								2920
		65												2921
		74												2922
				-34.500		1.292								2923
				-45.000		0.750								2924
				-50.500		0.627								2925
				-55.000		0.617								2926
				-60.000		0.541								2927
				-65.000		0.465								2928
				-70.000		0.361								2929
				-77.000		0.256								2930
				-117.000		0.142								2931
				-124.000		0.104								2932
				-134.000		0.095								2933
				-306.000		0.038								2934
				-351.352		0.030								2935
		80												2936
				-363.000		0.028								2937
				-363.000		-0.000								2938
		75												2939
				-364.000		1.000								2940
						3.000								2941
								180.00						2942
				-363.000										2943
138						0.000								2944
		74												2945
				-363.000		0.038								2946
				-306.000		0.047								2947
				-134.000		0.104								2948
				-124.000		0.114								2949
				-117.000		0.152								2950
				-77.000		0.266								2951
				-70.000		0.370								2952
				-65.000		0.475								2953
				-60.000		0.551								2954
				-55.000		0.627								2955
				-50.500		0.636								2956
				-45.000		0.760								2957
				-34.500		1.301								2958

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-29.500		1.311								2959
				-12.330										2960
				-19.330										2961
								359.99	0.000					2962
				-26.557										2963
		64												2964
	4												5.00	2965
		75												2966
				-29.500										2967
				-33.000		1.304								2968
		65												2969
		74												2970
				-34.500		1.301								2971
				-45.000		0.760								2972
				-50.500		0.636								2973
				-55.000		0.627								2974
				-60.000		0.551								2975
				-65.000		0.475								2976
				-70.000		0.370								2977
				-77.000		0.266								2978
				-117.000		0.152								2979
				-124.000		0.114								2980
				-134.000		0.104								2981
				-306.000		0.047								2982
				-351.362		0.040								2983
		80												2984
				-363.000		0.038								2985
				-363.000		-0.000								2986
		75												2987
				-364.000		1.000								2988
						3.000								2989
								180.00						2990

3.3 Original Boeing Tape - First 50 Plies.

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
	0				0.000	35.000	0.000	270.00	-0.000					1
						33.700								2
	98													3
		62												4
		75												5
					41.954	31.522								6
	1					29.700								7
	4												1.00	8
		74												9
	4												1.00	10
					43.391									11
	4												1.00	12
		80												13
	4												1.00	14
					46.790									15
									180.000					16
					51.626									17
		75												18
						32.522								19
					51.751			90.00						20
	2					29.700								21
	4												1.00	22
		74												23
	4												1.00	24
					50.036									25
	4												1.00	26
		80												27
	4												1.00	28
					46.790									29
									-0.000					30
					41.829									31
		75												32
						32.522								33
					41.614			270.00						34
	3					29.700								35
	4												1.00	36
		74												37
	4												1.00	38
					43.607									39
	4												1.00	40
		60												41
	4												1.00	42
					46.790									43
									180.000					44
					51.876									45
		75												46
						32.522								47

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
					52.001			90.00						48
4						29.700								49
	4												1.00	50
		74												51
	4												1.00	52
					49.730									53
	4												1.00	54
		80												55
	4												1.00	56
					46.790									57
									-0.000					58
					41.579									59
		75												60
						32.522								61
					41.454			270.00						62
5						29.700								63
	4												1.00	64
		74												65
	4												1.00	66
					44.003									67
	4												1.00	68
		80												69
	4												1.00	70
					46.790									71
									180.000					72
					52.126									73
		75												74
						32.522								75
					52.251			90.00						76
6						29.700								77
	4												1.00	78
		74												79
	4												1.00	80
					49.424									81
	4												1.00	82
		80												83
	4												1.00	84
					46.790									85
									-0.000					86
					41.329									87
		75												88
						32.522								89
					41.204			270.00						90
7						29.700								91
	4												1.00	92
		74												93

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
	4												1.00	94
					44.310									95
	4												1.00	96
		80												97
	4												1.00	98
					46.790									99
									180.000					100
					52.376									101
		75												102
						32.522								103
					52.411			90.00						104
8						29.700								105
	4												1.00	106
		74												107
	4												1.00	108
					49.027									109
	4												1.00	110
		80												111
	4												1.00	112
					46.790									113
									-0.000					114
					41.079									115
		75												116
						32.522								117
					40.954			270.00						118
9						29.700								119
	4												1.00	120
		74												121
	4												1.00	122
					44.617									123
	4												1.00	124
		80												125
	4												1.00	126
					46.790									127
									180.000					128
					52.626									129
		75												130
						32.522								131
					52.751			90.00						132
10						29.700								133
	4												1.00	134
		74												135
	4												1.00	136
					48.810									137
	4												1.00	138
		80												139
	4												1.00	[illegible]

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
					46.790									141
									-0.000					142
					40.829									143
		75												144
						32.522								145
					40.704			270.00						146
11						29.800								147
	4												1.00	148
		74												149
	4												1.00	150
					44.923									151
	4												1.00	152
		80												153
	4												1.00	154
					46.790									155
									180.000					156
					52.876									157
		75												158
						32.522								159
					53.001			90.00						160
12						29.800								161
	4												1.00	162
		74												163
	4												1.00	164
					48.504									165
	4												1.00	166
		80												167
	4												1.00	168
					46.790									169
									-0.000					170
					40.579									171
		75												172
						32.522								173
					40.454			270.00						174
13						29.800								175
	4												1.00	176
		74												177
	4												1.00	178
					45.229									179
	4												1.00	180
		80												181
	4												1.00	182
					46.790									183
									180.000					[illegible]
					53.126									[illegible]
		75												186
						32.522								187

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
					53.251			90.00						188
14						29.800								189
	4												1.00	190
		74												191
	4												1.00	192
					48.197									193
	4												1.00	194
		80												195
					46.790									196
									-0.000					197
					40.329									198
		75												199
						32.522								200
					40.204			270.00						201
15						29.800								202
	4												1.00	203
		74												204
	4												1.00	205
					45.446									206
	4												1.00	207
		80												208
	4												1.00	209
					46.790									210
									180.000					211
					53.376									212
		75												213
						32.522								214
					53.501			90.00						215
16						29.800								216
	4												1.00	217
		74												218
	4												1.00	219
					47.891									220
	4												1.00	221
		80												222
	4												1.00	223
					46.790									224
									-0.000					225
					40.079									226
		75												227
						32.522								228
					39.954			270.00						229
17						29.800								230
	4												1.00	231
		74												232
	4												1.00	233

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
					45.842									234
	4												1.00	235
		80												236
	4												1.00	237
					46.790									238
									180.000					239
					53.626									240
		75												241
						32.522								242
					53.830			90.00						243
18						29.800								244
	4												1.00	245
		74												246
	4												1.00	247
					47.505									248
	4												1.00	249
		80												250
	4												1.00	251
					46.790									252
									-0.000					253
					39.750									254
		75												255
						32.522								256
					39.546			270.00						257
19						29.800								258
	4												1.00	259
		74												260
	4												1.00	261
					46.307									262
	4												1.00	263
		80												264
	4												1.00	265
					46.790									266
									180.000					267
					54.034									268
		75												269
						32.522								270
					54.238			90.00						271
20						29.800								272
	4												1.00	273
		74												274
	4												1.00	275
					47.041									276
	4												1.00	277
		80												278
	4												1.00	279
					46.790									280

N	C	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
									-0.000					
					39.342									283
		75												284
						32.522								285
					39.138			270.00						
21						29.900								286
	4												1.00	287
		74												288
	4												1.00	289
					46.772									290
	4												1.00	291
		80												292
	4												1.00	293
					46.790									294
									180.000					295
					54.442									296
		75												297
						32.522								298
					54.646			90.00						299
22						29.900								300
	4												1.00	301
		74												302
	4												1.00	303
					46.790									304
									-173.470					305
	4												1.00	306
		80												307
	4												1.00	308
									-0.000					309
					38.934									310
	4												1.00	311
		75												312
	4												1.00	313
						32.522								314
					38.730			270.00						315
23						29.900								316
	4												1.00	317
		74												318
	4												1.00	319
					46.790									320
									13.547					321
	4												1.00	322
		80												323
	4												1.00	324
									180.000					325
					54.850									326
	4												1.00	327

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		75												328
	4												1.00	329
						32.522								330
					55.054			90.00						331
24						29.900								332
	4												1.00	333
		74												334
	4												1.00	335
					46.790									336
									-159.503					337
	4												1.00	338
		80												339
	4												1.00	340
									-0.000					341
					38.256									342
	4												1.00	343
		75												344
	4												1.00	345
						32.522								346
					38.322			270.00						347
25						29.900								348
	4												1.00	349
		74												350
	4												1.00	351
					46.790									352
									27.407					353
	4												1.00	354
		80												355
	4												1.00	356
									180.000					357
					55.258									358
	4												1.00	359
		75												360
	4												1.00	361
						32.522								362
					55.462			90.00						363
26						29.900								364
	4												1.00	365
		74												366
	4												1.00	367
					46.790									368
									-145.723					369
	4												1.00	370
		80												371
	4												1.00	372
									-0.000					373
					38.118									374

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
	4												1.00	375
		75												376
	4												1.00	377
						32.522								378
					37.914			270.00						379
27						29.900								380
	4												1.00	381
		74												382
	4												1.00	383
					46.790									384
									40.983					385
	4												1.00	386
		80												387
	4												1.00	388
									180.000					389
					55.666									390
	4												1.00	391
		75												392
	4												1.00	393
						32.522								394
					55.870			90.00						395
28						29.900								396
	4												1.00	397
		74												398
	4												1.00	399
					46.790									400
									-132.323					401
	4												1.00	402
		80												403
	4												1.00	404
									-0.000					405
					37.710									406
	4												1.00	407
		75												408
	4												1.00	409
						32.522								410
					37.506			270.00						411
29						29.900								412
	4												1.00	413
		74												414
	4												1.00	415
					46.790									416
									54.330					417
	4												1.00	418
		80												419
	4												1.00	420
									180.000					421

N	C	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
					56.074									422
	4												1.00	423
		75												424
	4												1.00	425
						32.522								426
					56.278			90.00						427
30						29.900								428
	4												1.00	429
		74												430
	4												1.00	431
					46.790									432
									-119.099					433
	4												1.00	434
		80												435
	4												1.00	436
									-0.000					437
					37.302									438
	4												1.00	439
		75												440
	4												1.00	441
						32.522								442
					37.098			270.00						443
31						30.000								444
	4												1.00	445
		74												446
	4												1.00	447
					46.790									448
									67.412					449
	4												1.00	450
		80												451
	4												1.00	452
									180.000					453
					56.482									454
	4												1.00	455
		75												456
	4												1.00	457
						32.522								458
					56.686			90.00						459
32						30.000								460
	4												1.00	461
		74												462
	4												1.00	463
					46.790									464
									-107.168					465
	4												1.00	466
		80												467
	4												1.00	468

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
									-0.000					469
					36.896									470
	4												1.00	471
		75												472
	4												1.00	473
						32.522								474
					36.894			270.00						475
33						30.000								476
	4												1.00	477
		74												478
	4												1.00	479
					46.790									480
									80.273					481
	4												1.00	482
		80												483
	4												1.00	484
									180.000					485
					56.890									486
	4												1.00	487
		75												488
	4												1.00	489
						32.522								490
					57.094			90.00						491
34						30.000								492
	4												1.00	493
		74												494
	4												1.00	495
					46.790									496
									-93.392					497
	4												1.00	498
		80												499
	4												1.00	500
									-0.000					501
					36.485									502
	4												1.00	503
		75												504
	4												1.00	505
						32.522								506
					36.282			270.00						507
35						30.000								508
	4												1.00	509
		74												510
	4												1.00	511
					46.790									512
									92.901					513
	4												1.00	514
		80												515

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
	4												1.00	516
									180.000					517
					57.289									518
	4												1.00	519
		75												520
	4												1.00	521
						32.522								522
					57.507			90.00						523
36						30.000								524
	4												1.00	525
		74												526
	4												1.00	527
					46.790									528
									-80.849					529
	4												1.00	530
		80												531
	4												1.00	532
									-0.000					533
					36.073									534
	4												1.00	535
		75												536
	4												1.00	537
						32.522								538
					35.856			270.00						539
37						30.000								540
	4												1.00	541
		74												542
	4												1.00	543
					46.790									544
									105.801					545
	4												1.00	546
		80												547
	4												1.00	548
									180.000					549
					57.724									550
	4												1.00	551
		75												552
	4												1.00	553
						32.522								554
					57.941			90.00						555
38						30.000								556
	4												1.00	557
		74												558
	4												1.00	559
					46.790									560
									-67.720					561
	4												1.00	562

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
		80												563
	4												1.00	564
									-0.000					565
					35.639									566
	4												1.00	567
		75												568
	4												1.00	569
						32.522								570
					35.422			270.00						571
39						30.000								572
	4												1.00	573
		74												574
	4												1.00	575
					46.790									576
									118.711					577
	4												1.00	578
		80												579
	4												1.00	580
									180.000					581
					58.158									582
	4												1.00	583
		75												584
	4												1.00	585
						32.522								586
					58.375			90.00						587
40						30.000								588
	4												1.00	589
		74												590
	4												1.00	591
					46.790									592
									-54.925					593
	4												1.00	594
		80												595
	4												1.00	596
									-0.000					597
					35.205									598
	4												1.00	599
		75												600
	4												1.00	601
						32.522								602
					34.988			270.00						603
41						30.100								604
	4												1.00	605
		74												606
	4												1.00	607
					46.790									608
									131.384					609

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
	4												1.00	610
		80												611
	4												1.00	612
									180.000					613
					58.592									614
	4												1.00	615
		75												616
	4												1.00	617
						32.522								618
					58.809			90.00						619
42						30.100								620
	4												1.00	621
		74												622
	4												1.00	623
					46.790									624
									-43.358					625
	4												1.00	626
		80												627
	4												1.00	628
									-0.000					629
					34.771									630
	4												1.00	631
		75												632
	4												1.00	633
						32.522								634
					34.554			270.00						635
43						30.100								636
	4												1.00	637
		74												638
	4												1.00	639
					46.790									640
									143.844					641
	4												1.00	642
		80												643
	4												1.00	644
									180.000					645
					59.026									646
	4												1.00	647
		75												648
	4												1.00	649
						32.522								650
					59.243			90.00						651
44						30.100								652
	4												1.00	[illegible]
		74												[illegible]
	4												1.00	655
					46.790									656

N	C	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
									-30.010					657
	4												1.00	658
		80												659
	4												1.00	660
									-0.000					661
					34.337									662
	4												1.00	663
		75												664
	4												1.00	665
						32.522								666
					34.120			270.00						667
45						30.100								668
	4												1.00	669
		74												670
	4												1.00	671
					46.790									672
									156.084					673
	4												1.00	674
		80												675
	4												1.00	676
									180.000					677
					59.460									678
	4												1.00	679
		75												680
	4												1.00	681
						32.522								682
					59.677			90.00						683
46						30.100								684
	4												1.00	685
		74												686
	4												1.00	687
					46.790									688
									-17.872					689
	4												1.00	690
		80												691
	4												1.00	692
									-0.000					693
					33.903									694
	4												1.00	695
		75												696
	4												1.00	697
						32.522								698
					33.903			270.00						699
47						30.100								700
	4												1.00	701
		74												702
	4												1.00	703

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
					46.790									704
									168.118					705
	4												1.00	706
		80												707
	4												1.00	708
									180.000					709
					59.894									710
	4												1.00	711
		75												712
	4												1.00	713
						32.522								714
					60.111			90.00						715
48						30.100								716
	4												1.00	717
		74												718
	4												1.00	719
					46.790									720
									-5.944					721
	4												1.00	722
		80												723
	4												1.00	724
									-0.000					725
					33.469									726
	4												1.00	727
		75												728
	4												1.00	729
						32.522								730
					33.252			270.00						731
49						30.100								732
	4												1.00	733
		74												734
	4												1.00	735
					46.790									736
									179.945					737
	4												1.00	738
		80												739
	4												1.00	740
									180.000					741
					60.328									742
	4												1.00	743
		75												744
	4												1.00	745
						32.522								746
					60.545			90.00						747
99														748
	2													749

3.4 Original Boeing Tape - Ply 51 through Ply 144.

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********
	0												
	!90												
		62											
				0.000	0.000	35.000	0.000	180.00	-0.000				
				-317.777									
					46.790								
		75											
51						25.000							
		74											
				-303.805		25.450							
				-286.000									
	4												1.00
				-293.000									
								359.99	180.000				
				-298.500									
		64											
	4												5.00
		75											
				-304.237									
	4												1.00
		80											
	4												1.00
		65											
				-307.000									
		74											
	4												1.00
				-317.777		25.000							
		75											
	4												1.00
				-318.777		26.000							
						29.000							
				-317.994				180.00					
52						25.000							
		74											
				-303.805		25.459							
				-286.000									
	4												1.00
				-293.000									
								359.99	0.000				
				-298.500									
		64											
	4												5.00
		75											
				-304.454									
	4												1.00
		80											
	4												1.00
		65											

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-307.000										48
		74												49
	4												1.00	50
				-317.994		25.000								51
		75												52
	4												1.00	53
				-318.994		26.000								54
						29.000								55
				-318.211				180.00						56
53						25.000								57
		74												58
				-303.805		25.468								59
				-286.000										60
	4												1.00	61
				-293.000										62
								359.99	180.000					63
				-298.500										64
		64												65
	4												5.00	66
		75												67
				-304.671										68
	4												1.00	69
		80												70
	4												1.00	71
		65												72
				-307.000										73
		74												74
	4												1.00	75
				-318.211		25.000								76
		75												77
	4												1.00	78
				-319.211		26.000								79
						29.000								80
				-318.428				180.00						81
54						25.000								82
		74												83
				-303.805		25.477								84
				-286.000										85
	4												1.00	86
				-293.000										87
								359.99	0.000					88
				-298.500										89
		64												90
	4												5.00	91
		75												92
				-304.888										93
	4												1.00	94
		80												95

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
	4												1.00	96
		65												97
				-307.000										98
		74												99
	4												1.00	100
				-318.428		25.000								101
		75												102
	4												1.00	103
				-319.428		26.000								104
						29.000								105
				-318.643				180.00						106
55						25.000								107
		74												108
				-303.805		25.486								109
				-286.000										110
	4												1.00	111
				-293.000										112
								359.99	180.000					113
				-298.500										114
		64												115
	4												5.00	116
		75												117
				-305.105										118
	4												1.00	119
		80												120
	4												1.00	121
		65												122
				-307.000										123
		74												124
	4												1.00	125
				-318.645		25.000								126
		75												127
	4												1.00	128
				-319.645		26.000								129
						29.000								130
				-318.862				180.00						131
56						25.000								132
		74												133
				-303.805		25.495								134
				-286.000										135
	4												1.00	136
				-293.000										137
								359.99	0.000					138
				-298.500										139
		64												140
	4												5.00	141
		75												142
				-305.322										143

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	1-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
	4												1.00	144
		80												145
	4												1.00	146
		65												147
				-307.000										148
		74												149
	4												1.00	150
				-318.862		25.000								151
		75												152
	4												1.00	153
				-319.862		26.000								154
						29.000								155
				-319.079				180.00						156
57						25.000								157
		74												158
				-303.805		25.504								159
				-286.000										160
	4												1.00	161
				-293.000										162
								359.99	180.000					163
				-298.500										164
		64												165
	4												5.00	166
		75												167
				-305.539										168
	4												1.00	169
		80												170
	4												1.00	171
		65												172
				-307.000										173
		74												174
	4												1.00	175
				-319.079		25.000								176
		75												177
	4												1.00	178
				-320.079		26.000								179
						29.000								180
				-319.296				180.00						181
58						25.000								182
		74												183
				-303.805		25.513								184
				-286.000										185
	4												1.00	186
				-293.000										187
								359.99	0.000					188
				-298.500										189
		64												190
	4												5.00	

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		75												192
				-305.756										193
	4												1.00	194
		80												195
	4												1.00	196
		65												197
				-307.000										198
		74												199
	4												1.00	200
				-319.296		25.000								201
		75												202
	4												1.00	203
				-320.296		26.000								204
						29.000								205
				-319.719				180.00						206
59						25.000								207
		74												208
				-303.805		25.522								209
				-286.000										210
	4												1.00	211
				-293.000										212
								359.99	180.000					213
				-298.500										214
		64												215
	4												5.00	216
		75												217
				-306.179										218
	4												1.00	219
		80												220
	4												1.00	221
		65												222
				-307.000										223
		74												224
	4												1.00	225
				-319.719		25.000								226
		75												227
	4												1.00	228
				-320.719		26.000								229
						29.000								230
				-320.142				180.00						231
60						25.000								232
		74												233
				-303.805		25.531								234
				-286.000										235
	4												1.00	236
				-293.000										237
								359.99	0.000					238
				-298.500										239

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
		64												240
	4												5.00	241
		73												242
				-306.602										243
	4												1.00	244
		80												245
	4												1.00	246
		65												247
				-307.000										248
		74												249
	4												1.00	250
				-320.142		25.000								251
		75												252
	4												1.00	253
				-321.142		26.000								254
						29.000								255
				-320.565				180.00						256
61						25.000								257
		74												258
				-303.805		25.540								259
				-286.000										260
	4												1.00	261
235				-293.000										262
								359.99	180.000					263
				-298.500										264
		64												265
	4												5.00	266
		75												267
				-307.000										268
	4												1.00	269
		65												270
	4												1.00	271
		74												272
	4												1.00	273
				-307.025		25.540								274
		80												275
	4												1.00	276
				-320.565		25.000								277
		75												278
	4												1.00	279
				-321.565		26.000								280
						29.000								281
				-320.988				180.00						282
62						25.000								283
		74												284
				-303.805		25.549								285
				-286.000										286
	4												1.00	287

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
				-293.000										288
								359.99	0.000					289
				-298.500										290
		64												291
	4												5.00	292
		75												293
				-307.000										294
	4												1.00	295
		65												296
	4												1.00	297
		74												298
	4												1.00	299
				-307.488		25.549								300
		80												301
	4												1.00	302
				-320.988		25.000								303
		75												304
	4												1.00	305
				-321.988		26.000								306
						29.000								307
				-321.411				180.00						308
63						25.000								309
		74												310
				-303.805		25.558								311
				-286.000										312
	4												1.00	313
				-293.000										314
								359.99	180.000					315
				-298.500										316
		64												317
	4												5.00	318
		75												319
				-307.000										320
	4												1.00	321
		65												322
	4												1.00	323
		74												324
	4												1.00	325
				-307.871		25.551								326
		80												327
	4												1.00	328
				-321.411		25.000								329
		75												330
	4												1.00	331
				-322.411		26.000								332
						29.000								333
				-321.834				180.00						334

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
64						25.000								335
		74												336
				-303.805		25.567								337
				-286.000										338
	4												1.00	339
				-293.000										340
								359.99	0.000					341
				-298.500										342
		64												343
	4												5.00	344
		75												345
				-307.000										346
	4												1.00	347
		65												348
	4												1.00	349
		74												350
	4												1.00	351
				-308.294		25.525								352
		80												353
	4												1.00	354
				-321.834		25.000								355
		75												356
	4												1.00	357
				-322.834		26.000								358
						29.000								359
				-322.257				180.00						360
65						25.000								361
		74												362
				-303.805		25.576								363
				-286.000										364
	4												1.00	365
				-293.000										366
								359.99	180.000					367
				-298.500										368
		64												369
	4												5.00	370
		75												371
				-307.000										372
	4												1.00	[illegible]
		65												[illegible]
	4												1.00	375
		74												376
	4												1.00	377
				-308.717		25.521								378
		80												379
	4												1.00	380
				-322.257		25.000								381
		75												382

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
	4												1.00	383
				-323.257		26.000								384
						29.000								385
				-322.680				180.00						386
66						25.000								387
		74												388
				-303.805		25.585								389
				-286.000										390
	4												1.00	391
				-293.000										392
								359.99	0.000					393
				-298.500										394
		64												395
	4												5.00	396
		75												397
				-307.000										398
	4												1.00	399
		65												400
	4												1.00	401
		74												402
	4												1.00	403
				-309.140		25.516								404
		80												405
	4												1.00	406
				-322.680		25.000								407
		75												408
	4												1.00	409
				-323.680		26.000								410
						29.000								411
				-323.103				180.00						412
67						25.000								413
		74												414
				-303.805		25.594								415
				-286.000										416
	4												1.00	417
				-293.000										418
								359.99	180.000					419
				-298.500										420
		64												421
	4												5.00	422
		75												423
				-307.000										424
	4												1.00	425
		65												426
	4												1.00	427
		74												428
	4												1.00	429
				-309.563		25.524								430

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
		80												431
	4												1.00	432
				-323.103		25.000								433
		75												434
	4												1.00	435
				-324.103		26.000								436
						29.000								437
				-323.526				180.00						438
68						25.000								439
		74												440
				-303.805		25.603								441
				-286.000										442
	4												1.00	443
				-293.000										444
								359.99	0.000					445
				-298.500										446
		64												447
	4												5.00	448
		75												449
				-307.000										450
	4												1.00	451
		65												452
	4												1.00	453
		74												454
	4												1.00	455
				-309.986		25.522								456
		80												457
	4												1.00	458
				-323.526		25.000								459
		75												460
	4												1.00	461
				-324.526		26.000								462
						29.000								463
				-323.949				180.00						464
69						25.000								465
		74												466
				-303.805		25.612								467
				-286.000										468
	4												1.00	469
				-293.000										470
								359.99	180.000					471
				-298.500										472
		64												473
	4												5.00	474
		75												475
				-307.000										476
	4												1.00	477
		65												478

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
	4												1.00	479
		74												480
	4												1.00	481
				-310.409		25.519								482
		80												483
	4												1.00	484
				-323.949		25.000								485
		75												486
	4												1.00	487
				-324.949		26.000								488
						29.000								489
				-324.372				180.00						490
70						25.000								491
		74												492
				-303.805		25.621								493
				-286.000										494
	4												1.00	495
				-293.000										496
								359.99	0.000					497
				-298.500										498
		64												499
	4												5.00	500
		75												501
				-307.000										502
	4												1.00	503
		65												504
	4												1.00	505
		74												506
	4												1.00	507
				-310.832		25.517								508
		80												509
	4												1.00	510
				-324.372		25.000								511
		75												512
	4												1.00	513
				-325.372		26.000								514
						29.000								515
				-324.795				180.00						516
71						25.000								517
		74												518
				-303.805		25.630								519
				-286.000										520
	4												1.00	521
				-293.000										522
								359.99	180.000					523
				-298.500										524
		64												525
	4												5.00	526

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		75												527
				-307.000										528
	4												1.00	529
		65												530
	4												1.00	531
		74												532
	4												1.00	533
				-311.255		25.614								534
		80												535
	4												1.00	536
				-324.795		25.000								537
		75												538
	4												1.00	539
				-325.795		26.000								540
						29.000								541
				-329.295				180.00						542
72						25.000								543
		74												544
				-303.805		25.639								545
				-286.000										546
	4												1.00	547
				-293.000										548
								359.99	0.000					549
				-298.500										550
		64												551
	4												5.00	552
		75												553
				-307.000										554
	4												1.00	555
		65												556
	4												1.00	557
		74												558
	4												1.00	559
				-315.755		25.400								560
		80												561
	4												1.00	562
				-329.295		25.000								563
		75												564
	4												1.00	565
				-330.295		26.000								566
						29.000								567
				-329.860				180.00						568
73						25.000								569
		74												570
				-303.805		25.648								571
				-286.000										572
	4												1.00	573
				-293.000										574

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
								359.99	180.000					575
				-298.500										576
		64												577
	4												5.00	578
		75												579
				-307.000										580
	4												1.00	581
		65												582
	4												1.00	583
		74												584
	4												1.00	585
				-316.320		25.394								586
		80												587
	4												1.00	588
				-329.860		25.000								589
		75												590
	4												1.00	591
				-330.860		26.000								592
						29.000								593
				-330.405				180.00						594
74						25.000								595
		74												596
				-303.865		25.657								597
				-286.000										598
	4												1.00	599
				-293.000										600
								359.99	0.000					601
				-298.500										602
		64												603
	4												5.00	604
		75												605
				-307.000										606
	4												1.00	607
		65												608
	4												1.00	609
		74												610
	4												1.00	611
				-316.865		25.260								612
		80												613
	4												1.00	614
				-330.405		25.000								615
		75												616
	4												1.00	617
				-331.405		26.000								618
						29.000								619
				-330.970				180.00						620
75						25.000								621
		74												622

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-303.805		25.666								623
				-286.000										624
	4												1.00	625
				-293.000										626
								359.99	180.000					627
				-298.500										628
		64												629
	4												5.00	630
		75												631
				-307.000										632
	4												1.00	633
		65												634
	4												1.00	635
		74												636
	4												1.00	637
				-317.430		25.283								638
		80												639
	4												1.00	640
				-330.970		25.000								641
		75												642
	4												1.00	643
				-331.970		26.000								644
						29.000								645
				-331.525				180.00						646
76						25.000								647
		74												648
				-303.805		25.675								649
				-286.000										650
	4												1.00	651
				-293.000										652
								359.99	0.000					653
				-298.500										654
		64												655
	4												5.00	656
		75												657
				-307.000										658
	4												1.00	659
		65												660
	4												1.00	661
		74												662
	4												1.00	663
				-317.985		25.265								664
		80												665
	4												1.00	666
				-331.525		25.000								667
		75												668
	4												1.00	669
				-332.525		26.000								670
						29.000								671

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
				-332.080				180.00						672
77						25.000								673
	74													674
				-303.805		25.684								675
				-286.000										676
	4												1.00	677
				-293.000										678
								359.99	180.000					679
				-298.500										680
	64													681
	4												5.00	682
	75													683
				-307.000										684
	4												1.00	685
	65													686
	4												1.00	687
	74													688
	4												1.00	689
				-318.540		25.274								690
	80													691
	4												1.00	692
				-332.080		25.000								693
	75													694
	4												1.00	695
				-333.080		26.000								696
						29.000								697
				-332.635				180.00						698
78						25.000								699
	74													700
				-303.805		25.693								701
				-286.000										702
	4												1.00	703
				-293.000										704
								359.99	0.000					705
				-298.500										706
	64													707
	4												5.00	708
	75													709
				-307.000										710
	4												1.00	711
	65													712
	4												1.00	713
	74													714
	4												1.00	715
				-319.095		25.275								716
	80													717
	4												1.00	718
				-332.635		25.000								719

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		75												720
	4												1.00	721
				-333.635		26.000								722
						29.000								723
				-333.190				180.00						724
79						23.000								725
		74												726
				-303.805		25.702								727
				-286.000										728
	4												1.00	729
				-293.000										730
								359.99	180.000					731
				-298.500										732
		64												733
	4												5.00	734
		75												735
				-307.000										736
	4												1.00	737
		65												738
	4												1.00	739
		74												740
	4												1.00	741
				-319.650		25.269								742
		80												743
	4												1.00	744
				-333.190		25.000								745
		75												746
	4												1.00	747
				-334.190		26.000								748
						29.000								749
				-333.745				180.00						750
80						25.000								751
		74												752
				-303.805		25.711								753
				-286.000										754
	4												1.00	755
				-293.000										756
								359.99	0.000					757
				-298.500										758
		64												759
	4												5.00	760
		75												761
				-307.000										762
	4												1.00	763
		65												764
	4												1.00	765
		74												766
	4												1.00	767

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-320.205		25.263								768
		80												769
	4												1.00	770
				-333.745		25.000								771
		75												772
	4												1.00	773
				-334.745		26.000								774
						29.000								775
				-334.305				180.00						776
81						25.000								777
		74												778
				-303.805		25.720								779
				-285.000										780
	4												1.00	781
				-293.000										782
								359.99	180.000					783
				-298.500										784
		64												785
	4												5.00	786
		75												787
				-307.000										788
	4												1.00	789
		65												790
	4												1.00	791
		74												792
	4												1.00	793
				-320.765		25.257								794
		80												795
	4												1.00	796
				-334.305		25.000								797
		75												798
	4												1.00	799
				-335.305		26.000								800
						29.000								801
				-334.930				180.00						802
82						25.000								803
		74												804
				-303.805		25.729								805
				-286.000										806
	4												1.00	807
				-293.000										808
								359.99	0.000					809
				-298.500										810
		64												811
	4												5.00	812
		75												813
				-307.000										814
	4												1.00	815

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
		65												816
	4												1.00	817
		74												818
	4												1.00	819
				-321.390		25.249								820
		80												821
	4												1.00	822
				-334.930		25.000								823
		75												824
	4												1.00	825
				-335.930		26.000								826
						29.000								827
				-335.555				180.00						828
83						25.000								829
		74												830
				-303.805		25.738								831
				-286.000										832
	4												1.00	833
				-293.000										834
								359.99	180.000					835
				-298.500										836
		64												837
	4												5.00	838
		75												839
				-307.000										840
	4												1.00	841
		65												842
	4												1.00	843
		74												844
	4												1.00	845
				-322.015		25.331								846
		80												847
	4												1.00	848
				-335.555		25.000								849
		75												850
	4												1.00	851
				-336.555		26.000								852
						29.000								853
				-336.180				180.00						854
84						25.000								855
		74												856
				-303.805		25.740								857
				-286.000										858
	4												1.00	859
				-293.000										860
								359.99	0.000					861
				-298.500										862
		64												863

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
	4												5.00	864
		75												865
				-307.000										866
	4												1.00	867
		65												868
	4												1.00	869
		74												870
	4												1.00	871
				-322.640		25.319								872
		80												873
	4												1.00	874
				-336.180		25.000								875
		75												876
	4												1.00	877
				-337.180		26.000								878
						29.000								879
				-336.805				180.00						880
85						25.000								881
		74												882
				-303.805		25.747								883
				-286.000										884
	4												1.00	885
				-293.000										886
								359.99	180.000					887
				-298.500										888
		64												889
	4												5.00	890
		75												891
				-307.000										892
	4												1.00	893
		65												894
	4												1.00	895
		74												896
	4												1.00	897
				-323.265		25.312								898
		80												899
	4												1.00	900
				-336.805		25.000								901
		75												902
	4												1.00	903
				-337.805		26.000								904
						29.000								905
				-337.430				180.00						906
86						25.000								907
		74												908
				-303.805		25.756								909
				-286.000										910
	4												1.00	911

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-293.000										912
								359.99	0.000					913
				-298.500										914
		64												915
		4											5.00	916
		75												917
				-307.000										918
		4											1.00	919
		65												920
		4											1.00	921
		74												922
		4											1.00	923
				-323.890		25.306								924
		80												925
		4											1.00	926
				-337.430		25.000								927
		75												928
		4											1.00	929
				-338.430		26.000								930
						29.000								931
				-338.055				180.00						932
	87					25.000								933
		74												934
				-303.805		25.765								935
				-286.000										936
		4											1.00	937
				-293.000										938
								359.99	180.000					939
				-298.500										940
		64												941
		4											5.00	942
		75												943
				-307.000										944
		4											1.00	945
		65												946
		4											1.00	947
		74												948
		4											1.00	949
				-324.515		25.302								950
		80												951
		4											1.00	952
				-338.055		25.000								953
		75												954
		4											1.00	955
				-339.055		26.000								956
						29.000								957
				-338.680				180.00						958

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
88						25.000								959
		74												960
				-303.805		25.774								961
				-286.000										962
	4												1.00	963
				-293.000										964
								359.99	0.000					965
				-298.500										966
		64												967
	4												5.00	968
		75												969
				-307.000										970
	4												1.00	971
		65												972
	4												1.00	973
		74												974
	4												1.00	975
				-325.140		25.296								976
		80												977
	4												1.00	978
				-338.680		25.000								979
		75												980
	4												1.00	981
				-339.680		26.000								982
						29.000								983
				-339.305				180.00						984
89						25.000								985
		74												986
				-303.805		25.783								987
				-286.000										988
	4												1.00	989
				-293.000										990
								359.99	180.000					991
				-298.500										992
		64												993
	4												5.00	994
		75												995
				-307.000										996
	4												1.00	997
		65												998
	4												1.00	999
		74												1000
	4												1.00	1001
				-325.765		25.292								1002
		80												1003
	4												1.00	1004
				-339.305		25.000								1005
		75												1006

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
	4												1.00	1007
				-340.305		26.000								1008
						29.000								1009
				-339.759				180.00						1010
90						25.000								1011
		74												1012
				-303.805		25.792								1013
				-286.000										1014
	4												1.00	1015
				-293.000										1016
								359.99	0.000					1017
				-298.500										1018
		64												1019
	4												5.00	1020
		75												1021
				-307.000										1022
	4												1.00	1023
		65												1024
	4												1.00	1025
		74												1026
	4												1.00	1027
				-326.219		25.290								1028
		80												1029
	4												1.00	1030
				-339.759		25.000								1031
		75												1032
	4												1.00	1033
				-340.759		26.000								1034
						29.000								1035
				-340.213				180.00						1036
91						25.000								1037
		74												1038
				-303.805		25.801								1039
				-286.000										1040
	4												1.00	1041
				-293.000										1042
								359.99	180.000					1043
				-298.500										1044
		64												1045
	4												5.00	1046
		75												1047
				-307.000										1048
	4												1.00	1049
		65												1050
	4												1.00	1051
		74												1052
	4												1.00	1053
				-326.673		25.289								1054

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
		80												1055
	4												1.00	1056
				-340.213		25.000								1057
		75												1058
	4												1.00	1059
				-341.213		26.000								1060
						29.000								1061
				-340.667				180.00						1062
92						25.000								1063
		74												1064
				-303.805		25.810								1065
				-286.000										1066
	4												1.00	1067
				-293.000										1068
								359.99	0.000					1069
				-298.500										1070
		64												1071
	4												5.00	1072
		75												1073
				-307.000										1074
	4												1.00	1075
		65												1076
	4												1.00	1077
		74												1078
	4												1.00	1079
				-327.127		25.288								1080
		80												1081
	4												1.00	1082
				-340.667		25.000								1083
		75												1084
	4												1.00	1085
				-341.667		26.000								1086
						29.000								1087
				-341.121				180.00						1088
93						25.000								1089
		74												1090
				-303.805		25.819								1091
				-286.000										1092
	4												1.00	1093
				-293.000										1094
								359.99	180.000					1095
				-298.500										1096
		64												1097
	4												5.00	1098
		75												1099
				-307.000										1100
	4												1.00	1101
		65												1102

N	C	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
	4												1.00	1103
		74												1104
	4												1.00	1105
				-327.581		25.287								1106
		80												1107
	4												1.00	1108
				-341.121		25.000								1109
		75												1110
	4												1.00	1111
				-342.121		26.000								1112
						29.000								1113
				-341.575				180.00						1114
94						25.000								1115
		74												1116
				-303.805		25.828								1117
				-286.000										1118
	4												1.00	1119
				-293.000										1120
								359.99	0.000					1121
				-298.500										1122
		64												1123
	4												5.00	1124
		75												1125
				-307.000										1126
	4												1.00	1127
		65												1128
	4												1.00	1129
		74												1130
	4												1.00	1131
				-328.035		25.279								1132
		80												1133
	4												1.00	1134
				-341.575		25.000								1135
		75												1136
	4												1.00	1137
				-342.575		26.000								1138
						29.000								1139
				-342.029				180.00						1140
95						25.000								1141
		74												1142
				-303.805		25.837								1143
				-286.000										1144

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
		75												1151
				-307.000										1152
	4												1.00	1153
		65												1154
	4												1.00	1155
		74												1156
	4												1.00	1157
				-328.489		25.285								1158
		80												1159
	4												1.00	1160
				-342.029		25.000								1161
		75												1162
	4												1.00	1163
				-343.029		26.000								1164
						29.000								1165
				-342.483				180.00						1166
96						25.000								1167
		74												1168
				-303.805		25.846								1169
				-286.000										1170
	4												1.00	1171
				-293.000										1172
								359.99	0.000					1173
				-298.500										1174
		64												1175
	4												5.00	1176
		75												1177
				-307.000										1178
	4												1.00	1179
		65												1180
	4												1.00	1181
		74												1182
	4												1.00	1183
				-328.943		25.283								1184
		80												1185
	4												1.00	1186
				-342.483		25.000								1187
		75												1188
	4												1.00	1189
				-343.483		26.000								1190
						29.000								1191
				-342.937				180.00						1192
97						25.000								1193
		74												1194
				-303.805		25.855								1195
				-286.000										1196
	4												1.00	1197
				-293.000										1198

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
								359.99	180.000					1199
				-298.500										1200
		64												1201
	4												5.00	1202
		75												1203
				-307.000										1204
	4												1.00	1205
		65												1206
	4												1.00	1207
		74												1208
	4												1.00	1209
				-329.397		25.282								1210
		80												1211
	4												1.00	1212
				-342.937		25.000								1213
		75												1214
	4												1.00	1215
				-343.937		26.000								1216
						29.000								1217
				-343.391				180.00						1218
98						25.000								1219
		74												1220
				-303.805		25.864								1221
				-286.000										1222
	4												1.00	1223
				-293.000										1224
								359.99	0.000					1225
				-298.500										1226
		64												1227
	4												5.00	1228
		75												1229
				-307.000										1230
	4												1.00	1231
		65												1232
	4												1.00	1233
		74												1234
	4												1.00	1235
				-329.851		25.281								1236
		80												1237
	4												1.00	1238
				-343.391		25.000								1239
		75												1240
	4												1.00	1241
				-344.391		26.000								1242
						29.000								1243
				-343.845				180.00						1244
99						25.000								1245
		74												1246

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-303.805		25.873								1247
				-286.000										1248
	4												1.00	1249
				-293.000										1250
								359.99	180.000					1251
				-298.500										1252
		64												1253
	4												5.00	1254
		75												1255
				-307.000										1256
	4												1.00	1257
		65												1258
	4												1.00	1259
		74												1260
	4												1.00	1261
				-330.305		25.280								1262
		80												1263
	4												1.00	1264
				-343.845		25.000								1265
		75												1266
	4												1.00	1267
				-344.845		26.000								1268
						29.000								1269
256				-344.305				180.00						1270
100						25.000								1271
		74												1272
				-303.805		25.882								1273
				-286.000										1274
	4												1.00	1275
				-293.000										1276
								359.99	0.000					1277
				-298.500										1278
		64												1279
	4												5.00	1280
		75												1281
				-307.000										1282
	4												1.00	1283
		65												1284
	4												1.00	1285
		74												1286
	4												1.00	1287
				-330.765		25.279								1288
		80												1289
	4												1.00	1290
				-344.305		25.000								1291
		75												1292
	4												1.00	1293
				-345.305		26.000								1294
						29.000								1295

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-344.941				180.00						1296
101						25.000								1297
		74												1298
				-303.805		25.891								1299
				-286.000										1300
		4											1.00	1301
				-293.000										1302
								359.99	180.000					1303
				-298.500										1304
		64												1305
		4											5.00	1306
		75												1307
				-307.000										1308
		4											1.00	1309
		65												1310
		4											1.00	1311
		74												1312
		4											1.00	1313
				-331.401		25.273								1314
		80												1315
		4											1.00	1316
				-344.941		25.000								1317
		75												1318
		4											1.00	1319
				-345.941		26.000								1320
						29.000								1321
				-345.577				180.00						1322
102						25.000								1323
		74												1324
				-303.805		25.900								1325
				-286.000										1326
		4											1.00	1327
				-293.000										1328
								359.99	0.000					1329
				-298.500										1330
		64												1331
		4											5.00	1332
		75												1333
				-307.000										1334
		4											1.00	1335
		65												1336
		4											1.00	1337
		74												1338
		4											1.00	1339
				-332.037		25.268								1340
		80												1341
		4											1.00	1342
				-345.577		25.000								1343

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		73												1344
	4												1.00	1345
				-346.577		26.000								1346
						29.000								1347
				-346.213				180.00						1348
103						25.000								1349
		74												1350
				-303.805		25.909								1351
				-286.000										1352
	4												1.00	1353
				-293.000										1354
								359.99	180.000					1355
				-298.500										1356
		64												1357
	4												5.00	1358
		75												1359
				-307.000										1360
	4												1.00	1361
		65												1362
	4												1.00	1363
		74												1364
	4												1.00	1365
				-332.673		25.300								1366
		80												1367
	4												1.00	1368
				-346.213		25.000								1369
		73												1370
	4												1.00	1371
				-347.213		26.000								1372
						29.000								1373
				-346.849				180.00						1374
104						25.000								1375
		74												1376
				-303.805		25.918								1377
				-286.000										1378
	4												1.00	1379
				-293.000										1380
								359.99	0.000					1381
				-298.500										1382
		64												1383
	4												5.00	1384
		75												1385
				-307.000										1386
	4												1.00	1387
		65												1388
	4												1.00	1389
		74												1390
	4												1.00	1391

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-333.309		25.295								1392
		80												1393
	4												1.00	1394
				-346.849		25.000								1395
		75												1396
	4												1.00	1397
				-347.849		26.000								1398
						29.000								1399
				-347.485				180.00						1400
105						25.000								1401
		74												1402
				-303.805		25.927								1403
				-286.000										1404
	4												1.00	1405
				-293.000										1406
								359.99	180.000					1407
				-298.500										1408
		64												1409
	4												5.00	1410
		75												1411
				-307.000										1412
	4												1.00	1413
		65												1414
	4												1.00	1415
		74												1416
	4												1.00	1417
				-333.945		25.291								1418
		80												1419
	4												1.00	1420
				-347.485		25.000								1421
		75												1422
	4												1.00	1423
				-348.485		26.000								1424
						29.000								1425
				-348.121				180.00						1426
106						25.000								1427
		74												1428
				-303.805		25.936								1429
				-286.000										1430
	4												1.00	1431
				-293.000										1432
								359.99	0.000					1433
				-298.500										1434
		64												1435
	4												5.00	1436
		75												1437
				-307.000										1438
	4												1.00	1439

N	C	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		65												1440
	4												1.00	1441
		74												1442
	4												1.00	1443
				-334.581		25.286								1444
		80												1445
	4												1.00	1446
				-348.121		25.000								1447
		75												1448
	4												1.00	1449
				-349.121		26.000								1450
						29.000								1451
				-348.757				180.00						1452
107						25.000								1453
		74												1454
				-303.805		25.945								1455
				-286.000										1456
	4												1.00	1457
				-293.000										1458
								359.99	180.000					1459
				-298.500										1460
		64												1461
	4												5.00	1462
		75												1463
				-307.000										1464
	4												1.00	1465
		65												1466
	4												1.00	1467
		74												1468
	4												1.00	1469
				-335.217		25.282								1470
		80												1471
	4												1.00	1472
				-348.757		25.000								1473
		75												1474
	4												1.00	1475
				-349.757		26.000								1476
						29.000								1477
				-349.393				180.00						1478
108						25.000								1479
		74												1480
				-303.805		25.954								1481
				-286.000										1482
	4												1.00	1483
				-293.000										1484
								359.99	0.000					1485
				-298.500										1486
		64												1487

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
	4												5.00	1488
		75												1489
				-307.000										1490
	4												1.00	1491
		65												1492
	4												1.00	1493
		74												1494
	4												1.00	1495
				-335.853		25.278								1496
		80												1497
	4												1.00	1498
				-349.393		25.000								1499
		75												1500
	4												1.00	1501
				-350.393		26.000								1502
						29.000								1503
				-350.029				180.00						1504
109						25.000								1505
		74												1506
				-303.805		25.963								1507
				-286.000										1508
	4												1.00	1509
				-293.000										1510
								359.99	180.000					1511
				-298.500										1512
		64												1513
	4												5.00	1514
		75												1515
				-307.000										1516
	4												1.00	1517
		65												1518
	4												1.00	1519
		74												1520
	4												1.00	1521
				-336.489		25.273								1522
		80												1523
	4												1.00	1524
				-350.029		25.000								1525
		75												1526
	4												1.00	1527
				-351.029		26.000								1528
						29.000								1529
				-350.665				180.00						1530
110						25.000								1531
		74												1532
				-303.805		25.972								1533
				-286.000										1534
	4												1.00	1535

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-293.000										1536
								359.99	0.000					1537
				-298.500										1538
		64												1539
	4												5.00	1540
		75												1541
				-307.000										1542
	4												1.00	1543
		65												1544
	4												1.00	1545
		74												1546
	4												1.00	1547
				-337.125		25.269								1548
		80												1549
	4												1.00	1550
				-350.665		25.000								1551
		75												1552
	4												1.00	1553
				-351.665		26.000								1554
						29.000								1555
				-351.305				180.00						1556
111						25.000								1557
		74												1558
262				-303.805		25.981								1559
				-286.000										1560
	4												1.00	1561
				-293.000										1562
								359.99	180.000					1563
				-298.500										1564
		64												1565
	4												5.00	1566
		75												1567
				-307.000										1568
	4												1.00	1569
		65												1570
	4												1.00	1571
		74												1572
	4												1.00	1573
				-337.765		25.264								1574
		80												1575
	4												1.00	1576
				-351.305		25.000								1577
		75												1578
	4												1.00	1579
				-352.305		26.000								1580
						29.000								1581
				-354.638				180.00						1582

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
112						25.000								1583
		74												1584
				-303.805		25.990								1585
				-286.000										1586
		4											1.00	1587
				-293.000										1588
								359.99	0.000					1589
				-298.500										1590
		64												1591
		4											5.00	1592
		75												1593
				-307.000										1594
		4											1.00	1595
		65												1596
		4											1.00	1597
		74												1598
		4											1.00	1599
				-341.098		25.204								1600
		80												1601
		4											1.00	1602
				-354.638		25.000								1603
		75												1604
		4											1.00	1605
				-353.638		26.000								1606
						29.000								1607
				-357.971				180.00						1608
113						25.000								1609
		74												1610
				-303.805		25.999								1611
				-286.000										1612
		4											1.00	1613
				-293.000										1614
								359.99	180.000					1615
				-298.500										1616
		64												1617
		4											5.00	1618
		75												1619
				-307.000										1620
		4											1.00	1621
		65												1622
		4											1.00	1623
		74												1624
		4											1.00	1625
				-344.431		25.141								1626
		80												1627
		4											1.00	1628
				-357.971		25.000								1629
		75												1630

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
	4												1.00	1631
				-358.971		26.000								1632
						29.000								1633
				-361.304				180.00						1634
114						25.000								1635
		74												1636
				-303.805		26.008								1637
				-286.000										1638
	4												1.00	1639
				-293.000										1640
								359.99	0.000					1641
				-298.500										1642
		64												1643
	4												5.00	1644
		75												1645
				-307.000										1646
	4												1.00	1647
		65												1648
	4												1.00	1649
		74												1650
	4												1.00	1651
				-347.764		25.080								1652
		80												1653
	4												1.00	1654
				-361.304		25.000								1655
		75												1656
	4												1.00	1657
				-362.304		26.000								1658
						29.000								1659
				-364.637				180.00						1660
115						25.000								1661
		74												1662
				-303.805		26.017								1663
				-286.000										1664
	4												1.00	1665
				-293.000										1666
								359.99	180.000					1667
				-298.500										1668
		64												1669
	4												5.00	1670
		75												1671
				-307.000										1672
	4												1.00	1673
		65												1674
	4												1.00	1675
		74												1676
	4												1.00	1677
				-351.097		25.070								1678

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		80												1679
	4												1.00	1680
				-364.637		25.000								1681
		75												1682
	4												1.00	1683
				-365.637		26.000								1684
						29.000								1685
				-367.970				180.00						1686
116						25.000								1687
		74												1688
				-303.805		26.026								1689
				-286.000										1690
	4												1.00	1691
				-293.000										1692
								359.99	0.000					1693
				-298.500										1694
		64												1695
	4												5.00	1696
		75												1697
				-307.000										1698
	4												1.00	1699
		65												1700
	4												1.00	1701
		74												1702
	4												1.00	1703
				-354.430		25.060								1704
		80												1705
	4												1.00	1706
				-367.970		25.000								1707
		75												1708
	4												1.00	1709
				-368.970		26.000								1710
						29.000								1711
				-371.303				180.00						1712
117						25.000								1713
		74												1714
				-303.805		26.035								1715
				-286.000										1716
	4												1.00	1717
				-293.000										1718
								359.99	180.000					1719
				-298.500										1720
		64												1721
	4												5.00	1722
		75												1723
				-307.000										1724
	4												1.00	1725
		65												1726

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
	4												1.00	1727
		74												1728
	4												1.00	1729
				-357.803		25.050								1730
		80												1731
	4												1.00	1732
				-371.303		25.000								1733
		75												1734
	4												1.00	1735
				-372.303		26.000								1736
						29.000								1737
				-374.636				180.00						1738
118						25.000								1739
		74												1740
				-303.805		26.044								1741
				-286.000										1742
	4												1.00	1743
				-293.000										1744
								359.99	0.000					1745
				-298.500										1746
		64												1747
	4												5.00	1748
		75												1749
				-307.000										1750
	4												1.00	1751
		65												1752
	4												1.00	1753
		74												1754
	4												1.00	1755
				-360.096		25.040								1756
		80												1757
	4												1.00	1758
				-374.636		25.000								1759
		75												1760
	4												1.00	1761
				-375.636		26.000								1762
						29.000								1763
				-377.969				180.00						1764
119						25.000								1765
		74												1766
				-303.805		26.053								1767
				-286.000										1768
	4												1.00	1769
				-293.000										1770

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		75												1775
				-307.000										1776
	4												1.00	1777
		65												1778
	4												1.00	1779
		74												1780
	4												1.00	1781
				-364.429		25.035								1782
		80												1783
	4												1.00	1784
				-377.969		25.000								1785
		75												1786
	4												1.00	1787
				-378.969		26.000								1788
						29.000								1789
				-381.302				180.00						1790
120						25.000								1791
		74												1792
				-303.805		26.062								1793
				-286.000										1794
	4												1.00	1795
				-293.000										1796
								359.99	0.000					1797
				-298.500										1798
		64												1799
	4												5.00	1800
		75												1801
				-307.000										1802
	4												1.00	1803
		63												1804
	4												1.00	1805
		74												1806
	4												1.00	1807
				-367.762		25.030								1808
		80												1809
	4												1.00	1810
				-381.302		25.000								1811
		75												1812
	4												1.00	1813
				-382.302		26.000								1814
						29.000								1815
				-384.635				180.00						1816
121						25.000								1817
		74												1818

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
								359.99	180.000					1823
				-298.500										1824
		64												1825
	4												5.00	1826
		75												1827
				-307.000										1828
	4												1.00	1829
		65												1830
	4												1.00	1831
		74												1832
	4												1.00	1833
				-371.095		25.025								1834
		80												1835
	4												1.00	1836
				-384.635		25.000								1837
		75												1838
	4												1.00	1839
				-385.635		26.000								1840
						29.000								1841
				-387.968				180.00						1842
122						25.000								1843
		74												1844
				-303.805		26.080								1845
				-286.000										1846
	4												1.00	1847
				-293.000										1848
								359.99	0.000					1849
				-298.500										1850
		64												1851
	4												5.00	1852
		75												1853
				-307.000										1854
	4												1.00	1855
		65												1856
	4												1.00	1857
		74												1858
	4												1.00	1859
				-374.428		25.020								1860
		80												1861
	4												1.00	1862
				-387.968		25.000								1863
		75												1864
	4												1.00	1865
				-388.968		26.000								1866
						29.000								1867
				-391.301				180.00						1868
123						25.000								1869
		74												1870

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-303.805		26.089								1871
				-286.000										1872
	4												1.00	1873
				-293.000										1874
								359.99	180.000					1875
				-298.500										1876
		64												1877
	4												5.00	1878
		75												1879
				-307.000										1880
	4												1.00	1881
		65												1882
	4												1.00	1883
		74												1884
	4												1.00	1885
				-377.761		25.015								1886
		80												1887
	4												1.00	1888
				-391.301		25.000								1889
		75												1890
	4												1.00	1891
				-392.301		26.000								1892
						29.000								1893
				-393.055				180.00						1894
269														
124						25.000								1895
		74												1896
				-303.805		26.098								1897
				-286.000										1898
	4												1.00	1899
				-293.000										1900
								359.99	0.000					1901
				-298.500										1902
		64												1903
	4												5.00	1904
		75												1905
				-307.000										1906
	4												1.00	1907
		65												1908
	4												1.00	1909
		74												1910
	4												1.00	1911
				-379.515		25.010								1912
		80												1913
	4												1.00	1914
				-393.055		25.000								1915
		75												1916
	4												1.00	1917
				-394.055		26.000								1918
						29.000								1919

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	********	********	********	********	********	********	********	********	********	********	
				-394.805				180.00						1920
125						25.000								1921
	74													1922
				-303.805		26.107								1923
				-286.000										1924
		4											1.00	1925
				-293.000										1926
								359.99	180.000					1927
				-298.500										1928
	64													1929
		4											5.00	1930
	75													1931
				-307.000										1932
		4											1.00	1933
	65													1934
		4											1.00	1935
	74													1936
		4											1.00	1937
				-381.265		25.005								1938
	80													1939
		4											1.00	1940
				-394.805		25.000								1941
	75													1942
		4											1.00	1943
				-395.805		26.000								1944
						29.000								1945
				-396.555				180.00						1946
126						25.000								1947
	74													1948
				-303.805		26.116								1949
				-286.000										1950
		4											1.00	1951
				-293.000										1952
								359.99	0.000					1953
				-298.500										1954
	64													1955
		4											5.00	1956
	75													1957
				-307.000										1958
		4											1.00	1959
	65													1960
		4											1.00	1961
	74													1962
		4											1.00	1963
				-383.015		25.000								1964
	80													1965
		4											1.00	1966
				-396.555		25.000								1967

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		75												1968
	4												1.00	1969
				-397.555		26.000								1970
						29.000								1971
				-398.305				180.00						1972
127						25.000								1973
		74												1974
				-303.805		26.125								1975
				-286.000										1976
	4												1.00	1977
				-293.000										1978
								359.99	180.000					1979
				-298.500										1980
		64												1981
	4												5.00	1982
		75												1983
				-307.000										1984
	4												1.00	1985
		65												1986
	4												1.00	1987
		74												1988
	4												1.00	1989
				-384.765		25.000								1990
		80												1991
	4												1.00	1992
				-398.305		25.000								1993
		75												1994
	4												1.00	1995
				-399.305		26.000								1996
						29.000								1997
				-408.305				180.00						1998
128						25.000								1999
		74												2000
				-303.805		26.134								2001
				-286.000										2002
	4												1.00	2003
				-293.000										2004
								359.99	0.000					2005
				-298.500										2006
		64												2007
	4												5.00	2008
		75												2009
				-307.000										2010
	4												1.00	2011
		65												2012
	4												1.00	2013
		74												2014
	4												1.00	2015

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-394.765		25.000								2016
		80												2017
	4												1.00	2018
				-408.305		25.000								2019
		75												2020
	4												1.00	2021
				-409.305		26.000								2022
						29.000								2023
				-408.305				180.00						2024
129						25.000								2025
		74												2026
				-303.805		26.143								2027
				-286.000										2028
	4												1.00	2029
				-293.000										2030
								359.99	180.000					2031
				-298.500										2032
		64												2033
	4												5.00	2034
		75												2035
				-307.000										2036
	4												1.00	2037
		65												2038
	4												1.00	2039
		74												2040
	4												1.00	2041
				-394.765		25.009								2042
		80												2043
	4												1.00	2044
				-408.305		25.009								2045
		75												2046
	4												1.00	2047
				-409.305		26.000								2048
						29.000								2049
				-408.305				180.00						2050
130						25.000								2051
		74												2052
				-303.805		26.152								2053
				-286.000										2054
	4												1.00	2055
				-293.000										2056
								359.99	0.000					2057
				-298.500										2058
		64												2059
	4												5.00	2060
		75												2061
				-307.000										2062
	4												1.00	2063

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		65												2064
	4												1.00	2065
		74												2066
	4												1.00	2067
				-394.765		25.018								2068
		80												2069
	4												1.00	2070
				-408.305		25.018								2071
		75												2072
	4												1.00	2073
				-409.305		26.000								2074
						29.000								2075
				-408.305				180.00						2076
131						25.000								2077
		74												2078
				-303.805		26.161								2079
				-286.000										2080
	4												1.00	2081
				-293.000										2082
								359.99	180.000					2083
				-298.500										2084
		64												2085
	4												5.00	2086
		75												2087
				-307.000										2088
	4												1.00	2089
		65												2090
	4												1.00	2091
		74												2092
	4												1.00	2093
				-394.765		25.027								2094
		80												2095
	4												1.00	2096
				-408.305		25.027								2097
		75												2098
	4												1.00	2099
				-409.305		26.000								2100
						29.000								2101
				-408.305				180.00						2102
132						25.000								2103
		74												2104
				-303.805		26.170								2105
				-286.000										2106
	4												1.00	2107
				-293.000										2108
								359.99	0.000					2109
				-298.500										2110
		64												2111

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-394.765		25.000								2016
		80												2017
	4												1.00	2018
				-408.305		25.000								2019
		75												2020
	4												1.00	2021
				-409.305		26.000								2022
						29.000								2023
				-408.305				180.00						2024
129						25.000								2025
		74												2026
				-303.805		26.143								2027
				-286.000										2028
	4												1.00	2029
				-293.000										2030
								359.99	180.000					2031
				-298.500										2032
		64												2033
	4												5.00	2034
		75												2035
				-307.000										2036
	4												1.00	2037
		65												2038
	4												1.00	2039
		74												2040
	4												1.00	2041
				-394.765		25.009								2042
		80												2043
	4												1.00	2044
				-408.305		25.009								2045
		75												2046
	4												1.00	2047
				-409.305		26.000								2048
						29.000								2049
				-408.305				180.00						2050
130						25.000								2051
		74												2052
				-303.805		26.152								2053
				-286.000										2054
	4												1.00	2055
				-293.000										2056
								359.99	0.000					2057
				-298.500										2058
		64												2059
	4												5.00	2060
		75												2061
				-307.000										2062
	4												1.00	2063

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		65												2064
	4												1.00	2065
		74												2066
	4												1.00	2067
				-394.765		25.018								2068
		80												2069
	4												1.00	2070
				-408.305		25.018								2071
		75												2072
	4												1.00	2073
				-409.305		26.000								2074
						29.000								2075
				-408.305				180.00						2076
131						25.000								2077
		74												2078
				-303.805		26.161								2079
				-286.000										2080
	4												1.00	2081
				-293.000										2082
								359.99	180.000					2083
				-298.500										2084
		64												2085
	4												5.00	2086
		75												2087
				-307.000										2088
	4												1.00	2089
		65												2090
	4												1.00	2091
		74												2092
	4												1.00	2093
				-394.765		25.027								2094
		80												2095
	4												1.00	2096
				-408.305		25.027								2097
		75												2098
	4												1.00	2099
				-409.305		26.000								2100
						29.000								2101
				-408.305				180.00						2102
132						25.000								2103
		74												2104
				-303.805		26.170								2105
				-286.000										2106
	4												1.00	2107
				-293.000										2108
								359.99	0.000					2109
				-298.500										2110
		64												2111

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
	4												5.00	2112
		75												2113
				-307.000										2114
	4												1.00	2115
		65												2116
	4												1.00	2117
		74												2118
	4												1.00	2119
				-394.765		25.036								2120
		80												2121
	4												1.00	2122
				-408.305		25.036								2123
		75												2124
	4												1.00	2125
				-409.305		26.000								2126
						29.000								2127
				-408.305				180.00						2128
133						25.000								2129
		74												2130
				-303.805		26.179								2131
				-286.000										2132
	4												1.00	2133
				-293.000										2134
								359.99	180.000					2135
				-298.500										2136
		64												2137
	4												5.00	2138
		75												2139
				-307.000										2140
	4												1.00	2141
		65												2142
	4												1.00	2143
		74												2144
	4												1.00	2145
				-394.765		25.045								2146
		80												2147
	4												1.00	2148
				-408.305		25.045								2149
		75												2150
	4												1.00	2151
				-409.305		26.000								2152
						29.000								2153
				-408.305				180.00						2154
134						25.000								2155
		74												2156
				-303.805		26.188								2157
				-286.000										2158
	4												1.00	2159

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
				-293.000										2160
								359.99	0.000					2161
				-298.500										2162
		64												2163
	4												5.00	2164
		75												2165
				-307.000										2166
	4												1.00	2167
		65												2168
	4												1.00	2169
		74												2170
	4												1.00	2171
				-394.765		25.054								2172
		80												2173
	4												1.00	2174
				-408.305		25.054								2175
		75												2176
	4												1.00	2177
				-409.305		26.000								2178
						29.000								2179
				-408.305				180.00						2180
135						25.000								2181
		74												2182
				-303.805		26.197								2183
				-286.000										2184
	4												1.00	2185
				-293.000										2186
								359.99	180.000					2187
				-298.500										2188
		64												2189
	4												5.00	2190
		75												2191
				-307.000										2192
	4												1.00	2193
		65												2194
	4												1.00	2195
		74												2196
	4												1.00	2197
				-394.765		25.063								2198
		80												2199
	4												1.00	2200
				-408.305		25.063								2201
		75												2202
	4												1.00	2203
				-409.305		26.000								2204
						29.000								2205
				-408.305				180.00						2206

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
136						25.000								2207
		74												2208
				-303.805		26.206								2209
				-286.000										2210
	4												1.00	2211
				-293.000										2212
								359.99	0.000					2213
				-298.500										2214
		64												2215
	4												5.00	2216
		75												2217
				-307.000										2218
	4												1.00	2219
		65												2220
	4												1.00	2221
		74												2222
	4												1.00	2223
				-394.765		25.072								2224
		80												2225
	4												1.00	2226
				-408.305		25.072								2227
		73												2228
	4												1.00	2229
				-409.305		26.000								2230
						29.000								2231
				-408.305				180.00						2232
137						25.000								2233
		74												2234
				-303.805		26.215								2235
				-286.000										2236
	4												1.00	2237
				-293.000										2238
								359.99	180.000					2239
				-298.500										2240
		64												2241
	4												5.00	2242
		75												2243
				-307.000										2244
	4												1.00	2245
		65												2246
	4												1.00	2247
		74												2248
	4												1.00	2249
				-394.765		25.081								2250
		80												2251
	4												1.00	2252
				-408.305		25.081								2253
		75												2254

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
	4												1.00	2255
				-409.305		26.000								2256
						29.000								2257
				-408.305				180.00						2258
138						25.000								2259
		74												2260
				-303.805		26.224								2261
				-286.000										2262
	4												1.00	2263
				-293.000										2264
								359.99	0.000					2265
				-298.500										2266
		64												2267
	4												5.00	2268
		75												2269
				-307.000										2270
	4												1.00	2271
		65												2272
	4												1.00	2273
		74												2274
	4												1.00	2275
				-394.765		25.090								2276
		80												2277
	4												1.00	2278
				-408.305		25.090								2279
		75												2280
	4												1.00	2281
				-409.305		26.000								2282
						29.000								2283
				-408.305				180.00						2284
139						25.000								2285
		74												2286
				-303.805		26.233								2287
				-286.000										2288
	4												1.00	2289
				-293.000										2290
								359.99	180.000					2291
				-298.500										2292
		64												2293
	4												5.00	2294
		75												2295
				-307.000										2296
	4												1.00	2297
		65												2298
	4												1.00	2299
		74												2300
	4												1.00	2301
				-394.765		25.099								2302

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N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	*********	
		80												2303
	4												1.00	2304
				-408.305		25.099								2305
		75												2306
	4												1.00	2307
				-409.305		26.000								2308
						29.000								2309
				-408.305				180.00						2310
140						25.000								2311
		74												2312
				-303.805		26.242								2313
				-286.000										2314
	4												1.00	2315
				-293.000										2316
								359.99	0.000					2317
				-298.500										2318
		64												2319
	4												5.00	2320
		75												2321
				-307.000										2322
	4												1.00	2323
		65												2324
	4												1.00	2325
		74												2326
	4												1.00	2327
				-394.765		25.108								2328
		80												2329
	4												1.00	2330
				-408.305		25.108								2331
		75												2332
	4												1.00	2333
				-409.305		26.000								2334
						29.000								2335
				-408.305				180.00						2336
141						25.000								2337
		74												2338
				-303.805		26.251								2339
				-286.000										2340
	4												1.00	2341
				-293.000										2342
								359.99	180.000					2343
				-298.500										2344
		64												2345
	4												5.00	2346
		75												2347
				-307.000										2348
	4												1.00	2349
		65												2350

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
****	**	**	***	*********	*********	*********	*********	*********	*********	*********	*********	*********	**********	
	4												1.00	2353
		74												2354
	4												1.00	2355
				-394.765		25.117								2356
		80												2357
	4												1.00	2358
				-408.305		25.117								2359
		75												2360
	4												1.00	2361
				-409.305		26.000								2362
						29.000								2363
				-408.305				180.00						2364
142						25.000								2365
		74												2366
				-303.805		26.260								2367
				-286.000										2368
	4												1.00	2369
				-293.000										2370
								359.99	0.000					2371
				-298.500										2372
		64												2373
	4												5.00	2374
		75												2375
				-307.000										2376
	4												1.00	2377
		65												2378
	4												1.00	2379
		74												2380
	4												1.00	2381
				-397.765		25.126								2382
		80												2383
	4												1.00	2384
				-408.305		25.126								2385
		75												2386
	4												1.00	2387
				-409.305		26.000								2388
						29.000								2389
				-408.305				180.00						2390
143						25.000								2391
		74												2392
				-303.805		26.269								2393
				-286.000										2394
	4												1.00	2395
				-293.000										2396
								359.99	180.000					2397
				-298.500										2398
		64												2399
	4												5.00	2400

N	G	M	S	X-AXIS	Y-AXIS	Z-AXIS	A-AXIS	C-AXIS	D-AXIS	I-OFFSET	J-OFFSET	K-OFFSET	FEEDRATE	
		75												2399
				-307.000										2400
	4												1.00	2401
		65												2402
	4												1.00	2403
		74												2404
	4												1.00	2405
				-394.765		25.135								2406
		80												2407
	4												1.00	2408
				-408.305		25.135								2409
		75												2410
	4												1.00	2411
				-409.305		26.000								2412
						29.000								2413
				-408.305				180.00						2414
144						25.000								2415
		74												2416
				-303.805		26.278								2417
				-286.000										2418
	4												1.00	2419
				-293.000										2420
								359.99	0.000					2421
				-298.500										2422
		64												2423
	4												5.00	2424
		75												2425
				-307.000										2426
	4												1.00	2427
		65												2428
	4												1.00	2429
		74												2430
	4												1.00	2431
				-394.765		25.143								2432
		80												2433
	4												1.00	2434
				-408.305		25.143								2435
		75												2436
	4												1.00	2437
				-409.305		26.000								2438
						34.000								2439
								180.00						2440
					0.000									2441
				-100.000										2442
		2												2443

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